No-Build 2040 TNM Input and Output

Volkert
Nik Simonson

23 May 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: Il 47 at I-88 Interchange
RUN: AM Peak No Build IL-47

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
IL 47 north of Green Rd	24.0	point30	30	948,106.8	1,883,317.1	774.00				Average	
		point31	31	948,171.4	1,883,154.6	777.00				Average	
		point32	32	948,245.4	1,882,968.2	778.00				Average	
		point33	33	948,318.1	1,882,783.0	779.00				Average	
		point34	34	948,392.6	1,882,595.1	778.00				Average	
		point35	35	948,453.1	1,882,445.2	776.00				Average	
		point36	36	948,498.7	1,882,316.4	774.00				Average	
		point37	37	948,527.7	1,882,221.1	772.00				Average	
		point38	38	948,552.4	1,882,125.0	769.00				Average	
		point39	39	948,589.6	1,881,928.5	764.00				Average	
		point40	40	948,601.7	1,881,827.8	760.00				Average	
		point41	41	948,614.1	1,881,627.4	753.00				Average	
		point42	42	948,607.9	1,881,427.5	747.00				Average	
		point43	43	948,598.3	1,881,328.9	744.00				Average	
		point44	44	948,584.2	1,881,229.4	740.00				Average	
		point45	45	948,546.9	1,881,046.1	736.00				Average	
		point245	245	948,527.4	1,880,978.9	734.00					
I-88 EB Off Ramp	16.0	point164	164	948,034.1	1,876,059.1	749.00				Average	
		point165	165	947,997.3	1,876,055.8	749.00				Average	
		point166	166	947,847.8	1,876,066.9	745.00				Average	
		point167	167	947,745.8	1,876,072.4	741.00				Average	
		point168	168	947,676.7	1,876,084.0	739.00				Average	
		point169	169	947,557.2	1,876,123.9	735.00				Average	
		point170	170	947,515.6	1,876,141.0	734.00				Average	
		point171	171	947,407.9	1,876,209.4	732.00				Average	

		point172	172	947,319.6	1,876,270.9	731.00				Average	
		point173	173	947,178.9	1,876,375.8	731.00				Average	
		point174	174	946,772.4	1,876,673.5	729.00				Average	
		point175	175	946,490.6	1,876,881.4	729.00				Average	
		point176	176	946,367.2	1,876,984.1	729.00					
Scott Rd	24.0	point221	221	949,399.2	1,873,506.6	719.00				Average	
		point222	222	949,199.1	1,873,503.8	718.00				Average	
		point223	223	949,099.8	1,873,502.1	717.00				Average	
		point224	224	948,999.1	1,873,499.9	717.00				Average	
		point225	225	948,899.8	1,873,498.2	717.00				Average	
		point226	226	948,809.0	1,873,497.6	716.00				Average	
		point227	227	948,765.4	1,873,499.2	717.00				Average	
		point228	228	948,650.4	1,873,499.9	716.00				Average	
		point229	229	948,600.2	1,873,500.5	716.00				Average	
		point230	230	948,564.2	1,873,499.2	713.00				Average	
		point231	231	948,529.9	1,873,493.4	710.00				Average	
		point232	232	948,490.1	1,873,481.4	708.00				Average	
		point233	233	948,448.6	1,873,461.0	708.00				Average	
		point234	234	948,259.4	1,873,341.2	706.00					
IL 47 from Merrill Rd to Scott Rd	24.0	point240	240	949,399.2	1,873,506.6	719.00				Average	
		point99	99	949,475.3	1,873,266.2	719.00				Average	
		point100	100	949,523.1	1,873,071.5	716.00				Average	
		point101	101	949,560.8	1,872,875.1	713.00				Average	
		point236	236	949,579.9	1,872,735.1	712.00					
IL 47 between I-88 Ramps	24.0	point243	243	947,845.6	1,876,943.1	761.00				Average	
		point76	76	947,902.5	1,876,679.0	759.00				Average	
		point77	77	947,944.4	1,876,484.1	757.00				Average	
		point158	158	947,954.8	1,876,426.6	755.00				Average	
		point78	78	947,985.5	1,876,288.2	753.00				Average	
		point79	79	948,026.9	1,876,092.4	749.00				Average	
		point159	159	948,034.1	1,876,059.1	749.00					
IL 47 from I-88 WB OnRamp to Seavy R	24.0	point244	244	947,627.2	1,878,166.2	747.00				Average	
		point69	69	947,643.7	1,878,054.8	750.00				Average	
		point70	70	947,675.8	1,877,856.6	755.00				Average	
		point71	71	947,710.6	1,877,662.5	758.00				Average	
		point72	72	947,745.5	1,877,464.9	760.00				Average	
		point73	73	947,779.8	1,877,267.2	761.00				Average	
		point74	74	947,818.6	1,877,069.6	762.00				Average	

		point75	75	947,845.8	1,876,942.6	761.00					
I-88 from Seavy Rd to Green Rd	24.0	point246	246	948,527.4	1,880,978.9	734.00				Average	
		point46	46	948,486.3	1,880,843.1	734.00				Average	
		point47	47	948,412.1	1,880,657.4	734.00				Average	
		point48	48	948,322.6	1,880,478.4	737.00				Average	
		point49	49	948,218.5	1,880,308.9	743.00				Average	
		point50	50	948,104.2	1,880,143.9	748.00				Average	
		point119	119	947,994.3	1,879,976.9	751.00				Average	
		point54	54	947,942.4	1,879,891.6	753.00				Average	
		point55	55	947,849.1	1,879,713.9	754.00				Average	
		point56	56	947,770.9	1,879,529.8	754.00				Average	
		point57	57	947,736.2	1,879,435.6	754.00				Average	
		point58	58	947,704.8	1,879,341.1	753.00				Average	
		point59	59	947,655.2	1,879,147.5	751.00				Average	
		point60	60	947,618.7	1,878,951.6	747.00				Average	
		point63	63	947,600.4	1,878,751.1	744.00				Average	
		point64	64	947,596.4	1,878,653.1	742.00				Average	
		point65	65	947,595.3	1,878,553.0	742.00				Average	
		point66	66	947,601.5	1,878,454.6	742.00				Average	
		point67	67	947,605.4	1,878,353.6	743.00				Average	
		point68	68	947,614.8	1,878,254.0	744.00				Average	
		point157	157	947,627.2	1,878,166.2	747.00					
IL 47 from College Rd to Merrill Rd NB	24.0	point1	1	949,208.0	1,869,312.1	707.00				Average	
		point2	2	949,371.9	1,870,087.8	708.00				Average	
		point3	3	949,414.4	1,870,287.5	708.00				Average	
		point4	4	949,455.6	1,870,484.8	708.00				Average	
		point5	5	949,481.1	1,870,685.6	708.00				Average	
		point6	6	949,505.9	1,870,881.5	707.00				Average	
		point7	7	949,516.6	1,870,983.0	707.00				Average	
		point115	115	949,516.6	1,870,982.4	707.00				Average	
		point116	116	949,524.8	1,871,033.4	707.00					
IL 47 from College Rd to Merrill Rd 2Lane	24.0	point237	237	949,579.9	1,872,735.1	712.00				Average	
		point102	102	949,588.4	1,872,677.5	711.00				Average	
		point103	103	949,605.9	1,872,479.2	708.00				Average	
		point104	104	949,612.6	1,872,279.4	708.00				Average	
		point105	105	949,610.9	1,872,077.9	708.00				Average	
		point106	106	949,604.8	1,871,878.0	707.00				Average	
		point107	107	949,594.6	1,871,679.2	707.00				Average	

		point108	108	949,578.2	1,871,478.9	707.00				Average	
		point112	112	949,557.4	1,871,281.1	707.00				Average	
		point113	113	949,532.1	1,871,083.1	707.00				Average	
		point114	114	949,524.8	1,871,033.1	707.00					
IL 47 from College Rd to Merrill Rd SB	24.0	point117	117	949,524.4	1,871,033.4	707.00				Average	
		point15	15	949,511.4	1,870,985.1	707.00				Average	
		point14	14	949,490.9	1,870,887.2	707.00				Average	
		point13	13	949,445.6	1,870,693.9	708.00				Average	
		point12	12	949,400.2	1,870,489.5	708.00				Average	
		point11	11	949,358.4	1,870,302.4	708.00				Average	
		point10	10	949,312.3	1,870,100.0	707.00				Average	
		point9	9	949,160.5	1,869,424.2	707.00					
Finley Rd	24.0	point204	204	948,171.2	1,875,612.1	740.00				Average	
		point205	205	948,071.8	1,875,611.0	740.00				Average	
		point206	206	947,871.4	1,875,608.4	736.00				Average	
		point207	207	947,672.1	1,875,605.6	737.00				Average	
		point208	208	947,471.9	1,875,603.4	739.00				Average	
		point209	209	947,394.9	1,875,601.8	739.00				Average	
		point213	213	947,372.9	1,875,599.9	740.00				Average	
		point214	214	947,346.9	1,875,595.5	740.00				Average	
		point215	215	947,318.2	1,875,586.5	741.00				Average	
		point216	216	947,290.1	1,875,575.2	741.00				Average	
		point217	217	947,280.0	1,875,569.8	741.00				Average	
		point218	218	947,254.9	1,875,551.8	741.00				Average	
		point219	219	947,228.5	1,875,526.5	742.00				Average	
		point220	220	947,176.9	1,875,468.6	742.00					
Seavy Rd	24.0	point197	197	945,662.2	1,878,267.2	713.00				Average	
		point198	198	945,864.9	1,878,251.1	715.00				Average	
		point199	199	946,098.2	1,878,236.8	717.00				Average	
		point200	200	946,280.0	1,878,227.2	718.00				Average	
		point201	201	946,441.8	1,878,219.6	719.00				Average	
		point202	202	946,582.7	1,878,213.9	721.00				Average	
		point121	121	946,582.2	1,878,214.0	721.00				Average	
		point196	196	946,682.2	1,878,209.5	722.00				Average	
		point122	122	946,782.3	1,878,205.4	723.00				Average	
		point123	123	946,981.2	1,878,195.2	725.00				Average	
		point124	124	947,181.6	1,878,186.2	731.00				Average	
		point125	125	947,381.4	1,878,177.2	740.00				Average	

		point126	126	947,581.4	1,878,167.5	747.00				Average	
		point127	127	947,627.2	1,878,166.2	747.00					
Green Rd	24.0	point135	135	948,527.4	1,880,978.9	734.00				Average	
		point136	136	948,671.2	1,880,956.5	734.00				Average	
		point137	137	948,727.4	1,880,957.4	733.00				Average	
		point138	138	948,770.6	1,880,965.4	731.00				Average	
		point139	139	948,818.8	1,880,985.4	731.00				Average	
		point140	140	948,862.1	1,881,015.1	731.00				Average	
		point141	141	948,897.3	1,881,052.8	731.00				Average	
		point142	142	948,935.0	1,881,135.4	733.00				Average	
		point143	143	948,986.1	1,881,336.5	738.00				Average	
		point144	144	948,996.1	1,881,371.5	740.00				Average	
		point178	178	949,005.7	1,881,413.6	740.00				Average	
		point179	179	949,029.0	1,881,518.5	747.00				Average	
		point180	180	949,072.1	1,881,637.4	752.00				Average	
		point181	181	949,131.9	1,881,754.5	755.00				Average	
		point182	182	949,177.5	1,881,821.8	758.00				Average	
		point183	183	949,246.4	1,881,898.8	762.00				Average	
		point184	184	949,302.8	1,881,960.9	765.00				Average	
		point185	185	949,387.6	1,882,027.6	766.00				Average	
		point186	186	949,496.0	1,882,088.8	766.00				Average	
		point187	187	949,593.6	1,882,137.0	768.00				Average	
		point188	188	949,696.2	1,882,180.9	772.00				Average	
		point189	189	949,806.9	1,882,228.6	773.00					
IL 47 from Scott Rd to Finley Rd	24.0	point241	241	948,171.2	1,875,612.1	740.00				Average	
		point86	86	948,257.8	1,875,434.2	736.00				Average	
		point87	87	948,357.4	1,875,262.0	733.00				Average	
		point88	88	948,471.1	1,875,095.2	729.00				Average	
		point89	89	948,584.2	1,874,931.5	723.00				Average	
		point90	90	948,696.2	1,874,765.5	717.00				Average	
		point91	91	948,809.9	1,874,600.5	713.00				Average	
		point92	92	948,924.1	1,874,436.6	713.00				Average	
		point93	93	949,031.6	1,874,271.8	716.00				Average	
		point94	94	949,135.7	1,874,097.2	717.00				Average	
		point95	95	949,226.6	1,873,921.0	718.00				Average	
		point96	96	949,309.3	1,873,739.1	719.00				Average	
		point235	235	949,382.8	1,873,552.9	719.00				Average	
		point98	98	949,399.2	1,873,506.6	719.00					

IL 47 from Finley Rd to I-88 EB OffRamp	24.0	point242	242	948,034.1	1,876,059.1	749.00				Average	
		point80	80	948,073.0	1,875,897.0	745.00				Average	
		point84	84	948,138.0	1,875,708.9	745.00				Average	
		point85	85	948,171.2	1,875,612.1	740.00					

Volkert
Nik Simonson

23 May 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Il 47 at I-88 Interchange
RUN: AM Peak No Build IL-47

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
IL 47 north of Green Rd	point30	30	1295	55	89	55	104	55	0	0	0	0
	point31	31	1295	55	89	55	104	55	0	0	0	0
	point32	32	1295	55	89	55	104	55	0	0	0	0
	point33	33	1295	55	89	55	104	55	0	0	0	0
	point34	34	1295	55	89	55	104	55	0	0	0	0
	point35	35	1295	55	89	55	104	55	0	0	0	0
	point36	36	1295	55	89	55	104	55	0	0	0	0
	point37	37	1295	55	89	55	104	55	0	0	0	0
	point38	38	1295	55	89	55	104	55	0	0	0	0
	point39	39	1295	55	89	55	104	55	0	0	0	0
	point40	40	1295	55	89	55	104	55	0	0	0	0
	point41	41	1295	55	89	55	104	55	0	0	0	0
	point42	42	1295	55	89	55	104	55	0	0	0	0
	point43	43	1295	55	89	55	104	55	0	0	0	0
	point44	44	1295	55	89	55	104	55	0	0	0	0
	point45	45	1295	55	89	55	104	55	0	0	0	0
	point245	245										
I-88 EB Off Ramp	point164	164	370	35	25	35	25	35	0	0	0	0
	point165	165	370	35	25	35	25	35	0	0	0	0
	point166	166	370	35	25	35	25	35	0	0	0	0
	point167	167	370	35	25	35	25	35	0	0	0	0
	point168	168	370	35	25	35	25	35	0	0	0	0

	point169	169	370	35	25	35	25	35	0	0	0	0
	point170	170	370	35	25	35	25	35	0	0	0	0
	point171	171	370	35	25	35	25	35	0	0	0	0
	point172	172	370	35	25	35	25	35	0	0	0	0
	point173	173	370	35	25	35	25	35	0	0	0	0
	point174	174	370	35	25	35	25	35	0	0	0	0
	point175	175	370	35	25	35	25	35	0	0	0	0
	point176	176										
Scott Rd	point221	221	332	30	22	30	19	30	0	0	0	0
	point222	222	332	30	22	30	19	30	0	0	0	0
	point223	223	332	30	22	30	19	30	0	0	0	0
	point224	224	332	30	22	30	19	30	0	0	0	0
	point225	225	332	30	22	30	19	30	0	0	0	0
	point226	226	332	30	22	30	19	30	0	0	0	0
	point227	227	332	30	22	30	19	30	0	0	0	0
	point228	228	332	30	22	30	19	30	0	0	0	0
	point229	229	332	30	22	30	19	30	0	0	0	0
	point230	230	332	30	22	30	19	30	0	0	0	0
	point231	231	332	30	22	30	19	30	0	0	0	0
	point232	232	332	30	22	30	19	30	0	0	0	0
	point233	233	332	30	22	30	19	30	0	0	0	0
	point234	234										
IL 47 from Merrill Rd to Scott Rd	point240	240	1395	55	78	55	78	55	0	0	0	0
	point99	99	1395	55	78	55	78	55	0	0	0	0
	point100	100	1395	55	78	55	78	55	0	0	0	0
	point101	101	1395	55	78	55	78	55	0	0	0	0
	point236	236										
IL 47 between I-88 Ramps	point243	243	1364	55	93	55	93	55	0	0	0	0
	point76	76	1364	55	93	55	93	55	0	0	0	0
	point77	77	1364	55	93	55	93	55	0	0	0	0
	point158	158	1364	55	93	55	93	55	0	0	0	0
	point78	78	1364	55	93	55	93	55	0	0	0	0
	point79	79	1364	55	93	55	93	55	0	0	0	0
	point159	159										

IL 47 from I-88 WB OnRamp to Seavy R	point244	244	1380	55	93	55	78	55	0	0	0	0
	point69	69	1380	55	93	55	78	55	0	0	0	0
	point70	70	1380	55	93	55	78	55	0	0	0	0
	point71	71	1380	55	93	55	78	55	0	0	0	0
	point72	72	1380	55	93	55	78	55	0	0	0	0
	point73	73	1380	55	93	55	78	55	0	0	0	0
	point74	74	1380	55	93	55	78	55	0	0	0	0
	point75	75										
I-88 from Seavy Rd to Green Rd	point246	246	1349	55	109	55	93	55	0	0	0	0
	point46	46	1349	55	109	55	93	55	0	0	0	0
	point47	47	1349	55	109	55	93	55	0	0	0	0
	point48	48	1349	55	109	55	93	55	0	0	0	0
	point49	49	1349	55	109	55	93	55	0	0	0	0
	point50	50	1349	55	109	55	93	55	0	0	0	0
	point119	119	1349	55	109	55	93	55	0	0	0	0
	point54	54	1349	55	109	55	93	55	0	0	0	0
	point55	55	1349	55	109	55	93	55	0	0	0	0
	point56	56	1349	55	109	55	93	55	0	0	0	0
	point57	57	1349	55	109	55	93	55	0	0	0	0
	point58	58	1349	55	109	55	93	55	0	0	0	0
	point59	59	1349	55	109	55	93	55	0	0	0	0
	point60	60	1349	55	109	55	93	55	0	0	0	0
	point63	63	1349	55	109	55	93	55	0	0	0	0
	point64	64	1349	55	109	55	93	55	0	0	0	0
	point65	65	1349	55	109	55	93	55	0	0	0	0
	point66	66	1349	55	109	55	93	55	0	0	0	0
	point67	67	1349	55	109	55	93	55	0	0	0	0
	point68	68	1349	55	109	55	93	55	0	0	0	0
	point157	157										
IL 47 from College Rd to Merrill Rd NB	point1	1	416	55	29	55	44	55	0	0	0	0
	point2	2	416	55	29	55	44	55	0	0	0	0
	point3	3	416	55	29	55	44	55	0	0	0	0
	point4	4	416	55	29	55	44	55	0	0	0	0
	point5	5	416	55	29	55	44	55	0	0	0	0

	point6	6	416	55	29	55	44	55	0	0	0	0
	point7	7	416	55	29	55	44	55	0	0	0	0
	point115	115	416	55	29	55	44	55	0	0	0	0
	point116	116										
IL 47 from College Rd to Merrill Rd 2Lane	point237	237	1211	55	86	55	128	55	0	0	0	0
	point102	102	1211	55	86	55	128	55	0	0	0	0
	point103	103	1211	55	86	55	128	55	0	0	0	0
	point104	104	1211	55	86	55	128	55	0	0	0	0
	point105	105	1211	55	86	55	128	55	0	0	0	0
	point106	106	1211	55	86	55	128	55	0	0	0	0
	point107	107	1211	55	86	55	128	55	0	0	0	0
	point108	108	1211	55	86	55	128	55	0	0	0	0
	point112	112	1211	55	86	55	128	55	0	0	0	0
	point113	113	1211	55	86	55	128	55	0	0	0	0
	point114	114										
IL 47 from College Rd to Merrill Rd SB	point117	117	796	55	56	55	84	55	0	0	0	0
	point15	15	796	55	56	55	84	55	0	0	0	0
	point14	14	796	55	56	55	84	55	0	0	0	0
	point13	13	796	55	56	55	84	55	0	0	0	0
	point12	12	796	55	56	55	84	55	0	0	0	0
	point11	11	796	55	56	55	84	55	0	0	0	0
	point10	10	796	55	56	55	84	55	0	0	0	0
	point9	9										
Finley Rd	point204	204	216	35	15	35	15	35	0	0	0	0
	point205	205	216	35	15	35	15	35	0	0	0	0
	point206	206	216	35	15	35	15	35	0	0	0	0
	point207	207	216	35	15	35	15	35	0	0	0	0
	point208	208	216	35	15	35	15	35	0	0	0	0
	point209	209	216	35	15	35	15	35	0	0	0	0
	point213	213	216	35	15	35	15	35	0	0	0	0
	point214	214	216	35	15	35	15	35	0	0	0	0
	point215	215	216	35	15	35	15	35	0	0	0	0
	point216	216	216	35	15	35	15	35	0	0	0	0
	point217	217	216	35	15	35	15	35	0	0	0	0

	point218	218	216	35	15	35	15	35	0	0	0	0
	point219	219	216	35	15	35	15	35	0	0	0	0
	point220	220										
Seavy Rd	point197	197	250	35	20	35	17	35	0	0	0	0
	point198	198	250	35	20	35	17	35	0	0	0	0
	point199	199	250	35	20	35	17	35	0	0	0	0
	point200	200	250	35	20	35	17	35	0	0	0	0
	point201	201	250	35	20	35	17	35	0	0	0	0
	point202	202	250	35	20	35	17	35	0	0	0	0
	point121	121	250	35	20	35	17	35	0	0	0	0
	point196	196	250	35	20	35	17	35	0	0	0	0
	point122	122	250	35	20	35	17	35	0	0	0	0
	point123	123	250	35	20	35	17	35	0	0	0	0
	point124	124	250	35	20	35	17	35	0	0	0	0
	point125	125	250	35	20	35	17	35	0	0	0	0
	point126	126	250	35	20	35	17	35	0	0	0	0
	point127	127										
Green Rd	point135	135	191	35	13	35	15	35	0	0	0	0
	point136	136	191	35	13	35	15	35	0	0	0	0
	point137	137	191	35	13	35	15	35	0	0	0	0
	point138	138	191	35	13	35	15	35	0	0	0	0
	point139	139	191	35	13	35	15	35	0	0	0	0
	point140	140	191	35	13	35	15	35	0	0	0	0
	point141	141	191	35	13	35	15	35	0	0	0	0
	point142	142	191	35	13	35	15	35	0	0	0	0
	point143	143	191	35	13	35	15	35	0	0	0	0
	point144	144	191	35	13	35	15	35	0	0	0	0
	point178	178	191	35	13	35	15	35	0	0	0	0
	point179	179	191	35	13	35	15	35	0	0	0	0
	point180	180	191	35	13	35	15	35	0	0	0	0
	point181	181	191	35	13	35	15	35	0	0	0	0
	point182	182	191	35	13	35	15	35	0	0	0	0
	point183	183	191	35	13	35	15	35	0	0	0	0
	point184	184	191	35	13	35	15	35	0	0	0	0

	point185	185	191	35	13	35	15	35	0	0	0	0
	point186	186	191	35	13	35	15	35	0	0	0	0
	point187	187	191	35	13	35	15	35	0	0	0	0
	point188	188	191	35	13	35	15	35	0	0	0	0
	point189	189										
IL 47 from Scott Rd to Finley Rd	point241	241	1380	55	93	55	78	55	0	0	0	0
	point86	86	1380	55	93	55	78	55	0	0	0	0
	point87	87	1380	55	93	55	78	55	0	0	0	0
	point88	88	1380	55	93	55	78	55	0	0	0	0
	point89	89	1380	55	93	55	78	55	0	0	0	0
	point90	90	1380	55	93	55	78	55	0	0	0	0
	point91	91	1380	55	93	55	78	55	0	0	0	0
	point92	92	1380	55	93	55	78	55	0	0	0	0
	point93	93	1380	55	93	55	78	55	0	0	0	0
	point94	94	1380	55	93	55	78	55	0	0	0	0
	point95	95	1380	55	93	55	78	55	0	0	0	0
	point96	96	1380	55	93	55	78	55	0	0	0	0
	point235	235	1380	55	93	55	78	55	0	0	0	0
	point98	98										
IL 47 from Finley Rd to I-88 EB OffRamp	point242	242	1364	55	93	55	93	55	0	0	0	0
	point80	80	1364	55	93	55	93	55	0	0	0	0
	point84	84	1364	55	93	55	93	55	0	0	0	0
	point85	85										

Volkert
Nik Simonson

23 May 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: Il 47 at I-88 Interchange
RUN: AM Peak No Build IL-47

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 1	1	4	949,221.6	1,870,476.6	722.00	4.92	60.40	66	14.0	8.0	Y
Res 2	2	36	949,072.8	1,874,065.4	722.00	4.92	70.00	66	14.0	8.0	Y
Res 3	3	12	948,247.1	1,875,256.5	740.00	4.92	67.80	66	14.0	8.0	Y
Res 4	4	3	946,760.2	1,878,303.6	724.00	4.92	50.50	66	14.0	8.0	Y
Res 5	5	26	947,670.5	1,879,476.8	755.00	4.92	68.60	66	14.0	8.0	Y
Res 6	6	2	948,527.0	1,880,460.2	731.00	4.92	60.10	66	14.0	8.0	Y
Res 7	7	3	948,837.2	1,881,350.0	745.00	4.92	58.80	66	14.0	8.0	Y
Res 8	8	3	948,437.2	1,881,221.6	735.00	4.92	62.30	66	14.0	8.0	Y

INPUT: TERRAIN LINES

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TNM 2.5

INPUT: TERRAIN LINES
PROJECT/CONTRACT: Il 47 at I-88 Interchange
RUN: AM Peak No Build IL-47

Terrain Line Name	Points No.	Coordinates (ground) X ft	Y ft	Z ft
Terrain Line2	1	949,256.2	1,870,168.4	705.00
	2	949,281.8	1,870,266.0	709.00
	3	949,293.6	1,870,367.4	714.00
	4	949,311.9	1,870,460.6	719.00
	5	949,330.1	1,870,559.2	722.00
	6	949,353.9	1,870,658.8	721.00
	7	949,382.2	1,870,751.9	714.00
	8	949,409.6	1,870,843.4	708.00
	9	949,422.4	1,870,951.1	703.00
	10	949,433.3	1,871,050.9	700.00

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TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Il 47 at I-88 Interchange
RUN: AM Peak No Build IL-47
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 1	1	4	60.4	62.3	66	1.9	14	----	62.3	0.0	8	-8.0
Res 2	2	36	70.0	72.0	66	2.0	14	Snd Lvl	72.0	0.0	8	-8.0
Res 3	3	12	67.8	69.9	66	2.1	14	Snd Lvl	69.9	0.0	8	-8.0
Res 4	4	3	50.5	59.1	66	8.6	14	----	59.1	0.0	8	-8.0
Res 5	5	26	68.6	71.8	66	3.2	14	Snd Lvl	71.8	0.0	8	-8.0
Res 6	6	2	60.1	63.3	66	3.2	14	----	63.3	0.0	8	-8.0
Res 7	7	3	58.8	62.1	66	3.3	14	----	62.1	0.0	8	-8.0
Res 8	8	3	62.3	65.7	66	3.4	14	----	65.7	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	89	0.0	0.0	0.0
All Impacted	74	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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23 May 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: PM Peak No Build IL-47

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
IL 47 north of Green Rd	24.0	point30	30	948,106.8	1,883,317.1	774.00				Average	
		point31	31	948,171.4	1,883,154.6	777.00				Average	
		point32	32	948,245.4	1,882,968.2	778.00				Average	
		point33	33	948,318.1	1,882,783.0	779.00				Average	
		point34	34	948,392.6	1,882,595.1	778.00				Average	
		point35	35	948,453.1	1,882,445.2	776.00				Average	
		point36	36	948,498.7	1,882,316.4	774.00				Average	
		point37	37	948,527.7	1,882,221.1	772.00				Average	
		point38	38	948,552.4	1,882,125.0	769.00				Average	
		point39	39	948,589.6	1,881,928.5	764.00				Average	
		point40	40	948,601.7	1,881,827.8	760.00				Average	
		point41	41	948,614.1	1,881,627.4	753.00				Average	
		point42	42	948,607.9	1,881,427.5	747.00				Average	
		point43	43	948,598.3	1,881,328.9	744.00				Average	
		point44	44	948,584.2	1,881,229.4	740.00				Average	
		point45	45	948,546.9	1,881,046.1	736.00				Average	
		point245	245	948,527.4	1,880,978.9	734.00					
I-88 EB Off Ramp	16.0	point164	164	948,034.1	1,876,059.1	749.00				Average	
		point165	165	947,997.3	1,876,055.8	749.00				Average	
		point166	166	947,847.8	1,876,066.9	745.00				Average	
		point167	167	947,745.8	1,876,072.4	741.00				Average	
		point168	168	947,676.7	1,876,084.0	739.00				Average	
		point169	169	947,557.2	1,876,123.9	735.00				Average	
		point170	170	947,515.6	1,876,141.0	734.00				Average	
		point171	171	947,407.9	1,876,209.4	732.00				Average	

		point172	172	947,319.6	1,876,270.9	731.00				Average	
		point173	173	947,178.9	1,876,375.8	731.00				Average	
		point174	174	946,772.4	1,876,673.5	729.00				Average	
		point175	175	946,490.6	1,876,881.4	729.00				Average	
		point176	176	946,367.2	1,876,984.1	729.00					
Scott Rd	24.0	point221	221	949,399.2	1,873,506.6	719.00				Average	
		point222	222	949,199.1	1,873,503.8	718.00				Average	
		point223	223	949,099.8	1,873,502.1	717.00				Average	
		point224	224	948,999.1	1,873,499.9	717.00				Average	
		point225	225	948,899.8	1,873,498.2	717.00				Average	
		point226	226	948,809.0	1,873,497.6	716.00				Average	
		point227	227	948,765.4	1,873,499.2	717.00				Average	
		point228	228	948,650.4	1,873,499.9	716.00				Average	
		point229	229	948,600.2	1,873,500.5	716.00				Average	
		point230	230	948,564.2	1,873,499.2	713.00				Average	
		point231	231	948,529.9	1,873,493.4	710.00				Average	
		point232	232	948,490.1	1,873,481.4	708.00				Average	
		point233	233	948,448.6	1,873,461.0	708.00				Average	
		point234	234	948,259.4	1,873,341.2	706.00					
IL 47 from Merrill Rd to Scott Rd	24.0	point240	240	949,399.2	1,873,506.6	719.00				Average	
		point99	99	949,475.3	1,873,266.2	719.00				Average	
		point100	100	949,523.1	1,873,071.5	716.00				Average	
		point101	101	949,560.8	1,872,875.1	713.00				Average	
		point236	236	949,579.9	1,872,735.1	712.00					
IL 47 between the I-88 Ramps	24.0	point243	243	947,845.6	1,876,943.1	761.00				Average	
		point76	76	947,902.5	1,876,679.0	759.00				Average	
		point77	77	947,944.4	1,876,484.1	757.00				Average	
		point158	158	947,954.8	1,876,426.6	755.00				Average	
		point78	78	947,985.5	1,876,288.2	753.00				Average	
		point79	79	948,026.9	1,876,092.4	749.00				Average	
		point159	159	948,034.1	1,876,059.1	749.00					
IL 47 from I-88 WB OnRamp to Seavy R	24.0	point244	244	947,627.2	1,878,166.2	747.00				Average	
		point69	69	947,643.7	1,878,054.8	750.00				Average	
		point70	70	947,675.8	1,877,856.6	755.00				Average	
		point71	71	947,710.6	1,877,662.5	758.00				Average	
		point72	72	947,745.5	1,877,464.9	760.00				Average	
		point73	73	947,779.8	1,877,267.2	761.00				Average	
		point74	74	947,818.6	1,877,069.6	762.00				Average	

		point75	75	947,845.8	1,876,942.6	761.00					
IL 47 from Seavy Rd to Green Rd	24.0	point246	246	948,527.4	1,880,978.9	734.00				Average	
		point46	46	948,486.3	1,880,843.1	734.00				Average	
		point47	47	948,412.1	1,880,657.4	734.00				Average	
		point48	48	948,322.6	1,880,478.4	737.00				Average	
		point49	49	948,218.5	1,880,308.9	743.00				Average	
		point50	50	948,104.2	1,880,143.9	748.00				Average	
		point119	119	947,994.3	1,879,976.9	751.00				Average	
		point54	54	947,942.4	1,879,891.6	753.00				Average	
		point55	55	947,849.1	1,879,713.9	754.00				Average	
		point56	56	947,770.9	1,879,529.8	754.00				Average	
		point57	57	947,736.2	1,879,435.6	754.00				Average	
		point58	58	947,704.8	1,879,341.1	753.00				Average	
		point59	59	947,655.2	1,879,147.5	751.00				Average	
		point60	60	947,618.7	1,878,951.6	747.00				Average	
		point63	63	947,600.4	1,878,751.1	744.00				Average	
		point64	64	947,596.4	1,878,653.1	742.00				Average	
		point65	65	947,595.3	1,878,553.0	742.00				Average	
		point66	66	947,601.5	1,878,454.6	742.00				Average	
		point67	67	947,605.4	1,878,353.6	743.00				Average	
		point68	68	947,614.8	1,878,254.0	744.00				Average	
		point157	157	947,627.2	1,878,166.2	747.00					
IL 47 from College Dr to Merrill Rd NB	24.0	point1	1	949,208.0	1,869,312.1	707.00				Average	
		point2	2	949,371.9	1,870,087.8	708.00				Average	
		point3	3	949,414.4	1,870,287.5	708.00				Average	
		point4	4	949,455.6	1,870,484.8	708.00				Average	
		point5	5	949,481.1	1,870,685.6	708.00				Average	
		point6	6	949,505.9	1,870,881.5	707.00				Average	
		point7	7	949,516.6	1,870,983.0	707.00				Average	
		point115	115	949,516.6	1,870,982.4	707.00				Average	
		point116	116	949,524.8	1,871,033.4	707.00					
IL 47 from College Dr to Merrill Rd 2Lane	24.0	point237	237	949,579.9	1,872,735.1	712.00				Average	
		point102	102	949,588.4	1,872,677.5	711.00				Average	
		point103	103	949,605.9	1,872,479.2	708.00				Average	
		point104	104	949,612.6	1,872,279.4	708.00				Average	
		point105	105	949,610.9	1,872,077.9	708.00				Average	
		point106	106	949,604.8	1,871,878.0	707.00				Average	
		point107	107	949,594.6	1,871,679.2	707.00				Average	

		point108	108	949,578.2	1,871,478.9	707.00				Average	
		point112	112	949,557.4	1,871,281.1	707.00				Average	
		point113	113	949,532.1	1,871,083.1	707.00				Average	
		point114	114	949,524.8	1,871,033.1	707.00					
IL 47 from College Dr to Merrill Rd SB	24.0	point117	117	949,524.4	1,871,033.4	707.00				Average	
		point15	15	949,511.4	1,870,985.1	707.00				Average	
		point14	14	949,490.9	1,870,887.2	707.00				Average	
		point13	13	949,445.6	1,870,693.9	708.00				Average	
		point12	12	949,400.2	1,870,489.5	708.00				Average	
		point11	11	949,358.4	1,870,302.4	708.00				Average	
		point10	10	949,312.3	1,870,100.0	707.00				Average	
		point9	9	949,160.5	1,869,424.2	707.00					
Finley Rd	24.0	point204	204	948,171.2	1,875,612.1	740.00				Average	
		point205	205	948,071.8	1,875,611.0	740.00				Average	
		point206	206	947,871.4	1,875,608.4	736.00				Average	
		point207	207	947,672.1	1,875,605.6	737.00				Average	
		point208	208	947,471.9	1,875,603.4	739.00				Average	
		point209	209	947,394.9	1,875,601.8	739.00				Average	
		point213	213	947,372.9	1,875,599.9	740.00				Average	
		point214	214	947,346.9	1,875,595.5	740.00				Average	
		point215	215	947,318.2	1,875,586.5	741.00				Average	
		point216	216	947,290.1	1,875,575.2	741.00				Average	
		point217	217	947,280.0	1,875,569.8	741.00				Average	
		point218	218	947,254.9	1,875,551.8	741.00				Average	
		point219	219	947,228.5	1,875,526.5	742.00				Average	
		point220	220	947,176.9	1,875,468.6	742.00					
Seavy Rd	24.0	point197	197	945,662.2	1,878,267.2	713.00				Average	
		point198	198	945,864.9	1,878,251.1	715.00				Average	
		point199	199	946,098.2	1,878,236.8	717.00				Average	
		point200	200	946,280.0	1,878,227.2	718.00				Average	
		point201	201	946,441.8	1,878,219.6	719.00				Average	
		point202	202	946,582.7	1,878,213.9	721.00				Average	
		point121	121	946,582.2	1,878,214.0	721.00				Average	
		point196	196	946,682.2	1,878,209.5	722.00				Average	
		point122	122	946,782.3	1,878,205.4	723.00				Average	
		point123	123	946,981.2	1,878,195.2	725.00				Average	
		point124	124	947,181.6	1,878,186.2	731.00				Average	
		point125	125	947,381.4	1,878,177.2	740.00				Average	

		point126	126	947,581.4	1,878,167.5	747.00				Average	
		point127	127	947,627.2	1,878,166.2	747.00					
Green Rd	24.0	point135	135	948,527.4	1,880,978.9	734.00				Average	
		point136	136	948,671.2	1,880,956.5	734.00				Average	
		point137	137	948,727.4	1,880,957.4	733.00				Average	
		point138	138	948,770.6	1,880,965.4	731.00				Average	
		point139	139	948,818.8	1,880,985.4	731.00				Average	
		point140	140	948,862.1	1,881,015.1	731.00				Average	
		point141	141	948,897.3	1,881,052.8	731.00				Average	
		point142	142	948,935.0	1,881,135.4	733.00				Average	
		point143	143	948,986.1	1,881,336.5	738.00				Average	
		point144	144	948,996.1	1,881,371.5	740.00				Average	
		point178	178	949,005.7	1,881,413.6	740.00				Average	
		point179	179	949,029.0	1,881,518.5	747.00				Average	
		point180	180	949,072.1	1,881,637.4	752.00				Average	
		point181	181	949,131.9	1,881,754.5	755.00				Average	
		point182	182	949,177.5	1,881,821.8	758.00				Average	
		point183	183	949,246.4	1,881,898.8	762.00				Average	
		point184	184	949,302.8	1,881,960.9	765.00				Average	
		point185	185	949,387.6	1,882,027.6	766.00				Average	
		point186	186	949,496.0	1,882,088.8	766.00				Average	
		point187	187	949,593.6	1,882,137.0	768.00				Average	
		point188	188	949,696.2	1,882,180.9	772.00				Average	
		point189	189	949,806.9	1,882,228.6	773.00					
IL 47 from Scott rd to Finley Rd	24.0	point241	241	948,171.2	1,875,612.1	740.00				Average	
		point86	86	948,257.8	1,875,434.2	736.00				Average	
		point87	87	948,357.4	1,875,262.0	733.00				Average	
		point88	88	948,471.1	1,875,095.2	729.00				Average	
		point89	89	948,584.2	1,874,931.5	723.00				Average	
		point90	90	948,696.2	1,874,765.5	717.00				Average	
		point91	91	948,809.9	1,874,600.5	713.00				Average	
		point92	92	948,924.1	1,874,436.6	713.00				Average	
		point93	93	949,031.6	1,874,271.8	716.00				Average	
		point94	94	949,135.7	1,874,097.2	717.00				Average	
		point95	95	949,226.6	1,873,921.0	718.00				Average	
		point96	96	949,309.3	1,873,739.1	719.00				Average	
		point235	235	949,382.8	1,873,552.9	719.00				Average	
		point98	98	949,399.2	1,873,506.6	719.00					

IL 47 from Finley Rd to I-88 EB OffRamp	24.0	point242	242	948,034.1	1,876,059.1	749.00				Average	
		point80	80	948,073.0	1,875,897.0	745.00				Average	
		point84	84	948,138.0	1,875,708.9	745.00				Average	
		point85	85	948,171.2	1,875,612.1	740.00					

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23 May 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: PM Peak No Build IL-47

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
IL 47 north of Green Rd	point30	30	1253	55	0	0	39	55	0	0	0	0
	point31	31	1253	55	0	0	39	55	0	0	0	0
	point32	32	1253	55	0	0	39	55	0	0	0	0
	point33	33	1253	55	0	0	39	55	0	0	0	0
	point34	34	1253	55	0	0	39	55	0	0	0	0
	point35	35	1253	55	0	0	39	55	0	0	0	0
	point36	36	1253	55	0	0	39	55	0	0	0	0
	point37	37	1253	55	0	0	39	55	0	0	0	0
	point38	38	1253	55	0	0	39	55	0	0	0	0
	point39	39	1253	55	0	0	39	55	0	0	0	0
	point40	40	1253	55	0	0	39	55	0	0	0	0
	point41	41	1253	55	0	0	39	55	0	0	0	0
	point42	42	1253	55	0	0	39	55	0	0	0	0
	point43	43	1253	55	0	0	39	55	0	0	0	0
	point44	44	1253	55	0	0	39	55	0	0	0	0
	point45	45	1253	55	0	0	39	55	0	0	0	0
	point245	245										
I-88 EB Off Ramp	point164	164	495	35	11	35	21	35	0	0	0	0
	point165	165	495	35	11	35	21	35	0	0	0	0
	point166	166	495	35	11	35	21	35	0	0	0	0
	point167	167	495	35	11	35	21	35	0	0	0	0
	point168	168	495	35	11	35	21	35	0	0	0	0

	point169	169	495	35	11	35	21	35	0	0	0	0
	point170	170	495	35	11	35	21	35	0	0	0	0
	point171	171	495	35	11	35	21	35	0	0	0	0
	point172	172	495	35	11	35	21	35	0	0	0	0
	point173	173	495	35	11	35	21	35	0	0	0	0
	point174	174	495	35	11	35	21	35	0	0	0	0
	point175	175	495	35	11	35	21	35	0	0	0	0
	point176	176										
Scott Rd	point221	221	399	30	4	30	17	30	0	0	0	0
	point222	222	399	30	4	30	17	30	0	0	0	0
	point223	223	399	30	4	30	17	30	0	0	0	0
	point224	224	399	30	4	30	17	30	0	0	0	0
	point225	225	399	30	4	30	17	30	0	0	0	0
	point226	226	399	30	4	30	17	30	0	0	0	0
	point227	227	399	30	4	30	17	30	0	0	0	0
	point228	228	399	30	4	30	17	30	0	0	0	0
	point229	229	399	30	4	30	17	30	0	0	0	0
	point230	230	399	30	4	30	17	30	0	0	0	0
	point231	231	399	30	4	30	17	30	0	0	0	0
	point232	232	399	30	4	30	17	30	0	0	0	0
	point233	233	399	30	4	30	17	30	0	0	0	0
	point234	234										
IL 47 from Merrill Rd to Scott Rd	point240	240	1457	55	16	55	78	55	0	0	0	0
	point99	99	1457	55	16	55	78	55	0	0	0	0
	point100	100	1457	55	16	55	78	55	0	0	0	0
	point101	101	1457	55	16	55	78	55	0	0	0	0
	point236	236										
IL 47 between the I-88 Ramps	point243	243	1457	55	31	55	62	55	0	0	0	0
	point76	76	1457	55	31	55	62	55	0	0	0	0
	point77	77	1457	55	31	55	62	55	0	0	0	0
	point158	158	1457	55	31	55	62	55	0	0	0	0
	point78	78	1457	55	31	55	62	55	0	0	0	0
	point79	79	1457	55	31	55	62	55	0	0	0	0
	point159	159										

INPUT: TRAFFIC FOR LAeq1h Volumes **IL 47 at I 88 Interchange**

IL 47 from I-88 WB OnRamp to Seavy R	point244	244	1473	55	16	55	62	55	0	0	0	0
	point69	69	1473	55	16	55	62	55	0	0	0	0
	point70	70	1473	55	16	55	62	55	0	0	0	0
	point71	71	1473	55	16	55	62	55	0	0	0	0
	point72	72	1473	55	16	55	62	55	0	0	0	0
	point73	73	1473	55	16	55	62	55	0	0	0	0
	point74	74	1473	55	16	55	62	55	0	0	0	0
	point75	75										
IL 47 from Seavy Rd to Green Rd	point246	246	1504	55	0	0	47	55	0	0	0	0
	point46	46	1504	55	0	0	47	55	0	0	0	0
	point47	47	1504	55	0	0	47	55	0	0	0	0
	point48	48	1504	55	0	0	47	55	0	0	0	0
	point49	49	1504	55	0	0	47	55	0	0	0	0
	point50	50	1504	55	0	0	47	55	0	0	0	0
	point119	119	1504	55	0	0	47	55	0	0	0	0
	point54	54	1504	55	0	0	47	55	0	0	0	0
	point55	55	1504	55	0	0	47	55	0	0	0	0
	point56	56	1504	55	0	0	47	55	0	0	0	0
	point57	57	1504	55	0	0	47	55	0	0	0	0
	point58	58	1504	55	0	0	47	55	0	0	0	0
	point59	59	1504	55	0	0	47	55	0	0	0	0
	point60	60	1504	55	0	0	47	55	0	0	0	0
	point63	63	1504	55	0	0	47	55	0	0	0	0
	point64	64	1504	55	0	0	47	55	0	0	0	0
	point65	65	1504	55	0	0	47	55	0	0	0	0
	point66	66	1504	55	0	0	47	55	0	0	0	0
	point67	67	1504	55	0	0	47	55	0	0	0	0
	point68	68	1504	55	0	0	47	55	0	0	0	0
	point157	157										
IL 47 from College Dr to Merrill Rd NB	point1	1	661	55	14	55	28	55	0	0	0	0
	point2	2	661	55	14	55	28	55	0	0	0	0
	point3	3	661	55	14	55	28	55	0	0	0	0
	point4	4	661	55	14	55	28	55	0	0	0	0
	point5	5	661	55	14	55	28	55	0	0	0	0

	point6	6	661	55	14	55	28	55	0	0	0	0
	point7	7	661	55	14	55	28	55	0	0	0	0
	point115	115	661	55	14	55	28	55	0	0	0	0
	point116	116										
IL 47 from College Dr to Merrill Rd 2Lane	point237	237	1301	55	28	55	55	55	0	0	0	0
	point102	102	1301	55	28	55	55	55	0	0	0	0
	point103	103	1301	55	28	55	55	55	0	0	0	0
	point104	104	1301	55	28	55	55	55	0	0	0	0
	point105	105	1301	55	28	55	55	55	0	0	0	0
	point106	106	1301	55	28	55	55	55	0	0	0	0
	point107	107	1301	55	28	55	55	55	0	0	0	0
	point108	108	1301	55	28	55	55	55	0	0	0	0
	point112	112	1301	55	28	55	55	55	0	0	0	0
	point113	113	1301	55	28	55	55	55	0	0	0	0
	point114	114										
IL 47 from College Dr to Merrill Rd SB	point117	117	640	55	14	55	27	55	0	0	0	0
	point15	15	640	55	14	55	27	55	0	0	0	0
	point14	14	640	55	14	55	27	55	0	0	0	0
	point13	13	640	55	14	55	27	55	0	0	0	0
	point12	12	640	55	14	55	27	55	0	0	0	0
	point11	11	640	55	14	55	27	55	0	0	0	0
	point10	10	640	55	14	55	27	55	0	0	0	0
	point9	9										
Finley Rd	point204	204	148	35	2	35	6	35	0	0	0	0
	point205	205	148	35	2	35	6	35	0	0	0	0
	point206	206	148	35	2	35	6	35	0	0	0	0
	point207	207	148	35	2	35	6	35	0	0	0	0
	point208	208	148	35	2	35	6	35	0	0	0	0
	point209	209	148	35	2	35	6	35	0	0	0	0
	point213	213	148	35	2	35	6	35	0	0	0	0
	point214	214	148	35	2	35	6	35	0	0	0	0
	point215	215	148	35	2	35	6	35	0	0	0	0
	point216	216	148	35	2	35	6	35	0	0	0	0
	point217	217	148	35	2	35	6	35	0	0	0	0

	point218	218	148	35	2	35	6	35	0	0	0	0
	point219	219	148	35	2	35	6	35	0	0	0	0
	point220	220										
Seavy Rd	point197	197	266	35	0	0	8	35	0	0	0	0
	point198	198	266	35	0	0	8	35	0	0	0	0
	point199	199	266	35	0	0	8	35	0	0	0	0
	point200	200	266	35	0	0	8	35	0	0	0	0
	point201	201	266	35	0	0	8	35	0	0	0	0
	point202	202	266	35	0	0	8	35	0	0	0	0
	point121	121	266	35	0	0	8	35	0	0	0	0
	point196	196	266	35	0	0	8	35	0	0	0	0
	point122	122	266	35	0	0	8	35	0	0	0	0
	point123	123	266	35	0	0	8	35	0	0	0	0
	point124	124	266	35	0	0	8	35	0	0	0	0
	point125	125	266	35	0	0	8	35	0	0	0	0
	point126	126	266	35	0	0	8	35	0	0	0	0
	point127	127										
Green Rd	point135	135	316	35	0	0	10	35	0	0	0	0
	point136	136	316	35	0	0	10	35	0	0	0	0
	point137	137	316	35	0	0	10	35	0	0	0	0
	point138	138	316	35	0	0	10	35	0	0	0	0
	point139	139	316	35	0	0	10	35	0	0	0	0
	point140	140	316	35	0	0	10	35	0	0	0	0
	point141	141	316	35	0	0	10	35	0	0	0	0
	point142	142	316	35	0	0	10	35	0	0	0	0
	point143	143	316	35	0	0	10	35	0	0	0	0
	point144	144	316	35	0	0	10	35	0	0	0	0
	point178	178	316	35	0	0	10	35	0	0	0	0
	point179	179	316	35	0	0	10	35	0	0	0	0
	point180	180	316	35	0	0	10	35	0	0	0	0
	point181	181	316	35	0	0	10	35	0	0	0	0
	point182	182	316	35	0	0	10	35	0	0	0	0
	point183	183	316	35	0	0	10	35	0	0	0	0
	point184	184	316	35	0	0	10	35	0	0	0	0

	point185	185	316	35	0	0	10	35	0	0	0	0
	point186	186	316	35	0	0	10	35	0	0	0	0
	point187	187	316	35	0	0	10	35	0	0	0	0
	point188	188	316	35	0	0	10	35	0	0	0	0
	point189	189										
IL 47 from Scott rd to Finley Rd	point241	241	1457	55	31	55	62	55	0	0	0	0
	point86	86	1457	55	31	55	62	55	0	0	0	0
	point87	87	1457	55	31	55	62	55	0	0	0	0
	point88	88	1457	55	31	55	62	55	0	0	0	0
	point89	89	1457	55	31	55	62	55	0	0	0	0
	point90	90	1457	55	31	55	62	55	0	0	0	0
	point91	91	1457	55	31	55	62	55	0	0	0	0
	point92	92	1457	55	31	55	62	55	0	0	0	0
	point93	93	1457	55	31	55	62	55	0	0	0	0
	point94	94	1457	55	31	55	62	55	0	0	0	0
	point95	95	1457	55	31	55	62	55	0	0	0	0
	point96	96	1457	55	31	55	62	55	0	0	0	0
	point235	235	1457	55	31	55	62	55	0	0	0	0
	point98	98										
IL 47 from Finley Rd to I-88 EB OffRamp	point242	242	1473	55	16	55	62	55	0	0	0	0
	point80	80	1473	55	16	55	62	55	0	0	0	0
	point84	84	1473	55	16	55	62	55	0	0	0	0
	point85	85										

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23 May 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: PM Peak No Build IL-47

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 1	1	4	949,221.6	1,870,476.6	722.00	4.92	58.70	66	14.0	8.0	Y
Res 2	2	36	949,072.8	1,874,065.4	722.00	4.92	69.10	66	14.0	8.0	Y
Res 3	3	12	948,247.1	1,875,256.5	740.00	4.92	66.90	66	14.0	8.0	Y
Res 4	4	3	946,760.2	1,878,303.6	724.00	4.92	48.20	66	14.0	8.0	Y
Res 5	5	26	947,670.5	1,879,476.8	755.00	4.92	67.10	66	14.0	8.0	Y
Res 6	6	2	948,527.0	1,880,460.2	731.00	4.92	58.30	66	14.0	8.0	Y
Res 7	7	3	948,837.2	1,881,350.0	745.00	4.92	57.10	66	14.0	8.0	Y
Res 8	8	3	948,437.2	1,881,221.6	735.00	4.92	60.50	66	14.0	8.0	Y

INPUT: TERRAIN LINES

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Nik Simonson

23 May 2017
TNM 2.5

INPUT: TERRAIN LINES
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: PM Peak No Build IL-47

Terrain Line Name	Points No.	Coordinates (ground) X ft	Y ft	Z ft
Terrain Line2	1	949,256.2	1,870,168.4	705.00
	2	949,281.8	1,870,266.0	709.00
	3	949,293.6	1,870,367.4	714.00
	4	949,311.9	1,870,460.6	719.00
	5	949,330.1	1,870,559.2	722.00
	6	949,353.9	1,870,658.8	721.00
	7	949,382.2	1,870,751.9	714.00
	8	949,409.6	1,870,843.4	708.00
	9	949,422.4	1,870,951.1	703.00
	10	949,433.3	1,871,050.9	700.00

Volkert
Nik Simonson

23 May 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: PM Peak No Build IL-47
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 1	1	4	58.7	60.3	66	1.6	14	----	60.3	0.0	8	-8.0
Res 2	2	36	69.1	71.4	66	2.3	14	Snd Lvl	71.4	0.0	8	-8.0
Res 3	3	12	66.9	69.2	66	2.3	14	Snd Lvl	69.2	0.0	8	-8.0
Res 4	4	3	48.2	57.0	66	8.8	14	----	57.0	0.0	8	-8.0
Res 5	5	26	67.1	70.3	66	3.2	14	Snd Lvl	70.3	0.0	8	-8.0
Res 6	6	2	58.3	61.6	66	3.3	14	----	61.6	0.0	8	-8.0
Res 7	7	3	57.1	60.1	66	3.0	14	----	60.1	0.0	8	-8.0
Res 8	8	3	60.5	63.5	66	3.0	14	----	63.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	89	0.0	0.0	0.0
All Impacted	74	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Build Alternative 2040 TNM Input and Output

Volkert, Inc.
Nik Simonson

27 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build AM Peak

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Green Rd RT	18.0	point209	209	948,509.9	1,880,849.6	734.00				Average	
		point210	210	948,538.4	1,880,909.8	726.00				Average	
		point211	211	948,553.8	1,880,928.5	726.00				Average	
		point212	212	948,575.5	1,880,944.8	730.00				Average	
		point213	213	948,602.5	1,880,950.6	734.00				Average	
		point214	214	948,613.8	1,880,954.4	734.00				Average	
		point215	215	948,627.1	1,880,956.0	735.00				Average	
		point216	216	948,667.0	1,880,957.9	734.00					
I-88 EB OffRamp RT	34.0	point348	348	947,745.8	1,876,072.4	741.00				Average	
		point349	349	947,842.4	1,876,034.0	744.00				Average	
		point350	350	947,895.2	1,876,030.5	746.00				Average	
		point351	351	947,942.6	1,876,018.5	747.00				Average	
		point352	352	947,980.9	1,875,997.9	748.00				Average	
		point353	353	948,037.6	1,875,953.5	749.00					
I-88 EB OnRamp RT	28.0	point354	354	948,121.9	1,875,855.6	743.00				Average	
		point355	355	948,121.1	1,875,879.1	743.00				Average	
		point356	356	948,106.0	1,875,995.2	744.00				Average	
		point357	357	948,110.1	1,876,024.6	741.00				Average	
		point358	358	948,124.4	1,876,055.8	736.00				Average	
		point359	359	948,154.2	1,876,084.4	728.00					
I-88 EB OffRamp LT	12.0	point586	586	947,745.8	1,876,072.4	741.00				Average	
		point585	585	947,847.8	1,876,066.9	745.00				Average	
		point583	583	948,006.9	1,876,060.8	749.00					
Finley Rd	24.0	point596	596	948,167.4	1,875,614.8	739.00				Average	
		point597	597	948,071.8	1,875,611.0	740.00				Average	

		point598	598	947,871.4	1,875,608.4	736.00				Average	
		point599	599	947,672.1	1,875,605.6	737.00				Average	
		point600	600	947,471.9	1,875,603.4	739.00				Average	
		point601	601	947,394.9	1,875,601.8	739.00				Average	
		point602	602	947,372.9	1,875,599.9	740.00				Average	
		point603	603	947,346.9	1,875,595.5	740.00				Average	
		point604	604	947,318.3	1,875,586.5	741.00				Average	
		point605	605	947,290.1	1,875,575.2	741.00				Average	
		point606	606	947,280.0	1,875,569.8	741.00				Average	
		point607	607	947,254.9	1,875,551.8	741.00				Average	
		point608	608	947,228.5	1,875,526.5	742.00				Average	
		point609	609	947,176.9	1,875,468.6	742.00					
Scott Rd	24.0	point610	610	949,401.0	1,873,506.9	719.00				Average	
		point611	611	949,199.1	1,873,503.8	718.00				Average	
		point612	612	949,099.8	1,873,502.1	717.00				Average	
		point613	613	948,999.1	1,873,499.9	717.00				Average	
		point614	614	948,899.8	1,873,498.2	717.00				Average	
		point615	615	948,809.0	1,873,497.6	716.00				Average	
		point616	616	948,765.4	1,873,499.2	717.00				Average	
		point617	617	948,650.4	1,873,499.9	716.00				Average	
		point618	618	948,600.2	1,873,500.5	716.00				Average	
		point619	619	948,564.2	1,873,499.2	713.00				Average	
		point620	620	948,529.9	1,873,493.4	710.00				Average	
		point621	621	948,490.1	1,873,481.4	708.00				Average	
		point622	622	948,448.6	1,873,461.0	708.00				Average	
		point623	623	948,259.4	1,873,341.2	706.00					
I-88 EB OnRamp LT	24.0	point360	360	948,051.9	1,876,095.8	749.00				Average	
		point361	361	948,073.8	1,876,086.8	748.00				Average	
		point362	362	948,095.8	1,876,082.2	744.00				Average	
		point363	363	948,118.2	1,876,082.2	738.00				Average	
		point365	365	948,154.2	1,876,084.4	728.00					
Seavy Rd RT	18.0	point44	44	947,602.4	1,878,389.5	744.00				Average	
		point45	45	947,596.8	1,878,381.0	744.00				Average	
		point46	46	947,591.6	1,878,360.6	745.00				Average	
		point47	47	947,595.6	1,878,310.1	745.00				Average	
		point48	48	947,589.0	1,878,275.9	745.00				Average	
		point49	49	947,586.4	1,878,257.1	745.00				Average	
		point50	50	947,576.1	1,878,228.8	744.00				Average	

		point51	51	947,568.9	1,878,215.1	746.00				Average	
		point52	52	947,546.3	1,878,183.0	746.00				Average	
		point260	260	947,536.4	1,878,176.9	746.00				Average	
		point261	261	947,481.2	1,878,178.2	742.00				Average	
		point537	537	947,415.4	1,878,181.9	739.00				Average	
		point262	262	947,349.4	1,878,184.9	734.00				Average	
		point263	263	947,281.3	1,878,188.1	730.00				Average	
		point265	265	947,176.4	1,878,193.4	727.00				Average	
		point536	536	947,092.9	1,878,197.2	728.00				Average	
		point436	436	947,001.3	1,878,201.2	725.00				Average	
		point535	535	946,891.9	1,878,203.4	724.00				Average	
		point441	441	946,782.3	1,878,205.4	725.00					
Seavy Rd 2Lane	12.0	point574	574	946,782.3	1,878,205.4	725.00				Average	
		point573	573	946,682.3	1,878,209.5	722.00				Average	
		point571	571	946,582.1	1,878,214.0	721.00				Average	
		point570	570	946,441.8	1,878,219.6	719.00				Average	
		point569	569	946,280.0	1,878,227.2	718.00				Average	
		point568	568	946,098.2	1,878,236.8	717.00				Average	
		point567	567	945,864.8	1,878,250.6	715.00				Average	
		point566	566	945,662.2	1,878,267.2	713.00					
IL 47 from College Dr to Merrill Rd NB	44.0	point427	427	949,208.0	1,869,312.1	706.00				Average	
		point428	428	949,371.9	1,870,087.8	707.00				Average	
		point429	429	949,412.4	1,870,292.5	708.00				Average	
		point430	430	949,453.7	1,870,484.8	708.00				Average	
		point431	431	949,492.1	1,870,687.5	708.00				Average	
		point117	117	949,524.1	1,870,888.8	707.00				Average	
		point118	118	949,554.9	1,871,079.4	707.00				Average	
		point119	119	949,580.8	1,871,278.4	707.00				Average	
		point120	120	949,601.1	1,871,478.4	708.00				Average	
		point121	121	949,616.9	1,871,676.5	707.00				Average	
		point122	122	949,633.1	1,871,879.9	706.00				Average	
		point123	123	949,643.6	1,872,079.6	706.00				Average	
		point124	124	949,645.2	1,872,279.0	707.00				Average	
		point125	125	949,640.4	1,872,481.5	709.00				Average	
		point126	126	949,625.8	1,872,681.2	711.00				Average	
		point625	625	949,620.9	1,872,731.0	711.50					
IL 47 from Merrill Rd to Scott Rd NB	44.0	point627	627	949,620.9	1,872,731.0	711.50				Average	
		point127	127	949,616.1	1,872,780.9	712.00				Average	

		point128	128	949,603.5	1,872,882.1	713.00				Average	
		point129	129	949,571.1	1,873,078.2	716.00				Average	
		point130	130	949,527.3	1,873,274.8	718.00				Average	
		point131	131	949,472.6	1,873,470.0	719.00				Average	
		point632	632	949,457.2	1,873,513.4	719.50					
IL 47 from College Dr to Merrill Rd SB	44.0	point631	631	949,566.2	1,872,732.6	712.00				Average	
		point101	101	949,572.6	1,872,675.6	711.00				Average	
		point102	102	949,586.6	1,872,478.1	709.00				Average	
		point103	103	949,590.6	1,872,278.5	707.00				Average	
		point104	104	949,589.9	1,872,078.0	706.00				Average	
		point105	105	949,581.6	1,871,880.8	706.00				Average	
		point106	106	949,570.9	1,871,682.8	707.00				Average	
		point107	107	949,554.9	1,871,483.6	708.00				Average	
		point108	108	949,533.4	1,871,284.0	707.00				Average	
		point109	109	949,509.4	1,871,087.1	707.00				Average	
		point110	110	949,478.9	1,870,888.5	707.00				Average	
		point111	111	949,440.4	1,870,693.0	708.00				Average	
		point112	112	949,400.9	1,870,500.1	708.00				Average	
		point420	420	949,358.4	1,870,302.4	708.00				Average	
		point10	418	949,312.3	1,870,100.0	707.00				Average	
		point9	419	949,160.5	1,869,424.2	706.00					
IL 47 from Scott Rd to Finley Rd NB	44.0	point634	634	949,457.2	1,873,513.4	719.50				Average	
		point132	132	949,404.8	1,873,661.1	720.00				Average	
		point133	133	949,327.6	1,873,846.6	720.00				Average	
		point134	134	949,240.7	1,874,029.8	718.00				Average	
		point135	135	949,144.2	1,874,203.6	717.00				Average	
		point136	136	949,090.8	1,874,292.2	716.00				Average	
		point137	137	949,036.1	1,874,376.5	716.00				Average	
		point138	138	948,921.9	1,874,542.2	716.00				Average	
		point139	139	948,807.5	1,874,707.1	718.00				Average	
		point140	140	948,692.9	1,874,870.9	720.00				Average	
		point141	141	948,580.4	1,875,033.6	724.00				Average	
		point142	142	948,465.8	1,875,198.9	728.00				Average	
		point143	143	948,353.2	1,875,359.8	732.00				Average	
		point144	144	948,300.2	1,875,446.4	734.00				Average	
		point145	145	948,255.2	1,875,531.9	736.00				Average	
		point637	637	948,213.1	1,875,621.6	738.50					
IL 47 from Merrill Rd to Scott Rd SB	44.0	point636	636	949,401.0	1,873,506.9	719.00				Average	

		point97	97	949,420.4	1,873,452.5	719.00				Average	
		point98	98	949,474.1	1,873,264.6	718.00				Average	
		point99	99	949,517.6	1,873,068.8	716.00				Average	
		point100	100	949,550.4	1,872,873.5	713.00				Average	
		point629	629	949,566.2	1,872,732.6	712.00					
IL 47 from Scott Rd to Finley Rd SB	44.0	point639	639	948,167.4	1,875,614.8	739.00				Average	
		point80	80	948,213.4	1,875,515.9	736.00				Average	
		point81	81	948,312.2	1,875,333.4	732.00				Average	
		point82	82	948,364.6	1,875,251.8	732.00				Average	
		point84	84	948,363.9	1,875,252.6	732.00				Average	
		point85	85	948,480.1	1,875,082.6	726.00				Average	
		point86	86	948,593.0	1,874,916.9	722.00				Average	
		point87	87	948,709.9	1,874,754.1	719.00				Average	
		point88	88	948,823.8	1,874,588.4	717.00				Average	
		point89	89	948,936.3	1,874,426.6	716.00				Average	
		point90	90	948,992.0	1,874,345.9	716.00				Average	
		point91	91	949,098.1	1,874,175.5	716.00				Average	
		point92	92	949,146.1	1,874,092.4	717.00				Average	
		point93	93	949,192.6	1,874,003.0	718.00				Average	
		point94	94	949,237.8	1,873,914.2	719.00				Average	
		point95	95	949,278.7	1,873,823.1	719.00				Average	
		point96	96	949,354.1	1,873,641.8	720.00				Average	
		point635	635	949,401.0	1,873,506.9	719.00					
IL 47 from Finley Rd to I-88EB Ramps SB	44.0	point71	71	948,006.9	1,876,060.8	749.00				Average	
		point641	641	948,037.6	1,875,953.5	749.00				Average	
		point72	72	948,058.8	1,875,882.0	749.00				Average	
		point75	75	948,092.2	1,875,789.4	743.00				Average	
		point76	76	948,129.7	1,875,695.0	743.00				Average	
		point78	78	948,167.4	1,875,614.8	739.00					
IL 47 from Finley Rd to I-88EB Ramps NB	44.0	point638	638	948,213.1	1,875,621.6	738.50				Average	
		point146	146	948,173.6	1,875,713.9	741.00				Average	
		point147	147	948,138.1	1,875,805.4	743.00				Average	
		point640	640	948,121.9	1,875,855.6	743.00				Average	
		point148	148	948,078.0	1,875,992.6	747.00				Average	
		point540	540	948,051.9	1,876,095.8	749.00					
Roadway2-2	44.0	point643	643	947,602.4	1,878,389.5	744.00				Average	
		point31	31	947,605.6	1,878,344.9	772.00					
IL 47 from Seavy Rd to Green Rd NB	44.0	point644	644	947,664.4	1,878,349.9	745.00				Average	

		point165	165	947,658.4	1,878,446.2	744.00				Average	
		point166	166	947,654.3	1,878,644.4	744.00				Average	
		point167	167	947,665.2	1,878,843.8	746.00				Average	
		point168	168	947,690.0	1,879,034.5	749.00				Average	
		point169	169	947,710.2	1,879,132.5	751.00				Average	
		point170	170	947,759.3	1,879,325.4	754.00				Average	
		point171	171	947,789.8	1,879,419.2	754.00				Average	
		point172	172	947,823.4	1,879,513.6	755.00				Average	
		point173	173	947,895.2	1,879,697.2	755.00				Average	
		point174	174	947,940.8	1,879,794.9	754.00				Average	
		point175	175	948,032.4	1,879,965.6	753.00				Average	
		point176	176	948,080.8	1,880,044.9	750.00				Average	
		point177	177	948,138.8	1,880,131.5	748.00				Average	
		point178	178	948,239.8	1,880,280.2	743.00				Average	
		point179	179	948,356.9	1,880,468.8	738.00				Average	
		point180	180	948,403.6	1,880,564.9	736.00				Average	
		point181	181	948,478.4	1,880,747.8	734.00				Average	
		point182	182	948,509.9	1,880,849.6	734.00					
IL 47 from Seavy Rd to Green Rd SB 1L	32.0	point646	646	948,485.6	1,880,849.9	734.00				Average	
		point14	14	948,452.9	1,880,755.4	734.00				Average	
		point15	15	948,374.4	1,880,573.8	736.00				Average	
		point16	16	948,329.7	1,880,483.1	738.00				Average	
		point17	17	948,216.2	1,880,299.8	743.00				Average	
		point18	18	948,116.2	1,880,150.4	748.00				Average	
		point19	19	948,059.2	1,880,067.0	750.00				Average	
		point20	20	948,005.2	1,879,982.6	752.00				Average	
		point21	21	947,906.1	1,879,809.4	754.00				Average	
		point22	22	947,860.1	1,879,717.5	755.00				Average	
		point657	657	947,818.0	1,879,627.1	755.00					
IL 47 north of Green Rd NB	44.0	point645	645	948,509.9	1,880,849.6	734.00				Average	
		point184	184	948,541.6	1,880,982.8	734.00				Average	
		point654	654	948,553.8	1,881,070.6	735.00				Average	
		point185	185	948,562.7	1,881,138.9	738.00					
IL 47 north of Green Rd SB	24.0	point1	1	948,447.6	1,882,428.2	774.00				Average	
		point2	2	948,494.4	1,882,305.6	774.00				Average	
		point3	3	948,523.9	1,882,209.8	771.00				Average	
		point4	4	948,549.6	1,882,113.4	768.00				Average	
		point5	6	948,569.1	1,882,023.6	768.00				Average	

		point7	7	948,587.4	1,881,918.2	761.00				Average	
		point8	8	948,599.7	1,881,822.4	758.00				Average	
		point9	9	948,611.9	1,881,627.9	752.00				Average	
		point10	10	948,605.8	1,881,428.1	746.00				Average	
		point11	11	948,580.2	1,881,230.4	740.00				Average	
		point652	652	948,562.7	1,881,138.9	738.00					
I-88 EB OffRamp 2Lane	12.0	point595	595	946,367.3	1,876,984.1	729.00				Average	
		point594	594	946,490.6	1,876,881.4	729.00				Average	
		point593	593	946,772.4	1,876,673.5	729.00				Average	
		point592	592	947,178.9	1,876,375.8	731.00				Average	
		point591	591	947,319.6	1,876,270.9	731.00				Average	
		point590	590	947,407.9	1,876,209.4	732.00				Average	
		point589	589	947,515.6	1,876,141.0	734.00				Average	
		point588	588	947,557.3	1,876,123.9	735.00				Average	
		point587	587	947,676.7	1,876,084.0	739.00				Average	
		point647	647	947,745.8	1,876,072.4	741.00					
I-88 EB OnRamp 2Lane	24.0	point648	648	948,154.2	1,876,084.4	728.00				Average	
		point366	366	948,327.6	1,876,123.1	724.00				Average	
		point367	367	948,520.0	1,876,170.1	725.00				Average	
		point368	368	948,713.5	1,876,218.9	727.00				Average	
		point369	369	948,814.1	1,876,235.6	728.00				Average	
		point370	370	948,915.5	1,876,240.5	731.00				Average	
		point371	371	949,014.6	1,876,240.5	733.00				Average	
		point372	372	949,114.4	1,876,233.5	733.00				Average	
		point373	373	949,313.6	1,876,211.0	732.00				Average	
		point374	374	949,436.4	1,876,196.8	732.00				Average	
		point376	376	949,611.6	1,876,172.1	728.00				Average	
		point377	377	949,807.8	1,876,129.4	727.00				Average	
		point378	378	950,000.1	1,876,073.9	725.00				Average	
		point379	379	950,139.5	1,876,029.2	724.00					
IL 47 bt I-88 Ramps SB	44.0	point649	649	947,749.1	1,877,276.4	762.00				Average	
		point63	63	947,794.1	1,877,055.4	762.00				Average	
		point64	64	947,836.1	1,876,858.9	762.00				Average	
		point65	65	947,876.2	1,876,663.0	759.00				Average	
		point66	66	947,917.8	1,876,467.5	756.00				Average	
		point67	67	947,959.3	1,876,274.1	753.00				Average	
		point68	68	947,980.3	1,876,176.1	753.00				Average	
		point70	70	948,006.9	1,876,060.8	749.00					

IL 47 from I-88 WBOffRamp to Seavy NB	44.0	point650	650	947,803.4	1,877,264.2	762.00				Average	
		point159	159	947,767.6	1,877,458.2	760.00				Average	
		point160	160	947,751.8	1,877,558.2	759.00				Average	
		point161	161	947,725.5	1,877,753.5	756.00				Average	
		point162	162	947,701.9	1,877,952.5	752.00				Average	
		point163	163	947,680.2	1,878,151.4	748.00				Average	
		point538	538	947,674.7	1,878,221.1	737.00				Average	
		point164	164	947,664.4	1,878,349.9	745.00					
IL 47 bt I-88 Ramps NB	44.0	point642	642	948,051.9	1,876,095.8	749.00				Average	
		point149	149	948,028.9	1,876,187.0	751.00				Average	
		point153	153	948,008.4	1,876,285.6	753.00				Average	
		point154	154	947,967.2	1,876,478.2	756.00				Average	
		point155	155	947,925.8	1,876,673.1	759.00				Average	
		point156	156	947,883.6	1,876,870.9	761.00				Average	
		point581	581	947,866.9	1,876,962.4	761.00				Average	
		point157	157	947,848.1	1,877,066.9	762.00				Average	
		point541	541	947,837.3	1,877,115.8	762.00				Average	
		point158	158	947,803.4	1,877,264.2	762.00					
IL 47 from I-88 WBOffRamp to Seavy SB	44.0	point55	55	947,605.1	1,878,345.8	745.00				Average	
		point56	56	947,625.8	1,878,143.9	748.00				Average	
		point582	582	947,629.4	1,878,114.4	750.00				Average	
		point57	57	947,649.1	1,877,945.1	752.00				Average	
		point58	58	947,671.7	1,877,746.4	756.00				Average	
		point59	59	947,698.7	1,877,548.8	759.00				Average	
		point61	61	947,715.1	1,877,449.4	760.00				Average	
		point62	62	947,749.1	1,877,276.4	762.00					
Seavy Rd LT	24.0	point443	443	946,782.3	1,878,205.4	725.00				Average	
		point446	446	946,890.0	1,878,192.5	725.00				Average	
		point449	449	947,001.0	1,878,189.5	728.00				Average	
		point450	450	947,095.4	1,878,184.6	728.00				Average	
		point452	452	947,182.4	1,878,177.0	730.00				Average	
		point453	453	947,280.8	1,878,170.4	734.00				Average	
		point454	454	947,351.8	1,878,164.4	739.00				Average	
		point464	464	947,416.4	1,878,162.1	742.00				Average	
		point456	456	947,480.7	1,878,160.6	745.00				Average	
		point458	458	947,571.8	1,878,156.0	747.00				Average	
		point459	459	947,580.9	1,878,153.8	748.00				Average	
		point460	460	947,591.9	1,878,149.6	748.00				Average	

		point461	461	947,600.7	1,878,145.6	748.00				Average	
		point462	462	947,618.0	1,878,130.2	748.00				Average	
		point463	463	947,629.4	1,878,114.4	750.00					
IL 47 north of Green Rd SB-2	32.0	point653	653	948,562.7	1,881,138.9	738.00				Average	
		point12	12	948,536.8	1,881,043.1	736.00				Average	
		point13	13	948,485.6	1,880,849.9	734.00					
Green Rd LT-2	18.0	point655	655	948,667.0	1,880,957.9	734.00				Average	
		point205	205	948,606.9	1,880,983.2	734.00				Average	
		point206	206	948,575.9	1,881,016.9	732.00				Average	
		point207	207	948,561.4	1,881,051.6	732.00				Average	
		point208	208	948,553.8	1,881,070.6	735.00					
Green Rd 2Lane	24.0	point656	656	948,667.0	1,880,957.9	734.00				Average	
		point217	217	948,711.9	1,880,954.8	733.00				Average	
		point218	218	948,754.6	1,880,960.2	732.00				Average	
		point219	219	948,789.1	1,880,971.6	732.00				Average	
		point220	220	948,818.9	1,880,984.9	731.00				Average	
		point221	221	948,846.4	1,881,002.9	731.00				Average	
		point222	222	948,883.7	1,881,036.8	732.00				Average	
		point223	223	948,912.4	1,881,078.9	732.00				Average	
		point562	562	948,935.2	1,881,137.1	732.00				Average	
		point565	565	948,960.3	1,881,235.2	735.50				Average	
		point563	563	948,984.7	1,881,335.1	738.00				Average	
		point543	543	948,996.8	1,881,369.1	740.00				Average	
		point544	544	949,029.0	1,881,518.5	747.00				Average	
		point545	545	949,072.1	1,881,637.4	752.00				Average	
		point546	546	949,131.9	1,881,754.5	755.00				Average	
		point547	547	949,177.5	1,881,821.8	758.00				Average	
		point548	548	949,246.4	1,881,898.8	762.00				Average	
		point549	549	949,302.8	1,881,960.9	765.00				Average	
		point550	550	949,387.6	1,882,027.6	766.00				Average	
		point551	551	949,496.0	1,882,088.8	766.00				Average	
		point552	552	949,593.6	1,882,137.0	768.00				Average	
		point553	553	949,696.2	1,882,180.9	772.00				Average	
		point554	554	949,806.9	1,882,228.6	773.00					
IL 47 from Seavy Rd to Green Rd SB-2	44.0	point658	658	947,818.0	1,879,627.1	755.00				Average	
		point23	23	947,775.9	1,879,536.8	755.00				Average	
		point24	24	947,739.8	1,879,439.2	754.00				Average	
		point25	25	947,708.7	1,879,342.5	754.00				Average	

		point26	26	947,658.0	1,879,148.6	751.00				Average	
		point27	27	947,639.1	1,879,052.1	749.00				Average	
		point28	28	947,610.6	1,878,847.6	746.00				Average	
		point29	29	947,596.2	1,878,648.1	744.00				Average	
		point30	30	947,598.4	1,878,449.1	744.00				Average	
		point534	534	947,602.4	1,878,389.5	744.00					

Volkert, Inc.
Nik Simonson

27 July 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build AM Peak

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Green Rd RT	point209	209	112	35	8	35	9	35	0	0	0	0
	point210	210	112	35	8	35	9	35	0	0	0	0
	point211	211	112	35	8	35	9	35	0	0	0	0
	point212	212	112	35	8	35	9	35	0	0	0	0
	point213	213	112	35	8	35	9	35	0	0	0	0
	point214	214	112	35	8	35	9	35	0	0	0	0
	point215	215	112	35	8	35	9	35	0	0	0	0
	point216	216										
I-88 EB OffRamp RT	point348	348	185	35	13	35	13	35	0	0	0	0
	point349	349	185	35	13	35	13	35	0	0	0	0
	point350	350	185	35	13	35	13	35	0	0	0	0
	point351	351	185	35	13	35	13	35	0	0	0	0
	point352	352	185	35	13	35	13	35	0	0	0	0
	point353	353										
I-88 EB OnRamp RT	point354	354	287	35	20	35	20	35	0	0	0	0
	point355	355	287	35	20	35	20	35	0	0	0	0
	point356	356	287	35	20	35	20	35	0	0	0	0
	point357	357	287	35	20	35	20	35	0	0	0	0
	point358	358	287	35	20	35	20	35	0	0	0	0
	point359	359										
I-88 EB OffRamp LT	point586	586	185	35	13	35	13	35	0	0	0	0
	point585	585	185	35	13	35	13	35	0	0	0	0

	point583	583										
Finley Rd	point596	596	134	35	9	35	9	35	0	0	0	0
	point597	597	134	35	9	35	9	35	0	0	0	0
	point598	598	134	35	9	35	9	35	0	0	0	0
	point599	599	134	35	9	35	9	35	0	0	0	0
	point600	600	134	35	9	35	9	35	0	0	0	0
	point601	601	134	35	9	35	9	35	0	0	0	0
	point602	602	134	35	9	35	9	35	0	0	0	0
	point603	603	134	35	9	35	9	35	0	0	0	0
	point604	604	134	35	9	35	9	35	0	0	0	0
	point605	605	134	35	9	35	9	35	0	0	0	0
	point606	606	134	35	9	35	9	35	0	0	0	0
	point607	607	134	35	9	35	9	35	0	0	0	0
	point608	608	134	35	9	35	9	35	0	0	0	0
	point609	609										
Scott Rd	point610	610	457	35	31	35	26	35	0	0	0	0
	point611	611	457	35	31	35	26	35	0	0	0	0
	point612	612	457	35	31	35	26	35	0	0	0	0
	point613	613	457	35	31	35	26	35	0	0	0	0
	point614	614	457	35	31	35	26	35	0	0	0	0
	point615	615	457	35	31	35	26	35	0	0	0	0
	point616	616	457	35	31	35	26	35	0	0	0	0
	point617	617	457	35	31	35	26	35	0	0	0	0
	point618	618	457	35	31	35	26	35	0	0	0	0
	point619	619	457	35	31	35	26	35	0	0	0	0
	point620	620	457	35	31	35	26	35	0	0	0	0
	point621	621	457	35	31	35	26	35	0	0	0	0
	point622	622	457	35	31	35	26	35	0	0	0	0
	point623	623										
I-88 EB OnRamp LT	point360	360	287	35	20	35	20	35	0	0	0	0
	point361	361	287	35	20	35	20	35	0	0	0	0
	point362	362	287	35	20	35	20	35	0	0	0	0
	point363	363	287	35	20	35	20	35	0	0	0	0
	point365	365										

Seavy Rd RT	point44	44	124	35	10	35	9	35	0	0	0	0
	point45	45	124	35	10	35	9	35	0	0	0	0
	point46	46	124	35	10	35	9	35	0	0	0	0
	point47	47	124	35	10	35	9	35	0	0	0	0
	point48	48	124	35	10	35	9	35	0	0	0	0
	point49	49	124	35	10	35	9	35	0	0	0	0
	point50	50	124	35	10	35	9	35	0	0	0	0
	point51	51	124	35	10	35	9	35	0	0	0	0
	point52	52	124	35	10	35	9	35	0	0	0	0
	point260	260	124	35	10	35	9	35	0	0	0	0
	point261	261	124	35	10	35	9	35	0	0	0	0
	point537	537	124	35	10	35	9	35	0	0	0	0
	point262	262	124	35	10	35	9	35	0	0	0	0
	point263	263	124	35	10	35	9	35	0	0	0	0
	point265	265	124	35	10	35	9	35	0	0	0	0
	point536	536	124	35	10	35	9	35	0	0	0	0
	point436	436	124	35	10	35	9	35	0	0	0	0
	point535	535	124	35	10	35	9	35	0	0	0	0
	point441	441										
Seavy Rd 2Lane	point574	574	248	35	20	35	17	35	0	0	0	0
	point573	573	248	35	20	35	17	35	0	0	0	0
	point571	571	248	35	20	35	17	35	0	0	0	0
	point570	570	248	35	20	35	17	35	0	0	0	0
	point569	569	248	35	20	35	17	35	0	0	0	0
	point568	568	248	35	20	35	17	35	0	0	0	0
	point567	567	248	35	20	35	17	35	0	0	0	0
	point566	566										
IL 47 from College Dr to Merrill Rd NB	point427	427	531	55	38	55	56	55	0	0	0	0
	point428	428	531	55	38	55	56	55	0	0	0	0
	point429	429	531	55	38	55	56	55	0	0	0	0
	point430	430	531	55	38	55	56	55	0	0	0	0
	point431	431	531	55	38	55	56	55	0	0	0	0
	point117	117	531	55	38	55	56	55	0	0	0	0
	point118	118	531	55	38	55	56	55	0	0	0	0

	point119	119	531	55	38	55	56	55	0	0	0	0
	point120	120	531	55	38	55	56	55	0	0	0	0
	point121	121	531	55	38	55	56	55	0	0	0	0
	point122	122	531	55	38	55	56	55	0	0	0	0
	point123	123	531	55	38	55	56	55	0	0	0	0
	point124	124	531	55	38	55	56	55	0	0	0	0
	point125	125	531	55	38	55	56	55	0	0	0	0
	point126	126	531	55	38	55	56	55	0	0	0	0
	point625	625										
IL 47 from Merrill Rd to Scott Rd NB	point627	627	853	55	47	55	47	55	0	0	0	0
	point127	127	853	55	47	55	47	55	0	0	0	0
	point128	128	853	55	47	55	47	55	0	0	0	0
	point129	129	853	55	47	55	47	55	0	0	0	0
	point130	130	853	55	47	55	47	55	0	0	0	0
	point131	131	853	55	47	55	47	55	0	0	0	0
	point632	632										
IL 47 from College Dr to Merrill Rd SB	point631	631	900	55	64	55	95	55	0	0	0	0
	point101	101	900	55	64	55	95	55	0	0	0	0
	point102	102	900	55	64	55	95	55	0	0	0	0
	point103	103	900	55	64	55	95	55	0	0	0	0
	point104	104	900	55	64	55	95	55	0	0	0	0
	point105	105	900	55	64	55	95	55	0	0	0	0
	point106	106	900	55	64	55	95	55	0	0	0	0
	point107	107	900	55	64	55	95	55	0	0	0	0
	point108	108	900	55	64	55	95	55	0	0	0	0
	point109	109	900	55	64	55	95	55	0	0	0	0
	point110	110	900	55	64	55	95	55	0	0	0	0
	point111	111	900	55	64	55	95	55	0	0	0	0
	point112	112	900	55	64	55	95	55	0	0	0	0
	point420	420	900	55	64	55	95	55	0	0	0	0
	point10	418	900	55	64	55	95	55	0	0	0	0
	point9	419										
IL 47 from Scott Rd to Finley Rd NB	point634	634	1241	55	84	55	70	55	0	0	0	0
	point132	132	1241	55	84	55	70	55	0	0	0	0

	point133	133	1241	55	84	55	70	55	0	0	0	0
	point134	134	1241	55	84	55	70	55	0	0	0	0
	point135	135	1241	55	84	55	70	55	0	0	0	0
	point136	136	1241	55	84	55	70	55	0	0	0	0
	point137	137	1241	55	84	55	70	55	0	0	0	0
	point138	138	1241	55	84	55	70	55	0	0	0	0
	point139	139	1241	55	84	55	70	55	0	0	0	0
	point140	140	1241	55	84	55	70	55	0	0	0	0
	point141	141	1241	55	84	55	70	55	0	0	0	0
	point142	142	1241	55	84	55	70	55	0	0	0	0
	point143	143	1241	55	84	55	70	55	0	0	0	0
	point144	144	1241	55	84	55	70	55	0	0	0	0
	point145	145	1241	55	84	55	70	55	0	0	0	0
	point637	637										
IL 47 from Merrill Rd to Scott Rd SB	point636	636	1049	55	58	55	58	55	0	0	0	0
	point97	97	1049	55	58	55	58	55	0	0	0	0
	point98	98	1049	55	58	55	58	55	0	0	0	0
	point99	99	1049	55	58	55	58	55	0	0	0	0
	point100	100	1049	55	58	55	58	55	0	0	0	0
	point629	629										
IL 47 from Scott Rd to Finley Rd SB	point639	639	1113	55	75	55	63	55	0	0	0	0
	point80	80	1113	55	75	55	63	55	0	0	0	0
	point81	81	1113	55	75	55	63	55	0	0	0	0
	point82	82	1113	55	75	55	63	55	0	0	0	0
	point84	84	1113	55	75	55	63	55	0	0	0	0
	point85	85	1113	55	75	55	63	55	0	0	0	0
	point86	86	1113	55	75	55	63	55	0	0	0	0
	point87	87	1113	55	75	55	63	55	0	0	0	0
	point88	88	1113	55	75	55	63	55	0	0	0	0
	point89	89	1113	55	75	55	63	55	0	0	0	0
	point90	90	1113	55	75	55	63	55	0	0	0	0
	point91	91	1113	55	75	55	63	55	0	0	0	0
	point92	92	1113	55	75	55	63	55	0	0	0	0
	point93	93	1113	55	75	55	63	55	0	0	0	0

	point94	94	1113	55	75	55	63	55	0	0	0	0
	point95	95	1113	55	75	55	63	55	0	0	0	0
	point96	96	1113	55	75	55	63	55	0	0	0	0
	point635	635										
IL 47 from Finley Rd to I-88EB Ramps SB	point71	71	1111	55	76	55	76	55	0	0	0	0
	point641	641	1111	55	76	55	76	55	0	0	0	0
	point72	72	1111	55	76	55	76	55	0	0	0	0
	point75	75	1111	55	76	55	76	55	0	0	0	0
	point76	76	1111	55	76	55	76	55	0	0	0	0
	point78	78										
IL 47 from Finley Rd to I-88EB Ramps NB	point638	638	1287	55	88	55	88	55	0	0	0	0
	point146	146	1287	55	88	55	88	55	0	0	0	0
	point147	147	1287	55	88	55	88	55	0	0	0	0
	point640	640	1287	55	88	55	88	55	0	0	0	0
	point148	148	1287	55	88	55	88	55	0	0	0	0
	point540	540										
Roadway2-2	point643	643	0	0	0	0	0	0	0	0	0	0
	point31	31										
IL 47 from Seavy Rd to Green Rd NB	point644	644	857	55	69	55	59	55	0	0	0	0
	point165	165	857	55	69	55	59	55	0	0	0	0
	point166	166	857	55	69	55	59	55	0	0	0	0
	point167	167	857	55	69	55	59	55	0	0	0	0
	point168	168	857	55	69	55	59	55	0	0	0	0
	point169	169	857	55	69	55	59	55	0	0	0	0
	point170	170	857	55	69	55	59	55	0	0	0	0
	point171	171	857	55	69	55	59	55	0	0	0	0
	point172	172	857	55	69	55	59	55	0	0	0	0
	point173	173	857	55	69	55	59	55	0	0	0	0
	point174	174	857	55	69	55	59	55	0	0	0	0
	point175	175	857	55	69	55	59	55	0	0	0	0
	point176	176	857	55	69	55	59	55	0	0	0	0
	point177	177	857	55	69	55	59	55	0	0	0	0
	point178	178	857	55	69	55	59	55	0	0	0	0
	point179	179	857	55	69	55	59	55	0	0	0	0

	point180	180	857	55	69	55	59	55	0	0	0	0
	point181	181	857	55	69	55	59	55	0	0	0	0
	point182	182										
IL 47 from Seavy Rd to Green Rd SB 1L	point646	646	767	55	62	55	53	55	0	0	0	0
	point14	14	767	55	62	55	53	55	0	0	0	0
	point15	15	767	55	62	55	53	55	0	0	0	0
	point16	16	767	55	62	55	53	55	0	0	0	0
	point17	17	767	55	62	55	53	55	0	0	0	0
	point18	18	767	55	62	55	53	55	0	0	0	0
	point19	19	767	55	62	55	53	55	0	0	0	0
	point20	20	767	55	62	55	53	55	0	0	0	0
	point21	21	767	55	62	55	53	55	0	0	0	0
	point22	22	767	55	62	55	53	55	0	0	0	0
	point657	657										
IL 47 north of Green Rd NB	point645	645	737	55	51	55	59	55	0	0	0	0
	point184	184	737	55	51	55	59	55	0	0	0	0
	point654	654	737	55	51	55	59	55	0	0	0	0
	point185	185										
IL 47 north of Green Rd SB	point1	1	1471	55	101	55	118	55	0	0	0	0
	point2	2	1471	55	101	55	118	55	0	0	0	0
	point3	3	1471	55	101	55	118	55	0	0	0	0
	point4	4	1471	55	101	55	118	55	0	0	0	0
	point5	6	1471	55	101	55	118	55	0	0	0	0
	point7	7	1471	55	101	55	118	55	0	0	0	0
	point8	8	1471	55	101	55	118	55	0	0	0	0
	point9	9	1471	55	101	55	118	55	0	0	0	0
	point10	10	1471	55	101	55	118	55	0	0	0	0
	point11	11	1471	55	101	55	118	55	0	0	0	0
	point652	652										
I-88 EB OffRamp 2Lane	point595	595	370	35	25	35	25	35	0	0	0	0
	point594	594	370	35	25	35	25	35	0	0	0	0
	point593	593	370	35	25	35	25	35	0	0	0	0
	point592	592	370	35	25	35	25	35	0	0	0	0
	point591	591	370	35	25	35	25	35	0	0	0	0

	point590	590	370	35	25	35	25	35	0	0	0	0
	point589	589	370	35	25	35	25	35	0	0	0	0
	point588	588	370	35	25	35	25	35	0	0	0	0
	point587	587	370	35	25	35	25	35	0	0	0	0
	point647	647										
I-88 EB OnRamp 2Lane	point648	648	575	35	39	35	39	35	0	0	0	0
	point366	366	575	35	39	35	39	35	0	0	0	0
	point367	367	575	35	39	35	39	35	0	0	0	0
	point368	368	575	35	39	35	39	35	0	0	0	0
	point369	369	575	35	39	35	39	35	0	0	0	0
	point370	370	575	35	39	35	39	35	0	0	0	0
	point371	371	575	35	39	35	39	35	0	0	0	0
	point372	372	575	35	39	35	39	35	0	0	0	0
	point373	373	575	35	39	35	39	35	0	0	0	0
	point374	374	575	35	39	35	39	35	0	0	0	0
	point376	376	575	35	39	35	39	35	0	0	0	0
	point377	377	575	35	39	35	39	35	0	0	0	0
	point378	378	575	35	39	35	39	35	0	0	0	0
	point379	379										
IL 47 bt I-88 Ramps SB	point649	649	1103	55	75	55	75	55	0	0	0	0
	point63	63	1103	55	75	55	75	55	0	0	0	0
	point64	64	1103	55	75	55	75	55	0	0	0	0
	point65	65	1103	55	75	55	75	55	0	0	0	0
	point66	66	1103	55	75	55	75	55	0	0	0	0
	point67	67	1103	55	75	55	75	55	0	0	0	0
	point68	68	1103	55	75	55	75	55	0	0	0	0
	point70	70										
IL 47 from I-88 WBOffRamp to Seavy NB	point650	650	989	55	67	55	56	55	0	0	0	0
	point159	159	989	55	67	55	56	55	0	0	0	0
	point160	160	989	55	67	55	56	55	0	0	0	0
	point161	161	989	55	67	55	56	55	0	0	0	0
	point162	162	989	55	67	55	56	55	0	0	0	0
	point163	163	989	55	67	55	56	55	0	0	0	0
	point538	538	989	55	67	55	56	55	0	0	0	0

	point164	164										
IL 47 bt I-88 Ramps NB	point642	642	1074	55	73	55	73	55	0	0	0	0
	point149	149	1074	55	73	55	73	55	0	0	0	0
	point153	153	1074	55	73	55	73	55	0	0	0	0
	point154	154	1074	55	73	55	73	55	0	0	0	0
	point155	155	1074	55	73	55	73	55	0	0	0	0
	point156	156	1074	55	73	55	73	55	0	0	0	0
	point581	581	1074	55	73	55	73	55	0	0	0	0
	point157	157	1074	55	73	55	73	55	0	0	0	0
	point541	541	1074	55	73	55	73	55	0	0	0	0
	point158	158										
IL 47 from I-88 WBOffRamp to Seavy SB	point55	55	947	55	64	55	53	55	0	0	0	0
	point56	56	947	55	64	55	53	55	0	0	0	0
	point582	582	947	55	64	55	53	55	0	0	0	0
	point57	57	947	55	64	55	53	55	0	0	0	0
	point58	58	947	55	64	55	53	55	0	0	0	0
	point59	59	947	55	64	55	53	55	0	0	0	0
	point61	61	947	55	64	55	53	55	0	0	0	0
	point62	62										
Seavy Rd LT	point443	443	124	35	10	35	9	35	0	0	0	0
	point446	446	124	35	10	35	9	35	0	0	0	0
	point449	449	124	35	10	35	9	35	0	0	0	0
	point450	450	124	35	10	35	9	35	0	0	0	0
	point452	452	124	35	10	35	9	35	0	0	0	0
	point453	453	124	35	10	35	9	35	0	0	0	0
	point454	454	124	35	10	35	9	35	0	0	0	0
	point464	464	124	35	10	35	9	35	0	0	0	0
	point456	456	124	35	10	35	9	35	0	0	0	0
	point458	458	124	35	10	35	9	35	0	0	0	0
	point459	459	124	35	10	35	9	35	0	0	0	0
	point460	460	124	35	10	35	9	35	0	0	0	0
	point461	461	124	35	10	35	9	35	0	0	0	0
	point462	462	124	35	10	35	9	35	0	0	0	0
	point463	463										

IL 47 north of Green Rd SB-2	point653	653	734	55	51	55	59	55	0	0	0	0
	point12	12	734	55	51	55	59	55	0	0	0	0
	point13	13										
Green Rd LT-2	point655	655	112	35	8	35	9	35	0	0	0	0
	point205	205	112	35	8	35	9	35	0	0	0	0
	point206	206	112	35	8	35	9	35	0	0	0	0
	point207	207	112	35	8	35	9	35	0	0	0	0
	point208	208										
Green Rd 2Lane	point656	656	112	35	8	35	9	35	0	0	0	0
	point217	217	112	35	8	35	9	35	0	0	0	0
	point218	218	112	35	8	35	9	35	0	0	0	0
	point219	219	112	35	8	35	9	35	0	0	0	0
	point220	220	112	35	8	35	9	35	0	0	0	0
	point221	221	112	35	8	35	9	35	0	0	0	0
	point222	222	112	35	8	35	9	35	0	0	0	0
	point223	223	112	35	8	35	9	35	0	0	0	0
	point562	562	224	35	15	35	18	35	0	0	0	0
	point565	565	224	35	15	35	18	35	0	0	0	0
	point563	563	224	35	15	35	18	35	0	0	0	0
	point543	543	224	35	15	35	18	35	0	0	0	0
	point544	544	224	35	15	35	18	35	0	0	0	0
	point545	545	224	35	15	35	18	35	0	0	0	0
	point546	546	224	35	15	35	18	35	0	0	0	0
	point547	547	224	35	15	35	18	35	0	0	0	0
	point548	548	224	35	15	35	18	35	0	0	0	0
	point549	549	224	35	15	35	18	35	0	0	0	0
	point550	550	224	35	15	35	18	35	0	0	0	0
	point551	551	224	35	15	35	18	35	0	0	0	0
	point552	552	224	35	15	35	18	35	0	0	0	0
	point553	553	224	35	15	35	18	35	0	0	0	0
	point554	554										
IL 47 from Seavy Rd to Green Rd SB-2	point658	658	767	55	62	55	53	55	0	0	0	0
	point23	23	767	55	62	55	53	55	0	0	0	0
	point24	24	767	55	62	55	53	55	0	0	0	0

	point25	25	767	55	62	55	53	55	0	0	0	0
	point26	26	767	55	62	55	53	55	0	0	0	0
	point27	27	767	55	62	55	53	55	0	0	0	0
	point28	28	767	55	62	55	53	55	0	0	0	0
	point29	29	767	55	62	55	53	55	0	0	0	0
	point30	30	767	55	62	55	53	55	0	0	0	0
	point534	534										

Volkert, Inc.
Nik Simonson

27 July 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build AM Peak

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 1	2	1	949,221.6	1,870,476.6	722.00	4.92	60.40	66	14.0	8.0	Y
Res 2	3	1	949,072.8	1,874,065.4	722.00	4.92	70.00	66	14.0	8.0	Y
Res 3	4	1	948,247.1	1,875,256.5	740.00	4.92	67.80	66	14.0	8.0	Y
Res 4	5	1	946,760.2	1,878,303.6	724.00	4.92	50.50	66	14.0	8.0	Y
Res 5	6	1	947,670.5	1,879,476.8	755.00	4.92	68.60	66	14.0	8.0	Y
Res 6	7	1	948,527.0	1,880,460.2	731.00	4.92	60.10	66	14.0	8.0	Y
Res 7	8	1	948,837.2	1,881,350.0	745.00	4.92	58.80	66	14.0	8.0	Y
Res 8	9	1	948,437.2	1,881,221.6	735.00	4.92	62.30	66	14.0	8.0	Y

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27 July 2017
TNM 2.5

INPUT: TERRAIN LINES
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build AM Peak

Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Terrain Line1	1	949,256.2	1,870,168.4	705.00
	2	949,281.8	1,870,266.0	709.00
	3	949,293.6	1,870,367.4	714.00
	4	949,311.9	1,870,460.6	719.00
	5	949,330.1	1,870,559.2	722.00
	6	949,353.9	1,870,658.8	721.00
	7	949,382.2	1,870,751.9	714.00
	8	949,409.6	1,870,843.4	708.00
	9	949,422.4	1,870,951.1	703.00
	10	949,433.3	1,871,050.9	700.00

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27 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build AM Peak
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 1	2	1	60.4	65.2	66	4.8	14	----	65.2	0.0	8	-8.0
Res 2	3	1	70.0	72.4	66	2.4	14	Snd Lvl	72.4	0.0	8	-8.0
Res 3	4	1	67.8	71.5	66	3.7	14	Snd Lvl	71.5	0.0	8	-8.0
Res 4	5	1	50.5	58.0	66	7.5	14	----	58.0	0.0	8	-8.0
Res 5	6	1	68.6	71.1	66	2.5	14	Snd Lvl	71.1	0.0	8	-8.0
Res 6	7	1	60.1	65.9	66	5.8	14	----	65.9	0.0	8	-8.0
Res 7	8	1	58.8	63.2	66	4.4	14	----	63.2	0.0	8	-8.0
Res 8	9	1	62.3	66.9	66	4.6	14	Snd Lvl	66.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	8	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Volkert, Inc.
Nik Simonson

27 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build PM Peak

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Green Rd RT	18.0	point209	209	948,509.9	1,880,849.6	734.00				Average	
		point210	210	948,538.4	1,880,909.8	726.00				Average	
		point211	211	948,553.8	1,880,928.5	726.00				Average	
		point212	212	948,575.5	1,880,944.8	730.00				Average	
		point213	213	948,602.5	1,880,950.6	734.00				Average	
		point214	214	948,613.8	1,880,954.4	734.00				Average	
		point215	215	948,627.1	1,880,956.0	735.00				Average	
		point216	216	948,667.0	1,880,957.9	734.00					
I-88 EB OffRamp RT	34.0	point348	348	947,745.8	1,876,072.4	741.00				Average	
		point349	349	947,842.4	1,876,034.0	744.00				Average	
		point350	350	947,895.2	1,876,030.5	746.00				Average	
		point351	351	947,942.6	1,876,018.5	747.00				Average	
		point352	352	947,980.9	1,875,997.9	748.00				Average	
		point353	353	948,037.6	1,875,953.5	749.00					
I-88 EB OnRamp RT	28.0	point354	354	948,121.9	1,875,855.6	743.00				Average	
		point355	355	948,121.1	1,875,879.1	743.00				Average	
		point356	356	948,106.0	1,875,995.2	744.00				Average	
		point357	357	948,110.1	1,876,024.6	741.00				Average	
		point358	358	948,124.4	1,876,055.8	736.00				Average	
		point359	359	948,154.2	1,876,084.4	728.00					
I-88 EB OffRamp LT	12.0	point586	586	947,745.8	1,876,072.4	741.00				Average	
		point585	585	947,847.8	1,876,066.9	745.00				Average	
		point583	583	948,006.9	1,876,060.8	749.00					
Finley Rd	24.0	point596	596	948,167.4	1,875,614.8	739.00				Average	
		point597	597	948,071.8	1,875,611.0	740.00				Average	

		point598	598	947,871.4	1,875,608.4	736.00				Average	
		point599	599	947,672.1	1,875,605.6	737.00				Average	
		point600	600	947,471.9	1,875,603.4	739.00				Average	
		point601	601	947,394.9	1,875,601.8	739.00				Average	
		point602	602	947,372.9	1,875,599.9	740.00				Average	
		point603	603	947,346.9	1,875,595.5	740.00				Average	
		point604	604	947,318.3	1,875,586.5	741.00				Average	
		point605	605	947,290.1	1,875,575.2	741.00				Average	
		point606	606	947,280.0	1,875,569.8	741.00				Average	
		point607	607	947,254.9	1,875,551.8	741.00				Average	
		point608	608	947,228.5	1,875,526.5	742.00				Average	
		point609	609	947,176.9	1,875,468.6	742.00					
Scott Rd	24.0	point610	610	949,401.0	1,873,506.9	719.00				Average	
		point611	611	949,199.1	1,873,503.8	718.00				Average	
		point612	612	949,099.8	1,873,502.1	717.00				Average	
		point613	613	948,999.1	1,873,499.9	717.00				Average	
		point614	614	948,899.8	1,873,498.2	717.00				Average	
		point615	615	948,809.0	1,873,497.6	716.00				Average	
		point616	616	948,765.4	1,873,499.2	717.00				Average	
		point617	617	948,650.4	1,873,499.9	716.00				Average	
		point618	618	948,600.2	1,873,500.5	716.00				Average	
		point619	619	948,564.2	1,873,499.2	713.00				Average	
		point620	620	948,529.9	1,873,493.4	710.00				Average	
		point621	621	948,490.1	1,873,481.4	708.00				Average	
		point622	622	948,448.6	1,873,461.0	708.00				Average	
		point623	623	948,259.4	1,873,341.2	706.00					
I-88 EB OnRamp LT	24.0	point360	360	948,051.9	1,876,095.8	749.00				Average	
		point361	361	948,073.8	1,876,086.8	748.00				Average	
		point362	362	948,095.8	1,876,082.2	744.00				Average	
		point363	363	948,118.2	1,876,082.2	738.00				Average	
		point365	365	948,154.2	1,876,084.4	728.00					
Seavy Rd RT	18.0	point44	44	947,602.4	1,878,389.5	744.00				Average	
		point45	45	947,596.8	1,878,381.0	744.00				Average	
		point46	46	947,591.6	1,878,360.6	745.00				Average	
		point47	47	947,595.6	1,878,310.1	745.00				Average	
		point48	48	947,589.0	1,878,275.9	745.00				Average	
		point49	49	947,586.4	1,878,257.1	745.00				Average	
		point50	50	947,576.1	1,878,228.8	744.00				Average	

		point51	51	947,568.9	1,878,215.1	746.00				Average	
		point52	52	947,546.3	1,878,183.0	746.00				Average	
		point260	260	947,536.4	1,878,176.9	746.00				Average	
		point261	261	947,481.2	1,878,178.2	742.00				Average	
		point537	537	947,415.4	1,878,181.9	739.00				Average	
		point262	262	947,349.4	1,878,184.9	734.00				Average	
		point263	263	947,281.3	1,878,188.1	730.00				Average	
		point265	265	947,176.4	1,878,193.4	727.00				Average	
		point536	536	947,092.9	1,878,197.2	728.00				Average	
		point436	436	947,001.3	1,878,201.2	725.00				Average	
		point535	535	946,891.9	1,878,203.4	724.00				Average	
		point441	441	946,782.3	1,878,205.4	725.00					
Seavy Rd 2Lane	12.0	point574	574	946,782.3	1,878,205.4	725.00				Average	
		point573	573	946,682.3	1,878,209.5	722.00				Average	
		point571	571	946,582.1	1,878,214.0	721.00				Average	
		point570	570	946,441.8	1,878,219.6	719.00				Average	
		point569	569	946,280.0	1,878,227.2	718.00				Average	
		point568	568	946,098.2	1,878,236.8	717.00				Average	
		point567	567	945,864.8	1,878,250.6	715.00				Average	
		point566	566	945,662.2	1,878,267.2	713.00					
IL 47 from College Dr to Merrill Rd NB	44.0	point427	427	949,208.0	1,869,312.1	706.00				Average	
		point428	428	949,371.9	1,870,087.8	707.00				Average	
		point429	429	949,412.4	1,870,292.5	708.00				Average	
		point430	430	949,453.7	1,870,484.8	708.00				Average	
		point431	431	949,492.1	1,870,687.5	708.00				Average	
		point117	117	949,524.1	1,870,888.8	707.00				Average	
		point118	118	949,554.9	1,871,079.4	707.00				Average	
		point119	119	949,580.8	1,871,278.4	707.00				Average	
		point120	120	949,601.1	1,871,478.4	708.00				Average	
		point121	121	949,616.9	1,871,676.5	707.00				Average	
		point122	122	949,633.1	1,871,879.9	706.00				Average	
		point123	123	949,643.6	1,872,079.6	706.00				Average	
		point124	124	949,645.2	1,872,279.0	707.00				Average	
		point125	125	949,640.4	1,872,481.5	709.00				Average	
		point126	126	949,625.8	1,872,681.2	711.00				Average	
		point625	625	949,620.9	1,872,731.0	711.50					
IL 47 from Merrill Rd to Scott Rd NB	44.0	point627	627	949,620.9	1,872,731.0	711.50				Average	
		point127	127	949,616.1	1,872,780.9	712.00				Average	

		point128	128	949,603.5	1,872,882.1	713.00				Average	
		point129	129	949,571.1	1,873,078.2	716.00				Average	
		point130	130	949,527.3	1,873,274.8	718.00				Average	
		point131	131	949,472.6	1,873,470.0	719.00				Average	
		point632	632	949,457.2	1,873,513.4	719.50					
IL 47 from College Dr to Merrill Rd SB	44.0	point631	631	949,566.2	1,872,732.6	712.00				Average	
		point101	101	949,572.6	1,872,675.6	711.00				Average	
		point102	102	949,586.6	1,872,478.1	709.00				Average	
		point103	103	949,590.6	1,872,278.5	707.00				Average	
		point104	104	949,589.9	1,872,078.0	706.00				Average	
		point105	105	949,581.6	1,871,880.8	706.00				Average	
		point106	106	949,570.9	1,871,682.8	707.00				Average	
		point107	107	949,554.9	1,871,483.6	708.00				Average	
		point108	108	949,533.4	1,871,284.0	707.00				Average	
		point109	109	949,509.4	1,871,087.1	707.00				Average	
		point110	110	949,478.9	1,870,888.5	707.00				Average	
		point111	111	949,440.4	1,870,693.0	708.00				Average	
		point112	112	949,400.9	1,870,500.1	708.00				Average	
		point420	420	949,358.4	1,870,302.4	708.00				Average	
		point10	418	949,312.3	1,870,100.0	707.00				Average	
		point9	419	949,160.5	1,869,424.2	706.00					
IL 47 from Scott Rd to Finley Rd NB	44.0	point634	634	949,457.2	1,873,513.4	719.50				Average	
		point132	132	949,404.8	1,873,661.1	720.00				Average	
		point133	133	949,327.6	1,873,846.6	720.00				Average	
		point134	134	949,240.7	1,874,029.8	718.00				Average	
		point135	135	949,144.2	1,874,203.6	717.00				Average	
		point136	136	949,090.8	1,874,292.2	716.00				Average	
		point137	137	949,036.1	1,874,376.5	716.00				Average	
		point138	138	948,921.9	1,874,542.2	716.00				Average	
		point139	139	948,807.5	1,874,707.1	718.00				Average	
		point140	140	948,692.9	1,874,870.9	720.00				Average	
		point141	141	948,580.4	1,875,033.6	724.00				Average	
		point142	142	948,465.8	1,875,198.9	728.00				Average	
		point143	143	948,353.2	1,875,359.8	732.00				Average	
		point144	144	948,300.2	1,875,446.4	734.00				Average	
		point145	145	948,255.2	1,875,531.9	736.00				Average	
		point637	637	948,213.1	1,875,621.6	738.50					
IL 47 from Merrill Rd to Scott Rd SB	44.0	point636	636	949,401.0	1,873,506.9	719.00				Average	

		point97	97	949,420.4	1,873,452.5	719.00				Average	
		point98	98	949,474.1	1,873,264.6	718.00				Average	
		point99	99	949,517.6	1,873,068.8	716.00				Average	
		point100	100	949,550.4	1,872,873.5	713.00				Average	
		point629	629	949,566.2	1,872,732.6	712.00					
IL 47 from Scott Rd to Finley Rd SB	44.0	point639	639	948,167.4	1,875,614.8	739.00				Average	
		point80	80	948,213.4	1,875,515.9	736.00				Average	
		point81	81	948,312.2	1,875,333.4	732.00				Average	
		point82	82	948,364.6	1,875,251.8	732.00				Average	
		point84	84	948,363.9	1,875,252.6	732.00				Average	
		point85	85	948,480.1	1,875,082.6	726.00				Average	
		point86	86	948,593.0	1,874,916.9	722.00				Average	
		point87	87	948,709.9	1,874,754.1	719.00				Average	
		point88	88	948,823.8	1,874,588.4	717.00				Average	
		point89	89	948,936.3	1,874,426.6	716.00				Average	
		point90	90	948,992.0	1,874,345.9	716.00				Average	
		point91	91	949,098.1	1,874,175.5	716.00				Average	
		point92	92	949,146.1	1,874,092.4	717.00				Average	
		point93	93	949,192.6	1,874,003.0	718.00				Average	
		point94	94	949,237.8	1,873,914.2	719.00				Average	
		point95	95	949,278.7	1,873,823.1	719.00				Average	
		point96	96	949,354.1	1,873,641.8	720.00				Average	
		point635	635	949,401.0	1,873,506.9	719.00					
IL 47 from Finley Rd to I-88EB Ramps SB	44.0	point71	71	948,006.9	1,876,060.8	749.00				Average	
		point641	641	948,037.6	1,875,953.5	749.00				Average	
		point72	72	948,058.8	1,875,882.0	749.00				Average	
		point75	75	948,092.2	1,875,789.4	743.00				Average	
		point76	76	948,129.7	1,875,695.0	743.00				Average	
		point78	78	948,167.4	1,875,614.8	739.00					
IL 47 from Finley Rd to I-88EB Ramps NB	44.0	point638	638	948,213.1	1,875,621.6	738.50				Average	
		point146	146	948,173.6	1,875,713.9	741.00				Average	
		point147	147	948,138.1	1,875,805.4	743.00				Average	
		point640	640	948,121.9	1,875,855.6	743.00				Average	
		point148	148	948,078.0	1,875,992.6	747.00				Average	
		point540	540	948,051.9	1,876,095.8	749.00					
Roadway2-2	44.0	point643	643	947,602.4	1,878,389.5	744.00				Average	
		point31	31	947,605.6	1,878,344.9	772.00					
IL 47 from Seavy Rd to Green Rd NB	44.0	point644	644	947,664.4	1,878,349.9	745.00				Average	

		point165	165	947,658.4	1,878,446.2	744.00				Average	
		point166	166	947,654.3	1,878,644.4	744.00				Average	
		point167	167	947,665.2	1,878,843.8	746.00				Average	
		point168	168	947,690.0	1,879,034.5	749.00				Average	
		point169	169	947,710.2	1,879,132.5	751.00				Average	
		point170	170	947,759.3	1,879,325.4	754.00				Average	
		point171	171	947,789.8	1,879,419.2	754.00				Average	
		point172	172	947,823.4	1,879,513.6	755.00				Average	
		point173	173	947,895.2	1,879,697.2	755.00				Average	
		point174	174	947,940.8	1,879,794.9	754.00				Average	
		point175	175	948,032.4	1,879,965.6	753.00				Average	
		point176	176	948,080.8	1,880,044.9	750.00				Average	
		point177	177	948,138.8	1,880,131.5	748.00				Average	
		point178	178	948,239.8	1,880,280.2	743.00				Average	
		point179	179	948,356.9	1,880,468.8	738.00				Average	
		point180	180	948,403.6	1,880,564.9	736.00				Average	
		point181	181	948,478.4	1,880,747.8	734.00				Average	
		point182	182	948,509.9	1,880,849.6	734.00					
IL 47 from Seavy Rd to Green Rd SB 1L	32.0	point646	646	948,485.6	1,880,849.9	734.00				Average	
		point14	14	948,452.9	1,880,755.4	734.00				Average	
		point15	15	948,374.4	1,880,573.8	736.00				Average	
		point16	16	948,329.7	1,880,483.1	738.00				Average	
		point17	17	948,216.2	1,880,299.8	743.00				Average	
		point18	18	948,116.2	1,880,150.4	748.00				Average	
		point19	19	948,059.2	1,880,067.0	750.00				Average	
		point20	20	948,005.2	1,879,982.6	752.00				Average	
		point21	21	947,906.1	1,879,809.4	754.00				Average	
		point22	22	947,860.1	1,879,717.5	755.00				Average	
		point657	657	947,818.0	1,879,627.1	755.00					
IL 47 north of Green Rd NB	44.0	point645	645	948,509.9	1,880,849.6	734.00				Average	
		point184	184	948,541.6	1,880,982.8	734.00				Average	
		point654	654	948,553.8	1,881,070.6	735.00				Average	
		point185	185	948,562.7	1,881,138.9	738.00					
IL 47 north of Green Rd SB	24.0	point1	1	948,447.6	1,882,428.2	774.00				Average	
		point2	2	948,494.4	1,882,305.6	774.00				Average	
		point3	3	948,523.9	1,882,209.8	771.00				Average	
		point4	4	948,549.6	1,882,113.4	768.00				Average	
		point5	6	948,569.1	1,882,023.6	768.00				Average	

		point7	7	948,587.4	1,881,918.2	761.00				Average	
		point8	8	948,599.7	1,881,822.4	758.00				Average	
		point9	9	948,611.9	1,881,627.9	752.00				Average	
		point10	10	948,605.8	1,881,428.1	746.00				Average	
		point11	11	948,580.2	1,881,230.4	740.00				Average	
		point652	652	948,562.7	1,881,138.9	738.00					
I-88 EB OffRamp 2Lane	12.0	point595	595	946,367.3	1,876,984.1	729.00				Average	
		point594	594	946,490.6	1,876,881.4	729.00				Average	
		point593	593	946,772.4	1,876,673.5	729.00				Average	
		point592	592	947,178.9	1,876,375.8	731.00				Average	
		point591	591	947,319.6	1,876,270.9	731.00				Average	
		point590	590	947,407.9	1,876,209.4	732.00				Average	
		point589	589	947,515.6	1,876,141.0	734.00				Average	
		point588	588	947,557.3	1,876,123.9	735.00				Average	
		point587	587	947,676.7	1,876,084.0	739.00				Average	
		point647	647	947,745.8	1,876,072.4	741.00					
I-88 EB OnRamp 2Lane	24.0	point648	648	948,154.2	1,876,084.4	728.00				Average	
		point366	366	948,327.6	1,876,123.1	724.00				Average	
		point367	367	948,520.0	1,876,170.1	725.00				Average	
		point368	368	948,713.5	1,876,218.9	727.00				Average	
		point369	369	948,814.1	1,876,235.6	728.00				Average	
		point370	370	948,915.5	1,876,240.5	731.00				Average	
		point371	371	949,014.6	1,876,240.5	733.00				Average	
		point372	372	949,114.4	1,876,233.5	733.00				Average	
		point373	373	949,313.6	1,876,211.0	732.00				Average	
		point374	374	949,436.4	1,876,196.8	732.00				Average	
		point376	376	949,611.6	1,876,172.1	728.00				Average	
		point377	377	949,807.8	1,876,129.4	727.00				Average	
		point378	378	950,000.1	1,876,073.9	725.00				Average	
		point379	379	950,139.5	1,876,029.2	724.00					
IL 47 bt I-88 Ramps SB	44.0	point649	649	947,749.1	1,877,276.4	762.00				Average	
		point63	63	947,794.1	1,877,055.4	762.00				Average	
		point64	64	947,836.1	1,876,858.9	762.00				Average	
		point65	65	947,876.2	1,876,663.0	759.00				Average	
		point66	66	947,917.8	1,876,467.5	756.00				Average	
		point67	67	947,959.3	1,876,274.1	753.00				Average	
		point68	68	947,980.3	1,876,176.1	753.00				Average	
		point70	70	948,006.9	1,876,060.8	749.00					

IL 47 from I-88 WBOffRamp to Seavy NB	44.0	point650	650	947,803.4	1,877,264.2	762.00				Average	
		point159	159	947,767.6	1,877,458.2	760.00				Average	
		point160	160	947,751.8	1,877,558.2	759.00				Average	
		point161	161	947,725.5	1,877,753.5	756.00				Average	
		point162	162	947,701.9	1,877,952.5	752.00				Average	
		point163	163	947,680.2	1,878,151.4	748.00				Average	
		point538	538	947,674.7	1,878,221.1	737.00				Average	
		point164	164	947,664.4	1,878,349.9	745.00					
IL 47 bt I-88 Ramps NB	44.0	point642	642	948,051.9	1,876,095.8	749.00				Average	
		point149	149	948,028.9	1,876,187.0	751.00				Average	
		point153	153	948,008.4	1,876,285.6	753.00				Average	
		point154	154	947,967.2	1,876,478.2	756.00				Average	
		point155	155	947,925.8	1,876,673.1	759.00				Average	
		point156	156	947,883.6	1,876,870.9	761.00				Average	
		point581	581	947,866.9	1,876,962.4	761.00				Average	
		point157	157	947,848.1	1,877,066.9	762.00				Average	
		point541	541	947,837.3	1,877,115.8	762.00				Average	
		point158	158	947,803.4	1,877,264.2	762.00					
IL 47 from I-88 WBOffRamp to Seavy SB	44.0	point55	55	947,605.1	1,878,345.8	745.00				Average	
		point56	56	947,625.8	1,878,143.9	748.00				Average	
		point582	582	947,629.4	1,878,114.4	750.00				Average	
		point57	57	947,649.1	1,877,945.1	752.00				Average	
		point58	58	947,671.7	1,877,746.4	756.00				Average	
		point59	59	947,698.7	1,877,548.8	759.00				Average	
		point61	61	947,715.1	1,877,449.4	760.00				Average	
		point62	62	947,749.1	1,877,276.4	762.00					
Seavy Rd LT	24.0	point443	443	946,782.3	1,878,205.4	725.00				Average	
		point446	446	946,890.0	1,878,192.5	725.00				Average	
		point449	449	947,001.0	1,878,189.5	728.00				Average	
		point450	450	947,095.4	1,878,184.6	728.00				Average	
		point452	452	947,182.4	1,878,177.0	730.00				Average	
		point453	453	947,280.8	1,878,170.4	734.00				Average	
		point454	454	947,351.8	1,878,164.4	739.00				Average	
		point464	464	947,416.4	1,878,162.1	742.00				Average	
		point456	456	947,480.7	1,878,160.6	745.00				Average	
		point458	458	947,571.8	1,878,156.0	747.00				Average	
		point459	459	947,580.9	1,878,153.8	748.00				Average	
		point460	460	947,591.9	1,878,149.6	748.00				Average	

		point461	461	947,600.7	1,878,145.6	748.00				Average	
		point462	462	947,618.0	1,878,130.2	748.00				Average	
		point463	463	947,629.4	1,878,114.4	750.00					
IL 47 north of Green Rd SB-2	32.0	point653	653	948,562.7	1,881,138.9	738.00				Average	
		point12	12	948,536.8	1,881,043.1	736.00				Average	
		point13	13	948,485.6	1,880,849.9	734.00					
Green Rd LT-2	18.0	point655	655	948,667.0	1,880,957.9	734.00				Average	
		point205	205	948,606.9	1,880,983.2	734.00				Average	
		point206	206	948,575.9	1,881,016.9	732.00				Average	
		point207	207	948,561.4	1,881,051.6	732.00				Average	
		point208	208	948,553.8	1,881,070.6	735.00					
Green Rd 2Lane	24.0	point656	656	948,667.0	1,880,957.9	734.00				Average	
		point217	217	948,711.9	1,880,954.8	733.00				Average	
		point218	218	948,754.6	1,880,960.2	732.00				Average	
		point219	219	948,789.1	1,880,971.6	732.00				Average	
		point220	220	948,818.9	1,880,984.9	731.00				Average	
		point221	221	948,846.4	1,881,002.9	731.00				Average	
		point222	222	948,883.7	1,881,036.8	732.00				Average	
		point223	223	948,912.4	1,881,078.9	732.00				Average	
		point562	562	948,935.2	1,881,137.1	732.00				Average	
		point565	565	948,960.3	1,881,235.2	735.50				Average	
		point563	563	948,984.7	1,881,335.1	738.00				Average	
		point543	543	948,996.8	1,881,369.1	740.00				Average	
		point544	544	949,029.0	1,881,518.5	747.00				Average	
		point545	545	949,072.1	1,881,637.4	752.00				Average	
		point546	546	949,131.9	1,881,754.5	755.00				Average	
		point547	547	949,177.5	1,881,821.8	758.00				Average	
		point548	548	949,246.4	1,881,898.8	762.00				Average	
		point549	549	949,302.8	1,881,960.9	765.00				Average	
		point550	550	949,387.6	1,882,027.6	766.00				Average	
		point551	551	949,496.0	1,882,088.8	766.00				Average	
		point552	552	949,593.6	1,882,137.0	768.00				Average	
		point553	553	949,696.2	1,882,180.9	772.00				Average	
		point554	554	949,806.9	1,882,228.6	773.00					
IL 47 from Seavy Rd to Green Rd SB-2	44.0	point658	658	947,818.0	1,879,627.1	755.00				Average	
		point23	23	947,775.9	1,879,536.8	755.00				Average	
		point24	24	947,739.8	1,879,439.2	754.00				Average	
		point25	25	947,708.7	1,879,342.5	754.00				Average	

		point26	26	947,658.0	1,879,148.6	751.00				Average	
		point27	27	947,639.1	1,879,052.1	749.00				Average	
		point28	28	947,610.6	1,878,847.6	746.00				Average	
		point29	29	947,596.2	1,878,648.1	744.00				Average	
		point30	30	947,598.4	1,878,449.1	744.00				Average	
		point534	534	947,602.4	1,878,389.5	744.00					

Volkert, Inc.
Nik Simonson

27 July 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build PM Peak

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Green Rd RT	point209	209	182	35	0	0	6	35	0	0	0	0
	point210	210	182	35	0	0	6	35	0	0	0	0
	point211	211	182	35	0	0	6	35	0	0	0	0
	point212	212	182	35	0	0	6	35	0	0	0	0
	point213	213	182	35	0	0	6	35	0	0	0	0
	point214	214	182	35	0	0	6	35	0	0	0	0
	point215	215	182	35	0	0	6	35	0	0	0	0
	point216	216										
I-88 EB OffRamp RT	point348	348	248	35	5	35	11	35	0	0	0	0
	point349	349	248	35	5	35	11	35	0	0	0	0
	point350	350	248	35	5	35	11	35	0	0	0	0
	point351	351	248	35	5	35	11	35	0	0	0	0
	point352	352	248	35	5	35	11	35	0	0	0	0
	point353	353										
I-88 EB OnRamp RT	point354	354	197	35	4	35	8	35	0	0	0	0
	point355	355	197	35	4	35	8	35	0	0	0	0
	point356	356	197	35	4	35	8	35	0	0	0	0
	point357	357	197	35	4	35	8	35	0	0	0	0
	point358	358	197	35	4	35	8	35	0	0	0	0
	point359	359										
I-88 EB OffRamp LT	point586	586	248	35	5	35	11	35	0	0	0	0
	point585	585	248	35	5	35	11	35	0	0	0	0

	point583	583										
Finley Rd	point596	596	92	35	1	35	4	35	0	0	0	0
	point597	597	92	35	1	35	4	35	0	0	0	0
	point598	598	92	35	1	35	4	35	0	0	0	0
	point599	599	92	35	1	35	4	35	0	0	0	0
	point600	600	92	35	1	35	4	35	0	0	0	0
	point601	601	92	35	1	35	4	35	0	0	0	0
	point602	602	92	35	1	35	4	35	0	0	0	0
	point603	603	92	35	1	35	4	35	0	0	0	0
	point604	604	92	35	1	35	4	35	0	0	0	0
	point605	605	92	35	1	35	4	35	0	0	0	0
	point606	606	92	35	1	35	4	35	0	0	0	0
	point607	607	92	35	1	35	4	35	0	0	0	0
	point608	608	92	35	1	35	4	35	0	0	0	0
	point609	609										
Scott Rd	point610	610	541	35	6	35	23	35	0	0	0	0
	point611	611	541	35	6	35	23	35	0	0	0	0
	point612	612	541	35	6	35	23	35	0	0	0	0
	point613	613	541	35	6	35	23	35	0	0	0	0
	point614	614	541	35	6	35	23	35	0	0	0	0
	point615	615	541	35	6	35	23	35	0	0	0	0
	point616	616	541	35	6	35	23	35	0	0	0	0
	point617	617	541	35	6	35	23	35	0	0	0	0
	point618	618	541	35	6	35	23	35	0	0	0	0
	point619	619	541	35	6	35	23	35	0	0	0	0
	point620	620	541	35	6	35	23	35	0	0	0	0
	point621	621	541	35	6	35	23	35	0	0	0	0
	point622	622	541	35	6	35	23	35	0	0	0	0
	point623	623										
I-88 EB OnRamp LT	point360	360	197	35	4	35	8	35	0	0	0	0
	point361	361	197	35	4	35	8	35	0	0	0	0
	point362	362	197	35	4	35	8	35	0	0	0	0
	point363	363	197	35	4	35	8	35	0	0	0	0
	point365	365										

Seavy Rd RT	point44	44	131	35	0	0	4	35	0	0	0	0
	point45	45	131	35	0	0	4	35	0	0	0	0
	point46	46	131	35	0	0	4	35	0	0	0	0
	point47	47	131	35	0	0	4	35	0	0	0	0
	point48	48	131	35	0	0	4	35	0	0	0	0
	point49	49	131	35	0	0	4	35	0	0	0	0
	point50	50	131	35	0	0	4	35	0	0	0	0
	point51	51	131	35	0	0	4	35	0	0	0	0
	point52	52	131	35	0	0	4	35	0	0	0	0
	point260	260	131	35	0	0	4	35	0	0	0	0
	point261	261	131	35	0	0	4	35	0	0	0	0
	point537	537	131	35	0	0	4	35	0	0	0	0
	point262	262	131	35	0	0	4	35	0	0	0	0
	point263	263	131	35	0	0	4	35	0	0	0	0
	point265	265	131	35	0	0	4	35	0	0	0	0
	point536	536	131	35	0	0	4	35	0	0	0	0
	point436	436	131	35	0	0	4	35	0	0	0	0
	point535	535	131	35	0	0	4	35	0	0	0	0
	point441	441										
Seavy Rd 2Lane	point574	574	263	35	0	0	8	35	0	0	0	0
	point573	573	263	35	0	0	8	35	0	0	0	0
	point571	571	263	35	0	0	8	35	0	0	0	0
	point570	570	263	35	0	0	8	35	0	0	0	0
	point569	569	263	35	0	0	8	35	0	0	0	0
	point568	568	263	35	0	0	8	35	0	0	0	0
	point567	567	263	35	0	0	8	35	0	0	0	0
	point566	566										
IL 47 from College Dr to Merrill Rd NB	point427	427	725	55	15	55	31	55	0	0	0	0
	point428	428	725	55	15	55	31	55	0	0	0	0
	point429	429	725	55	15	55	31	55	0	0	0	0
	point430	430	725	55	15	55	31	55	0	0	0	0
	point431	431	725	55	15	55	31	55	0	0	0	0
	point117	117	725	55	15	55	31	55	0	0	0	0
	point118	118	725	55	15	55	31	55	0	0	0	0

	point119	119	725	55	15	55	31	55	0	0	0	0
	point120	120	725	55	15	55	31	55	0	0	0	0
	point121	121	725	55	15	55	31	55	0	0	0	0
	point122	122	725	55	15	55	31	55	0	0	0	0
	point123	123	725	55	15	55	31	55	0	0	0	0
	point124	124	725	55	15	55	31	55	0	0	0	0
	point125	125	725	55	15	55	31	55	0	0	0	0
	point126	126	725	55	15	55	31	55	0	0	0	0
	point625	625										
IL 47 from Merrill Rd to Scott Rd NB	point627	627	920	55	10	55	49	55	0	0	0	0
	point127	127	920	55	10	55	49	55	0	0	0	0
	point128	128	920	55	10	55	49	55	0	0	0	0
	point129	129	920	55	10	55	49	55	0	0	0	0
	point130	130	920	55	10	55	49	55	0	0	0	0
	point131	131	920	55	10	55	49	55	0	0	0	0
	point632	632										
IL 47 from College Dr to Merrill Rd SB	point631	631	686	55	15	55	29	55	0	0	0	0
	point101	101	686	55	15	55	29	55	0	0	0	0
	point102	102	686	55	15	55	29	55	0	0	0	0
	point103	103	686	55	15	55	29	55	0	0	0	0
	point104	104	686	55	15	55	29	55	0	0	0	0
	point105	105	686	55	15	55	29	55	0	0	0	0
	point106	106	686	55	15	55	29	55	0	0	0	0
	point107	107	686	55	15	55	29	55	0	0	0	0
	point108	108	686	55	15	55	29	55	0	0	0	0
	point109	109	686	55	15	55	29	55	0	0	0	0
	point110	110	686	55	15	55	29	55	0	0	0	0
	point111	111	686	55	15	55	29	55	0	0	0	0
	point112	112	686	55	15	55	29	55	0	0	0	0
	point420	420	686	55	15	55	29	55	0	0	0	0
	point10	418	686	55	15	55	29	55	0	0	0	0
	point9	419										
IL 47 from Scott Rd to Finley Rd NB	point634	634	1266	55	27	55	54	55	0	0	0	0
	point132	132	1266	55	27	55	54	55	0	0	0	0

	point133	133	1266	55	27	55	54	55	0	0	0	0
	point134	134	1266	55	27	55	54	55	0	0	0	0
	point135	135	1266	55	27	55	54	55	0	0	0	0
	point136	136	1266	55	27	55	54	55	0	0	0	0
	point137	137	1266	55	27	55	54	55	0	0	0	0
	point138	138	1266	55	27	55	54	55	0	0	0	0
	point139	139	1266	55	27	55	54	55	0	0	0	0
	point140	140	1266	55	27	55	54	55	0	0	0	0
	point141	141	1266	55	27	55	54	55	0	0	0	0
	point142	142	1266	55	27	55	54	55	0	0	0	0
	point143	143	1266	55	27	55	54	55	0	0	0	0
	point144	144	1266	55	27	55	54	55	0	0	0	0
	point145	145	1266	55	27	55	54	55	0	0	0	0
	point637	637										
IL 47 from Merrill Rd to Scott Rd SB	point636	636	845	55	9	55	45	55	0	0	0	0
	point97	97	845	55	9	55	45	55	0	0	0	0
	point98	98	845	55	9	55	45	55	0	0	0	0
	point99	99	0	55	9	55	45	55	0	0	0	0
	point100	100	845	55	9	55	45	55	0	0	0	0
	point629	629										
IL 47 from Scott Rd to Finley Rd SB	point639	639	1163	55	25	55	49	55	0	0	0	0
	point80	80	1163	55	25	55	49	55	0	0	0	0
	point81	81	1163	55	25	55	49	55	0	0	0	0
	point82	82	1163	55	25	55	49	55	0	0	0	0
	point84	84	1163	55	25	55	49	55	0	0	0	0
	point85	85	1163	55	25	55	49	55	0	0	0	0
	point86	86	1163	55	25	55	49	55	0	0	0	0
	point87	87	1163	55	25	55	49	55	0	0	0	0
	point88	88	1163	55	25	55	49	55	0	0	0	0
	point89	89	1163	55	25	55	49	55	0	0	0	0
	point90	90	1163	55	25	55	49	55	0	0	0	0
	point91	91	1163	55	25	55	49	55	0	0	0	0
	point92	92	1163	55	25	55	49	55	0	0	0	0
	point93	93	1163	55	25	55	49	55	0	0	0	0

	point94	94	1163	55	25	55	49	55	0	0	0	0
	point95	95	1163	55	25	55	49	55	0	0	0	0
	point96	96	1163	55	25	55	49	55	0	0	0	0
	point635	635										
IL 47 from Finley Rd to I-88EB Ramps SB	point71	71	1206	55	13	55	51	55	0	0	0	0
	point641	641	1206	55	13	55	51	55	0	0	0	0
	point72	72	1206	55	13	55	51	55	0	0	0	0
	point75	75	1206	55	13	55	51	55	0	0	0	0
	point76	76	1206	55	13	55	51	55	0	0	0	0
	point78	78										
IL 47 from Finley Rd to I-88EB Ramps NB	point638	638	1290	55	14	55	54	55	0	0	0	0
	point146	146	1290	55	14	55	54	55	0	0	0	0
	point147	147	1290	55	14	55	54	55	0	0	0	0
	point640	640	1290	55	14	55	54	55	0	0	0	0
	point148	148	1290	55	14	55	54	55	0	0	0	0
	point540	540										
Roadway2-2	point643	643	0	0	0	0	0	0	0	0	0	0
	point31	31										
IL 47 from Seavy Rd to Green Rd NB	point644	644	1082	55	0	0	22	55	0	0	0	0
	point165	165	1082	55	0	0	22	55	0	0	0	0
	point166	166	1082	55	0	0	22	55	0	0	0	0
	point167	167	1082	55	0	0	22	55	0	0	0	0
	point168	168	1082	55	0	0	22	55	0	0	0	0
	point169	169	1082	55	0	0	22	55	0	0	0	0
	point170	170	1082	55	0	0	22	55	0	0	0	0
	point171	171	1082	55	0	0	22	55	0	0	0	0
	point172	172	1082	55	0	0	22	55	0	0	0	0
	point173	173	1082	55	0	0	22	55	0	0	0	0
	point174	174	1082	55	0	0	22	55	0	0	0	0
	point175	175	1082	55	0	0	22	55	0	0	0	0
	point176	176	1082	55	0	0	22	55	0	0	0	0
	point177	177	1082	55	0	0	22	55	0	0	0	0
	point178	178	1082	55	0	0	22	55	0	0	0	0
	point179	179	1082	55	0	0	22	55	0	0	0	0

	point180	180	1082	55	0	0	22	55	0	0	0	0
	point181	181	1082	55	0	0	22	55	0	0	0	0
	point182	182										
IL 47 from Seavy Rd to Green Rd SB 1L	point646	646	686	55	0	0	21	55	0	0	0	0
	point14	14	686	55	0	0	21	55	0	0	0	0
	point15	15	686	55	0	0	21	55	0	0	0	0
	point16	16	686	55	0	0	21	55	0	0	0	0
	point17	17	686	55	0	0	21	55	0	0	0	0
	point18	18	686	55	0	0	21	55	0	0	0	0
	point19	19	686	55	0	0	21	55	0	0	0	0
	point20	20	686	55	0	0	21	55	0	0	0	0
	point21	21	686	55	0	0	21	55	0	0	0	0
	point22	22	686	55	0	0	21	55	0	0	0	0
	point657	657										
IL 47 north of Green Rd NB	point645	645	883	55	0	0	27	55	0	0	0	0
	point184	184	883	55	0	0	27	55	0	0	0	0
	point654	654	883	55	0	0	27	55	0	0	0	0
	point185	185										
IL 47 north of Green Rd SB	point1	1	1503	55	0	0	46	55	0	0	0	0
	point2	2	1503	55	0	0	46	55	0	0	0	0
	point3	3	1503	55	0	0	46	55	0	0	0	0
	point4	4	1503	55	0	0	46	55	0	0	0	0
	point5	6	1503	55	0	0	46	55	0	0	0	0
	point7	7	1503	55	0	0	46	55	0	0	0	0
	point8	8	1503	55	0	0	46	55	0	0	0	0
	point9	9	1503	55	0	0	46	55	0	0	0	0
	point10	10	1503	55	0	0	46	55	0	0	0	0
	point11	11	1503	55	0	0	46	55	0	0	0	0
	point652	652										
I-88 EB OffRamp 2Lane	point595	595	495	35	11	35	21	35	0	0	0	0
	point594	594	495	35	11	35	21	35	0	0	0	0
	point593	593	495	35	11	35	21	35	0	0	0	0
	point592	592	495	35	11	35	21	35	0	0	0	0
	point591	591	495	35	11	35	21	35	0	0	0	0

	point590	590	495	35	11	35	21	35	0	0	0	0
	point589	589	495	35	11	35	21	35	0	0	0	0
	point588	588	495	35	11	35	21	35	0	0	0	0
	point587	587	495	35	11	35	21	35	0	0	0	0
	point647	647										
I-88 EB OnRamp 2Lane	point648	648	394	35	8	35	17	35	0	0	0	0
	point366	366	394	35	8	35	17	35	0	0	0	0
	point367	367	394	35	8	35	17	35	0	0	0	0
	point368	368	394	35	8	35	17	35	0	0	0	0
	point369	369	394	35	8	35	17	35	0	0	0	0
	point370	370	394	35	8	35	17	35	0	0	0	0
	point371	371	394	35	8	35	17	35	0	0	0	0
	point372	372	394	35	8	35	17	35	0	0	0	0
	point373	373	394	35	8	35	17	35	0	0	0	0
	point374	374	394	35	8	35	17	35	0	0	0	0
	point376	376	394	35	8	35	17	35	0	0	0	0
	point377	377	394	35	8	35	17	35	0	0	0	0
	point378	378	394	35	8	35	17	35	0	0	0	0
	point379	379										
IL 47 bt I-88 Ramps SB	point649	649	990	55	21	55	42	55	0	0	0	0
	point63	63	990	55	21	55	42	55	0	0	0	0
	point64	64	990	55	21	55	42	55	0	0	0	0
	point65	65	990	55	21	55	42	55	0	0	0	0
	point66	66	990	55	21	55	42	55	0	0	0	0
	point67	67	990	55	21	55	42	55	0	0	0	0
	point68	68	990	55	21	55	42	55	0	0	0	0
	point70	70										
IL 47 from I-88 WBOffRamp to Seavy NB	point650	650	1244	55	13	55	52	55	0	0	0	0
	point159	159	1244	55	13	55	52	55	0	0	0	0
	point160	160	1244	55	13	55	52	55	0	0	0	0
	point161	161	1244	55	13	55	52	55	0	0	0	0
	point162	162	1244	55	13	55	52	55	0	0	0	0
	point163	163	1244	55	13	55	52	55	0	0	0	0
	point538	538	1244	55	13	55	52	55	0	0	0	0

	point164	164										
IL 47 bt I-88 Ramps NB	point642	642	1176	55	25	55	50	55	0	0	0	0
	point149	149	1176	55	25	55	50	55	0	0	0	0
	point153	153	1176	55	25	55	50	55	0	0	0	0
	point154	154	1176	55	25	55	50	55	0	0	0	0
	point155	155	1176	55	25	55	50	55	0	0	0	0
	point156	156	1176	55	25	55	50	55	0	0	0	0
	point581	581	1176	55	25	55	50	55	0	0	0	0
	point157	157	1176	55	25	55	50	55	0	0	0	0
	point541	541	1176	55	25	55	50	55	0	0	0	0
	point158	158										
IL 47 from I-88 WBOffRamp to Seavy SB	point55	55	741	55	8	55	31	55	0	0	0	0
	point56	56	741	55	8	55	31	55	0	0	0	0
	point582	582	741	55	8	55	31	55	0	0	0	0
	point57	57	741	55	8	55	31	55	0	0	0	0
	point58	58	741	55	8	55	31	55	0	0	0	0
	point59	59	741	55	8	55	31	55	0	0	0	0
	point61	61	741	55	8	55	31	55	0	0	0	0
	point62	62										
Seavy Rd LT	point443	443	131	35	0	0	4	35	0	0	0	0
	point446	446	131	35	0	0	4	35	0	0	0	0
	point449	449	131	35	0	0	4	35	0	0	0	0
	point450	450	131	35	0	0	4	35	0	0	0	0
	point452	452	131	35	0	0	4	35	0	0	0	0
	point453	453	131	35	0	0	4	35	0	0	0	0
	point454	454	131	35	0	0	1	35	0	0	0	0
	point464	464	131	35	0	0	4	35	0	0	0	0
	point456	456	131	35	0	0	4	35	0	0	0	0
	point458	458	131	35	0	0	4	35	0	0	0	0
	point459	459	131	35	0	0	4	35	0	0	0	0
	point460	460	131	35	0	0	4	35	0	0	0	0
	point461	461	131	35	0	0	4	35	0	0	0	0
	point462	462	131	35	0	0	4	35	0	0	0	0
	point463	463										

IL 47 north of Green Rd SB-2	point653	653	620	55	0	0	19	55	0	0	0	0
	point12	12	620	55	0	0	19	55	0	0	0	0
	point13	13										
Green Rd LT-2	point655	655	182	35	0	0	6	35	0	0	0	0
	point205	205	182	35	0	0	6	35	0	0	0	0
	point206	206	182	35	0	0	6	35	0	0	0	0
	point207	207	182	35	0	0	6	35	0	0	0	0
	point208	208										
Green Rd 2Lane	point656	656	364	35	0	0	11	35	0	0	0	0
	point217	217	364	35	0	0	11	35	0	0	0	0
	point218	218	364	35	0	0	11	35	0	0	0	0
	point219	219	364	35	0	0	11	35	0	0	0	0
	point220	220	364	35	0	0	11	35	0	0	0	0
	point221	221	364	35	0	0	11	35	0	0	0	0
	point222	222	364	35	0	0	11	35	0	0	0	0
	point223	223	364	35	0	0	11	35	0	0	0	0
	point562	562	364	35	0	0	11	35	0	0	0	0
	point565	565	364	35	0	0	11	35	0	0	0	0
	point563	563	364	35	0	0	11	35	0	0	0	0
	point543	543	364	35	0	0	11	35	0	0	0	0
	point544	544	364	35	0	0	11	35	0	0	0	0
	point545	545	364	35	0	0	11	35	0	0	0	0
	point546	546	364	35	0	0	11	35	0	0	0	0
	point547	547	364	35	0	0	11	35	0	0	0	0
	point548	548	364	35	0	0	11	35	0	0	0	0
	point549	549	364	35	0	0	11	35	0	0	0	0
	point550	550	364	35	0	0	11	35	0	0	0	0
	point551	551	364	35	0	0	11	35	0	0	0	0
	point552	552	364	35	0	0	11	35	0	0	0	0
	point553	553	364	35	0	0	11	35	0	0	0	0
	point554	554										
IL 47 from Seavy Rd to Green Rd SB-2	point658	658	686	55	0	0	21	55	0	0	0	0
	point23	23	686	55	0	0	21	55	0	0	0	0
	point24	24	686	55	0	0	21	55	0	0	0	0

	point25	25	686	55	0	0	21	55	0	0	0	0
	point26	26	686	55	0	0	21	55	0	0	0	0
	point27	27	686	55	0	0	21	55	0	0	0	0
	point28	28	686	55	0	0	21	55	0	0	0	0
	point29	29	686	55	0	0	21	55	0	0	0	0
	point30	30	686	55	0	0	21	55	0	0	0	0
	point534	534										

Volkert, Inc.
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27 July 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build PM Peak

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 1	2	1	949,221.6	1,870,476.6	722.00	4.92	60.40	66	14.0	8.0	Y
Res 2	3	1	949,072.8	1,874,065.4	722.00	4.92	70.00	66	14.0	8.0	Y
Res 3	4	1	948,247.1	1,875,256.5	740.00	4.92	67.80	66	14.0	8.0	Y
Res 4	5	1	946,760.2	1,878,303.6	724.00	4.92	50.50	66	14.0	8.0	Y
Res 5	6	1	947,670.5	1,879,476.8	755.00	4.92	68.60	66	14.0	8.0	Y
Res 6	7	1	948,527.0	1,880,460.2	731.00	4.92	60.10	66	14.0	8.0	Y
Res 7	8	1	948,837.2	1,881,350.0	745.00	4.92	58.80	66	14.0	8.0	Y
Res 8	9	1	948,437.2	1,881,221.6	735.00	4.92	62.30	66	14.0	8.0	Y

INPUT: TERRAIN LINES

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27 July 2017
TNM 2.5

INPUT: TERRAIN LINES
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build PM Peak

Terrain Line Name	Points No.	Coordinates (ground) X ft	Y ft	Z ft
Terrain Line1	1	949,256.2	1,870,168.4	705.00
	2	949,281.8	1,870,266.0	709.00
	3	949,293.6	1,870,367.4	714.00
	4	949,311.9	1,870,460.6	719.00
	5	949,330.1	1,870,559.2	722.00
	6	949,353.9	1,870,658.8	721.00
	7	949,382.2	1,870,751.9	714.00
	8	949,409.6	1,870,843.4	708.00
	9	949,422.4	1,870,951.1	703.00
	10	949,433.3	1,871,050.9	700.00

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27 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Build PM Peak
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 1	2	1	60.4	63.1	66	2.7	14	----	63.1	0.0	8	-8.0
Res 2	3	1	70.0	71.7	66	1.7	14	Snd Lvl	71.7	0.0	8	-8.0
Res 3	4	1	67.8	70.7	66	2.9	14	Snd Lvl	70.7	0.0	8	-8.0
Res 4	5	1	50.5	55.8	66	5.3	14	----	55.8	0.0	8	-8.0
Res 5	6	1	68.6	69.2	66	0.6	14	Snd Lvl	69.2	0.0	8	-8.0
Res 6	7	1	60.1	64.3	66	4.2	14	----	64.3	0.0	8	-8.0
Res 7	8	1	58.8	61.2	66	2.4	14	----	61.2	0.0	8	-8.0
Res 8	9	1	62.3	64.9	66	2.6	14	----	64.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	8	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

CNE 2 Barrier TNM Input and Output

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Scott Rd	24.0	point610	610	949,401.0	1,873,506.9	719.00				Average	
		point611	611	949,199.1	1,873,503.8	718.00				Average	
		point612	612	949,099.8	1,873,502.1	717.00				Average	
		point613	613	948,999.1	1,873,499.9	717.00				Average	
		point614	614	948,899.8	1,873,498.2	717.00				Average	
		point615	615	948,809.0	1,873,497.6	716.00				Average	
		point616	616	948,765.4	1,873,499.2	717.00				Average	
		point617	617	948,650.4	1,873,499.9	716.00				Average	
		point618	618	948,600.2	1,873,500.5	716.00				Average	
		point619	619	948,564.2	1,873,499.2	713.00				Average	
		point620	620	948,529.9	1,873,493.4	710.00				Average	
		point621	621	948,490.1	1,873,481.4	708.00				Average	
		point622	622	948,448.6	1,873,461.0	708.00				Average	
		point623	623	948,259.4	1,873,341.2	706.00					
IL 47 from College Dr to Merrill Rd NB	44.0	point427	427	949,208.0	1,869,312.1	706.00				Average	
		point428	428	949,371.9	1,870,087.8	707.00				Average	
		point429	429	949,412.4	1,870,292.5	708.00				Average	
		point430	430	949,453.7	1,870,484.8	708.00				Average	
		point431	431	949,492.1	1,870,687.5	708.00				Average	
		point117	117	949,524.1	1,870,888.8	707.00				Average	
		point118	118	949,554.9	1,871,079.4	707.00				Average	
		point119	119	949,580.8	1,871,278.4	707.00				Average	
		point120	120	949,601.1	1,871,478.4	708.00				Average	
		point121	121	949,616.9	1,871,676.5	707.00				Average	
		point122	122	949,633.1	1,871,879.9	706.00				Average	

		point123	123	949,643.6	1,872,079.6	706.00				Average	
		point124	124	949,645.2	1,872,279.0	707.00				Average	
		point125	125	949,640.4	1,872,481.5	709.00				Average	
		point126	126	949,625.8	1,872,681.2	711.00				Average	
		point625	625	949,620.9	1,872,731.0	711.50					
IL 47 from Merrill Rd to Scott Rd NB	44.0	point627	627	949,620.9	1,872,731.0	711.50				Average	
		point127	127	949,616.1	1,872,780.9	712.00				Average	
		point128	128	949,603.5	1,872,882.1	713.00				Average	
		point129	129	949,571.1	1,873,078.2	716.00				Average	
		point130	130	949,527.3	1,873,274.8	718.00				Average	
		point131	131	949,472.6	1,873,470.0	719.00				Average	
		point632	632	949,457.2	1,873,513.4	719.50					
IL 47 from College Dr to Merrill Rd SB	44.0	point631	631	949,566.2	1,872,732.6	712.00				Average	
		point101	101	949,572.6	1,872,675.6	711.00				Average	
		point102	102	949,586.6	1,872,478.1	709.00				Average	
		point103	103	949,590.6	1,872,278.5	707.00				Average	
		point104	104	949,589.9	1,872,078.0	706.00				Average	
		point105	105	949,581.6	1,871,880.8	706.00				Average	
		point106	106	949,570.9	1,871,682.8	707.00				Average	
		point107	107	949,554.9	1,871,483.6	708.00				Average	
		point108	108	949,533.4	1,871,284.0	707.00				Average	
		point109	109	949,509.4	1,871,087.1	707.00				Average	
		point110	110	949,478.9	1,870,888.5	707.00				Average	
		point111	111	949,440.4	1,870,693.0	708.00				Average	
		point112	112	949,400.9	1,870,500.1	708.00				Average	
		point420	420	949,358.4	1,870,302.4	708.00				Average	
		point10	418	949,312.3	1,870,100.0	707.00				Average	
		point9	419	949,160.5	1,869,424.2	706.00					
IL 47 from Scott Rd to Finley Rd NB	44.0	point634	634	949,457.2	1,873,513.4	719.50				Average	
		point132	132	949,404.8	1,873,661.1	720.00				Average	
		point133	133	949,327.6	1,873,846.6	720.00				Average	
		point134	134	949,240.7	1,874,029.8	718.00				Average	
		point135	135	949,144.2	1,874,203.6	717.00				Average	
		point136	136	949,090.8	1,874,292.2	716.00				Average	
		point137	137	949,036.1	1,874,376.5	716.00				Average	
		point138	138	948,921.9	1,874,542.2	716.00				Average	
		point139	139	948,807.5	1,874,707.1	718.00				Average	
		point140	140	948,692.9	1,874,870.9	720.00				Average	

		point141	141	948,580.4	1,875,033.6	724.00				Average	
		point142	142	948,465.8	1,875,198.9	728.00				Average	
		point143	143	948,353.2	1,875,359.8	732.00				Average	
		point144	144	948,300.2	1,875,446.4	734.00				Average	
		point145	145	948,255.2	1,875,531.9	736.00				Average	
		point637	637	948,213.1	1,875,621.6	738.50					
IL 47 from Merrill Rd to Scott Rd SB	44.0	point636	636	949,401.0	1,873,506.9	719.00				Average	
		point97	97	949,420.4	1,873,452.5	719.00				Average	
		point98	98	949,474.1	1,873,264.6	718.00				Average	
		point99	99	949,517.6	1,873,068.8	716.00				Average	
		point100	100	949,550.4	1,872,873.5	713.00				Average	
		point629	629	949,566.2	1,872,732.6	712.00					
IL 47 from Scott Rd to Finley Rd SB	44.0	point639	639	948,167.4	1,875,614.8	739.00				Average	
		point80	80	948,213.4	1,875,515.9	736.00				Average	
		point81	81	948,312.2	1,875,333.4	732.00				Average	
		point82	82	948,364.6	1,875,251.8	732.00				Average	
		point84	84	948,363.9	1,875,252.6	732.00				Average	
		point85	85	948,480.1	1,875,082.6	726.00				Average	
		point86	86	948,593.0	1,874,916.9	722.00				Average	
		point87	87	948,709.9	1,874,754.1	719.00				Average	
		point88	88	948,823.8	1,874,588.4	717.00				Average	
		point89	89	948,936.3	1,874,426.6	716.00				Average	
		point90	90	948,992.0	1,874,345.9	716.00				Average	
		point91	91	949,098.1	1,874,175.5	716.00				Average	
		point92	92	949,146.1	1,874,092.4	717.00				Average	
		point93	93	949,192.6	1,874,003.0	718.00				Average	
		point94	94	949,237.8	1,873,914.2	719.00				Average	
		point95	95	949,278.7	1,873,823.1	719.00				Average	
		point96	96	949,354.1	1,873,641.8	720.00				Average	
		point635	635	949,401.0	1,873,506.9	719.00					

Volkert, Inc. 28 July 2017
Nik Simonson TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Scott Rd	point610	610	457	35	31	35	26	35	0	0	0	0
	point611	611	457	35	31	35	26	35	0	0	0	0
	point612	612	457	35	31	35	26	35	0	0	0	0
	point613	613	457	35	31	35	26	35	0	0	0	0
	point614	614	457	35	31	35	26	35	0	0	0	0
	point615	615	457	35	31	35	26	35	0	0	0	0
	point616	616	457	35	31	35	26	35	0	0	0	0
	point617	617	457	35	31	35	26	35	0	0	0	0
	point618	618	457	35	31	35	26	35	0	0	0	0
	point619	619	457	35	31	35	26	35	0	0	0	0
	point620	620	457	35	31	35	26	35	0	0	0	0
	point621	621	457	35	31	35	26	35	0	0	0	0
	point622	622	457	35	31	35	26	35	0	0	0	0
	point623	623										
IL 47 from College Dr to Merrill Rd NB	point427	427	531	55	38	55	56	55	0	0	0	0
	point428	428	531	55	38	55	56	55	0	0	0	0
	point429	429	531	55	38	55	56	55	0	0	0	0
	point430	430	531	55	38	55	56	55	0	0	0	0
	point431	431	531	55	38	55	56	55	0	0	0	0
	point117	117	531	55	38	55	56	55	0	0	0	0
	point118	118	531	55	38	55	56	55	0	0	0	0
	point119	119	531	55	38	55	56	55	0	0	0	0

	point120	120	531	55	38	55	56	55	0	0	0	0
	point121	121	531	55	38	55	56	55	0	0	0	0
	point122	122	531	55	38	55	56	55	0	0	0	0
	point123	123	531	55	38	55	56	55	0	0	0	0
	point124	124	531	55	38	55	56	55	0	0	0	0
	point125	125	531	55	38	55	56	55	0	0	0	0
	point126	126	531	55	38	55	56	55	0	0	0	0
	point625	625										
IL 47 from Merrill Rd to Scott Rd NB	point627	627	853	55	47	55	47	55	0	0	0	0
	point127	127	853	55	47	55	47	55	0	0	0	0
	point128	128	853	55	47	55	47	55	0	0	0	0
	point129	129	853	55	47	55	47	55	0	0	0	0
	point130	130	853	55	47	55	47	55	0	0	0	0
	point131	131	853	55	47	55	47	55	0	0	0	0
	point632	632										
IL 47 from College Dr to Merrill Rd SB	point631	631	900	55	64	55	95	55	0	0	0	0
	point101	101	900	55	64	55	95	55	0	0	0	0
	point102	102	900	55	64	55	95	55	0	0	0	0
	point103	103	900	55	64	55	95	55	0	0	0	0
	point104	104	900	55	64	55	95	55	0	0	0	0
	point105	105	900	55	64	55	95	55	0	0	0	0
	point106	106	900	55	64	55	95	55	0	0	0	0
	point107	107	900	55	64	55	95	55	0	0	0	0
	point108	108	900	55	64	55	95	55	0	0	0	0
	point109	109	900	55	64	55	95	55	0	0	0	0
	point110	110	900	55	64	55	95	55	0	0	0	0
	point111	111	900	55	64	55	95	55	0	0	0	0
	point112	112	900	55	64	55	95	55	0	0	0	0
	point420	420	900	55	64	55	95	55	0	0	0	0
	point10	418	900	55	64	55	95	55	0	0	0	0
	point9	419										
IL 47 from Scott Rd to Finley Rd NB	point634	634	1241	55	84	55	70	55	0	0	0	0
	point132	132	1241	55	84	55	70	55	0	0	0	0
	point133	133	1241	55	84	55	70	55	0	0	0	0

	point134	134	1241	55	84	55	70	55	0	0	0	0
	point135	135	1241	55	84	55	70	55	0	0	0	0
	point136	136	1241	55	84	55	70	55	0	0	0	0
	point137	137	1241	55	84	55	70	55	0	0	0	0
	point138	138	1241	55	84	55	70	55	0	0	0	0
	point139	139	1241	55	84	55	70	55	0	0	0	0
	point140	140	1241	55	84	55	70	55	0	0	0	0
	point141	141	1241	55	84	55	70	55	0	0	0	0
	point142	142	1241	55	84	55	70	55	0	0	0	0
	point143	143	1241	55	84	55	70	55	0	0	0	0
	point144	144	1241	55	84	55	70	55	0	0	0	0
	point145	145	1241	55	84	55	70	55	0	0	0	0
	point637	637										
IL 47 from Merrill Rd to Scott Rd SB	point636	636	1049	55	58	55	58	55	0	0	0	0
	point97	97	1049	55	58	55	58	55	0	0	0	0
	point98	98	1049	55	58	55	58	55	0	0	0	0
	point99	99	1049	55	58	55	58	55	0	0	0	0
	point100	100	1049	55	58	55	58	55	0	0	0	0
	point629	629										
IL 47 from Scott Rd to Finley Rd SB	point639	639	1113	55	75	55	63	55	0	0	0	0
	point80	80	1113	55	75	55	63	55	0	0	0	0
	point81	81	1113	55	75	55	63	55	0	0	0	0
	point82	82	1113	55	75	55	63	55	0	0	0	0
	point84	84	1113	55	75	55	63	55	0	0	0	0
	point85	85	1113	55	75	55	63	55	0	0	0	0
	point86	86	1113	55	75	55	63	55	0	0	0	0
	point87	87	1113	55	75	55	63	55	0	0	0	0
	point88	88	1113	55	75	55	63	55	0	0	0	0
	point89	89	1113	55	75	55	63	55	0	0	0	0
	point90	90	1113	55	75	55	63	55	0	0	0	0
	point91	91	1113	55	75	55	63	55	0	0	0	0
	point92	92	1113	55	75	55	63	55	0	0	0	0
	point93	93	1113	55	75	55	63	55	0	0	0	0
	point94	94	1113	55	75	55	63	55	0	0	0	0

	point95	95	1113	55	75	55	63	55	0	0	0	0
	point96	96	1113	55	75	55	63	55	0	0	0	0
	point635	635										

Volkert, Inc.
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TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 2	3	1	949,072.8	1,874,065.4	722.00	4.92	70.00	66	14.0	8.0	Y
CNE 2 - 1	11	1	949,472.1	1,872,069.2	703.00	4.92	64.60	66	14.0	8.0	Y
CNE 2 - 2	12	1	949,367.9	1,872,017.2	706.00	4.92	59.20	66	14.0	8.0	Y
CNE 2 - 3	13	1	949,268.9	1,871,987.8	707.00	4.92	56.00	66	14.0	8.0	Y
CNE 2 - 4	14	1	949,147.4	1,871,970.4	707.00	4.92	53.30	66	14.0	8.0	Y
CNE 2 - 5	15	1	949,517.2	1,872,315.9	710.00	4.92	68.60	66	14.0	8.0	Y
CNE 2 - 6	16	1	949,393.9	1,872,308.9	711.00	4.92	60.20	66	14.0	8.0	Y
CNE 2 - 7	17	1	949,225.5	1,872,255.1	713.00	4.92	54.90	66	14.0	8.0	Y
CNE 2 - 8	18	1	949,099.1	1,872,351.6	714.00	4.92	52.30	66	14.0	8.0	Y
CNE 2 - 9	19	1	949,133.5	1,872,583.2	717.00	4.92	53.00	66	14.0	8.0	Y
CNE 2 - 10	20	1	949,406.1	1,872,748.1	718.00	4.92	62.00	66	14.0	8.0	Y
CNE 2 - 11	21	1	949,140.4	1,872,737.8	717.00	4.92	53.30	66	14.0	8.0	Y
CNE 2 - 12	22	1	949,399.1	1,872,847.1	719.00	4.92	62.30	66	14.0	8.0	Y
CNE 2 - 13	23	1	949,442.6	1,872,963.4	720.00	4.92	67.40	66	14.0	8.0	Y
CNE 2 - 14	24	1	949,397.4	1,873,067.6	719.00	4.92	65.10	66	14.0	8.0	Y
CNE 2 - 15	25	1	949,157.8	1,872,947.8	716.00	4.92	54.30	66	14.0	8.0	Y
CNE 2 - 16	26	1	949,322.8	1,873,194.2	718.00	4.92	62.10	66	14.0	8.0	Y
CNE 2 - 17	27	1	949,133.5	1,873,166.5	716.00	4.92	54.90	66	14.0	8.0	Y
CNE 2 - 18	28	1	949,310.6	1,873,302.0	720.00	4.92	63.40	66	14.0	8.0	Y
CNE 2 - 19	29	1	949,117.9	1,873,265.5	715.00	4.92	55.20	66	14.0	8.0	Y
CNE 2 - 20	30	1	949,314.1	1,873,397.5	720.00	4.92	66.10	66	14.0	8.0	Y
CNE 2 - 21	31	1	949,050.2	1,873,413.0	714.00	4.92	55.80	66	14.0	8.0	Y

CNE 2 - 22	32	1	948,942.6	1,873,366.2	710.00	4.92	53.70	66	14.0	8.0	Y
CNE 2 - 23	33	1	949,249.8	1,873,621.4	718.00	4.92	67.80	66	14.0	8.0	Y
CNE 2 - 24	34	1	949,138.8	1,873,607.5	720.00	4.92	60.60	66	14.0	8.0	Y
CNE 2 - 25	35	1	949,057.1	1,873,612.8	720.00	4.92	57.90	66	14.0	8.0	Y
CNE 2 - 26	36	1	948,947.8	1,873,598.9	719.00	4.92	55.70	66	14.0	8.0	Y
CNE 2 - 27	37	1	948,821.0	1,873,630.1	719.00	4.92	53.60	66	14.0	8.0	Y
CNE 2 - 28	38	1	949,149.1	1,873,808.9	719.00	4.92	66.10	66	14.0	8.0	Y
CNE 2 - 29	39	1	949,043.2	1,873,821.0	721.00	4.92	60.40	66	14.0	8.0	Y
CNE 2 - 30	40	1	948,926.9	1,873,821.0	719.00	4.92	56.50	66	14.0	8.0	Y
CNE 2 - 31	41	1	948,793.2	1,873,838.4	714.00	4.92	54.20	66	14.0	8.0	Y
CNE 2 - 32	42	1	948,975.5	1,874,196.0	721.00	4.92	68.90	66	14.0	8.0	Y
CNE 2 - 33	43	1	948,701.2	1,874,161.4	711.00	4.92	55.80	66	14.0	8.0	Y
CNE 2 - 34	44	1	948,565.8	1,874,154.4	710.00	4.92	53.30	66	14.0	8.0	Y
CNE 2 - 35	45	1	948,836.6	1,874,345.4	711.00	4.92	65.50	66	14.0	8.0	Y

Volkert, Inc. 28 July 2017
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INPUT: BARRIERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	Perturbs #Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	30.00				0.00	point1	1	949,098.8	1,874,037.4	721.00	12.00	1.00	13	12		
									point2	2	949,050.4	1,874,124.9	722.00	12.00	1.00	13	12		
									point3	3	949,000.1	1,874,209.5	721.00	12.00	1.00	13	12		
									point4	4	948,943.8	1,874,296.0	716.00	12.00	1.00	13	12		
									point5	5	948,892.4	1,874,374.5	710.00	12.00	1.00	13	12		
									point6	6	948,780.7	1,874,481.0	706.00	12.00					
Barrier2	W	0.00	99.99	30.00				0.00	point7	7	949,481.8	1,871,540.1	699.00	12.00	1.00	13	12		
									point8	8	949,489.6	1,871,638.6	700.00	12.00	1.00	13	12		
									point9	9	949,497.2	1,871,742.9	703.00	12.00	1.00	13	12		
									point10	10	949,505.9	1,871,841.4	701.00	12.00	1.00	13	12		
									point11	11	949,511.8	1,871,940.9	701.00	12.00	1.00	13	12		
									point12	12	949,515.6	1,872,040.8	702.00	12.00	1.00	13	12		
									point13	13	949,517.6	1,872,142.1	704.00	12.00	1.00	13	12		
									point14	14	949,516.6	1,872,192.4	705.00	12.00					
Barrier3	W	0.00	99.99	30.00				0.00	point15	15	949,533.0	1,872,285.5	707.00	12.00	1.00	13	12		
									point16	16	949,534.0	1,872,386.9	708.00	12.00	1.00	13	12		
									point17	17	949,513.7	1,872,489.2	712.00	12.00	1.00	13	12		
									point18	18	949,505.9	1,872,585.9	714.00	12.00	1.00	13	12		
									point19	19	949,498.2	1,872,687.5	714.00	12.00	1.00	13	12		
									point20	20	949,487.6	1,872,788.9	716.00	12.00	1.00	13	12		
									point21	21	949,474.1	1,872,886.5	718.00	12.00	1.00	13	12		
									point22	22	949,458.6	1,872,982.5	719.00	12.00	1.00	13	12		
									point23	23	949,438.4	1,873,084.9	718.00	12.00	1.00	13	12		
									point24	24	949,445.1	1,873,162.1	716.00	12.00	1.00	13	12		
									point25	25	949,417.1	1,873,263.9	717.00	12.00	1.00	13	12		
									point26	26	949,390.1	1,873,361.5	718.00	12.00	1.00	13	12		
									point27	27	949,358.2	1,873,457.1	719.00	12.00	1.00	13	12		
									point28	28	949,241.3	1,873,455.1	719.00	12.00					
Barrier4	W	0.00	99.99	30.00				0.00	point29	29	949,299.1	1,873,545.5	718.00	12.00	1.00	13	12		
									point30	30	949,316.5	1,873,580.2	718.00	12.00	1.00	13	12		
									point31	31	949,284.6	1,873,664.4	718.00	12.00	1.00	13	12		
									point32	32	949,250.8	1,873,760.9	719.00	12.00	1.00	13	12		
									point33	33	949,211.2	1,873,847.9	719.00	12.00	1.00	13	12		
									point34	34	949,166.8	1,873,939.6	720.00	12.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 2	3	1	70.0	72.5	66	2.5	14	Snd Lvl	60.5	12.0	8	4.0
CNE 2 - 1	11	1	64.6	69.6	66	5.0	14	Snd Lvl	60.1	9.5	8	1.5
CNE 2 - 2	12	1	59.2	65.8	66	6.6	14	----	60.9	4.9	8	-3.1
CNE 2 - 3	13	1	56.0	62.1	66	6.1	14	----	58.9	3.2	8	-4.8
CNE 2 - 4	14	1	53.3	59.3	66	6.0	14	----	56.8	2.5	8	-5.5
CNE 2 - 5	15	1	68.6	71.9	66	3.3	14	Snd Lvl	64.2	7.7	8	-0.3
CNE 2 - 6	16	1	60.2	66.0	66	5.8	14	Snd Lvl	61.9	4.1	8	-3.9
CNE 2 - 7	17	1	54.9	60.5	66	5.6	14	----	57.4	3.1	8	-4.9
CNE 2 - 8	18	1	52.3	57.6	66	5.3	14	----	54.6	3.0	8	-5.0
CNE 2 - 9	19	1	53.0	58.1	66	5.1	14	----	54.2	3.9	8	-4.1
CNE 2 - 10	20	1	62.0	67.9	66	5.9	14	Snd Lvl	58.0	9.9	8	1.9
CNE 2 - 11	21	1	53.3	58.0	66	4.7	14	----	53.7	4.3	8	-3.7
CNE 2 - 12	22	1	62.3	68.1	66	5.8	14	Snd Lvl	57.8	10.3	8	2.3
CNE 2 - 13	23	1	67.4	70.9	66	3.5	14	Snd Lvl	58.7	12.2	8	4.2
CNE 2 - 14	24	1	65.1	69.7	66	4.6	14	Snd Lvl	58.7	11.0	8	3.0
CNE 2 - 15	25	1	54.3	59.1	66	4.8	14	----	54.1	5.0	8	-3.0
CNE 2 - 16	26	1	62.1	67.4	66	5.3	14	Snd Lvl	57.8	9.6	8	1.6
CNE 2 - 17	27	1	54.9	60.7	66	5.8	14	----	55.1	5.6	8	-2.4
CNE 2 - 18	28	1	63.4	68.6	66	5.2	14	Snd Lvl	58.8	9.8	8	1.8
CNE 2 - 19	29	1	55.2	61.3	66	6.1	14	----	56.0	5.3	8	-2.7
CNE 2 - 20	30	1	66.1	70.2	66	4.1	14	Snd Lvl	59.7	10.5	8	2.5
CNE 2 - 21	31	1	55.8	63.7	66	7.9	14	----	62.0	1.7	8	-6.3
CNE 2 - 22	32	1	53.7	60.0	66	6.3	14	----	58.6	1.4	8	-6.6

CNE 2 - 23	33	1	67.8	71.1	66	3.3	14	Snd Lvl	61.6	9.5	8	1.5
CNE 2 - 24	34	1	60.6	66.7	66	6.1	14	Snd Lvl	62.4	4.3	8	-3.7
CNE 2 - 25	35	1	57.9	64.4	66	6.5	14	----	61.5	2.9	8	-5.1
CNE 2 - 26	36	1	55.7	63.2	66	7.5	14	----	61.5	1.7	8	-6.3
CNE 2 - 27	37	1	53.6	61.2	66	7.6	14	----	59.4	1.8	8	-6.2
CNE 2 - 28	38	1	66.1	70.0	66	3.9	14	Snd Lvl	62.5	7.5	8	-0.5
CNE 2 - 29	39	1	60.4	65.5	66	5.1	14	----	61.5	4.0	8	-4.0
CNE 2 - 30	40	1	56.5	62.1	66	5.6	14	----	58.9	3.2	8	-4.8
CNE 2 - 31	41	1	54.2	59.7	66	5.5	14	----	57.1	2.6	8	-5.4
CNE 2 - 32	42	1	68.9	71.6	66	2.7	14	Snd Lvl	60.9	10.7	8	2.7
CNE 2 - 33	43	1	55.8	61.0	66	5.2	14	----	58.5	2.5	8	-5.5
CNE 2 - 34	44	1	53.3	59.0	66	5.7	14	----	57.3	1.7	8	-6.3
CNE 2 - 35	45	1	65.5	69.3	66	3.8	14	Snd Lvl	61.4	7.9	8	-0.1

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	36	1.4	5.9	12.2
All Impacted	16	4.1	9.2	12.2
All that meet NR Goal	11	9.5	10.5	12.2

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND-LEVEL DIAGNOSIS BY BARRIER SEGMENT

PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Total LAeq1h dBA	Important Barriers Name	Important Segments Name	No.	Partial LAeq1h dBA
Res 2	3	60.50	Barrier1	point1	1	56.80
			Barrier1	point2	2	45.70
			Barrier1	point3	3	45.60
			Barrier4	point33	33	44.90
			Barrier1	point5	5	43.40
			Barrier1	point4	4	43.30
			Barrier4	point32	32	41.00
			Barrier4	point31	31	40.50
			Barrier4	point29	29	36.50
			Barrier4	point30	30	36.50
CNE 2 - 1	11	60.10	Barrier2	point12	12	55.60
			Barrier2	point11	11	53.40
			Barrier2	point10	10	48.40
			Barrier2	point13	13	46.80
			Barrier2	point9	9	44.10
			Barrier3	point15	15	42.40
			Barrier3	point16	16	42.00
			Barrier2	point8	8	40.70
			Barrier2	point7	7	38.90

			Barrier3	point17	17	35.20
CNE 2 - 2	12	60.90	Barrier2	point11	11	54.60
			Barrier2	point12	12	53.00
			Barrier2	point10	10	52.90
			Barrier2	point9	9	49.90
			Barrier2	point8	8	47.30
			Barrier2	point13	13	46.40
			Barrier2	point7	7	45.10
			Barrier3	point15	15	42.60
			Barrier3	point16	16	41.30
			Barrier3	point17	17	36.80
CNE 2 - 3	13	58.90	Barrier2	point11	11	50.80
			Barrier2	point10	10	50.50
			Barrier2	point12	12	49.60
			Barrier2	point9	9	48.90
			Barrier2	point8	8	47.50
			Barrier2	point7	7	46.00
			Barrier2	point13	13	44.60
			Barrier3	point15	15	41.20
			Barrier3	point16	16	39.70
			Barrier3	point17	17	36.20
CNE 2 - 4	14	56.80	Barrier2	point10	10	47.10
			Barrier2	point11	11	47.00
			Barrier2	point9	9	46.20
			Barrier2	point12	12	46.00
			Barrier2	point8	8	45.60
			Barrier2	point7	7	44.90
			Barrier2	point13	13	41.90
			Barrier3	point15	15	39.10
			Barrier3	point16	16	37.90
			Barrier3	point17	17	34.80
CNE 2 - 5	15	64.20	Barrier3	point15	15	58.70
			Barrier3	point16	16	49.40
			Barrier2	point10	10	37.10

			Barrier2	point11	11	37.00
			Barrier3	point17	17	35.40
			Barrier2	point9	9	35.20
			Barrier2	point12	12	34.60
			Barrier2	point13	13	34.00
			Barrier2	point7	7	33.80
			Barrier2	point8	8	32.20
CNE 2 - 6	16	61.90	Barrier3	point15	15	50.50
			Barrier2	point12	12	50.10
			Barrier2	point13	13	48.80
			Barrier3	point16	16	48.60
			Barrier2	point11	11	47.80
			Barrier2	point10	10	45.70
			Barrier3	point17	17	44.00
			Barrier2	point9	9	43.00
			Barrier3	point18	18	41.30
			Barrier2	point8	8	40.40
CNE 2 - 7	17	57.40	Barrier2	point12	12	47.90
			Barrier2	point11	11	46.90
			Barrier2	point10	10	45.50
			Barrier2	point13	13	45.40
			Barrier3	point15	15	44.70
			Barrier2	point9	9	43.50
			Barrier3	point16	16	43.30
			Barrier2	point8	8	42.10
			Barrier2	point7	7	40.80
			Barrier3	point17	17	40.30
CNE 2 - 8	18	54.60	Barrier2	point12	12	43.80
			Barrier2	point11	11	43.00
			Barrier2	point10	10	41.90
			Barrier3	point15	15	41.60
			Barrier2	point13	13	41.10
			Barrier3	point16	16	40.80
			Barrier2	point9	9	40.40

			Barrier2	point8	8	39.40
			Barrier3	point17	17	38.80
			Barrier2	point7	7	38.50
CNE 2 - 9	19	54.20	Barrier3	point15	15	43.60
			Barrier3	point16	16	41.60
			Barrier2	point12	12	41.00
			Barrier3	point18	18	40.90
			Barrier3	point17	17	40.50
			Barrier3	point19	19	40.50
			Barrier2	point11	11	40.10
			Barrier3	point20	20	39.20
			Barrier2	point10	10	39.00
			Barrier3	point24	24	38.70
CNE 2 - 10	20	58.00	Barrier3	point19	19	51.90
			Barrier3	point20	20	49.70
			Barrier3	point18	18	48.70
			Barrier3	point21	21	45.70
			Barrier3	point17	17	44.40
			Barrier3	point15	15	43.90
			Barrier3	point22	22	43.20
			Barrier3	point24	24	42.00
			Barrier3	point16	16	41.30
			Barrier2	point12	12	40.50
CNE 2 - 11	21	53.70	Barrier3	point19	19	41.30
			Barrier3	point24	24	41.20
			Barrier3	point18	18	40.70
			Barrier3	point20	20	40.60
			Barrier3	point21	21	40.10
			Barrier3	point22	22	40.10
			Barrier3	point15	15	39.70
			Barrier3	point17	17	39.40
			Barrier3	point16	16	38.90
			Barrier2	point12	12	38.60
CNE 2 - 12	22	57.80	Barrier3	point20	20	51.50

			Barrier3	point21	21	49.80
			Barrier3	point19	19	48.80
			Barrier3	point22	22	46.60
			Barrier3	point18	18	44.90
			Barrier3	point24	24	44.50
			Barrier3	point15	15	41.50
			Barrier3	point17	17	41.30
			Barrier3	point25	25	40.80
			Barrier3	point27	27	40.30
CNE 2 - 13	23	58.70	Barrier3	point21	21	55.50
			Barrier3	point22	22	52.20
			Barrier3	point20	20	45.40
			Barrier3	point24	24	45.00
			Barrier3	point25	25	42.40
			Barrier3	point27	27	41.80
			Barrier3	point19	19	41.60
			Barrier3	point26	26	39.60
			Barrier3	point18	18	39.00
			Barrier2	point11	11	38.40
CNE 2 - 14	24	58.70	Barrier3	point22	22	53.50
			Barrier3	point23	23	52.10
			Barrier3	point24	24	50.80
			Barrier3	point25	25	46.20
			Barrier3	point21	21	45.40
			Barrier3	point27	27	43.90
			Barrier3	point26	26	43.30
			Barrier3	point20	20	41.90
			Barrier3	point19	19	39.50
			Barrier1	point5	5	39.20
CNE 2 - 15	25	54.10	Barrier3	point24	24	44.30
			Barrier3	point22	22	42.70
			Barrier3	point23	23	42.20
			Barrier3	point21	21	41.50
			Barrier3	point25	25	41.30

			Barrier3	point27	27	41.00
			Barrier3	point20	20	40.50
			Barrier3	point26	26	40.00
			Barrier3	point19	19	40.00
			Barrier3	point18	18	38.60
CNE 2 - 16	26	57.80	Barrier3	point24	24	52.10
			Barrier3	point25	25	50.20
			Barrier3	point23	23	49.20
			Barrier3	point26	26	47.30
			Barrier3	point27	27	47.00
			Barrier3	point22	22	44.80
			Barrier1	point5	5	40.80
			Barrier3	point21	21	40.60
			Barrier3	point20	20	38.60
			Barrier4	point30	30	38.00
CNE 2 - 17	27	55.10	Barrier3	point24	24	44.90
			Barrier3	point27	27	44.40
			Barrier3	point25	25	44.30
			Barrier3	point26	26	43.30
			Barrier3	point23	23	42.70
			Barrier3	point22	22	41.40
			Barrier1	point5	5	40.10
			Barrier4	point30	30	39.30
			Barrier3	point21	21	38.60
			Barrier4	point31	31	38.60
CNE 2 - 18	28	58.80	Barrier3	point25	25	53.10
			Barrier3	point26	26	51.50
			Barrier3	point27	27	50.50
			Barrier3	point24	24	50.40
			Barrier3	point23	23	46.70
			Barrier3	point22	22	40.90
			Barrier4	point30	30	40.60
			Barrier4	point29	29	39.60
			Barrier3	point21	21	38.00

			Barrier1	point5	5	37.60
CNE 2 - 19	29	56.00	Barrier3	point27	27	45.30
			Barrier3	point25	25	44.50
			Barrier3	point26	26	44.10
			Barrier3	point24	24	44.00
			Barrier4	point30	30	42.60
			Barrier3	point23	23	41.70
			Barrier1	point5	5	40.90
			Barrier4	point31	31	40.40
			Barrier3	point22	22	39.60
			Barrier4	point32	32	38.90
CNE 2 - 20	30	59.70	Barrier3	point26	26	55.00
			Barrier3	point27	27	53.70
			Barrier3	point25	25	51.00
			Barrier3	point24	24	46.20
			Barrier3	point23	23	43.90
			Barrier4	point30	30	43.40
			Barrier4	point29	29	43.20
			Barrier3	point22	22	37.40
			Barrier1	point5	5	36.90
			Barrier4	point31	31	36.80
CNE 2 - 21	31	62.00	Barrier4	point30	30	43.70
			Barrier3	point26	26	42.90
			Barrier4	point31	31	42.80
			Barrier3	point25	25	42.30
			Barrier1	point5	5	42.10
			Barrier3	point24	24	40.90
			Barrier4	point32	32	40.80
			Barrier4	point33	33	39.10
			Barrier3	point23	23	38.80
			Barrier4	point29	29	37.90
CNE 2 - 22	32	58.60	Barrier4	point30	30	40.70
			Barrier4	point31	31	40.50
			Barrier3	point26	26	39.90

			Barrier1	point5	5	39.80
			Barrier3	point25	25	39.70
			Barrier3	point24	24	39.00
			Barrier4	point32	32	39.00
			Barrier4	point33	33	37.80
			Barrier3	point23	23	36.90
			Barrier3	point27	27	35.40
CNE 2 - 23	33	61.60	Barrier4	point30	30	55.80
			Barrier4	point31	31	52.70
			Barrier4	point29	29	50.50
			Barrier4	point32	32	46.70
			Barrier1	point5	5	45.10
			Barrier3	point27	27	44.00
			Barrier4	point33	33	42.90
			Barrier1	point4	4	39.20
			Barrier3	point26	26	38.90
			Barrier3	point25	25	36.10
CNE 2 - 24	34	62.40	Barrier4	point30	30	51.20
			Barrier4	point31	31	50.30
			Barrier4	point32	32	47.50
			Barrier1	point5	5	46.90
			Barrier4	point29	29	46.50
			Barrier4	point33	33	44.70
			Barrier3	point27	27	44.20
			Barrier3	point26	26	41.70
			Barrier3	point25	25	38.10
			Barrier3	point23	23	38.10
CNE 2 - 25	35	61.50	Barrier4	point30	30	48.80
			Barrier4	point31	31	48.70
			Barrier4	point32	32	46.30
			Barrier1	point5	5	45.10
			Barrier4	point29	29	44.30
			Barrier4	point33	33	44.30
			Barrier3	point27	27	41.20

			Barrier3	point26	26	40.20
			Barrier3	point25	25	39.40
			Barrier3	point24	24	39.10
CNE 2 - 26	36	61.50	Barrier4	point31	31	46.00
			Barrier4	point30	30	45.60
			Barrier1	point5	5	43.80
			Barrier4	point32	32	43.60
			Barrier4	point33	33	42.30
			Barrier4	point29	29	40.90
			Barrier3	point25	25	39.30
			Barrier1	point4	4	38.50
			Barrier3	point26	26	38.40
			Barrier3	point24	24	38.00
CNE 2 - 27	37	59.40	Barrier1	point5	5	44.20
			Barrier4	point31	31	43.10
			Barrier4	point30	30	43.00
			Barrier4	point32	32	41.30
			Barrier4	point33	33	40.60
			Barrier1	point4	4	38.70
			Barrier4	point29	29	38.40
			Barrier1	point1	1	37.40
			Barrier3	point25	25	37.40
			Barrier3	point24	24	37.10
CNE 2 - 28	38	62.50	Barrier4	point32	32	53.50
			Barrier4	point33	33	52.50
			Barrier4	point31	31	50.30
			Barrier1	point5	5	48.20
			Barrier4	point30	30	45.20
			Barrier4	point29	29	43.50
			Barrier1	point4	4	42.20
			Barrier1	point1	1	41.60
			Barrier3	point27	27	40.20
			Barrier1	point3	3	39.50
CNE 2 - 29	39	61.50	Barrier1	point5	5	50.20

			Barrier4	point33	33	49.60
			Barrier4	point32	32	49.00
			Barrier4	point31	31	48.30
			Barrier4	point30	30	45.20
			Barrier1	point1	1	43.90
			Barrier1	point4	4	42.60
			Barrier4	point29	29	42.50
			Barrier1	point2	2	41.40
			Barrier1	point3	3	41.00
CNE 2 - 30	40	58.90	Barrier1	point5	5	48.00
			Barrier4	point33	33	45.40
			Barrier4	point31	31	45.20
			Barrier4	point32	32	44.80
			Barrier4	point30	30	43.30
			Barrier1	point4	4	42.80
			Barrier1	point1	1	42.70
			Barrier1	point3	3	40.80
			Barrier1	point2	2	40.80
			Barrier4	point29	29	39.60
CNE 2 - 31	41	57.10	Barrier1	point5	5	46.90
			Barrier1	point4	4	42.20
			Barrier4	point33	33	41.40
			Barrier4	point31	31	41.40
			Barrier4	point32	32	40.80
			Barrier1	point1	1	40.30
			Barrier1	point3	4	39.80
			Barrier4	point30	30	39.70
			Barrier1	point2	2	39.20
			Barrier4	point29	29	36.00
CNE 2 - 32	42	60.90	Barrier1	point3	3	55.70
			Barrier1	point2	2	54.10
			Barrier1	point5	5	53.80
			Barrier1	point4	4	53.80
			Barrier1	point1	1	45.90

			Barrier4	point33	33	41.00
			Barrier4	point31	31	37.90
			Barrier4	point32	32	37.80
			Barrier4	point29	29	35.00
			Barrier4	point30	30	34.40
CNE 2 - 33	43	58.50	Barrier1	point5	5	52.90
			Barrier1	point4	4	48.00
			Barrier1	point3	3	43.50
			Barrier1	point2	2	41.10
			Barrier1	point1	1	40.10
			Barrier4	point33	33	38.10
			Barrier4	point32	32	36.70
			Barrier4	point31	31	36.50
			Barrier4	point30	30	33.90
			Barrier4	point29	29	32.90
CNE 2 - 34	44	57.30	Barrier1	point5	5	50.20
			Barrier1	point4	4	44.20
			Barrier1	point3	3	40.20
			Barrier1	point2	2	37.90
			Barrier1	point1	1	37.20
			Barrier4	point33	33	36.10
			Barrier4	point31	31	35.10
			Barrier4	point32	32	35.10
			Barrier4	point30	30	33.50
			Barrier4	point29	29	31.30
CNE 2 - 35	45	61.40	Barrier1	point5	5	59.80
			Barrier1	point4	4	53.80
			Barrier1	point3	3	46.00
			Barrier1	point2	2	41.20
			Barrier1	point1	1	38.90
			Barrier4	point33	33	36.20
			Barrier4	point32	32	34.20
			Barrier4	point31	31	34.20
			Barrier4	point29	29	32.20

			Barrier3	point27	27	31.70

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: BARRIER DESIGN
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 2 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Calc LAeq1h	Noise Reduction Calc	Noise Reduction Goal	Noise Reduction Calc-Goal	Barrier Reviewed	Important Segments Name	Important Segments No.	Important Segments Height	Partial LAeq1h
		dBA	dB	dB	dB				ft	dBA
Res 2	3	60.5	12.0	8	4.0	Barrier1	point1	1	12.0	56.8
						Barrier1	point2	2	12.0	45.7
						Barrier1	point3	3	12.0	45.6
						Barrier4	point33	33	12.0	44.9
						Barrier1	point5	5	12.0	43.4
						Barrier1	point4	4	12.0	43.3
						Barrier4	point32	32	12.0	41.0
						Barrier4	point31	31	12.0	40.5
						Barrier4	point29	29	12.0	36.5
						Barrier4	point30	30	12.0	36.5
CNE 2 - 1	11	60.1	9.5	8	1.5	Barrier2	point12	12	12.0	55.6
						Barrier2	point11	11	12.0	53.4
						Barrier2	point10	10	12.0	48.4
						Barrier2	point13	13	12.0	46.8
						Barrier2	point9	9	12.0	44.1
						Barrier3	point15	15	12.0	42.4
						Barrier3	point16	16	12.0	42.0
						Barrier2	point8	8	12.0	40.7
						Barrier2	point7	7	12.0	38.9
						Barrier3	point17	17	12.0	35.2

CNE 2 - 2	12	60.9	4.9	8	-3.1	Barrier2	point11	11	12.0	54.6
						Barrier2	point12	12	12.0	53.0
						Barrier2	point10	10	12.0	52.9
						Barrier2	point9	9	12.0	49.9
						Barrier2	point8	8	12.0	47.3
						Barrier2	point13	13	12.0	46.4
						Barrier2	point7	7	12.0	45.1
						Barrier3	point15	15	12.0	42.6
						Barrier3	point16	16	12.0	41.3
						Barrier3	point17	17	12.0	36.8
CNE 2 - 3	13	58.9	3.2	8	-4.8	Barrier2	point11	11	12.0	50.8
						Barrier2	point10	10	12.0	50.5
						Barrier2	point12	12	12.0	49.6
						Barrier2	point9	9	12.0	48.9
						Barrier2	point8	8	12.0	47.5
						Barrier2	point7	7	12.0	46.0
						Barrier2	point13	13	12.0	44.6
						Barrier3	point15	15	12.0	41.2
						Barrier3	point16	16	12.0	39.7
						Barrier3	point17	17	12.0	36.2
CNE 2 - 4	14	56.8	2.5	8	-5.5	Barrier2	point10	10	12.0	47.1
						Barrier2	point11	11	12.0	47.0
						Barrier2	point9	9	12.0	46.2
						Barrier2	point12	12	12.0	46.0
						Barrier2	point8	8	12.0	45.6
						Barrier2	point7	7	12.0	44.9
						Barrier2	point13	13	12.0	41.9
						Barrier3	point15	15	12.0	39.1
						Barrier3	point16	16	12.0	37.9
						Barrier3	point17	17	12.0	34.8
CNE 2 - 5	15	64.2	7.7	8	-0.3	Barrier3	point15	15	12.0	58.7
						Barrier3	point16	16	12.0	49.4
						Barrier2	point10	10	12.0	37.1
						Barrier2	point11	11	12.0	37.0
						Barrier3	point17	17	12.0	35.4
						Barrier2	point9	9	12.0	35.2

						Barrier2	point12	12	12.0	34.6
						Barrier2	point13	13	12.0	34.0
						Barrier2	point7	7	12.0	33.8
						Barrier2	point8	8	12.0	32.2
CNE 2 - 6	16	61.9	4.1	8	-3.9	Barrier3	point15	15	12.0	50.5
						Barrier2	point12	12	12.0	50.1
						Barrier2	point13	13	12.0	48.8
						Barrier3	point16	16	12.0	48.6
						Barrier2	point11	11	12.0	47.8
						Barrier2	point10	10	12.0	45.7
						Barrier3	point17	17	12.0	44.0
						Barrier2	point9	9	12.0	43.0
						Barrier3	point18	18	12.0	41.3
						Barrier2	point8	8	12.0	40.4
CNE 2 - 7	17	57.4	3.1	8	-4.9	Barrier2	point12	12	12.0	47.9
						Barrier2	point11	11	12.0	46.9
						Barrier2	point10	10	12.0	45.5
						Barrier2	point13	13	12.0	45.4
						Barrier3	point15	15	12.0	44.7
						Barrier2	point9	9	12.0	43.5
						Barrier3	point16	16	12.0	43.3
						Barrier2	point8	8	12.0	42.1
						Barrier2	point7	7	12.0	40.8
						Barrier3	point17	17	12.0	40.3
CNE 2 - 8	18	54.6	3.0	8	-5.0	Barrier2	point12	12	12.0	43.8
						Barrier2	point11	11	12.0	43.0
						Barrier2	point10	10	12.0	41.9
						Barrier3	point15	15	12.0	41.6
						Barrier2	point13	13	12.0	41.1
						Barrier3	point16	16	12.0	40.8
						Barrier2	point9	9	12.0	40.4
						Barrier2	point8	8	12.0	39.4
						Barrier3	point17	17	12.0	38.8
						Barrier2	point7	7	12.0	38.5
CNE 2 - 9	19	54.2	3.9	8	-4.1	Barrier3	point15	15	12.0	43.6
						Barrier3	point16	16	12.0	41.6

						Barrier2	point12	12	12.0	41.0
						Barrier3	point18	18	12.0	40.9
						Barrier3	point17	17	12.0	40.5
						Barrier3	point19	19	12.0	40.5
						Barrier2	point11	11	12.0	40.1
						Barrier3	point20	20	12.0	39.2
						Barrier2	point10	10	12.0	39.0
						Barrier3	point24	24	12.0	38.7
CNE 2 - 10	20	58.0	9.9	8	1.9	Barrier3	point19	19	12.0	51.9
						Barrier3	point20	20	12.0	49.7
						Barrier3	point18	18	12.0	48.7
						Barrier3	point21	21	12.0	45.7
						Barrier3	point17	17	12.0	44.4
						Barrier3	point15	15	12.0	43.9
						Barrier3	point22	22	12.0	43.2
						Barrier3	point24	24	12.0	42.0
						Barrier3	point16	16	12.0	41.3
						Barrier2	point12	12	12.0	40.5
CNE 2 - 11	21	53.7	4.3	8	-3.7	Barrier3	point19	19	12.0	41.3
						Barrier3	point24	24	12.0	41.2
						Barrier3	point18	18	12.0	40.7
						Barrier3	point20	20	12.0	40.6
						Barrier3	point21	21	12.0	40.1
						Barrier3	point22	22	12.0	40.1
						Barrier3	point15	15	12.0	39.7
						Barrier3	point17	17	12.0	39.4
						Barrier3	point16	16	12.0	38.9
						Barrier2	point12	12	12.0	38.6
CNE 2 - 12	22	57.8	10.3	8	2.3	Barrier3	point20	20	12.0	51.5
						Barrier3	point21	21	12.0	49.8
						Barrier3	point19	19	12.0	48.8
						Barrier3	point22	22	12.0	46.6
						Barrier3	point18	18	12.0	44.9
						Barrier3	point24	24	12.0	44.5
						Barrier3	point15	15	12.0	41.5
						Barrier3	point17	17	12.0	41.3

						Barrier3	point25	25	12.0	40.8
						Barrier3	point27	27	12.0	40.3
CNE 2 - 13	23	58.7	12.2	8	4.2	Barrier3	point21	21	12.0	55.5
						Barrier3	point22	22	12.0	52.2
						Barrier3	point20	20	12.0	45.4
						Barrier3	point24	24	12.0	45.0
						Barrier3	point25	25	12.0	42.4
						Barrier3	point27	27	12.0	41.8
						Barrier3	point19	19	12.0	41.6
						Barrier3	point26	26	12.0	39.6
						Barrier3	point18	18	12.0	39.0
						Barrier2	point11	11	12.0	38.4
CNE 2 - 14	24	58.7	11.0	8	3.0	Barrier3	point22	22	12.0	53.5
						Barrier3	point23	23	12.0	52.1
						Barrier3	point24	24	12.0	50.8
						Barrier3	point25	25	12.0	46.2
						Barrier3	point21	21	12.0	45.4
						Barrier3	point27	27	12.0	43.9
						Barrier3	point26	26	12.0	43.3
						Barrier3	point20	20	12.0	41.9
						Barrier3	point19	19	12.0	39.5
						Barrier1	point5	5	12.0	39.2
CNE 2 - 15	25	54.1	5.0	8	-3.0	Barrier3	point24	24	12.0	44.3
						Barrier3	point22	22	12.0	42.7
						Barrier3	point23	23	12.0	42.2
						Barrier3	point21	21	12.0	41.5
						Barrier3	point25	25	12.0	41.3
						Barrier3	point27	27	12.0	41.0
						Barrier3	point20	20	12.0	40.5
						Barrier3	point26	26	12.0	40.0
						Barrier3	point19	19	12.0	40.0
						Barrier3	point18	18	12.0	38.6
CNE 2 - 16	26	57.8	9.6	8	1.6	Barrier3	point24	24	12.0	52.1
						Barrier3	point25	25	12.0	50.2
						Barrier3	point23	23	12.0	49.2
						Barrier3	point26	26	12.0	47.3

						Barrier3	point27	27	12.0	47.0
						Barrier3	point22	22	12.0	44.8
						Barrier1	point5	5	12.0	40.8
						Barrier3	point21	21	12.0	40.6
						Barrier3	point20	20	12.0	38.6
						Barrier4	point30	30	12.0	38.0
CNE 2 - 17	27	55.1	5.6	8	-2.4	Barrier3	point24	24	12.0	44.9
						Barrier3	point27	27	12.0	44.4
						Barrier3	point25	25	12.0	44.3
						Barrier3	point26	26	12.0	43.3
						Barrier3	point23	23	12.0	42.7
						Barrier3	point22	22	12.0	41.4
						Barrier1	point5	5	12.0	40.1
						Barrier4	point30	30	12.0	39.3
						Barrier3	point21	21	12.0	38.6
						Barrier4	point31	31	12.0	38.6
CNE 2 - 18	28	58.8	9.8	8	1.8	Barrier3	point25	25	12.0	53.1
						Barrier3	point26	26	12.0	51.5
						Barrier3	point27	27	12.0	50.5
						Barrier3	point24	24	12.0	50.4
						Barrier3	point23	23	12.0	46.7
						Barrier3	point22	22	12.0	40.9
						Barrier4	point30	30	12.0	40.6
						Barrier4	point29	29	12.0	39.6
						Barrier3	point21	21	12.0	38.0
						Barrier1	point5	5	12.0	37.6
CNE 2 - 19	29	56.0	5.3	8	-2.7	Barrier3	point27	27	12.0	45.3
						Barrier3	point25	25	12.0	44.5
						Barrier3	point26	26	12.0	44.1
						Barrier3	point24	24	12.0	44.0
						Barrier4	point30	30	12.0	42.6
						Barrier3	point23	23	12.0	41.7
						Barrier1	point5	5	12.0	40.9
						Barrier4	point31	31	12.0	40.4
						Barrier3	point22	22	12.0	39.6
						Barrier4	point32	32	12.0	38.9

CNE 2 - 20	30	59.7	10.5	8	2.5	Barrier3	point26	26	12.0	55.0
						Barrier3	point27	27	12.0	53.7
						Barrier3	point25	25	12.0	51.0
						Barrier3	point24	24	12.0	46.2
						Barrier3	point23	23	12.0	43.9
						Barrier4	point30	30	12.0	43.4
						Barrier4	point29	29	12.0	43.2
						Barrier3	point22	22	12.0	37.4
						Barrier1	point5	5	12.0	36.9
						Barrier4	point31	31	12.0	36.8
CNE 2 - 21	31	62.0	1.7	8	-6.3	Barrier4	point30	30	12.0	43.7
						Barrier3	point26	26	12.0	42.9
						Barrier4	point31	31	12.0	42.8
						Barrier3	point25	25	12.0	42.3
						Barrier1	point5	5	12.0	42.1
						Barrier3	point24	24	12.0	40.9
						Barrier4	point32	32	12.0	40.8
						Barrier4	point33	33	12.0	39.1
						Barrier3	point23	23	12.0	38.8
						Barrier4	point29	29	12.0	37.9
CNE 2 - 22	32	58.6	1.4	8	-6.6	Barrier4	point30	30	12.0	40.7
						Barrier4	point31	31	12.0	40.5
						Barrier3	point26	26	12.0	39.9
						Barrier1	point5	5	12.0	39.8
						Barrier3	point25	25	12.0	39.7
						Barrier3	point24	24	12.0	39.0
						Barrier4	point32	32	12.0	39.0
						Barrier4	point33	33	12.0	37.8
						Barrier3	point23	23	12.0	36.9
						Barrier3	point27	27	12.0	35.4
CNE 2 - 23	33	61.6	9.5	8	1.5	Barrier4	point30	30	12.0	55.8
						Barrier4	point31	31	12.0	52.7
						Barrier4	point29	29	12.0	50.5
						Barrier4	point32	32	12.0	46.7
						Barrier1	point5	5	12.0	45.1
						Barrier3	point27	27	12.0	44.0

						Barrier4	point33	33	12.0	42.9
						Barrier1	point4	4	12.0	39.2
						Barrier3	point26	26	12.0	38.9
						Barrier3	point25	25	12.0	36.1
CNE 2 - 24	34	62.4	4.3	8	-3.7	Barrier4	point30	30	12.0	51.2
						Barrier4	point31	31	12.0	50.3
						Barrier4	point32	32	12.0	47.5
						Barrier1	point5	5	12.0	46.9
						Barrier4	point29	29	12.0	46.5
						Barrier4	point33	33	12.0	44.7
						Barrier3	point27	27	12.0	44.2
						Barrier3	point26	26	12.0	41.7
						Barrier3	point25	25	12.0	38.1
						Barrier3	point23	23	12.0	38.1
CNE 2 - 25	35	61.5	2.9	8	-5.1	Barrier4	point30	30	12.0	48.8
						Barrier4	point31	31	12.0	48.7
						Barrier4	point32	32	12.0	46.3
						Barrier1	point5	5	12.0	45.1
						Barrier4	point29	29	12.0	44.3
						Barrier4	point33	33	12.0	44.3
						Barrier3	point27	27	12.0	41.2
						Barrier3	point26	26	12.0	40.2
						Barrier3	point25	25	12.0	39.4
						Barrier3	point24	24	12.0	39.1
CNE 2 - 26	36	61.5	1.7	8	-6.3	Barrier4	point31	31	12.0	46.0
						Barrier4	point30	30	12.0	45.6
						Barrier1	point5	5	12.0	43.8
						Barrier4	point32	32	12.0	43.6
						Barrier4	point33	33	12.0	42.3
						Barrier4	point29	29	12.0	40.9
						Barrier3	point25	25	12.0	39.3
						Barrier1	point4	4	12.0	38.5
						Barrier3	point26	26	12.0	38.4
						Barrier3	point24	24	12.0	38.0
CNE 2 - 27	37	59.4	1.8	8	-6.2	Barrier1	point5	5	12.0	44.2
						Barrier4	point31	31	12.0	43.1

						Barrier4	point30	30	12.0	43.0
						Barrier4	point32	32	12.0	41.3
						Barrier4	point33	33	12.0	40.6
						Barrier1	point4	4	12.0	38.7
						Barrier4	point29	29	12.0	38.4
						Barrier1	point1	1	12.0	37.4
						Barrier3	point25	25	12.0	37.4
						Barrier3	point24	24	12.0	37.1
CNE 2 - 28	38	62.5	7.5	8	-0.5	Barrier4	point32	32	12.0	53.5
						Barrier4	point33	33	12.0	52.5
						Barrier4	point31	31	12.0	50.3
						Barrier1	point5	5	12.0	48.2
						Barrier4	point30	30	12.0	45.2
						Barrier4	point29	29	12.0	43.5
						Barrier1	point4	4	12.0	42.2
						Barrier1	point1	1	12.0	41.6
						Barrier3	point27	27	12.0	40.2
						Barrier1	point3	3	12.0	39.5
CNE 2 - 29	39	61.5	4.0	8	-4.0	Barrier1	point5	5	12.0	50.2
						Barrier4	point33	33	12.0	49.6
						Barrier4	point32	32	12.0	49.0
						Barrier4	point31	31	12.0	48.3
						Barrier4	point30	30	12.0	45.2
						Barrier1	point1	1	12.0	43.9
						Barrier1	point4	4	12.0	42.6
						Barrier4	point29	29	12.0	42.5
						Barrier1	point2	2	12.0	41.4
						Barrier1	point3	3	12.0	41.0
CNE 2 - 30	40	58.9	3.2	8	-4.8	Barrier1	point5	5	12.0	48.0
						Barrier4	point33	33	12.0	45.4
						Barrier4	point31	31	12.0	45.2
						Barrier4	point32	32	12.0	44.8
						Barrier4	point30	30	12.0	43.3
						Barrier1	point4	4	12.0	42.8
						Barrier1	point1	1	12.0	42.7
						Barrier1	point3	3	12.0	40.8

						Barrier1	point2	2	12.0	40.8
						Barrier4	point29	29	12.0	39.6
CNE 2 - 31	41	57.1	2.6	8	-5.4	Barrier1	point5	5	12.0	46.9
						Barrier1	point4	4	12.0	42.2
						Barrier4	point33	33	12.0	41.4
						Barrier4	point31	31	12.0	41.4
						Barrier4	point32	32	12.0	40.8
						Barrier1	point1	1	12.0	40.3
						Barrier1	point3	3	12.0	39.8
						Barrier4	point30	30	12.0	39.7
						Barrier1	point2	2	12.0	39.2
						Barrier4	point29	29	12.0	36.0
CNE 2 - 32	42	60.9	10.7	8	2.7	Barrier1	point3	3	12.0	55.7
						Barrier1	point2	2	12.0	54.1
						Barrier1	point5	5	12.0	53.8
						Barrier1	point4	4	12.0	53.8
						Barrier1	point1	1	12.0	45.9
						Barrier4	point33	33	12.0	41.0
						Barrier4	point31	31	12.0	37.9
						Barrier4	point32	32	12.0	37.8
						Barrier4	point29	29	12.0	35.0
						Barrier4	point30	30	12.0	34.4
CNE 2 - 33	43	58.5	2.5	8	-5.5	Barrier1	point5	5	12.0	52.9
						Barrier1	point4	4	12.0	48.0
						Barrier1	point3	3	12.0	43.5
						Barrier1	point2	2	12.0	41.1
						Barrier1	point1	1	12.0	40.1
						Barrier4	point33	33	12.0	38.1
						Barrier4	point32	32	12.0	36.7
						Barrier4	point31	31	12.0	36.5
						Barrier4	point30	30	12.0	33.9
						Barrier4	point29	29	12.0	32.9
CNE 2 - 34	44	57.3	1.7	8	-6.3	Barrier1	point5	5	12.0	50.2
						Barrier1	point4	4	12.0	44.2
						Barrier1	point3	3	12.0	40.2
						Barrier1	point2	2	12.0	37.9

						Barrier1	point1	1	12.0	37.2
						Barrier4	point33	33	12.0	36.1
						Barrier4	point31	31	12.0	35.1
						Barrier4	point32	32	12.0	35.1
						Barrier4	point30	30	12.0	33.5
						Barrier4	point29	29	12.0	31.3
CNE 2 - 35	45	61.4	7.9	8	-0.1	Barrier1	point5	5	12.0	59.8
						Barrier1	point4	4	12.0	53.8
						Barrier1	point3	3	12.0	46.0
						Barrier1	point2	2	12.0	41.2
						Barrier1	point1	1	12.0	38.9
						Barrier4	point33	33	12.0	36.2
						Barrier4	point32	32	12.0	34.2
						Barrier4	point31	31	12.0	34.2
						Barrier4	point29	29	12.0	32.2
						Barrier3	point27	27	12.0	31.7
Total Cost, All Barriers (including additional cost(s))					$1058626					

CNE 3 Barrier TNM Input and Output

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
I-88 EB OffRamp RT	34.0	point348	348	947,745.8	1,876,072.4	741.00				Average	
		point349	349	947,842.4	1,876,034.0	744.00				Average	
		point350	350	947,895.2	1,876,030.5	746.00				Average	
		point351	351	947,942.6	1,876,018.5	747.00				Average	
		point352	352	947,980.9	1,875,997.9	748.00				Average	
		point353	353	948,037.6	1,875,953.5	749.00					
I-88 EB OnRamp RT	28.0	point354	354	948,121.9	1,875,855.6	743.00				Average	
		point355	355	948,121.1	1,875,879.1	743.00				Average	
		point356	356	948,106.0	1,875,995.2	744.00				Average	
		point357	357	948,110.1	1,876,024.6	741.00				Average	
		point358	358	948,124.4	1,876,055.8	736.00				Average	
		point359	359	948,154.2	1,876,084.4	728.00					
I-88 EB OffRamp LT	12.0	point586	586	947,745.8	1,876,072.4	741.00				Average	
		point585	585	947,847.8	1,876,066.9	745.00				Average	
		point583	583	948,006.9	1,876,060.8	749.00					
Finley Rd	24.0	point596	596	948,167.4	1,875,614.8	739.00				Average	
		point597	597	948,071.8	1,875,611.0	740.00				Average	
		point598	598	947,871.4	1,875,608.4	736.00				Average	
		point599	599	947,672.1	1,875,605.6	737.00				Average	
		point600	600	947,471.9	1,875,603.4	739.00				Average	
		point601	601	947,394.9	1,875,601.8	739.00				Average	
		point602	602	947,372.9	1,875,599.9	740.00				Average	
		point603	603	947,346.9	1,875,595.5	740.00				Average	
		point604	604	947,318.3	1,875,586.5	741.00				Average	
		point605	605	947,290.1	1,875,575.2	741.00				Average	

		point606	606	947,280.0	1,875,569.8	741.00				Average	
		point607	607	947,254.9	1,875,551.8	741.00				Average	
		point608	608	947,228.5	1,875,526.5	742.00				Average	
		point609	609	947,176.9	1,875,468.6	742.00					
I-88 EB OnRamp LT	24.0	point360	360	948,051.9	1,876,095.8	749.00				Average	
		point361	361	948,073.8	1,876,086.8	748.00				Average	
		point362	362	948,095.8	1,876,082.2	744.00				Average	
		point363	363	948,118.2	1,876,082.2	738.00				Average	
		point365	365	948,154.2	1,876,084.4	728.00					
IL 47 from Scott Rd to Finley Rd NB	44.0	point634	634	949,457.2	1,873,513.4	719.50				Average	
		point132	132	949,404.8	1,873,661.1	720.00				Average	
		point133	133	949,327.6	1,873,846.6	720.00				Average	
		point134	134	949,240.7	1,874,029.8	718.00				Average	
		point135	135	949,144.2	1,874,203.6	717.00				Average	
		point136	136	949,090.8	1,874,292.2	716.00				Average	
		point137	137	949,036.1	1,874,376.5	716.00				Average	
		point138	138	948,921.9	1,874,542.2	716.00				Average	
		point139	139	948,807.5	1,874,707.1	718.00				Average	
		point140	140	948,692.9	1,874,870.9	720.00				Average	
		point141	141	948,580.4	1,875,033.6	724.00				Average	
		point142	142	948,465.8	1,875,198.9	728.00				Average	
		point143	143	948,353.2	1,875,359.8	732.00				Average	
		point144	144	948,300.2	1,875,446.4	734.00				Average	
		point145	145	948,255.2	1,875,531.9	736.00				Average	
		point637	637	948,213.1	1,875,621.6	738.50					
IL 47 from Scott Rd to Finley Rd SB	44.0	point639	639	948,167.4	1,875,614.8	739.00				Average	
		point80	80	948,213.4	1,875,515.9	736.00				Average	
		point81	81	948,312.2	1,875,333.4	732.00				Average	
		point82	82	948,364.6	1,875,251.8	732.00				Average	
		point84	84	948,363.9	1,875,252.6	732.00				Average	
		point85	85	948,480.1	1,875,082.6	726.00				Average	
		point86	86	948,593.0	1,874,916.9	722.00				Average	
		point87	87	948,709.9	1,874,754.1	719.00				Average	
		point88	88	948,823.8	1,874,588.4	717.00				Average	
		point89	89	948,936.3	1,874,426.6	716.00				Average	
		point90	90	948,992.0	1,874,345.9	716.00				Average	
		point91	91	949,098.1	1,874,175.5	716.00				Average	
		point92	92	949,146.1	1,874,092.4	717.00				Average	

		point93	93	949,192.6	1,874,003.0	718.00				Average	
		point94	94	949,237.8	1,873,914.2	719.00				Average	
		point95	95	949,278.7	1,873,823.1	719.00				Average	
		point96	96	949,354.1	1,873,641.8	720.00				Average	
		point635	635	949,401.0	1,873,506.9	719.00					
IL 47 from Finley Rd to I-88EB Ramps SB	44.0	point71	71	948,006.9	1,876,060.8	749.00				Average	
		point641	641	948,037.6	1,875,953.5	749.00				Average	
		point72	72	948,058.8	1,875,882.0	749.00				Average	
		point75	75	948,092.2	1,875,789.4	743.00				Average	
		point76	76	948,129.7	1,875,695.0	743.00				Average	
		point78	78	948,167.4	1,875,614.8	739.00					
IL 47 from Finley Rd to I-88EB Ramps NB	44.0	point638	638	948,213.1	1,875,621.6	738.50				Average	
		point146	146	948,173.6	1,875,713.9	741.00				Average	
		point147	147	948,138.1	1,875,805.4	743.00				Average	
		point640	640	948,121.9	1,875,855.6	743.00				Average	
		point148	148	948,078.0	1,875,992.6	747.00				Average	
		point540	540	948,051.9	1,876,095.8	749.00					
I-88 EB OffRamp 2Lane	12.0	point595	595	946,367.3	1,876,984.1	729.00				Average	
		point594	594	946,490.6	1,876,881.4	729.00				Average	
		point593	593	946,772.4	1,876,673.5	729.00				Average	
		point592	592	947,178.9	1,876,375.8	731.00				Average	
		point591	591	947,319.6	1,876,270.9	731.00				Average	
		point590	590	947,407.9	1,876,209.4	732.00				Average	
		point589	589	947,515.6	1,876,141.0	734.00				Average	
		point588	588	947,557.3	1,876,123.9	735.00				Average	
		point587	587	947,676.7	1,876,084.0	739.00				Average	
		point647	647	947,745.8	1,876,072.4	741.00					
I-88 EB OnRamp 2Lane	24.0	point648	648	948,154.2	1,876,084.4	728.00				Average	
		point366	366	948,327.6	1,876,123.1	724.00				Average	
		point367	367	948,520.0	1,876,170.1	725.00				Average	
		point368	368	948,713.5	1,876,218.9	727.00				Average	
		point369	369	948,814.1	1,876,235.6	728.00				Average	
		point370	370	948,915.5	1,876,240.5	731.00				Average	
		point371	371	949,014.6	1,876,240.5	733.00				Average	
		point372	372	949,114.4	1,876,233.5	733.00				Average	
		point373	373	949,313.6	1,876,211.0	732.00				Average	
		point374	374	949,436.4	1,876,196.8	732.00				Average	
		point376	376	949,611.6	1,876,172.1	728.00				Average	

		point377	377	949,807.8	1,876,129.4	727.00				Average	
		point378	378	950,000.1	1,876,073.9	725.00				Average	
		point379	379	950,139.5	1,876,029.2	724.00					
IL 47 bt I-88 Ramps SB	44.0	point649	649	947,749.1	1,877,276.4	762.00				Average	
		point63	63	947,794.1	1,877,055.4	762.00				Average	
		point64	64	947,836.1	1,876,858.9	762.00				Average	
		point65	65	947,876.2	1,876,663.0	759.00				Average	
		point66	66	947,917.8	1,876,467.5	756.00				Average	
		point67	67	947,959.3	1,876,274.1	753.00				Average	
		point68	68	947,980.3	1,876,176.1	753.00				Average	
		point70	70	948,006.9	1,876,060.8	749.00					
IL 47 bt I-88 Ramps NB	44.0	point642	642	948,051.9	1,876,095.8	749.00				Average	
		point149	149	948,028.9	1,876,187.0	751.00				Average	
		point153	153	948,008.4	1,876,285.6	753.00				Average	
		point154	154	947,967.2	1,876,478.2	756.00				Average	
		point155	155	947,925.8	1,876,673.1	759.00				Average	
		point156	156	947,883.6	1,876,870.9	761.00				Average	
		point581	581	947,866.9	1,876,962.4	761.00				Average	
		point157	157	947,848.1	1,877,066.9	762.00				Average	
		point541	541	947,837.3	1,877,115.8	762.00				Average	
		point158	158	947,803.4	1,877,264.2	762.00					

Volkert, Inc.
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28 July 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
I-88 EB OffRamp RT	point348	348	185	35	13	35	13	35	0	0	0	0
	point349	349	185	35	13	35	13	35	0	0	0	0
	point350	350	185	35	13	35	13	35	0	0	0	0
	point351	351	185	35	13	35	13	35	0	0	0	0
	point352	352	185	35	13	35	13	35	0	0	0	0
	point353	353										
I-88 EB OnRamp RT	point354	354	287	35	20	35	20	35	0	0	0	0
	point355	355	287	35	20	35	20	35	0	0	0	0
	point356	356	287	35	20	35	20	35	0	0	0	0
	point357	357	287	35	20	35	20	35	0	0	0	0
	point358	358	287	35	20	35	20	35	0	0	0	0
	point359	359										
I-88 EB OffRamp LT	point586	586	185	35	13	35	13	35	0	0	0	0
	point585	585	185	35	13	35	13	35	0	0	0	0
	point583	583										
Finley Rd	point596	596	134	35	9	35	9	35	0	0	0	0
	point597	597	134	35	9	35	9	35	0	0	0	0
	point598	598	134	35	9	35	9	35	0	0	0	0
	point599	599	134	35	9	35	9	35	0	0	0	0
	point600	600	134	35	9	35	9	35	0	0	0	0
	point601	601	134	35	9	35	9	35	0	0	0	0
	point602	602	134	35	9	35	9	35	0	0	0	0

	point603	603	134	35	9	35	9	35	0	0	0	0
	point604	604	134	35	9	35	9	35	0	0	0	0
	point605	605	134	35	9	35	9	35	0	0	0	0
	point606	606	134	35	9	35	9	35	0	0	0	0
	point607	607	134	35	9	35	9	35	0	0	0	0
	point608	608	134	35	9	35	9	35	0	0	0	0
	point609	609										
I-88 EB OnRamp LT	point360	360	287	35	20	35	20	35	0	0	0	0
	point361	361	287	35	20	35	20	35	0	0	0	0
	point362	362	287	35	20	35	20	35	0	0	0	0
	point363	363	287	35	20	35	20	35	0	0	0	0
	point365	365										
IL 47 from Scott Rd to Finley Rd NB	point634	634	1241	55	84	55	70	55	0	0	0	0
	point132	132	1241	55	84	55	70	55	0	0	0	0
	point133	133	1241	55	84	55	70	55	0	0	0	0
	point134	134	1241	55	84	55	70	55	0	0	0	0
	point135	135	1241	55	84	55	70	55	0	0	0	0
	point136	136	1241	55	84	55	70	55	0	0	0	0
	point137	137	1241	55	84	55	70	55	0	0	0	0
	point138	138	1241	55	84	55	70	55	0	0	0	0
	point139	139	1241	55	84	55	70	55	0	0	0	0
	point140	140	1241	55	84	55	70	55	0	0	0	0
	point141	141	1241	55	84	55	70	55	0	0	0	0
	point142	142	1241	55	84	55	70	55	0	0	0	0
	point143	143	1241	55	84	55	70	55	0	0	0	0
	point144	144	1241	55	84	55	70	55	0	0	0	0
	point145	145	1241	55	84	55	70	55	0	0	0	0
	point637	637										
IL 47 from Scott Rd to Finley Rd SB	point639	639	1113	55	75	55	63	55	0	0	0	0
	point80	80	1113	55	75	55	63	55	0	0	0	0
	point81	81	1113	55	75	55	63	55	0	0	0	0
	point82	82	1113	55	75	55	63	55	0	0	0	0
	point84	84	1113	55	75	55	63	55	0	0	0	0
	point85	85	1113	55	75	55	63	55	0	0	0	0

	point86	86	1113	55	75	55	63	55	0	0	0	0
	point87	87	1113	55	75	55	63	55	0	0	0	0
	point88	88	1113	55	75	55	63	55	0	0	0	0
	point89	89	1113	55	75	55	63	55	0	0	0	0
	point90	90	1113	55	75	55	63	55	0	0	0	0
	point91	91	1113	55	75	55	63	55	0	0	0	0
	point92	92	1113	55	75	55	63	55	0	0	0	0
	point93	93	1113	55	75	55	63	55	0	0	0	0
	point94	94	1113	55	75	55	63	55	0	0	0	0
	point95	95	1113	55	75	55	63	55	0	0	0	0
	point96	96	1113	55	75	55	63	55	0	0	0	0
	point635	635										
IL 47 from Finley Rd to I-88EB Ramps SB	point71	71	1111	55	76	55	76	55	0	0	0	0
	point641	641	1111	55	76	55	76	55	0	0	0	0
	point72	72	1111	55	76	55	76	55	0	0	0	0
	point75	75	1111	55	76	55	76	55	0	0	0	0
	point76	76	1111	55	76	55	76	55	0	0	0	0
	point78	78										
IL 47 from Finley Rd to I-88EB Ramps NB	point638	638	1287	55	88	55	88	55	0	0	0	0
	point146	146	1287	55	88	55	88	55	0	0	0	0
	point147	147	1287	55	88	55	88	55	0	0	0	0
	point640	640	1287	55	88	55	88	55	0	0	0	0
	point148	148	1287	55	88	55	88	55	0	0	0	0
	point540	540										
I-88 EB OffRamp 2Lane	point595	595	370	35	25	35	25	35	0	0	0	0
	point594	594	370	35	25	35	25	35	0	0	0	0
	point593	593	370	35	25	35	25	35	0	0	0	0
	point592	592	370	35	25	35	25	35	0	0	0	0
	point591	591	370	35	25	35	25	35	0	0	0	0
	point590	590	370	35	25	35	25	35	0	0	0	0
	point589	589	370	35	25	35	25	35	0	0	0	0
	point588	588	370	35	25	35	25	35	0	0	0	0
	point587	587	370	35	25	35	25	35	0	0	0	0
	point647	647										

I-88 EB OnRamp 2Lane	point648	648	575	35	39	35	39	35	0	0	0	0
	point366	366	575	35	39	35	39	35	0	0	0	0
	point367	367	575	35	39	35	39	35	0	0	0	0
	point368	368	575	35	39	35	39	35	0	0	0	0
	point369	369	575	35	39	35	39	35	0	0	0	0
	point370	370	575	35	39	35	39	35	0	0	0	0
	point371	371	575	35	39	35	39	35	0	0	0	0
	point372	372	575	35	39	35	39	35	0	0	0	0
	point373	373	575	35	39	35	39	35	0	0	0	0
	point374	374	575	35	39	35	39	35	0	0	0	0
	point376	376	575	35	39	35	39	35	0	0	0	0
	point377	377	575	35	39	35	39	35	0	0	0	0
	point378	378	575	35	39	35	39	35	0	0	0	0
	point379	379										
IL 47 bt I-88 Ramps SB	point649	649	1103	55	75	55	75	55	0	0	0	0
	point63	63	1103	55	75	55	75	55	0	0	0	0
	point64	64	1103	55	75	55	75	55	0	0	0	0
	point65	65	1103	55	75	55	75	55	0	0	0	0
	point66	66	1103	55	75	55	75	55	0	0	0	0
	point67	67	1103	55	75	55	75	55	0	0	0	0
	point68	68	1103	55	75	55	75	55	0	0	0	0
	point70	70										
IL 47 bt I-88 Ramps NB	point642	642	1074	55	73	55	73	55	0	0	0	0
	point149	149	1074	55	73	55	73	55	0	0	0	0
	point153	153	1074	55	73	55	73	55	0	0	0	0
	point154	154	1074	55	73	55	73	55	0	0	0	0
	point155	155	1074	55	73	55	73	55	0	0	0	0
	point156	156	1074	55	73	55	73	55	0	0	0	0
	point581	581	1074	55	73	55	73	55	0	0	0	0
	point157	157	1074	55	73	55	73	55	0	0	0	0
	point541	541	1074	55	73	55	73	55	0	0	0	0
	point158	158										

Volkert, Inc.
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INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 3	4	1	948,247.1	1,875,256.5	740.00	4.92	67.80	66	14.0	8.0	Y
CNE 3 - 1	11	1	948,377.3	1,874,932.4	734.00	4.92	62.10	66	14.0	8.0	Y
CNE 3 - 2	12	1	948,212.4	1,874,821.2	729.00	4.92	54.20	66	14.0	8.0	Y
CNE 3 - 3	13	1	948,115.1	1,874,743.1	719.00	4.92	51.80	66	14.0	8.0	Y
CNE 3 - 4	15	1	948,283.6	1,875,090.4	740.00	4.92	63.00	66	14.0	8.0	Y
CNE 3 - 5	16	1	948,101.2	1,874,979.2	737.00	4.92	54.20	66	14.0	8.0	Y
CNE 3 - 6	17	1	947,998.8	1,874,942.8	736.00	4.92	52.00	66	14.0	8.0	Y
CNE 3 - 7	18	1	947,953.7	1,875,161.5	744.00	4.92	54.10	66	14.0	8.0	Y
CNE 3 - 8	19	1	947,832.2	1,875,142.4	744.00	4.92	52.20	66	14.0	8.0	Y
CNE 3 - 9	20	1	948,118.6	1,875,394.1	741.00	4.92	63.80	66	14.0	8.0	Y
CNE 3 - 10	21	1	948,005.8	1,875,460.1	740.00	4.92	59.70	66	14.0	8.0	Y
CNE 3 - 11	22	1	947,771.4	1,875,494.9	740.00	4.92	55.10	66	14.0	8.0	Y

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TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	Perturbs #Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	30.00				0.00	point1	1	948,686.4	1,874,628.4	705.00	12.00	1.00	13	12		
									point2	2	948,626.5	1,874,711.4	706.00	12.00	1.00	13	12		
									point3	3	948,568.1	1,874,793.6	712.00	12.00	1.00	13	12		
									point4	4	948,515.0	1,874,874.4	722.00	12.00	1.00	13	12		
									point5	5	948,457.3	1,874,956.8	735.00	12.00	1.00	13	12		
									point6	6	948,398.9	1,875,042.9	741.00	12.00	1.00	13	12		
									point7	7	948,344.2	1,875,122.2	740.00	12.00	1.00	13	12		
									point8	8	948,305.8	1,875,212.1	738.00	12.00	1.00	13	12		
									point9	9	948,263.5	1,875,303.6	738.00	12.00	1.00	13	12		
									point10	10	948,218.1	1,875,393.8	738.00	12.00	1.00	13	12		
									point11	11	948,138.0	1,875,540.8	735.00	12.00	1.00	13	12		
									point12	12	947,938.9	1,875,540.8	736.00	12.00					

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28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 3	4	1	67.8	71.5	66	3.7	14	Snd Lvl	59.7	11.8	8	3.8
CNE 3 - 1	11	1	62.1	64.9	66	2.8	14	----	60.6	4.3	8	-3.7
CNE 3 - 2	12	1	54.2	59.2	66	5.0	14	----	57.5	1.7	8	-6.3
CNE 3 - 3	13	1	51.8	56.3	66	4.5	14	----	55.1	1.2	8	-6.8
CNE 3 - 4	15	1	63.0	65.7	66	2.7	14	----	58.6	7.1	8	-0.9
CNE 3 - 5	16	1	54.2	59.1	66	4.9	14	----	56.6	2.5	8	-5.5
CNE 3 - 6	17	1	52.0	57.4	66	5.4	14	----	55.2	2.2	8	-5.8
CNE 3 - 7	18	1	54.1	60.1	66	6.0	14	----	57.6	2.5	8	-5.5
CNE 3 - 8	19	1	52.2	58.5	66	6.3	14	----	56.4	2.1	8	-5.9
CNE 3 - 9	20	1	63.8	69.2	66	5.4	14	Snd Lvl	61.5	7.7	8	-0.3
CNE 3 - 10	21	1	59.7	66.4	66	6.7	14	Snd Lvl	60.2	6.2	8	-1.8
CNE 3 - 11	22	1	55.1	61.4	66	6.3	14	----	60.6	0.8	8	-7.2

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	12	0.8	4.2	11.8
All Impacted	3	6.2	8.6	11.8
All that meet NR Goal	1	11.8	11.8	11.8

Volkert, Inc.
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28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND-LEVEL DIAGNOSIS BY BARRIER SEGMENT

PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Total LAeq1h dBA	Important Barriers Name	Important Segments Name	No.	Partial LAeq1h dBA
Res 3	4	59.70	Barrier1	point8	8	56.70
			Barrier1	point9	9	53.50
			Barrier1	point10	10	51.80
			Barrier1	point7	7	48.50
			Barrier1	point11	11	39.10
			Barrier1	point3	3	33.30
			Barrier1	point1	1	30.40
			Barrier1	point2	2	28.30
			Barrier1	point6	6	26.80
			Barrier1	point5	5	26.20
CNE 3 - 1	11	60.60	Barrier1	point3	3	56.00
			Barrier1	point2	2	53.10
			Barrier1	point4	4	52.30
			Barrier1	point5	5	49.90
			Barrier1	point1	1	49.30
			Barrier1	point6	6	46.00
			Barrier1	point8	8	45.10
			Barrier1	point7	7	43.00
			Barrier1	point9	9	42.60

			Barrier1	point11	11	31.00
CNE 3 - 2	12	57.50	Barrier1	point2	2	51.20
			Barrier1	point1	1	49.70
			Barrier1	point3	3	49.50
			Barrier1	point11	11	44.30
			Barrier1	point4	4	44.00
			Barrier1	point10	10	42.90
			Barrier1	point5	5	41.50
			Barrier1	point6	6	40.50
			Barrier1	point7	7	39.50
			Barrier1	point8	8	38.80
CNE 3 - 3	13	55.10	Barrier1	point2	2	47.60
			Barrier1	point1	1	47.40
			Barrier1	point3	3	44.90
			Barrier1	point11	11	43.50
			Barrier1	point4	4	40.00
			Barrier1	point10	10	39.80
			Barrier1	point5	5	37.90
			Barrier1	point6	6	37.10
			Barrier1	point7	7	36.60
			Barrier1	point8	8	36.20
CNE 3 - 4	15	58.60	Barrier1	point7	7	51.10
			Barrier1	point10	10	50.50
			Barrier1	point6	6	49.80
			Barrier1	point3	3	49.30
			Barrier1	point8	8	48.10
			Barrier1	point9	9	47.70
			Barrier1	point4	4	47.60
			Barrier1	point5	5	45.70
			Barrier1	point2	2	45.60
			Barrier1	point1	1	42.70
CNE 3 - 5	16	56.60	Barrier1	point11	11	49.80
			Barrier1	point2	2	47.90
			Barrier1	point3	3	47.10

			Barrier1	point1	1	46.70
			Barrier1	point10	10	45.50
			Barrier1	point4	4	42.60
			Barrier1	point7	7	42.20
			Barrier1	point8	8	41.90
			Barrier1	point9	9	41.30
			Barrier1	point6	6	41.10
CNE 3 - 6	17	55.20	Barrier1	point11	11	49.10
			Barrier1	point2	2	45.80
			Barrier1	point3	3	45.20
			Barrier1	point1	1	44.40
			Barrier1	point10	10	43.70
			Barrier1	point4	4	40.00
			Barrier1	point7	7	39.40
			Barrier1	point8	8	39.40
			Barrier1	point9	9	39.10
			Barrier1	point6	6	38.20
CNE 3 - 7	18	57.60	Barrier1	point11	11	55.00
			Barrier1	point10	10	47.70
			Barrier1	point2	2	44.10
			Barrier1	point1	1	43.30
			Barrier1	point3	3	42.80
			Barrier1	point9	9	42.50
			Barrier1	point8	8	42.00
			Barrier1	point7	7	40.70
			Barrier1	point4	4	39.50
			Barrier1	point6	6	38.10
CNE 3 - 8	19	56.40	Barrier1	point11	11	51.50
			Barrier1	point10	10	45.00
			Barrier1	point2	2	42.00
			Barrier1	point1	1	40.90
			Barrier1	point3	3	40.50
			Barrier1	point9	9	39.50
			Barrier1	point8	8	38.90

			Barrier1	point7	7	37.80
			Barrier1	point4	4	37.10
			Barrier1	point6	6	35.60
CNE 3 - 9	20	61.50	Barrier1	point11	11	57.80
			Barrier1	point10	10	57.70
			Barrier1	point9	9	50.60
			Barrier1	point8	8	47.00
			Barrier1	point7	7	43.40
			Barrier1	point3	3	35.90
			Barrier1	point6	6	32.70
			Barrier1	point4	4	32.40
			Barrier1	point2	2	31.10
			Barrier1	point5	5	30.60
CNE 3 - 10	21	60.20	Barrier1	point11	11	58.60
			Barrier1	point10	10	53.10
			Barrier1	point9	9	45.30
			Barrier1	point8	8	43.00
			Barrier1	point7	7	40.30
			Barrier1	point3	3	38.40
			Barrier1	point2	2	36.60
			Barrier1	point1	1	34.90
			Barrier1	point6	6	34.60
			Barrier1	point5	5	33.40
CNE 3 - 11	22	60.60	Barrier1	point10	10	45.40
			Barrier1	point11	11	44.30
			Barrier1	point2	2	39.40
			Barrier1	point9	9	39.00
			Barrier1	point1	1	38.00
			Barrier1	point8	8	37.80
			Barrier1	point3	3	36.90
			Barrier1	point7	7	36.10
			Barrier1	point4	4	32.60
			Barrier1	point6	6	32.40

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: BARRIER DESIGN
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 3 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Calc LAeq1h	Noise Reduction Calc	Noise Reduction Goal	Noise Reduction Calc-Goal	Barrier Reviewed	Important Segments Name	Important Segments No.	Important Segments Height	Partial LAeq1h
		dBA	dB	dB	dB				ft	dBA
Res 3	4	59.7	11.8	8	3.8	Barrier1	point8	8	12.0	56.7
						Barrier1	point9	9	12.0	53.5
						Barrier1	point10	10	12.0	51.8
						Barrier1	point7	7	12.0	48.5
						Barrier1	point11	11	12.0	39.1
						Barrier1	point3	3	12.0	33.3
						Barrier1	point1	1	12.0	30.4
						Barrier1	point2	2	12.0	28.3
						Barrier1	point6	6	12.0	26.8
						Barrier1	point5	5	12.0	26.2
CNE 3 - 1	11	60.6	4.3	8	-3.7	Barrier1	point3	3	12.0	56.0
						Barrier1	point2	2	12.0	53.1
						Barrier1	point4	4	12.0	52.3
						Barrier1	point5	5	12.0	49.9
						Barrier1	point1	1	12.0	49.3
						Barrier1	point6	6	12.0	46.0
						Barrier1	point8	8	12.0	45.1
						Barrier1	point7	7	12.0	43.0
						Barrier1	point9	9	12.0	42.6
						Barrier1	point11	11	12.0	31.0

CNE 3 - 2	12	57.5	1.7	8	-6.3	Barrier1	point2	2	12.0	51.2
						Barrier1	point1	1	12.0	49.7
						Barrier1	point3	3	12.0	49.5
						Barrier1	point11	11	12.0	44.3
						Barrier1	point4	4	12.0	44.0
						Barrier1	point10	10	12.0	42.9
						Barrier1	point5	5	12.0	41.5
						Barrier1	point6	6	12.0	40.5
						Barrier1	point7	7	12.0	39.5
						Barrier1	point8	8	12.0	38.8
CNE 3 - 3	13	55.1	1.2	8	-6.8	Barrier1	point2	2	12.0	47.6
						Barrier1	point1	1	12.0	47.4
						Barrier1	point3	3	12.0	44.9
						Barrier1	point11	11	12.0	43.5
						Barrier1	point4	4	12.0	40.0
						Barrier1	point10	10	12.0	39.8
						Barrier1	point5	5	12.0	37.9
						Barrier1	point6	6	12.0	37.1
						Barrier1	point7	7	12.0	36.6
						Barrier1	point8	8	12.0	36.2
CNE 3 - 4	15	58.6	7.1	8	-0.9	Barrier1	point7	7	12.0	51.1
						Barrier1	point10	10	12.0	50.5
						Barrier1	point6	6	12.0	49.8
						Barrier1	point3	3	12.0	49.3
						Barrier1	point8	8	12.0	48.1
						Barrier1	point9	9	12.0	47.7
						Barrier1	point4	4	12.0	47.6
						Barrier1	point5	5	12.0	45.7
						Barrier1	point2	2	12.0	45.6
						Barrier1	point1	1	12.0	42.7
CNE 3 - 5	16	56.6	2.5	8	-5.5	Barrier1	point11	11	12.0	49.8
						Barrier1	point2	2	12.0	47.9
						Barrier1	point3	3	12.0	47.1
						Barrier1	point1	1	12.0	46.7
						Barrier1	point10	10	12.0	45.5
						Barrier1	point4	4	12.0	42.6

						Barrier1	point7	7	12.0	42.2
						Barrier1	point8	8	12.0	41.9
						Barrier1	point9	9	12.0	41.3
						Barrier1	point6	6	12.0	41.1
CNE 3 - 6	17	55.2	2.2	8	-5.8	Barrier1	point11	11	12.0	49.1
						Barrier1	point2	2	12.0	45.8
						Barrier1	point3	3	12.0	45.2
						Barrier1	point1	1	12.0	44.4
						Barrier1	point10	10	12.0	43.7
						Barrier1	point4	4	12.0	40.0
						Barrier1	point7	7	12.0	39.4
						Barrier1	point8	8	12.0	39.4
						Barrier1	point9	9	12.0	39.1
						Barrier1	point6	6	12.0	38.2
CNE 3 - 7	18	57.6	2.5	8	-5.5	Barrier1	point11	11	12.0	55.0
						Barrier1	point10	10	12.0	47.7
						Barrier1	point2	2	12.0	44.1
						Barrier1	point1	1	12.0	43.3
						Barrier1	point3	3	12.0	42.8
						Barrier1	point9	9	12.0	42.5
						Barrier1	point8	8	12.0	42.0
						Barrier1	point7	7	12.0	40.7
						Barrier1	point4	4	12.0	39.5
						Barrier1	point6	6	12.0	38.1
CNE 3 - 8	19	56.4	2.1	8	-5.9	Barrier1	point11	11	12.0	51.5
						Barrier1	point10	10	12.0	45.0
						Barrier1	point2	2	12.0	42.0
						Barrier1	point1	1	12.0	40.9
						Barrier1	point3	3	12.0	40.5
						Barrier1	point9	9	12.0	39.5
						Barrier1	point8	8	12.0	38.9
						Barrier1	point7	7	12.0	37.8
						Barrier1	point4	4	12.0	37.1
						Barrier1	point6	6	12.0	35.6
CNE 3 - 9	20	61.5	7.7	8	-0.3	Barrier1	point11	11	12.0	57.8
						Barrier1	point10	10	12.0	57.7

						Barrier1	point9	9	12.0	50.6
						Barrier1	point8	8	12.0	47.0
						Barrier1	point7	7	12.0	43.4
						Barrier1	point3	3	12.0	35.9
						Barrier1	point6	6	12.0	32.7
						Barrier1	point4	4	12.0	32.4
						Barrier1	point2	2	12.0	31.1
						Barrier1	point5	5	12.0	30.6
CNE 3 - 10	21	60.2	6.2	8	-1.8	Barrier1	point11	11	12.0	58.6
						Barrier1	point10	10	12.0	53.1
						Barrier1	point9	9	12.0	45.3
						Barrier1	point8	8	12.0	43.0
						Barrier1	point7	7	12.0	40.3
						Barrier1	point3	3	12.0	38.4
						Barrier1	point2	2	12.0	36.6
						Barrier1	point1	1	12.0	34.9
						Barrier1	point6	6	12.0	34.6
						Barrier1	point5	5	12.0	33.4
CNE 3 - 11	22	60.6	0.8	8	-7.2	Barrier1	point10	10	12.0	45.4
						Barrier1	point11	11	12.0	44.3
						Barrier1	point2	2	12.0	39.4
						Barrier1	point9	9	12.0	39.0
						Barrier1	point1	1	12.0	38.0
						Barrier1	point8	8	12.0	37.8
						Barrier1	point3	3	12.0	36.9
						Barrier1	point7	7	12.0	36.1
						Barrier1	point4	4	12.0	32.6
						Barrier1	point6	6	12.0	32.4
Total Cost, All Barriers (including additional cost(s))					$456086					

CNE 5 Barrier TNM Input and Output

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Seavy Rd RT	18.0	point44	44	947,602.4	1,878,389.5	744.00				Average	
		point45	45	947,596.8	1,878,381.0	744.00				Average	
		point46	46	947,591.6	1,878,360.6	745.00				Average	
		point47	47	947,595.6	1,878,310.1	745.00				Average	
		point48	48	947,589.0	1,878,275.9	745.00				Average	
		point49	49	947,586.4	1,878,257.1	745.00				Average	
		point50	50	947,576.1	1,878,228.8	744.00				Average	
		point51	51	947,568.9	1,878,215.1	746.00				Average	
		point52	52	947,546.3	1,878,183.0	746.00				Average	
		point260	260	947,536.4	1,878,176.9	746.00				Average	
		point261	261	947,481.2	1,878,178.2	742.00				Average	
		point537	537	947,415.4	1,878,181.9	739.00				Average	
		point262	262	947,349.4	1,878,184.9	734.00				Average	
		point263	263	947,281.3	1,878,188.1	730.00				Average	
		point265	265	947,176.4	1,878,193.4	727.00				Average	
		point536	536	947,092.9	1,878,197.2	728.00				Average	
		point436	436	947,001.3	1,878,201.2	725.00				Average	
		point535	535	946,891.9	1,878,203.4	724.00				Average	
		point441	441	946,782.3	1,878,205.4	725.00					
Seavy Rd 2Lane	12.0	point574	574	946,782.3	1,878,205.4	725.00				Average	
		point573	573	946,682.3	1,878,209.5	722.00				Average	
		point571	571	946,582.1	1,878,214.0	721.00				Average	
		point570	570	946,441.8	1,878,219.6	719.00				Average	
		point569	569	946,280.0	1,878,227.2	718.00				Average	
		point568	568	946,098.2	1,878,236.8	717.00				Average	

		point567	567	945,864.8	1,878,250.6	715.00				Average	
		point566	566	945,662.2	1,878,267.2	713.00					
Roadway2-2	44.0	point643	643	947,602.4	1,878,389.5	744.00				Average	
		point31	31	947,605.6	1,878,344.9	772.00					
IL 47 from Seavy Rd to Green Rd NB	44.0	point644	644	947,664.4	1,878,349.9	745.00				Average	
		point165	165	947,658.4	1,878,446.2	744.00				Average	
		point166	166	947,654.3	1,878,644.4	744.00				Average	
		point167	167	947,665.2	1,878,843.8	746.00				Average	
		point168	168	947,690.0	1,879,034.5	749.00				Average	
		point169	169	947,710.2	1,879,132.5	751.00				Average	
		point170	170	947,759.3	1,879,325.4	754.00				Average	
		point171	171	947,789.8	1,879,419.2	754.00				Average	
		point172	172	947,823.4	1,879,513.6	755.00				Average	
		point173	173	947,895.2	1,879,697.2	755.00				Average	
		point174	174	947,940.8	1,879,794.9	754.00				Average	
		point175	175	948,032.4	1,879,965.6	753.00				Average	
		point176	176	948,080.8	1,880,044.9	750.00				Average	
		point177	177	948,138.8	1,880,131.5	748.00				Average	
		point178	178	948,239.8	1,880,280.2	743.00				Average	
		point179	179	948,356.9	1,880,468.8	738.00				Average	
		point180	180	948,403.6	1,880,564.9	736.00				Average	
		point181	181	948,478.4	1,880,747.8	734.00				Average	
		point182	182	948,509.9	1,880,849.6	734.00					
IL 47 from Seavy Rd to Green Rd SB 1L	32.0	point646	646	948,485.6	1,880,849.9	734.00				Average	
		point14	14	948,452.9	1,880,755.4	734.00				Average	
		point15	15	948,374.4	1,880,573.8	736.00				Average	
		point16	16	948,329.7	1,880,483.1	738.00				Average	
		point17	17	948,216.2	1,880,299.8	743.00				Average	
		point18	18	948,116.2	1,880,150.4	748.00				Average	
		point19	19	948,059.2	1,880,067.0	750.00				Average	
		point20	20	948,005.2	1,879,982.6	752.00				Average	
		point21	21	947,906.1	1,879,809.4	754.00				Average	
		point22	22	947,860.1	1,879,717.5	755.00				Average	
		point657	657	947,818.0	1,879,627.1	755.00					
IL 47 north of Green Rd NB	44.0	point645	645	948,509.9	1,880,849.6	734.00				Average	
		point184	184	948,541.6	1,880,982.8	734.00				Average	
		point654	654	948,553.8	1,881,070.6	735.00				Average	
		point185	185	948,562.7	1,881,138.9	738.00					

IL 47 north of Green Rd SB	24.0	point1	1	948,447.6	1,882,428.2	774.00				Average	
		point2	2	948,494.4	1,882,305.6	774.00				Average	
		point3	3	948,523.9	1,882,209.8	771.00				Average	
		point4	4	948,549.6	1,882,113.4	768.00				Average	
		point5	6	948,569.1	1,882,023.6	768.00				Average	
		point7	7	948,587.4	1,881,918.2	761.00				Average	
		point8	8	948,599.7	1,881,822.4	758.00				Average	
		point9	9	948,611.9	1,881,627.9	752.00				Average	
		point10	10	948,605.8	1,881,428.1	746.00				Average	
		point11	11	948,580.2	1,881,230.4	740.00				Average	
		point652	652	948,562.7	1,881,138.9	738.00					
IL 47 bt I-88 Ramps SB	44.0	point649	649	947,749.1	1,877,276.4	762.00				Average	
		point63	63	947,794.1	1,877,055.4	762.00				Average	
		point64	64	947,836.1	1,876,858.9	762.00				Average	
		point65	65	947,876.2	1,876,663.0	759.00				Average	
		point66	66	947,917.8	1,876,467.5	756.00				Average	
		point67	67	947,959.3	1,876,274.1	753.00				Average	
		point68	68	947,980.3	1,876,176.1	753.00				Average	
		point70	70	948,006.9	1,876,060.8	749.00					
IL 47 from I-88 WBOffRamp to Seavy NB	44.0	point650	650	947,803.4	1,877,264.2	762.00				Average	
		point159	159	947,767.6	1,877,458.2	760.00				Average	
		point160	160	947,751.8	1,877,558.2	759.00				Average	
		point161	161	947,725.5	1,877,753.5	756.00				Average	
		point162	162	947,701.9	1,877,952.5	752.00				Average	
		point163	163	947,680.2	1,878,151.4	748.00				Average	
		point538	538	947,674.7	1,878,221.1	737.00				Average	
		point164	164	947,664.4	1,878,349.9	745.00					
IL 47 bt I-88 Ramps NB	44.0	point642	642	948,051.9	1,876,095.8	749.00				Average	
		point149	149	948,028.9	1,876,187.0	751.00				Average	
		point153	153	948,008.4	1,876,285.6	753.00				Average	
		point154	154	947,967.2	1,876,478.2	756.00				Average	
		point155	155	947,925.8	1,876,673.1	759.00				Average	
		point156	156	947,883.6	1,876,870.9	761.00				Average	
		point581	581	947,866.9	1,876,962.4	761.00				Average	
		point157	157	947,848.1	1,877,066.9	762.00				Average	
		point541	541	947,837.3	1,877,115.8	762.00				Average	
		point158	158	947,803.4	1,877,264.2	762.00					
IL 47 from I-88 WBOffRamp to Seavy SB	44.0	point55	55	947,605.1	1,878,345.8	745.00				Average	

		point56	56	947,625.8	1,878,143.9	748.00				Average	
		point582	582	947,629.4	1,878,114.4	750.00				Average	
		point57	57	947,649.1	1,877,945.1	752.00				Average	
		point58	58	947,671.7	1,877,746.4	756.00				Average	
		point59	59	947,698.7	1,877,548.8	759.00				Average	
		point61	61	947,715.1	1,877,449.4	760.00				Average	
		point62	62	947,749.1	1,877,276.4	762.00					
Seavy Rd LT	24.0	point443	443	946,782.3	1,878,205.4	725.00				Average	
		point446	446	946,890.0	1,878,192.5	725.00				Average	
		point449	449	947,001.0	1,878,189.5	728.00				Average	
		point450	450	947,095.4	1,878,184.6	728.00				Average	
		point452	452	947,182.4	1,878,177.0	730.00				Average	
		point453	453	947,280.8	1,878,170.4	734.00				Average	
		point454	454	947,351.8	1,878,164.4	739.00				Average	
		point464	464	947,416.4	1,878,162.1	742.00				Average	
		point456	456	947,480.7	1,878,160.6	745.00				Average	
		point458	458	947,571.8	1,878,156.0	747.00				Average	
		point459	459	947,580.9	1,878,153.8	748.00				Average	
		point460	460	947,591.9	1,878,149.6	748.00				Average	
		point461	461	947,600.7	1,878,145.6	748.00				Average	
		point462	462	947,618.0	1,878,130.2	748.00				Average	
		point463	463	947,629.4	1,878,114.4	750.00					
IL 47 north of Green Rd SB-2	32.0	point653	653	948,562.7	1,881,138.9	738.00				Average	
		point12	12	948,536.8	1,881,043.1	736.00				Average	
		point13	13	948,485.6	1,880,849.9	734.00					
IL 47 from Seavy Rd to Green Rd SB-2	44.0	point658	658	947,818.0	1,879,627.1	755.00				Average	
		point23	23	947,775.9	1,879,536.8	755.00				Average	
		point24	24	947,739.8	1,879,439.2	754.00				Average	
		point25	25	947,708.7	1,879,342.5	754.00				Average	
		point26	26	947,658.0	1,879,148.6	751.00				Average	
		point27	27	947,639.1	1,879,052.1	749.00				Average	
		point28	28	947,610.6	1,878,847.6	746.00				Average	
		point29	29	947,596.2	1,878,648.1	744.00				Average	
		point30	30	947,598.4	1,878,449.1	744.00				Average	
		point534	534	947,602.4	1,878,389.5	744.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Seavy Rd RT	point44	44	124	35	10	35	9	35	0	0	0	0
	point45	45	124	35	10	35	9	35	0	0	0	0
	point46	46	124	35	10	35	9	35	0	0	0	0
	point47	47	124	35	10	35	9	35	0	0	0	0
	point48	48	124	35	10	35	9	35	0	0	0	0
	point49	49	124	35	10	35	9	35	0	0	0	0
	point50	50	124	35	10	35	9	35	0	0	0	0
	point51	51	124	35	10	35	9	35	0	0	0	0
	point52	52	124	35	10	35	9	35	0	0	0	0
	point260	260	124	35	10	35	9	35	0	0	0	0
	point261	261	124	35	10	35	9	35	0	0	0	0
	point537	537	124	35	10	35	9	35	0	0	0	0
	point262	262	124	35	10	35	9	35	0	0	0	0
	point263	263	124	35	10	35	9	35	0	0	0	0
	point265	265	124	35	10	35	9	35	0	0	0	0
	point536	536	124	35	10	35	9	35	0	0	0	0
	point436	436	124	35	10	35	9	35	0	0	0	0
	point535	535	124	35	10	35	9	35	0	0	0	0
	point441	441										
Seavy Rd 2Lane	point574	574	248	35	20	35	17	35	0	0	0	0
	point573	573	248	35	20	35	17	35	0	0	0	0
	point571	571	248	35	20	35	17	35	0	0	0	0

	point570	570	248	35	20	35	17	35	0	0	0	0
	point569	569	248	35	20	35	17	35	0	0	0	0
	point568	568	248	35	20	35	17	35	0	0	0	0
	point567	567	248	35	20	35	17	35	0	0	0	0
	point566	566										
Roadway2-2	point643	643	0	0	0	0	0	0	0	0	0	0
	point31	31										
IL 47 from Seavy Rd to Green Rd NB	point644	644	857	55	69	55	59	55	0	0	0	0
	point165	165	857	55	69	55	59	55	0	0	0	0
	point166	166	857	55	69	55	59	55	0	0	0	0
	point167	167	857	55	69	55	59	55	0	0	0	0
	point168	168	857	55	69	55	59	55	0	0	0	0
	point169	169	857	55	69	55	59	55	0	0	0	0
	point170	170	857	55	69	55	59	55	0	0	0	0
	point171	171	857	55	69	55	59	55	0	0	0	0
	point172	172	857	55	69	55	59	55	0	0	0	0
	point173	173	857	55	69	55	59	55	0	0	0	0
	point174	174	857	55	69	55	59	55	0	0	0	0
	point175	175	857	55	69	55	59	55	0	0	0	0
	point176	176	857	55	69	55	59	55	0	0	0	0
	point177	177	857	55	69	55	59	55	0	0	0	0
	point178	178	857	55	69	55	59	55	0	0	0	0
	point179	179	857	55	69	55	59	55	0	0	0	0
	point180	180	857	55	69	55	59	55	0	0	0	0
	point181	181	857	55	69	55	59	55	0	0	0	0
	point182	182										
IL 47 from Seavy Rd to Green Rd SB 1L	point646	646	767	55	62	55	53	55	0	0	0	0
	point14	14	767	55	62	55	53	55	0	0	0	0
	point15	15	767	55	62	55	53	55	0	0	0	0
	point16	16	767	55	62	55	53	55	0	0	0	0
	point17	17	767	55	62	55	53	55	0	0	0	0
	point18	18	767	55	62	55	53	55	0	0	0	0
	point19	19	767	55	62	55	53	55	0	0	0	0
	point20	20	767	55	62	55	53	55	0	0	0	0

	point21	21	767	55	62	55	53	55	0	0	0	0
	point22	22	767	55	62	55	53	55	0	0	0	0
	point657	657										
IL 47 north of Green Rd NB	point645	645	737	55	51	55	59	55	0	0	0	0
	point184	184	737	55	51	55	59	55	0	0	0	0
	point654	654	737	55	51	55	59	55	0	0	0	0
	point185	185										
IL 47 north of Green Rd SB	point1	1	1471	55	101	55	118	55	0	0	0	0
	point2	2	1471	55	101	55	118	55	0	0	0	0
	point3	3	1471	55	101	55	118	55	0	0	0	0
	point4	4	1471	55	101	55	118	55	0	0	0	0
	point5	6	1471	55	101	55	118	55	0	0	0	0
	point7	7	1471	55	101	55	118	55	0	0	0	0
	point8	8	1471	55	101	55	118	55	0	0	0	0
	point9	9	1471	55	101	55	118	55	0	0	0	0
	point10	10	1471	55	101	55	118	55	0	0	0	0
	point11	11	1471	55	101	55	118	55	0	0	0	0
	point652	652										
IL 47 bt I-88 Ramps SB	point649	649	1103	55	75	55	75	55	0	0	0	0
	point63	63	1103	55	75	55	75	55	0	0	0	0
	point64	64	1103	55	75	55	75	55	0	0	0	0
	point65	65	1103	55	75	55	75	55	0	0	0	0
	point66	66	1103	55	75	55	75	55	0	0	0	0
	point67	67	1103	55	75	55	75	55	0	0	0	0
	point68	68	1103	55	75	55	75	55	0	0	0	0
	point70	70										
IL 47 from I-88 WBOffRamp to Seavy NB	point650	650	989	55	67	55	56	55	0	0	0	0
	point159	159	989	55	67	55	56	55	0	0	0	0
	point160	160	989	55	67	55	56	55	0	0	0	0
	point161	161	989	55	67	55	56	55	0	0	0	0
	point162	162	989	55	67	55	56	55	0	0	0	0
	point163	163	989	55	67	55	56	55	0	0	0	0
	point538	538	989	55	67	55	56	55	0	0	0	0
	point164	164										

INPUT: TRAFFIC FOR LAeq1h Volumes

IL 47 at I 88 Interchange

IL 47 bt I-88 Ramps NB	point642	642	1074	55	73	55	73	55	0	0	0	0
	point149	149	1074	55	73	55	73	55	0	0	0	0
	point153	153	1074	55	73	55	73	55	0	0	0	0
	point154	154	1074	55	73	55	73	55	0	0	0	0
	point155	155	1074	55	73	55	73	55	0	0	0	0
	point156	156	1074	55	73	55	73	55	0	0	0	0
	point581	581	1074	55	73	55	73	55	0	0	0	0
	point157	157	1074	55	73	55	73	55	0	0	0	0
	point541	541	1074	55	73	55	73	55	0	0	0	0
	point158	158										
IL 47 from I-88 WBOffRamp to Seavy SB	point55	55	947	55	64	55	53	55	0	0	0	0
	point56	56	947	55	64	55	53	55	0	0	0	0
	point582	582	947	55	64	55	53	55	0	0	0	0
	point57	57	947	55	64	55	53	55	0	0	0	0
	point58	58	947	55	64	55	53	55	0	0	0	0
	point59	59	947	55	64	55	53	55	0	0	0	0
	point61	61	947	55	64	55	53	55	0	0	0	0
	point62	62										
Seavy Rd LT	point443	443	124	35	10	35	9	35	0	0	0	0
	point446	446	124	35	10	35	9	35	0	0	0	0
	point449	449	124	35	10	35	9	35	0	0	0	0
	point450	450	124	35	10	35	9	35	0	0	0	0
	point452	452	124	35	10	35	9	35	0	0	0	0
	point453	453	124	35	10	35	9	35	0	0	0	0
	point454	454	124	35	10	35	9	35	0	0	0	0
	point464	464	124	35	10	35	9	35	0	0	0	0
	point456	456	124	35	10	35	9	35	0	0	0	0
	point458	458	124	35	10	35	9	35	0	0	0	0
	point459	459	124	35	10	35	9	35	0	0	0	0
	point460	460	124	35	10	35	9	35	0	0	0	0
	point461	461	124	35	10	35	9	35	0	0	0	0
	point462	462	124	35	10	35	9	35	0	0	0	0
	point463	463										
IL 47 north of Green Rd SB-2	point653	653	734	55	51	55	59	55	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

IL 47 at I 88 Interchange

	point12	12	734	55	51	55	59	55	0	0	0	0
	point13	13										
IL 47 from Seavy Rd to Green Rd SB-2	point658	658	767	55	62	55	53	55	0	0	0	0
	point23	23	767	55	62	55	53	55	0	0	0	0
	point24	24	767	55	62	55	53	55	0	0	0	0
	point25	25	767	55	62	55	53	55	0	0	0	0
	point26	26	767	55	62	55	53	55	0	0	0	0
	point27	27	767	55	62	55	53	55	0	0	0	0
	point28	28	767	55	62	55	53	55	0	0	0	0
	point29	29	767	55	62	55	53	55	0	0	0	0
	point30	30	767	55	62	55	53	55	0	0	0	0
	point534	534										

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 5	6	1	947,670.5	1,879,476.8	755.00	4.92	68.60	66	14.0	8.0	Y
CNE 5 - 1	11	1	947,439.8	1,878,707.5	750.00	4.92	62.50	66	14.0	8.0	Y
CNE 5 - 2	12	1	947,221.1	1,878,849.9	751.00	4.92	54.30	66	14.0	8.0	Y
CNE 5 - 3	13	1	947,351.2	1,878,903.8	751.00	4.92	57.70	66	14.0	8.0	Y
CNE 5 - 4	14	1	947,488.4	1,879,007.9	755.00	4.92	64.00	66	14.0	8.0	Y
CNE 5 - 5	15	1	947,511.0	1,879,150.2	751.00	4.92	63.80	66	14.0	8.0	Y
CNE 5 - 6	16	1	947,599.5	1,879,202.4	751.00	4.92	69.20	66	14.0	8.0	Y
CNE 5 - 7	17	1	947,368.6	1,879,242.2	745.00	4.92	56.30	66	14.0	8.0	Y
CNE 5 - 8	18	1	947,566.5	1,879,464.5	754.00	4.92	62.00	66	14.0	8.0	Y
CNE 5 - 9	19	1	947,462.4	1,879,461.0	754.00	4.92	57.60	66	14.0	8.0	Y
CNE 5 - 10	20	1	947,684.6	1,879,751.0	762.00	4.92	62.10	66	14.0	8.0	Y
CNE 5 - 11	21	1	947,523.1	1,879,759.6	762.00	4.92	56.00	66	14.0	8.0	Y
CNE 5 - 12	22	1	947,415.5	1,879,763.1	762.00	4.92	53.50	66	14.0	8.0	Y
CNE 5 - 13	23	1	947,830.4	1,879,947.1	763.00	4.92	64.80	66	14.0	8.0	Y
CNE 5 - 14	24	1	947,675.9	1,879,954.0	765.00	4.92	57.50	66	14.0	8.0	Y
CNE 5 - 15	25	1	947,552.6	1,879,935.0	766.00	4.92	54.70	66	14.0	8.0	Y
CNE 5 - 16	26	1	947,434.6	1,879,947.1	767.00	4.92	52.30	66	14.0	8.0	Y
CNE 5 - 17	27	1	947,816.5	1,880,198.9	753.00	4.92	57.20	66	14.0	8.0	Y
CNE 5 - 18	28	1	947,688.1	1,880,219.8	757.00	4.92	53.80	66	14.0	8.0	Y
CNE 5 - 19	29	1	947,568.2	1,880,204.0	761.00	4.92	52.00	66	14.0	8.0	Y
CNE 5 - 20	30	1	948,137.7	1,880,424.5	738.00	4.92	63.90	66	14.0	8.0	Y
CNE 5 - 21	31	1	948,049.2	1,880,440.1	738.00	4.92	59.30	66	14.0	8.0	Y

CNE 5 - 22	32	1	947,859.9	1,880,466.2	739.00	4.92	54.10	66	14.0	8.0	Y
CNE 5 - 23	33	1	947,774.9	1,880,450.6	743.00	4.92	52.70	66	14.0	8.0	Y
CNE 5 - 24	34	1	947,944.1	1,880,700.1	731.00	4.92	53.20	66	14.0	8.0	Y

Volkert, Inc. 28 July 2017
Nik Simonson TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier2	W	0.00	99.99	30.00				0.00	point1	1	947,485.8	1,878,251.6	733.00	12.00	1.00	13	12		
									point2	2	947,499.6	1,878,347.2	734.00	12.00	1.00	13	12		
									point3	3	947,510.4	1,878,446.0	736.00	12.00	1.00	13	12		
									point4	4	947,527.3	1,878,544.6	739.00	12.00	1.00	13	12		
									point5	5	947,536.1	1,878,643.2	742.00	12.00	1.00	13	12		
									point6	6	947,542.0	1,878,745.9	746.00	12.00	1.00	13	12		
									point7	7	947,545.0	1,878,843.5	751.00	12.00	1.00	13	12		
									point8	8	947,552.9	1,878,943.1	753.00	12.00	1.00	13	12		
									point9	9	947,572.6	1,879,040.8	754.00	12.00	1.00	13	12		
									point10	10	947,592.4	1,879,133.5	753.00	12.00	1.00	13	12		
									point11	11	947,624.9	1,879,227.1	752.00	12.00	1.00	13	12		
									point12	12	947,652.6	1,879,327.8	751.00	12.00	1.00	13	12		
									point13	13	947,681.1	1,879,420.5	752.00	12.00	1.00	13	12		
									point14	14	947,711.8	1,879,519.2	757.00	12.00	1.00	13	12		
									point15	15	947,715.7	1,879,566.6	757.00	12.00					
Barrier3	W	0.00	99.99	30.00				0.00	point16	16	947,764.4	1,879,678.4	758.00	12.00	1.00	13	12		
									point17	17	947,800.9	1,879,774.0	760.00	12.00	1.00	13	12		
									point18	18	947,839.4	1,879,864.9	762.00	12.00	1.00	13	12		
									point19	19	947,883.9	1,879,956.6	762.00	12.00	1.00	13	12		
									point20	20	947,898.6	1,879,986.1	762.00	12.00					
Barrier4	W	0.00	99.99	30.00				0.00	point21	21	947,973.5	1,880,119.6	757.00	12.00	1.00	13	12		
									point22	22	948,028.8	1,880,204.5	751.00	12.00	1.00	13	12		
									point23	23	948,089.9	1,880,284.5	744.00	12.00	1.00	13	12		
									point24	24	948,144.2	1,880,362.4	738.00	12.00	1.00	13	12		
									point25	25	948,208.3	1,880,443.2	735.00	12.00	1.00	13	12		
									point26	26	948,241.9	1,880,491.6	732.00	12.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 5	6	1	68.6	71.2	66	2.6	14	Snd Lvl	59.1	12.1	8	4.1
CNE 5 - 1	11	1	62.5	67.5	66	5.0	14	Snd Lvl	61.4	6.1	8	-1.9
CNE 5 - 2	12	1	54.3	59.2	66	4.9	14	----	56.7	2.5	8	-5.5
CNE 5 - 3	13	1	57.7	61.8	66	4.1	14	----	57.5	4.3	8	-3.7
CNE 5 - 4	14	1	64.0	68.3	66	4.3	14	Snd Lvl	58.6	9.7	8	1.7
CNE 5 - 5	15	1	63.8	66.1	66	2.3	14	Snd Lvl	56.6	9.5	8	1.5
CNE 5 - 6	16	1	69.2	71.7	66	2.5	14	Snd Lvl	57.7	14.0	8	6.0
CNE 5 - 7	17	1	56.3	58.4	66	2.1	14	----	54.2	4.2	8	-3.8
CNE 5 - 8	18	1	62.0	66.3	66	4.3	14	Snd Lvl	59.6	6.7	8	-1.3
CNE 5 - 9	19	1	57.6	61.8	66	4.2	14	----	57.1	4.7	8	-3.3
CNE 5 - 10	20	1	62.1	66.3	66	4.2	14	Snd Lvl	62.7	3.6	8	-4.4
CNE 5 - 11	21	1	56.0	60.6	66	4.6	14	----	57.7	2.9	8	-5.1
CNE 5 - 12	22	1	53.5	58.4	66	4.9	14	----	55.5	2.9	8	-5.1
CNE 5 - 13	23	1	64.8	68.5	66	3.7	14	Snd Lvl	60.7	7.8	8	-0.2
CNE 5 - 14	24	1	57.5	61.5	66	4.0	14	----	58.2	3.3	8	-4.7
CNE 5 - 15	25	1	54.7	59.2	66	4.5	14	----	56.2	3.0	8	-5.0
CNE 5 - 16	26	1	52.3	57.1	66	4.8	14	----	54.4	2.7	8	-5.3
CNE 5 - 17	27	1	57.2	60.4	66	3.2	14	----	59.0	1.4	8	-6.6
CNE 5 - 18	28	1	53.8	57.4	66	3.6	14	----	55.7	1.7	8	-6.3
CNE 5 - 19	29	1	52.0	55.8	66	3.8	14	----	54.1	1.7	8	-6.3
CNE 5 - 20	30	1	63.9	68.4	66	4.5	14	Snd Lvl	61.0	7.4	8	-0.6
CNE 5 - 21	31	1	59.3	64.0	66	4.7	14	----	59.4	4.6	8	-3.4
CNE 5 - 22	32	1	54.1	57.5	66	3.4	14	----	55.9	1.6	8	-6.4

RESULTS: SOUND LEVELS

IL 47 at I 88 Interchange

CNE 5 - 23	33	1	52.7	56.0	66	3.3	14	----	54.7	1.3	8	-6.7
CNE 5 - 24	34	1	53.2	56.7	66	3.5	14	----	56.0	0.7	8	-7.3

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	25	0.7	4.8	14.0
All Impacted	9	3.6	8.5	14.0
All that meet NR Goal	4	9.5	11.3	14.0

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND-LEVEL DIAGNOSIS BY BARRIER SEGMENT

PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Total LAeq1h dBA	Important Barriers Name	Important Segments Name	No.	Partial LAeq1h dBA
Res 5	6	59.10	Barrier2	point13	13	57.30
			Barrier2	point12	12	53.00
			Barrier2	point14	14	48.90
			Barrier4	point24	24	26.30
			Barrier4	point22	22	25.80
			Barrier4	point21	21	25.20
			Barrier4	point23	23	23.30
			Barrier3	point16	16	23.00
			Barrier4	point25	25	20.80
			Barrier2	point11	11	19.80
CNE 5 - 1	11	61.40	Barrier2	point3	3	56.20
			Barrier2	point4	4	55.40
			Barrier2	point5	5	54.70
			Barrier2	point2	2	51.30
			Barrier2	point6	6	49.70
			Barrier2	point7	7	46.90
			Barrier2	point8	8	44.80
			Barrier2	point1	1	31.60
			Barrier2	point9	9	24.10

			Barrier4	point24	24	22.60
CNE 5 - 2	12	56.70	Barrier2	point2	2	49.00
			Barrier2	point1	1	48.80
			Barrier2	point3	3	46.00
			Barrier2	point4	4	46.00
			Barrier2	point5	5	44.90
			Barrier2	point6	6	41.80
			Barrier2	point7	7	41.20
			Barrier2	point11	11	40.20
			Barrier2	point8	8	40.10
			Barrier2	point9	9	39.60
CNE 5 - 3	13	57.50	Barrier2	point3	3	50.70
			Barrier2	point2	2	50.20
			Barrier2	point4	4	47.80
			Barrier2	point5	5	46.80
			Barrier2	point1	1	46.50
			Barrier2	point7	7	45.20
			Barrier2	point6	6	45.10
			Barrier2	point8	8	44.20
			Barrier2	point9	9	43.10
			Barrier2	point12	12	42.60
CNE 5 - 4	14	58.60	Barrier2	point5	5	53.10
			Barrier2	point8	8	51.80
			Barrier2	point9	9	49.90
			Barrier2	point11	11	49.00
			Barrier2	point7	7	48.50
			Barrier2	point6	6	48.10
			Barrier2	point10	10	47.00
			Barrier2	point12	12	29.70
			Barrier2	point3	3	25.50
			Barrier4	point24	24	25.20
CNE 5 - 5	15	56.60	Barrier2	point10	10	50.60
			Barrier2	point9	9	49.70
			Barrier2	point11	11	49.00

			Barrier2	point12	12	47.40
			Barrier2	point7	7	46.60
			Barrier2	point8	8	46.20
			Barrier2	point13	13	42.80
			Barrier2	point14	14	28.40
			Barrier4	point24	24	24.50
			Barrier2	point3	3	23.20
CNE 5 - 6	16	57.70	Barrier2	point10	10	56.30
			Barrier2	point11	11	51.80
			Barrier2	point12	12	25.40
			Barrier4	point24	24	24.40
			Barrier4	point22	22	23.30
			Barrier4	point23	23	23.10
			Barrier2	point14	14	22.50
			Barrier4	point21	21	21.50
			Barrier4	point25	25	20.90
			Barrier2	point13	13	17.70
CNE 5 - 7	17	54.20	Barrier2	point11	11	45.60
			Barrier2	point3	3	45.20
			Barrier2	point12	12	44.60
			Barrier2	point10	10	44.00
			Barrier2	point4	4	42.90
			Barrier2	point9	9	42.30
			Barrier2	point13	13	41.50
			Barrier2	point8	8	40.60
			Barrier2	point5	5	39.60
			Barrier2	point7	7	38.50
CNE 5 - 8	18	59.60	Barrier2	point12	12	52.90
			Barrier2	point13	13	50.40
			Barrier2	point11	11	48.80
			Barrier2	point10	10	47.10
			Barrier2	point14	14	45.00
			Barrier3	point16	16	42.70
			Barrier2	point9	9	42.20

			Barrier3	point17	17	33.70
			Barrier3	point18	18	27.30
			Barrier4	point22	22	23.90
CNE 5 - 9	19	57.10	Barrier2	point12	12	50.20
			Barrier2	point11	11	47.50
			Barrier2	point13	13	46.80
			Barrier2	point10	10	43.60
			Barrier2	point7	7	41.90
			Barrier2	point14	14	41.60
			Barrier3	point16	16	40.60
			Barrier2	point6	6	40.50
			Barrier2	point9	9	40.20
			Barrier2	point8	8	39.60
CNE 5 - 10	20	62.70	Barrier3	point16	16	51.40
			Barrier2	point13	13	48.70
			Barrier3	point17	17	47.80
			Barrier2	point12	12	47.80
			Barrier3	point18	18	43.80
			Barrier2	point14	14	40.90
			Barrier2	point11	11	39.70
			Barrier3	point19	19	35.40
			Barrier4	point21	21	29.60
			Barrier4	point24	24	26.40
CNE 5 - 11	21	57.70	Barrier2	point13	13	45.30
			Barrier2	point12	12	45.20
			Barrier3	point16	16	44.60
			Barrier2	point9	9	44.00
			Barrier2	point10	10	43.60
			Barrier2	point11	11	42.60
			Barrier3	point17	17	42.30
			Barrier3	point18	18	40.20
			Barrier2	point14	14	40.00
			Barrier2	point8	8	36.40
CNE 5 - 12	22	55.50	Barrier2	point12	12	43.90

			Barrier2	point7	7	43.70
			Barrier2	point13	13	43.00
			Barrier2	point6	6	42.30
			Barrier2	point11	11	41.60
			Barrier3	point16	16	41.50
			Barrier3	point17	17	39.50
			Barrier2	point10	10	38.30
			Barrier2	point14	14	38.00
			Barrier3	point18	18	37.90
CNE 5 - 13	23	60.70	Barrier3	point18	18	53.70
			Barrier3	point17	17	49.60
			Barrier3	point19	19	47.10
			Barrier3	point16	16	43.90
			Barrier4	point21	21	37.10
			Barrier4	point24	24	33.30
			Barrier4	point25	25	33.20
			Barrier4	point23	23	31.80
			Barrier4	point22	22	23.60
CNE 5 - 14	24	58.20	Barrier2	point13	13	46.30
			Barrier3	point17	17	46.00
			Barrier2	point12	12	45.90
			Barrier3	point18	18	45.70
			Barrier3	point16	16	45.40
			Barrier4	point21	21	40.50
			Barrier3	point19	19	39.90
			Barrier2	point11	11	39.90
			Barrier4	point22	22	39.60
			Barrier4	point23	23	39.60
CNE 5 - 15	25	56.20	Barrier2	point10	10	45.70
			Barrier3	point16	16	43.50
			Barrier3	point17	17	42.80
			Barrier2	point11	11	42.70
			Barrier2	point13	13	42.10
			Barrier3	point18	18	41.80

			Barrier2	point12	12	41.80
			Barrier4	point23	23	38.20
			Barrier4	point21	21	38.00
			Barrier4	point22	22	37.90
CNE 5 - 16	26	54.40	Barrier2	point8	8	43.90
			Barrier2	point12	12	40.80
			Barrier3	point16	16	40.70
			Barrier2	point13	13	40.70
			Barrier2	point7	7	40.50
			Barrier3	point17	17	39.60
			Barrier2	point11	11	38.90
			Barrier3	point18	18	38.80
			Barrier4	point23	23	37.10
			Barrier2	point9	9	37.00
CNE 5 - 17	27	59.00	Barrier4	point23	23	46.00
			Barrier4	point21	21	45.40
			Barrier4	point22	22	45.10
			Barrier4	point24	24	44.50
			Barrier3	point18	18	41.40
			Barrier4	point25	25	40.90
			Barrier3	point17	17	40.30
			Barrier3	point16	16	40.10
			Barrier3	point19	19	37.40
			Barrier2	point13	13	21.60
CNE 5 - 18	28	55.70	Barrier4	point23	23	44.20
			Barrier4	point22	22	43.20
			Barrier4	point24	24	43.00
			Barrier4	point21	21	41.90
			Barrier3	point18	18	39.90
			Barrier4	point25	25	39.60
			Barrier2	point13	13	39.00
			Barrier3	point17	17	38.90
			Barrier2	point12	12	38.10
			Barrier3	point16	16	37.90

CNE 5 - 19	29	54.10	Barrier2	point11	11	42.30
			Barrier4	point23	23	41.70
			Barrier4	point24	24	40.80
			Barrier4	point22	22	40.60
			Barrier4	point21	21	39.20
			Barrier2	point12	12	39.00
			Barrier3	point18	18	38.60
			Barrier2	point10	10	38.50
			Barrier3	point17	17	38.20
			Barrier3	point16	16	37.80
CNE 5 - 20	30	61.00	Barrier4	point24	24	56.60
			Barrier4	point25	25	51.20
			Barrier4	point23	23	50.90
			Barrier4	point22	22	42.70
CNE 5 - 21	31	59.40	Barrier4	point24	24	53.20
			Barrier4	point25	25	50.10
			Barrier4	point23	23	50.10
			Barrier4	point22	22	46.10
			Barrier4	point21	21	42.60
CNE 5 - 22	32	55.90	Barrier4	point24	24	47.60
			Barrier4	point23	23	46.10
			Barrier4	point25	25	44.40
			Barrier4	point22	22	43.00
			Barrier4	point21	21	40.50
			Barrier3	point18	18	36.60
			Barrier3	point16	16	36.40
			Barrier3	point17	17	35.50
			Barrier3	point19	19	31.00
CNE 5 - 23	33	54.70	Barrier4	point24	24	45.50
			Barrier4	point23	23	45.10
			Barrier4	point25	25	42.50
			Barrier4	point22	22	42.00
			Barrier4	point21	21	39.90
			Barrier3	point18	18	35.60

			Barrier3	point16	16	35.40
			Barrier3	point17	17	35.00
			Barrier2	point12	12	32.20
			Barrier2	point13	13	31.20
CNE 5 - 24	34	56.00	Barrier4	point24	24	46.20
			Barrier4	point25	25	44.60
			Barrier4	point23	23	43.20
			Barrier4	point22	22	39.20
			Barrier4	point21	21	36.60
			Barrier3	point17	17	34.10
			Barrier3	point18	18	34.00
			Barrier3	point19	19	29.50
			Barrier3	point16	16	29.30

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: BARRIER DESIGN
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 5 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Calc LAeq1h	Noise Reduction Calc	Noise Reduction Goal	Noise Reduction Calc-Goal	Barrier Reviewed	Important Segments Name	Important Segments No.	Important Segments Height	Partial LAeq1h
		dBA	dB	dB	dB				ft	dBA
Res 5	6	59.1	12.1	8	4.1	Barrier2	point13	13	12.0	57.3
						Barrier2	point12	12	12.0	53.0
						Barrier2	point14	14	12.0	48.9
						Barrier4	point24	24	12.0	26.3
						Barrier4	point22	22	12.0	25.8
						Barrier4	point21	21	12.0	25.2
						Barrier4	point23	23	12.0	23.3
						Barrier3	point16	16	12.0	23.0
						Barrier4	point25	25	12.0	20.8
						Barrier2	point11	11	12.0	19.8
CNE 5 - 1	11	61.4	6.1	8	-1.9	Barrier2	point3	3	12.0	56.2
						Barrier2	point4	4	12.0	55.4
						Barrier2	point5	5	12.0	54.7
						Barrier2	point2	2	12.0	51.3
						Barrier2	point6	6	12.0	49.7
						Barrier2	point7	7	12.0	46.9
						Barrier2	point8	8	12.0	44.8
						Barrier2	point1	1	12.0	31.6
						Barrier2	point9	9	12.0	24.1
						Barrier4	point24	24	12.0	22.6

CNE 5 - 2	12	56.7	2.5	8	-5.5	Barrier2	point2	2	12.0	49.0
						Barrier2	point1	1	12.0	48.8
						Barrier2	point3	3	12.0	46.0
						Barrier2	point4	4	12.0	46.0
						Barrier2	point5	5	12.0	44.9
						Barrier2	point6	6	12.0	41.8
						Barrier2	point7	7	12.0	41.2
						Barrier2	point11	11	12.0	40.2
						Barrier2	point8	8	12.0	40.1
						Barrier2	point9	9	12.0	39.6
CNE 5 - 3	13	57.5	4.3	8	-3.7	Barrier2	point3	3	12.0	50.7
						Barrier2	point2	2	12.0	50.2
						Barrier2	point4	4	12.0	47.8
						Barrier2	point5	5	12.0	46.8
						Barrier2	point1	1	12.0	46.5
						Barrier2	point7	7	12.0	45.2
						Barrier2	point6	6	12.0	45.1
						Barrier2	point8	8	12.0	44.2
						Barrier2	point9	9	12.0	43.1
						Barrier2	point12	12	12.0	42.6
CNE 5 - 4	14	58.6	9.7	8	1.7	Barrier2	point5	5	12.0	53.1
						Barrier2	point8	8	12.0	51.8
						Barrier2	point9	9	12.0	49.9
						Barrier2	point11	11	12.0	49.0
						Barrier2	point7	7	12.0	48.5
						Barrier2	point6	6	12.0	48.1
						Barrier2	point10	10	12.0	47.0
						Barrier2	point12	12	12.0	29.7
						Barrier2	point3	3	12.0	25.5
						Barrier4	point24	24	12.0	25.2
CNE 5 - 5	15	56.6	9.5	8	1.5	Barrier2	point10	10	12.0	50.6
						Barrier2	point9	9	12.0	49.7
						Barrier2	point11	11	12.0	49.0
						Barrier2	point12	12	12.0	47.4
						Barrier2	point7	7	12.0	46.6
						Barrier2	point8	8	12.0	46.2

						Barrier2	point13	13	12.0	42.8
						Barrier2	point14	14	12.0	28.4
						Barrier4	point24	24	12.0	24.5
						Barrier2	point3	3	12.0	23.2
CNE 5 - 6	16	57.7	14.0	8	6.0	Barrier2	point10	10	12.0	56.3
						Barrier2	point11	11	12.0	51.8
						Barrier2	point12	12	12.0	25.4
						Barrier4	point24	24	12.0	24.4
						Barrier4	point22	22	12.0	23.3
						Barrier4	point23	23	12.0	23.1
						Barrier2	point14	14	12.0	22.5
						Barrier4	point21	21	12.0	21.5
						Barrier4	point25	25	12.0	20.9
						Barrier2	point13	13	12.0	17.7
CNE 5 - 7	17	54.2	4.2	8	-3.8	Barrier2	point11	11	12.0	45.6
						Barrier2	point3	3	12.0	45.2
						Barrier2	point12	12	12.0	44.6
						Barrier2	point10	10	12.0	44.0
						Barrier2	point4	4	12.0	42.9
						Barrier2	point9	9	12.0	42.3
						Barrier2	point13	13	12.0	41.5
						Barrier2	point8	8	12.0	40.6
						Barrier2	point5	5	12.0	39.6
						Barrier2	point7	7	12.0	38.5
CNE 5 - 8	18	59.6	6.7	8	-1.3	Barrier2	point12	12	12.0	52.9
						Barrier2	point13	13	12.0	50.4
						Barrier2	point11	11	12.0	48.8
						Barrier2	point10	10	12.0	47.1
						Barrier2	point14	14	12.0	45.0
						Barrier3	point16	16	12.0	42.7
						Barrier2	point9	9	12.0	42.2
						Barrier3	point17	17	12.0	33.7
						Barrier3	point18	18	12.0	27.3
						Barrier4	point22	22	12.0	23.9
CNE 5 - 9	19	57.1	4.7	8	-3.3	Barrier2	point12	12	12.0	50.2
						Barrier2	point11	11	12.0	47.5

						Barrier2	point13	13	12.0	46.8
						Barrier2	point10	10	12.0	43.6
						Barrier2	point7	7	12.0	41.9
						Barrier2	point14	14	12.0	41.6
						Barrier3	point16	16	12.0	40.6
						Barrier2	point6	6	12.0	40.5
						Barrier2	point9	9	12.0	40.2
						Barrier2	point8	8	12.0	39.6
CNE 5 - 10	20	62.7	3.6	8	-4.4	Barrier3	point16	16	12.0	51.4
						Barrier2	point13	13	12.0	48.7
						Barrier3	point17	17	12.0	47.8
						Barrier2	point12	12	12.0	47.8
						Barrier3	point18	18	12.0	43.8
						Barrier2	point14	14	12.0	40.9
						Barrier2	point11	11	12.0	39.7
						Barrier3	point19	19	12.0	35.4
						Barrier4	point21	21	12.0	29.6
						Barrier4	point24	24	12.0	26.4
CNE 5 - 11	21	57.7	2.9	8	-5.1	Barrier2	point13	13	12.0	45.3
						Barrier2	point12	12	12.0	45.2
						Barrier3	point16	16	12.0	44.6
						Barrier2	point9	9	12.0	44.0
						Barrier2	point10	10	12.0	43.6
						Barrier2	point11	11	12.0	42.6
						Barrier3	point17	17	12.0	42.3
						Barrier3	point18	18	12.0	40.2
						Barrier2	point14	14	12.0	40.0
						Barrier2	point8	8	12.0	36.4
CNE 5 - 12	22	55.5	2.9	8	-5.1	Barrier2	point12	12	12.0	43.9
						Barrier2	point7	7	12.0	43.7
						Barrier2	point13	13	12.0	43.0
						Barrier2	point6	6	12.0	42.3
						Barrier2	point11	11	12.0	41.6
						Barrier3	point16	16	12.0	41.5
						Barrier3	point17	17	12.0	39.5
						Barrier2	point10	10	12.0	38.3

						Barrier2	point14	14	12.0	38.0
						Barrier3	point18	18	12.0	37.9
CNE 5 - 13	23	60.7	7.8	8	-0.2	Barrier3	point18	18	12.0	53.7
						Barrier3	point17	17	12.0	49.6
						Barrier3	point19	19	12.0	47.1
						Barrier3	point16	16	12.0	43.9
						Barrier4	point21	21	12.0	37.1
						Barrier4	point24	24	12.0	33.3
						Barrier4	point25	25	12.0	33.2
						Barrier4	point23	23	12.0	31.8
						Barrier4	point22	22	12.0	23.6
CNE 5 - 14	24	58.2	3.3	8	-4.7	Barrier2	point13	13	12.0	46.3
						Barrier3	point17	17	12.0	46.0
						Barrier2	point12	12	12.0	45.9
						Barrier3	point18	18	12.0	45.7
						Barrier3	point16	16	12.0	45.4
						Barrier4	point21	21	12.0	40.5
						Barrier3	point19	19	12.0	39.9
						Barrier2	point11	11	12.0	39.9
						Barrier4	point22	22	12.0	39.6
						Barrier4	point23	23	12.0	39.6
CNE 5 - 15	25	56.2	3.0	8	-5.0	Barrier2	point10	10	12.0	45.7
						Barrier3	point16	16	12.0	43.5
						Barrier3	point17	17	12.0	42.8
						Barrier2	point11	11	12.0	42.7
						Barrier2	point13	13	12.0	42.1
						Barrier3	point18	18	12.0	41.8
						Barrier2	point12	12	12.0	41.8
						Barrier4	point23	23	12.0	38.2
						Barrier4	point21	21	12.0	38.0
						Barrier4	point22	22	12.0	37.9
CNE 5 - 16	26	54.4	2.7	8	-5.3	Barrier2	point8	8	12.0	43.9
						Barrier2	point12	12	12.0	40.8
						Barrier3	point16	16	12.0	40.7
						Barrier2	point13	13	12.0	40.7
						Barrier2	point7	7	12.0	40.5

						Barrier3	point17	17	12.0	39.6
						Barrier2	point11	11	12.0	38.9
						Barrier3	point18	18	12.0	38.8
						Barrier4	point23	23	12.0	37.1
						Barrier2	point9	9	12.0	37.0
CNE 5 - 17	27	59.0	1.4	8	-6.6	Barrier4	point23	23	12.0	46.0
						Barrier4	point21	21	12.0	45.4
						Barrier4	point22	22	12.0	45.1
						Barrier4	point24	24	12.0	44.5
						Barrier3	point18	18	12.0	41.4
						Barrier4	point25	25	12.0	40.9
						Barrier3	point17	17	12.0	40.3
						Barrier3	point16	16	12.0	40.1
						Barrier3	point19	19	12.0	37.4
						Barrier2	point13	13	12.0	21.6
CNE 5 - 18	28	55.7	1.7	8	-6.3	Barrier4	point23	23	12.0	44.2
						Barrier4	point22	22	12.0	43.2
						Barrier4	point24	24	12.0	43.0
						Barrier4	point21	21	12.0	41.9
						Barrier3	point18	18	12.0	39.9
						Barrier4	point25	25	12.0	39.6
						Barrier2	point13	13	12.0	39.0
						Barrier3	point17	17	12.0	38.9
						Barrier2	point12	12	12.0	38.1
						Barrier3	point16	16	12.0	37.9
CNE 5 - 19	29	54.1	1.7	8	-6.3	Barrier2	point11	11	12.0	42.3
						Barrier4	point23	23	12.0	41.7
						Barrier4	point24	24	12.0	40.8
						Barrier4	point22	22	12.0	40.6
						Barrier4	point21	21	12.0	39.2
						Barrier2	point12	12	12.0	39.0
						Barrier3	point18	18	12.0	38.6
						Barrier2	point10	10	12.0	38.5
						Barrier3	point17	17	12.0	38.2
						Barrier3	point16	16	12.0	37.8
CNE 5 - 20	30	61.0	7.4	8	-0.6	Barrier4	point24	24	12.0	56.6

						Barrier4	point25	25	12.0	51.2
						Barrier4	point23	23	12.0	50.9
						Barrier4	point22	22	12.0	42.7
CNE 5 - 21	31	59.4	4.6	8	-3.4	Barrier4	point24	24	12.0	53.2
						Barrier4	point25	25	12.0	50.1
						Barrier4	point23	23	12.0	50.1
						Barrier4	point22	22	12.0	46.1
						Barrier4	point21	21	12.0	42.6
CNE 5 - 22	32	55.9	1.6	8	-6.4	Barrier4	point24	24	12.0	47.6
						Barrier4	point23	23	12.0	46.1
						Barrier4	point25	25	12.0	44.4
						Barrier4	point22	22	12.0	43.0
						Barrier4	point21	21	12.0	40.5
						Barrier3	point18	18	12.0	36.6
						Barrier3	point16	16	12.0	36.4
						Barrier3	point17	17	12.0	35.5
						Barrier3	point19	19	12.0	31.0
CNE 5 - 23	33	54.7	1.3	8	-6.7	Barrier4	point24	24	12.0	45.5
						Barrier4	point23	23	12.0	45.1
						Barrier4	point25	25	12.0	42.5
						Barrier4	point22	22	12.0	42.0
						Barrier4	point21	21	12.0	39.9
						Barrier3	point18	18	12.0	35.6
						Barrier3	point16	16	12.0	35.4
						Barrier3	point17	17	12.0	35.0
						Barrier2	point12	12	12.0	32.2
						Barrier2	point13	13	12.0	31.2
CNE 5 - 24	34	56.0	0.7	8	-7.3	Barrier4	point24	24	12.0	46.2
						Barrier4	point25	25	12.0	44.6
						Barrier4	point23	23	12.0	43.2
						Barrier4	point22	22	12.0	39.2
						Barrier4	point21	21	12.0	36.6
						Barrier3	point17	17	12.0	34.1
						Barrier3	point18	18	12.0	34.0
						Barrier3	point19	19	12.0	29.5
						Barrier3	point16	16	12.0	29.3

Total Cost, All Barriers (including additional cost(s))					$769073					

CNE 6 Barrier TNM Input and Output

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Green Rd RT	18.0	point209	209	948,509.9	1,880,849.6	734.00				Average	
		point210	210	948,538.4	1,880,909.8	726.00				Average	
		point211	211	948,553.8	1,880,928.5	726.00				Average	
		point212	212	948,575.5	1,880,944.8	730.00				Average	
		point213	213	948,602.5	1,880,950.6	734.00				Average	
		point214	214	948,613.8	1,880,954.4	734.00				Average	
		point215	215	948,627.1	1,880,956.0	735.00				Average	
		point216	216	948,667.0	1,880,957.9	734.00					
Roadway2-2	44.0	point643	643	947,602.4	1,878,389.5	744.00				Average	
		point31	31	947,605.6	1,878,344.9	772.00					
IL 47 from Seavy Rd to Green Rd NB	44.0	point644	644	947,664.4	1,878,349.9	745.00				Average	
		point165	165	947,658.4	1,878,446.2	744.00				Average	
		point166	166	947,654.3	1,878,644.4	744.00				Average	
		point167	167	947,665.2	1,878,843.8	746.00				Average	
		point168	168	947,690.0	1,879,034.5	749.00				Average	
		point169	169	947,710.2	1,879,132.5	751.00				Average	
		point170	170	947,759.3	1,879,325.4	754.00				Average	
		point171	171	947,789.8	1,879,419.2	754.00				Average	
		point172	172	947,823.4	1,879,513.6	755.00				Average	
		point173	173	947,895.2	1,879,697.2	755.00				Average	
		point174	174	947,940.8	1,879,794.9	754.00				Average	
		point175	175	948,032.4	1,879,965.6	753.00				Average	
		point176	176	948,080.8	1,880,044.9	750.00				Average	
		point177	177	948,138.8	1,880,131.5	748.00				Average	
		point178	178	948,239.8	1,880,280.2	743.00				Average	

		point179	179	948,356.9	1,880,468.8	738.00				Average	
		point180	180	948,403.6	1,880,564.9	736.00				Average	
		point181	181	948,478.4	1,880,747.8	734.00				Average	
		point182	182	948,509.9	1,880,849.6	734.00					
IL 47 from Seavy Rd to Green Rd SB 1L	32.0	point646	646	948,485.6	1,880,849.9	734.00				Average	
		point14	14	948,452.9	1,880,755.4	734.00				Average	
		point15	15	948,374.4	1,880,573.8	736.00				Average	
		point16	16	948,329.7	1,880,483.1	738.00				Average	
		point17	17	948,216.2	1,880,299.8	743.00				Average	
		point18	18	948,116.2	1,880,150.4	748.00				Average	
		point19	19	948,059.2	1,880,067.0	750.00				Average	
		point20	20	948,005.2	1,879,982.6	752.00				Average	
		point21	21	947,906.1	1,879,809.4	754.00				Average	
		point22	22	947,860.1	1,879,717.5	755.00				Average	
		point657	657	947,818.0	1,879,627.1	755.00					
IL 47 north of Green Rd NB	44.0	point645	645	948,509.9	1,880,849.6	734.00				Average	
		point184	184	948,541.6	1,880,982.8	734.00				Average	
		point654	654	948,553.8	1,881,070.6	735.00				Average	
		point185	185	948,562.7	1,881,138.9	738.00					
IL 47 north of Green Rd SB	24.0	point1	1	948,447.6	1,882,428.2	774.00				Average	
		point2	2	948,494.4	1,882,305.6	774.00				Average	
		point3	3	948,523.9	1,882,209.8	771.00				Average	
		point4	4	948,549.6	1,882,113.4	768.00				Average	
		point5	6	948,569.1	1,882,023.6	768.00				Average	
		point7	7	948,587.4	1,881,918.2	761.00				Average	
		point8	8	948,599.7	1,881,822.4	758.00				Average	
		point9	9	948,611.9	1,881,627.9	752.00				Average	
		point10	10	948,605.8	1,881,428.1	746.00				Average	
		point11	11	948,580.2	1,881,230.4	740.00				Average	
		point652	652	948,562.7	1,881,138.9	738.00					
IL 47 north of Green Rd SB-2	32.0	point653	653	948,562.7	1,881,138.9	738.00				Average	
		point12	12	948,536.8	1,881,043.1	736.00				Average	
		point13	13	948,485.6	1,880,849.9	734.00					
Green Rd LT-2	18.0	point655	655	948,667.0	1,880,957.9	734.00				Average	
		point205	205	948,606.9	1,880,983.2	734.00				Average	
		point206	206	948,575.9	1,881,016.9	732.00				Average	
		point207	207	948,561.4	1,881,051.6	732.00				Average	
		point208	208	948,553.8	1,881,070.6	735.00					

Green Rd 2Lane	24.0	point656	656	948,667.0	1,880,957.9	734.00				Average	
		point217	217	948,711.9	1,880,954.8	733.00				Average	
		point218	218	948,754.6	1,880,960.2	732.00				Average	
		point219	219	948,789.1	1,880,971.6	732.00				Average	
		point220	220	948,818.9	1,880,984.9	731.00				Average	
		point221	221	948,846.4	1,881,002.9	731.00				Average	
		point222	222	948,883.7	1,881,036.8	732.00				Average	
		point223	223	948,912.4	1,881,078.9	732.00				Average	
		point562	562	948,935.2	1,881,137.1	732.00				Average	
		point565	565	948,960.3	1,881,235.2	735.50				Average	
		point563	563	948,984.7	1,881,335.1	738.00				Average	
		point543	543	948,996.8	1,881,369.1	740.00				Average	
		point544	544	949,029.0	1,881,518.5	747.00				Average	
		point545	545	949,072.1	1,881,637.4	752.00				Average	
		point546	546	949,131.9	1,881,754.5	755.00				Average	
		point547	547	949,177.5	1,881,821.8	758.00				Average	
		point548	548	949,246.4	1,881,898.8	762.00				Average	
		point549	549	949,302.8	1,881,960.9	765.00				Average	
		point550	550	949,387.6	1,882,027.6	766.00				Average	
		point551	551	949,496.0	1,882,088.8	766.00				Average	
		point552	552	949,593.6	1,882,137.0	768.00				Average	
		point553	553	949,696.2	1,882,180.9	772.00				Average	
		point554	554	949,806.9	1,882,228.6	773.00					
IL 47 from Seavy Rd to Green Rd SB-2	44.0	point658	658	947,818.0	1,879,627.1	755.00				Average	
		point23	23	947,775.9	1,879,536.8	755.00				Average	
		point24	24	947,739.8	1,879,439.2	754.00				Average	
		point25	25	947,708.7	1,879,342.5	754.00				Average	
		point26	26	947,658.0	1,879,148.6	751.00				Average	
		point27	27	947,639.1	1,879,052.1	749.00				Average	
		point28	28	947,610.6	1,878,847.6	746.00				Average	
		point29	29	947,596.2	1,878,648.1	744.00				Average	
		point30	30	947,598.4	1,878,449.1	744.00				Average	
		point534	534	947,602.4	1,878,389.5	744.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Green Rd RT	point209	209	112	35	8	35	9	35	0	0	0	0
	point210	210	112	35	8	35	9	35	0	0	0	0
	point211	211	112	35	8	35	9	35	0	0	0	0
	point212	212	112	35	8	35	9	35	0	0	0	0
	point213	213	112	35	8	35	9	35	0	0	0	0
	point214	214	112	35	8	35	9	35	0	0	0	0
	point215	215	112	35	8	35	9	35	0	0	0	0
	point216	216										
Roadway2-2	point643	643	0	0	0	0	0	0	0	0	0	0
	point31	31										
IL 47 from Seavy Rd to Green Rd NB	point644	644	857	55	69	55	59	55	0	0	0	0
	point165	165	857	55	69	55	59	55	0	0	0	0
	point166	166	857	55	69	55	59	55	0	0	0	0
	point167	167	857	55	69	55	59	55	0	0	0	0
	point168	168	857	55	69	55	59	55	0	0	0	0
	point169	169	857	55	69	55	59	55	0	0	0	0
	point170	170	857	55	69	55	59	55	0	0	0	0
	point171	171	857	55	69	55	59	55	0	0	0	0
	point172	172	857	55	69	55	59	55	0	0	0	0
	point173	173	857	55	69	55	59	55	0	0	0	0
	point174	174	857	55	69	55	59	55	0	0	0	0
	point175	175	857	55	69	55	59	55	0	0	0	0

	point176	176	857	55	69	55	59	55	0	0	0	0
	point177	177	857	55	69	55	59	55	0	0	0	0
	point178	178	857	55	69	55	59	55	0	0	0	0
	point179	179	857	55	69	55	59	55	0	0	0	0
	point180	180	857	55	69	55	59	55	0	0	0	0
	point181	181	857	55	69	55	59	55	0	0	0	0
	point182	182										
IL 47 from Seavy Rd to Green Rd SB 1L	point646	646	767	55	62	55	53	55	0	0	0	0
	point14	14	767	55	62	55	53	55	0	0	0	0
	point15	15	767	55	62	55	53	55	0	0	0	0
	point16	16	767	55	62	55	53	55	0	0	0	0
	point17	17	767	55	62	55	53	55	0	0	0	0
	point18	18	767	55	62	55	53	55	0	0	0	0
	point19	19	767	55	62	55	53	55	0	0	0	0
	point20	20	767	55	62	55	53	55	0	0	0	0
	point21	21	767	55	62	55	53	55	0	0	0	0
	point22	22	767	55	62	55	53	55	0	0	0	0
	point657	657										
IL 47 north of Green Rd NB	point645	645	737	55	51	55	59	55	0	0	0	0
	point184	184	737	55	51	55	59	55	0	0	0	0
	point654	654	737	55	51	55	59	55	0	0	0	0
	point185	185										
IL 47 north of Green Rd SB	point1	1	1471	55	101	55	118	55	0	0	0	0
	point2	2	1471	55	101	55	118	55	0	0	0	0
	point3	3	1471	55	101	55	118	55	0	0	0	0
	point4	4	1471	55	101	55	118	55	0	0	0	0
	point5	6	1471	55	101	55	118	55	0	0	0	0
	point7	7	1471	55	101	55	118	55	0	0	0	0
	point8	8	1471	55	101	55	118	55	0	0	0	0
	point9	9	1471	55	101	55	118	55	0	0	0	0
	point10	10	1471	55	101	55	118	55	0	0	0	0
	point11	11	1471	55	101	55	118	55	0	0	0	0
	point652	652										
IL 47 north of Green Rd SB-2	point653	653	734	55	51	55	59	55	0	0	0	0

	point12	12	734	55	51	55	59	55	0	0	0	0
	point13	13										
Green Rd LT-2	point655	655	112	35	8	35	9	35	0	0	0	0
	point205	205	112	35	8	35	9	35	0	0	0	0
	point206	206	112	35	8	35	9	35	0	0	0	0
	point207	207	112	35	8	35	9	35	0	0	0	0
	point208	208										
Green Rd 2Lane	point656	656	112	35	8	35	9	35	0	0	0	0
	point217	217	112	35	8	35	9	35	0	0	0	0
	point218	218	112	35	8	35	9	35	0	0	0	0
	point219	219	112	35	8	35	9	35	0	0	0	0
	point220	220	112	35	8	35	9	35	0	0	0	0
	point221	221	112	35	8	35	9	35	0	0	0	0
	point222	222	112	35	8	35	9	35	0	0	0	0
	point223	223	112	35	8	35	9	35	0	0	0	0
	point562	562	224	35	15	35	18	35	0	0	0	0
	point565	565	224	35	15	35	18	35	0	0	0	0
	point563	563	224	35	15	35	18	35	0	0	0	0
	point543	543	224	35	15	35	18	35	0	0	0	0
	point544	544	224	35	15	35	18	35	0	0	0	0
	point545	545	224	35	15	35	18	35	0	0	0	0
	point546	546	224	35	15	35	18	35	0	0	0	0
	point547	547	224	35	15	35	18	35	0	0	0	0
	point548	548	224	35	15	35	18	35	0	0	0	0
	point549	549	224	35	15	35	18	35	0	0	0	0
	point550	550	224	35	15	35	18	35	0	0	0	0
	point551	551	224	35	15	35	18	35	0	0	0	0
	point552	552	224	35	15	35	18	35	0	0	0	0
	point553	553	224	35	15	35	18	35	0	0	0	0
	point554	554										
IL 47 from Seavy Rd to Green Rd SB-2	point658	658	767	55	62	55	53	55	0	0	0	0
	point23	23	767	55	62	55	53	55	0	0	0	0
	point24	24	767	55	62	55	53	55	0	0	0	0
	point25	25	767	55	62	55	53	55	0	0	0	0

INPUT: TRAFFIC FOR LAeq1h Volumes

IL 47 at I 88 Interchange

	point26	26	767	55	62	55	53	55	0	0	0	0
	point27	27	767	55	62	55	53	55	0	0	0	0
	point28	28	767	55	62	55	53	55	0	0	0	0
	point29	29	767	55	62	55	53	55	0	0	0	0
	point30	30	767	55	62	55	53	55	0	0	0	0
	point534	534										

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 6	7	1	948,527.0	1,880,460.2	731.00	4.92	60.10	66	14.0	8.0	Y
CNE 6 - 1	11	1	948,167.7	1,879,811.8	761.00	4.92	58.80	66	14.0	8.0	Y

Volkert, Inc.
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28 July 2017
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier2	W	0.00	99.99	30.00				0.00	point1	1	947,798.4	1,879,186.2	755.00	12.00	1.00	13	12		
									point2	2	947,825.3	1,879,284.2	755.00	12.00	1.00	13	12		
									point3	3	947,855.3	1,879,382.4	755.00	12.00	1.00	13	12		
									point4	4	947,888.2	1,879,473.6	755.00	12.00	1.00	13	12		
									point5	5	947,924.9	1,879,567.2	756.00	12.00	1.00	13	12		
									point6	6	947,968.3	1,879,657.8	758.00	12.00	1.00	13	12		
									point7	7	948,019.9	1,879,743.6	760.00	12.00	1.00	13	12		
									point8	8	948,059.6	1,879,813.2	761.00	12.00					
Barrier3	W	0.00	99.99	30.00				0.00	point9	9	948,115.5	1,879,904.6	762.00	12.00	1.00	13	12		
									point10	10	948,165.6	1,879,989.2	759.00	12.00	1.00	13	12		
									point11	11	948,222.6	1,880,073.1	753.00	12.00	1.00	13	12		
									point12	12	948,280.2	1,880,158.4	746.00	12.00	1.00	13	12		
									point13	13	948,335.6	1,880,242.2	741.00	12.00	1.00	13	12		
									point14	14	948,390.9	1,880,328.9	737.00	12.00	1.00	13	12		
									point15	15	948,453.8	1,880,394.8	736.00	12.00	1.00	13	12		
									point16	16	948,478.5	1,880,441.9	733.00	12.00					
Barrier4	W	0.00	99.99	30.00				0.00	point17	17	948,525.4	1,880,531.5	727.00	12.00	1.00	13	12		
									point18	18	948,568.1	1,880,622.9	725.00	12.00	1.00	13	12		
									point19	19	948,605.6	1,880,714.9	724.00	12.00	1.00	13	12		
									point20	20	948,647.4	1,880,807.0	724.00	12.00	1.00	13	12		
									point21	21	948,680.4	1,880,890.0	725.00	12.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 6	7	1	60.1	65.9	66	5.8	14	----	65.4	0.5	8	-7.5
CNE 6 - 1	11	1	58.8	65.0	66	6.2	14	----	63.0	2.0	8	-6.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	2	0.5	1.2	2.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND-LEVEL DIAGNOSIS BY BARRIER SEGMENT

PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Total LAeq1h dBA	Important Barriers Name	Important Segments Name	No.	Partial LAeq1h dBA
Res 6	7	65.40	Barrier4	point17	17	49.30
			Barrier3	point15	15	47.70
			Barrier3	point13	13	40.30
			Barrier3	point14	14	36.70
			Barrier3	point12	12	35.50
			Barrier3	point11	11	28.90
			Barrier2	point4	4	26.20
			Barrier3	point9	9	25.80
			Barrier3	point10	10	25.10
			Barrier2	point3	3	24.70
CNE 6 - 1	11	63.00	Barrier3	point11	11	48.60
			Barrier2	point7	7	47.10
			Barrier3	point9	9	46.30
			Barrier2	point6	6	45.00
			Barrier3	point10	10	44.30
			Barrier2	point5	5	43.10
			Barrier2	point4	4	41.40
			Barrier3	point12	12	40.50
			Barrier2	point3	3	38.60

			Barrier2	point2	2	36.50

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28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: BARRIER DESIGN
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 6 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Calc LAeq1h	Noise Reduction Calc	Noise Reduction Goal	Noise Reduction Calc-Goal	Barrier Reviewed	Important Segments Name	Important Segments No.	Important Segments Height	Partial LAeq1h
		dBA	dB	dB	dB				ft	dBA
Res 6	7	65.4	0.5	8	-7.5	Barrier4	point17	17	12.0	49.3
						Barrier3	point15	15	12.0	47.7
						Barrier3	point13	13	12.0	40.3
						Barrier3	point14	14	12.0	36.7
						Barrier3	point12	12	12.0	35.5
						Barrier3	point11	11	12.0	28.9
						Barrier2	point4	4	12.0	26.2
						Barrier3	point9	9	12.0	25.8
						Barrier3	point10	10	12.0	25.1
						Barrier2	point3	3	12.0	24.7
CNE 6 - 1	11	63.0	2.0	8	-6.0	Barrier3	point11	11	12.0	48.6
						Barrier2	point7	7	12.0	47.1
						Barrier3	point9	9	12.0	46.3
						Barrier2	point6	6	12.0	45.0
						Barrier3	point10	10	12.0	44.3
						Barrier2	point5	5	12.0	43.1
						Barrier2	point4	4	12.0	41.4
						Barrier3	point12	12	12.0	40.5
						Barrier2	point3	3	12.0	38.6
						Barrier2	point2	2	12.0	36.5

Total Cost, All Barriers (including additional cost(s))					$620435					

CNE 8 Barrier TNM Input and Output

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Roadway2-2	44.0	point643	643	947,602.4	1,878,389.5	744.00				Average	
		point31	31	947,605.6	1,878,344.9	772.00					
IL 47 from Seavy Rd to Green Rd NB	44.0	point644	644	947,664.4	1,878,349.9	745.00				Average	
		point165	165	947,658.4	1,878,446.2	744.00				Average	
		point166	166	947,654.3	1,878,644.4	744.00				Average	
		point167	167	947,665.2	1,878,843.8	746.00				Average	
		point168	168	947,690.0	1,879,034.5	749.00				Average	
		point169	169	947,710.2	1,879,132.5	751.00				Average	
		point170	170	947,759.3	1,879,325.4	754.00				Average	
		point171	171	947,789.8	1,879,419.2	754.00				Average	
		point172	172	947,823.4	1,879,513.6	755.00				Average	
		point173	173	947,895.2	1,879,697.2	755.00				Average	
		point174	174	947,940.8	1,879,794.9	754.00				Average	
		point175	175	948,032.4	1,879,965.6	753.00				Average	
		point176	176	948,080.8	1,880,044.9	750.00				Average	
		point177	177	948,138.8	1,880,131.5	748.00				Average	
		point178	178	948,239.8	1,880,280.2	743.00				Average	
		point179	179	948,356.9	1,880,468.8	738.00				Average	
		point180	180	948,403.6	1,880,564.9	736.00				Average	
		point181	181	948,478.4	1,880,747.8	734.00				Average	
		point182	182	948,509.9	1,880,849.6	734.00					
IL 47 from Seavy Rd to Green Rd SB 1L	32.0	point646	646	948,485.6	1,880,849.9	734.00				Average	
		point14	14	948,452.9	1,880,755.4	734.00				Average	
		point15	15	948,374.4	1,880,573.8	736.00				Average	
		point16	16	948,329.7	1,880,483.1	738.00				Average	

		point17	17	948,216.2	1,880,299.8	743.00				Average	
		point18	18	948,116.2	1,880,150.4	748.00				Average	
		point19	19	948,059.2	1,880,067.0	750.00				Average	
		point20	20	948,005.2	1,879,982.6	752.00				Average	
		point21	21	947,906.1	1,879,809.4	754.00				Average	
		point22	22	947,860.1	1,879,717.5	755.00				Average	
		point657	657	947,818.0	1,879,627.1	755.00					
IL 47 north of Green Rd NB	44.0	point645	645	948,509.9	1,880,849.6	734.00				Average	
		point184	184	948,541.6	1,880,982.8	734.00				Average	
		point654	654	948,553.8	1,881,070.6	735.00				Average	
		point185	185	948,562.7	1,881,138.9	738.00					
IL 47 north of Green Rd SB	24.0	point1	1	948,447.6	1,882,428.2	774.00				Average	
		point2	2	948,494.4	1,882,305.6	774.00				Average	
		point3	3	948,523.9	1,882,209.8	771.00				Average	
		point4	4	948,549.6	1,882,113.4	768.00				Average	
		point5	6	948,569.1	1,882,023.6	768.00				Average	
		point7	7	948,587.4	1,881,918.2	761.00				Average	
		point8	8	948,599.7	1,881,822.4	758.00				Average	
		point9	9	948,611.9	1,881,627.9	752.00				Average	
		point10	10	948,605.8	1,881,428.1	746.00				Average	
		point11	11	948,580.2	1,881,230.4	740.00				Average	
		point652	652	948,562.7	1,881,138.9	738.00					
IL 47 north of Green Rd SB-2	32.0	point653	653	948,562.7	1,881,138.9	738.00				Average	
		point12	12	948,536.8	1,881,043.1	736.00				Average	
		point13	13	948,485.6	1,880,849.9	734.00					
IL 47 from Seavy Rd to Green Rd SB-2	44.0	point658	658	947,818.0	1,879,627.1	755.00				Average	
		point23	23	947,775.9	1,879,536.8	755.00				Average	
		point24	24	947,739.8	1,879,439.2	754.00				Average	
		point25	25	947,708.7	1,879,342.5	754.00				Average	
		point26	26	947,658.0	1,879,148.6	751.00				Average	
		point27	27	947,639.1	1,879,052.1	749.00				Average	
		point28	28	947,610.6	1,878,847.6	746.00				Average	
		point29	29	947,596.2	1,878,648.1	744.00				Average	
		point30	30	947,598.4	1,878,449.1	744.00				Average	
		point534	534	947,602.4	1,878,389.5	744.00					
Roadway158	12.0	point655	663	948,105.6	1,883,318.2	774.00				Average	
		point654	662	948,210.0	1,883,053.8	778.00				Average	
		point653	661	948,283.0	1,882,868.0	779.00				Average	

		point652	660	948,357.1	1,882,681.8	779.00				Average	
		point651	659	948,447.6	1,882,428.2	774.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Roadway2-2	point643	643	0	0	0	0	0	0	0	0	0	0
	point31	31										
IL 47 from Seavy Rd to Green Rd NB	point644	644	857	55	69	55	59	55	0	0	0	0
	point165	165	857	55	69	55	59	55	0	0	0	0
	point166	166	857	55	69	55	59	55	0	0	0	0
	point167	167	857	55	69	55	59	55	0	0	0	0
	point168	168	857	55	69	55	59	55	0	0	0	0
	point169	169	857	55	69	55	59	55	0	0	0	0
	point170	170	857	55	69	55	59	55	0	0	0	0
	point171	171	857	55	69	55	59	55	0	0	0	0
	point172	172	857	55	69	55	59	55	0	0	0	0
	point173	173	857	55	69	55	59	55	0	0	0	0
	point174	174	857	55	69	55	59	55	0	0	0	0
	point175	175	857	55	69	55	59	55	0	0	0	0
	point176	176	857	55	69	55	59	55	0	0	0	0
	point177	177	857	55	69	55	59	55	0	0	0	0
	point178	178	857	55	69	55	59	55	0	0	0	0
	point179	179	857	55	69	55	59	55	0	0	0	0
	point180	180	857	55	69	55	59	55	0	0	0	0
	point181	181	857	55	69	55	59	55	0	0	0	0
	point182	182										
IL 47 from Seavy Rd to Green Rd SB 1L	point646	646	767	55	62	55	53	55	0	0	0	0

	point14	14	767	55	62	55	53	55	0	0	0	0
	point15	15	767	55	62	55	53	55	0	0	0	0
	point16	16	767	55	62	55	53	55	0	0	0	0
	point17	17	767	55	62	55	53	55	0	0	0	0
	point18	18	767	55	62	55	53	55	0	0	0	0
	point19	19	767	55	62	55	53	55	0	0	0	0
	point20	20	767	55	62	55	53	55	0	0	0	0
	point21	21	767	55	62	55	53	55	0	0	0	0
	point22	22	767	55	62	55	53	55	0	0	0	0
	point657	657										
IL 47 north of Green Rd NB	point645	645	737	55	51	55	59	55	0	0	0	0
	point184	184	737	55	51	55	59	55	0	0	0	0
	point654	654	737	55	51	55	59	55	0	0	0	0
	point185	185										
IL 47 north of Green Rd SB	point1	1	1471	55	101	55	118	55	0	0	0	0
	point2	2	1471	55	101	55	118	55	0	0	0	0
	point3	3	1471	55	101	55	118	55	0	0	0	0
	point4	4	1471	55	101	55	118	55	0	0	0	0
	point5	6	1471	55	101	55	118	55	0	0	0	0
	point7	7	1471	55	101	55	118	55	0	0	0	0
	point8	8	1471	55	101	55	118	55	0	0	0	0
	point9	9	1471	55	101	55	118	55	0	0	0	0
	point10	10	1471	55	101	55	118	55	0	0	0	0
	point11	11	1471	55	101	55	118	55	0	0	0	0
	point652	652										
IL 47 north of Green Rd SB-2	point653	653	734	55	51	55	59	55	0	0	0	0
	point12	12	734	55	51	55	59	55	0	0	0	0
	point13	13										
IL 47 from Seavy Rd to Green Rd SB-2	point658	658	767	55	62	55	53	55	0	0	0	0
	point23	23	767	55	62	55	53	55	0	0	0	0
	point24	24	767	55	62	55	53	55	0	0	0	0
	point25	25	767	55	62	55	53	55	0	0	0	0
	point26	26	767	55	62	55	53	55	0	0	0	0
	point27	27	767	55	62	55	53	55	0	0	0	0

	point28	28	767	55	62	55	53	55	0	0	0	0
	point29	29	767	55	62	55	53	55	0	0	0	0
	point30	30	767	55	62	55	53	55	0	0	0	0
	point534	534										
Roadway158	point655	663	1471	55	101	55	118	55	0	0	0	0
	point654	662	1471	55	101	55	118	55	0	0	0	0
	point653	661	1471	55	101	55	118	55	0	0	0	0
	point652	660	1471	55	101	55	118	55	0	0	0	0
	point651	659										

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Res 8	9	1	948,437.2	1,881,221.6	735.00	4.92	62.30	66	14.0	8.0	Y
CNE 8 - 1	11	1	948,276.7	1,881,311.6	734.00	4.92	55.50	66	14.0	8.0	Y
CNE 8 - 2	12	1	948,139.6	1,881,381.0	736.00	4.92	52.50	66	14.0	8.0	Y
CNE 8 - 3	13	1	948,261.1	1,881,613.6	750.00	4.92	54.40	66	14.0	8.0	Y
CNE 8 - 4	14	1	948,294.1	1,882,063.4	767.00	4.92	56.50	66	14.0	8.0	Y
CNE 8 - 5	15	1	948,189.9	1,882,117.1	768.00	4.92	53.90	66	14.0	8.0	Y
CNE 8 - 6	16	1	948,316.6	1,882,287.2	773.00	4.92	60.20	66	14.0	8.0	Y
CNE 8 - 7	17	1	948,188.2	1,882,249.1	770.00	4.92	54.90	66	14.0	8.0	Y

Volkert, Inc.
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28 July 2017
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier2	W	0.00	99.99	30.00				0.00	point1	1	948,544.1	1,881,500.8	743.00	12.00	1.00	13	12		
									point2	2	948,547.6	1,881,602.2	748.00	12.00	1.00	13	12		
									point3	3	948,548.3	1,881,701.5	753.00	12.00	1.00	13	12		
									point4	4	948,538.6	1,881,801.6	756.00	12.00	1.00	13	12		
									point5	5	948,527.6	1,881,902.4	761.00	12.00	1.00	13	12		
									point6	6	948,512.4	1,881,998.1	764.00	12.00	1.00	13	12		
									point7	7	948,493.1	1,882,097.5	767.00	12.00	1.00	13	12		
									point8	8	948,469.6	1,882,196.9	770.00	12.00					
Barrier3	W	0.00	99.99	30.00				0.00	point9	9	948,449.6	1,882,251.2	771.00	12.00	1.00	13	12		
									point10	10	948,392.3	1,882,415.5	777.00	12.00					
Barrier4	W	0.00	99.99	30.00				0.00	point11	11	948,314.4	1,880,619.2	726.00	12.00	1.00	13	12		
									point12	12	948,352.4	1,880,712.5	725.00	12.00	1.00	13	12		
									point13	13	948,389.3	1,880,805.9	725.00	12.00	1.00	13	12		
									point14	14	948,420.4	1,880,895.8	725.00	12.00	1.00	13	12		
									point15	15	948,456.1	1,880,997.2	727.00	12.00	1.00	13	12		
									point16	16	948,480.3	1,881,093.5	729.00	12.00	1.00	13	12		
									point17	17	948,499.9	1,881,192.5	732.00	12.00	1.00	13	12		
									point18	18	948,517.2	1,881,289.4	734.00	12.00	1.00	13	12		
									point19	19	948,524.1	1,881,348.1	736.00	12.00					

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Res 8	9	1	62.3	68.0	66	5.7	14	Snd Lvl	63.5	4.5	8	-3.5
CNE 8 - 1	11	1	55.5	60.2	66	4.7	14	----	59.0	1.2	8	-6.8
CNE 8 - 2	12	1	52.5	56.8	66	4.3	14	----	56.0	0.8	8	-7.2
CNE 8 - 3	13	1	54.4	58.6	66	4.2	14	----	57.0	1.6	8	-6.4
CNE 8 - 4	14	1	56.5	60.6	66	4.1	14	----	57.3	3.3	8	-4.7
CNE 8 - 5	15	1	53.9	57.8	66	3.9	14	----	55.5	2.3	8	-5.7
CNE 8 - 6	16	1	60.2	63.9	66	3.7	14	----	59.9	4.0	8	-4.0
CNE 8 - 7	17	1	54.9	58.4	66	3.5	14	----	56.4	2.0	8	-6.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	8	0.8	2.5	4.5
All Impacted	1	4.5	4.5	4.5
All that meet NR Goal	0	0.0	0.0	0.0

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND-LEVEL DIAGNOSIS BY BARRIER SEGMENT

PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Total LAeq1h dBA	Important Barriers Name	Important Segments Name	No.	Partial LAeq1h dBA
Res 8	9	63.50	Barrier4	point17	17	58.70
			Barrier4	point16	16	57.50
			Barrier4	point15	15	52.70
			Barrier4	point18	18	52.60
			Barrier4	point14	14	51.30
			Barrier4	point13	13	49.10
			Barrier4	point12	12	46.70
			Barrier4	point11	11	44.10
			Barrier2	point1	1	43.70
			Barrier2	point2	2	39.00
CNE 8 - 1	11	59.00	Barrier4	point17	17	50.60
			Barrier4	point16	16	50.00
			Barrier4	point18	18	48.50
			Barrier4	point15	15	48.40
			Barrier4	point14	14	47.90
			Barrier2	point1	1	45.80
			Barrier4	point13	13	45.70
			Barrier4	point12	12	44.90
			Barrier4	point11	11	42.80

			Barrier2	point2	2	41.90
CNE 8 - 2	12	56.00	Barrier4	point17	17	46.20
			Barrier4	point16	16	45.80
			Barrier4	point14	14	44.90
			Barrier4	point15	15	44.80
			Barrier4	point18	18	44.30
			Barrier2	point1	1	43.90
			Barrier4	point13	13	43.30
			Barrier4	point12	12	42.50
			Barrier4	point11	11	41.00
			Barrier2	point2	2	40.90
CNE 8 - 3	13	57.00	Barrier2	point1	1	48.40
			Barrier2	point2	2	47.20
			Barrier4	point17	17	45.70
			Barrier4	point18	18	44.80
			Barrier2	point3	3	44.20
			Barrier4	point16	16	44.00
			Barrier4	point15	15	43.10
			Barrier2	point5	5	42.90
			Barrier4	point14	14	42.80
			Barrier2	point4	4	42.30
CNE 8 - 4	14	57.30	Barrier2	point6	6	50.00
			Barrier2	point7	7	47.10
			Barrier3	point9	9	45.70
			Barrier2	point5	5	45.20
			Barrier2	point4	4	44.70
			Barrier2	point3	3	44.20
			Barrier2	point2	2	42.40
			Barrier2	point1	1	41.20
			Barrier4	point17	17	38.00
			Barrier4	point16	16	36.60
CNE 8 - 5	15	55.50	Barrier2	point6	6	46.20
			Barrier3	point9	9	45.50
			Barrier2	point7	7	44.20

			Barrier2	point5	5	42.60
			Barrier2	point3	3	41.70
			Barrier2	point4	4	41.50
			Barrier2	point2	2	40.20
			Barrier2	point1	1	39.40
			Barrier4	point17	17	36.60
			Barrier4	point16	16	35.30
CNE 8 - 6	16	59.90	Barrier3	point9	9	52.30
			Barrier2	point7	7	48.20
			Barrier2	point6	6	43.90
			Barrier2	point5	5	40.20
			Barrier2	point4	4	39.10
			Barrier2	point2	2	37.40
			Barrier2	point3	3	37.00
			Barrier2	point1	1	36.50
			Barrier4	point17	17	34.40
			Barrier4	point16	16	33.90
CNE 8 - 7	17	56.40	Barrier3	point9	9	46.80
			Barrier2	point6	6	44.60
			Barrier2	point7	7	44.40
			Barrier2	point4	4	39.50
			Barrier2	point5	5	39.30
			Barrier2	point3	3	39.20
			Barrier2	point2	2	37.90
			Barrier2	point1	1	37.00
			Barrier4	point17	17	34.70
			Barrier4	point16	16	33.50

Volkert, Inc.
Nik Simonson

28 July 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: BARRIER DESIGN
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: CNE 8 Barrier
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Selected Receivers

Name	No.	Calc LAeq1h	Noise Reduction Calc	Noise Reduction Goal	Noise Reduction Calc-Goal	Barrier Reviewed	Important Segments Name	Important Segments No.	Important Segments Height	Partial LAeq1h
		dBA	dB	dB	dB				ft	dBA
Res 8	9	63.5	4.5	8	-3.5	Barrier4	point17	17	12.0	58.7
						Barrier4	point16	16	12.0	57.5
						Barrier4	point15	15	12.0	52.7
						Barrier4	point18	18	12.0	52.6
						Barrier4	point14	14	12.0	51.3
						Barrier4	point13	13	12.0	49.1
						Barrier4	point12	12	12.0	46.7
						Barrier4	point11	11	12.0	44.1
						Barrier2	point1	1	12.0	43.7
						Barrier2	point2	2	12.0	39.0
CNE 8 - 1	11	59.0	1.2	8	-6.8	Barrier4	point17	17	12.0	50.6
						Barrier4	point16	16	12.0	50.0
						Barrier4	point18	18	12.0	48.5
						Barrier4	point15	15	12.0	48.4
						Barrier4	point14	14	12.0	47.9
						Barrier2	point1	1	12.0	45.8
						Barrier4	point13	13	12.0	45.7
						Barrier4	point12	12	12.0	44.9
						Barrier4	point11	11	12.0	42.8
						Barrier2	point2	2	12.0	41.9

CNE 8 - 2	12	56.0	0.8	8	-7.2	Barrier4	point17	17	12.0	46.2
						Barrier4	point16	16	12.0	45.8
						Barrier4	point14	14	12.0	44.9
						Barrier4	point15	15	12.0	44.8
						Barrier4	point18	18	12.0	44.3
						Barrier2	point1	1	12.0	43.9
						Barrier4	point13	13	12.0	43.3
						Barrier4	point12	12	12.0	42.5
						Barrier4	point11	11	12.0	41.0
						Barrier2	point2	2	12.0	40.9
CNE 8 - 3	13	57.0	1.6	8	-6.4	Barrier2	point1	1	12.0	48.4
						Barrier2	point2	2	12.0	47.2
						Barrier4	point17	17	12.0	45.7
						Barrier4	point18	18	12.0	44.8
						Barrier2	point3	3	12.0	44.2
						Barrier4	point16	16	12.0	44.0
						Barrier4	point15	15	12.0	43.1
						Barrier2	point5	5	12.0	42.9
						Barrier4	point14	14	12.0	42.8
						Barrier2	point4	4	12.0	42.3
CNE 8 - 4	14	57.3	3.3	8	-4.7	Barrier2	point6	6	12.0	50.0
						Barrier2	point7	7	12.0	47.1
						Barrier3	point9	9	12.0	45.7
						Barrier2	point5	5	12.0	45.2
						Barrier2	point4	4	12.0	44.7
						Barrier2	point3	3	12.0	44.2
						Barrier2	point2	2	12.0	42.4
						Barrier2	point1	1	12.0	41.2
						Barrier4	point17	17	12.0	38.0
						Barrier4	point16	16	12.0	36.6
CNE 8 - 5	15	55.5	2.3	8	-5.7	Barrier2	point6	6	12.0	46.2
						Barrier3	point9	9	12.0	45.5
						Barrier2	point7	7	12.0	44.2
						Barrier2	point5	5	12.0	42.6
						Barrier2	point3	3	12.0	41.7
						Barrier2	point4	4	12.0	41.5

						Barrier2	point2	2	12.0	40.2
						Barrier2	point1	1	12.0	39.4
						Barrier4	point17	17	12.0	36.6
						Barrier4	point16	16	12.0	35.3
CNE 8 - 6	16	59.9	4.0	8	-4.0	Barrier3	point9	9	12.0	52.3
						Barrier2	point7	7	12.0	48.2
						Barrier2	point6	6	12.0	43.9
						Barrier2	point5	5	12.0	40.2
						Barrier2	point4	4	12.0	39.1
						Barrier2	point2	2	12.0	37.4
						Barrier2	point3	3	12.0	37.0
						Barrier2	point1	1	12.0	36.5
						Barrier4	point17	17	12.0	34.4
						Barrier4	point16	16	12.0	33.9
CNE 8 - 7	17	56.4	2.0	8	-6.0	Barrier3	point9	9	12.0	46.8
						Barrier2	point6	6	12.0	44.6
						Barrier2	point7	7	12.0	44.4
						Barrier2	point4	4	12.0	39.5
						Barrier2	point5	5	12.0	39.3
						Barrier2	point3	3	12.0	39.2
						Barrier2	point2	2	12.0	37.9
						Barrier2	point1	1	12.0	37.0
						Barrier4	point17	17	12.0	34.7
						Barrier4	point16	16	12.0	33.5
Total Cost, All Barriers (including additional cost(s))					$589878					

Appendix C – Field Data Sheets and Model Validation Results

File 0001

Reading 1 of 3 at this receptor location.

Project: DOT Project No. / Volkert Project No.

Receptor Location (or #): Noise Monitoring Site V1: Receptor Res 1

Landuse Characteristics: Residence along I-47 and Old Oaks Rd.

Equipment:	Meter:	Rion NL-42	Calibrator:	Nor-1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES
	Date:	4/11/17	Time:	4:45 pm
Weather Data:	Wind:	W. 12 mph	Temperature:	52° F
	Weather:	Cloudy/overcast		

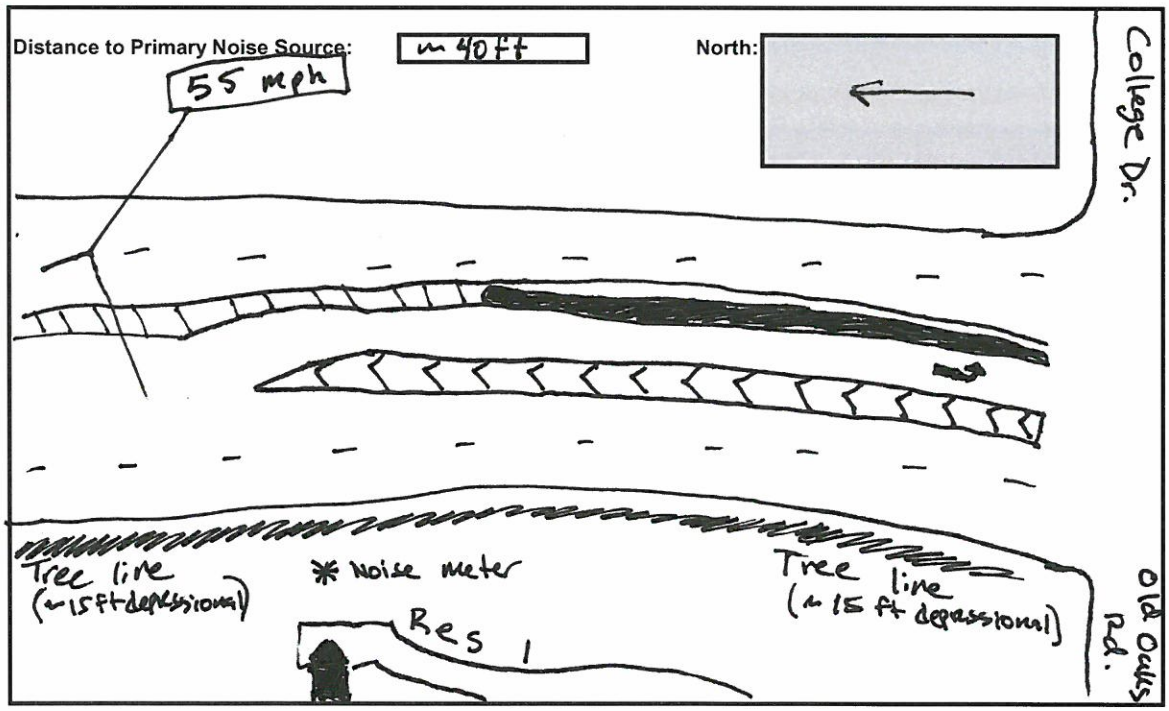
Start Time: 4:45 p.m. **End Time:** 5:00 P.M.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)
	NB	SB	
Automobiles:	125	110	
Medium Trucks:	1	1	
Heavy Trucks:	6	5	

Distance to Primary Noise Source: ~40 ft

North:



Background Noise: None

Major Sources: I-47

Unusual Events: Flock of geese 4:50 p.m.

Other Notes: none

Reading 2 of 3 at this receptor location.

Project:
DOT Project No. / Volkert Project No.

Receptor Location (or #): Noise Monitoring Site V1: Receptor Res 1

Landuse Characteristics: Residence along I-47 and Old Oaks Rd.

Equipment:	Meter:	Rion NL-42	Calibrator:	Nor-1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES

	Date:	4/11/17	Time:	5:05 p.m.
Weather Data:	Wind:	W. 12 mph	Temperature:	52° F
	Weather:	Cloudy / overcast		

Start Time: 5:05 p.m. **End Time:** 5:20 p.m.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)
	NB SB		
Automobiles:	104 111		
Medium Trucks:	- 1		
Heavy Trucks:	4 10		

Distance to Primary Noise Source:

North:

See Reading 0001

Background Noise: None
Major Sources: I-47
Unusual Events: –
Other Notes: –

Reading 3 of 3 at this receptor location.

Project:
DOT Project No. / Volkert Project No.

Receptor Location (or #): Noise Monitoring Site V1: Receptor Res 1

Landuse Characteristics: Residence along I-47 and Old Oaks Rd.

Equipment:	Meter:	Rion NL-42	Calibrator:	Nor-1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES

	Date:	4/11/17	Time:	5:24 p.m
Weather Data:	Wind:	W. 12 mph	Temperature:	52° F
	Weather:	Cloudy/Overcast		

Start Time: 5:24 p.m. **End Time:** 5:39 p.m.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)
	NB SB		
Automobiles:	109 119		
Medium Trucks:	3 2		
Heavy Trucks:	5 10		

Distance to Primary Noise Source:

North:

See Reading 0001

Background Noise: None
Major Sources: I-47
Unusual Events: Horn 45 seconds in, traffic backup at 7 minute mark
Other Notes: -

Reading 1 of 3 at this receptor location.

Project: DOT Project No. / Volkert Project No.

Receptor Location (or #): Noise Monitoring Site V2: Receptor Res 2

Landuse Characteristics: Residence along I-47 and Thornapple Tree Rd.

Equipment:	Meter:	Rion NL-42	Calibrator:	Nor 1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES
	Date:	4/12/17	Time:	11:05 a.m.
Weather Data:	Wind:	SE 4 MPH	Temperature:	63° F
	Weather:	Sunny		

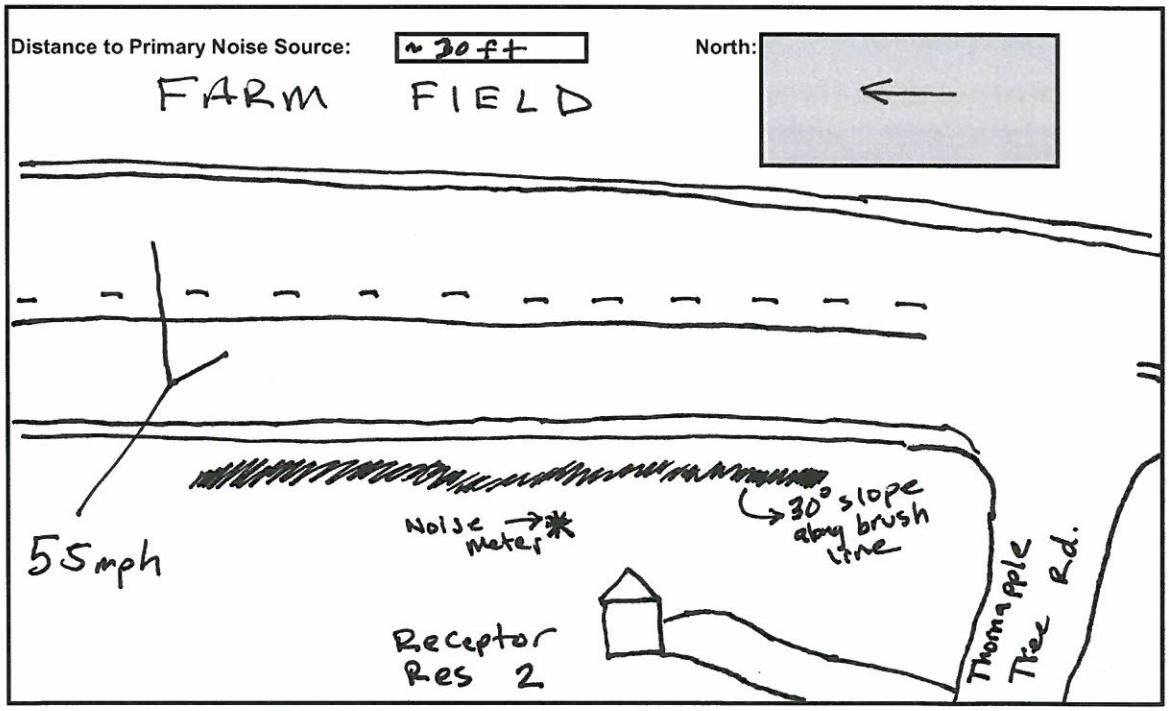
Start Time: 11:05 a.m. **End Time:** 11:30 am

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)
Automobiles:	65		
Medium Trucks:	9		
Heavy Trucks:	14		

Distance to Primary Noise Source: ~30 ft

North:



Background Noise: None

Major Sources: I-47

Unusual Events: —

Other Notes: —

Reading 2 of 3 at this receptor location.

Project: DOT Project No. / Volkert Project No.

Receptor Location (or #): Noise Monitoring Site V2: Receptor Res 2

Landuse Characteristics: Residence along I-47 and Thornapple Tree Rd.

Equipment:	Meter:	Rion NL-42	Calibrator:	Nor 1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES
	Date:	4/12/17	Time:	2:09 P.M.
Weather Data:	Wind:	SE 4 Mph	Temperature:	63° F
	Weather:	Sunny		

Start Time: 2:09 p.m. **End Time:** 2:24 p.m.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)
Automobiles:	150		
Medium Trucks:	16		
Heavy Trucks:	24		

Distance to Primary Noise Source:

North:

See Reading 0007

Background Noise: None

Major Sources: I-47

Unusual Events: Loud talking at 2:22 pm

Other Notes: —

Reading 3 of 3 at this receptor location.

Project: DOT Project No. / Volkert Project No.

Receptor Location (or #): Noise Monitoring Site V2: Receptor Res 2

Landuse Characteristics: Residence along I-47 and Thornapple Tree Rd.

Equipment:	Meter:	Rion NL-42	Calibrator:	Nor 1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES
	Date:	4/12/17	Time:	2:25 pm
Weather Data:	Wind:	SE 4MPH	Temperature:	63°F
	Weather:	Sunny		

Start Time: 2:25 p.m. **End Time:** 2:40 p.m.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)
Automobiles:	158		
Medium Trucks:	13		
Heavy Trucks:	23		

Distance to Primary Noise Source:

North:

See Reading 0007

Background Noise: None

Major Sources: I-47

Unusual Events: Horn at 2:31 p.m.

Other Notes: Landowner discussion at 2:29 p.m.

Reading 1 of 3 at this receptor location.

Project: DOT Project No. ######## / Volkert Project No.######

Receptor Location (or #): Noise Monitoring Site V3: Receptor Res 5

Landuse Characteristics: Residence along I-47 and Oak Leaf Dr.

Equipment:	Meter:	Rion NL-21	Calibrator:	NOR-1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES
	Date:	4/12/17	Time:	3:30 p.m.
Weather Data:	Wind:	SSE 6 MPH	Temperature:	63°F
	Weather:	Sunny		

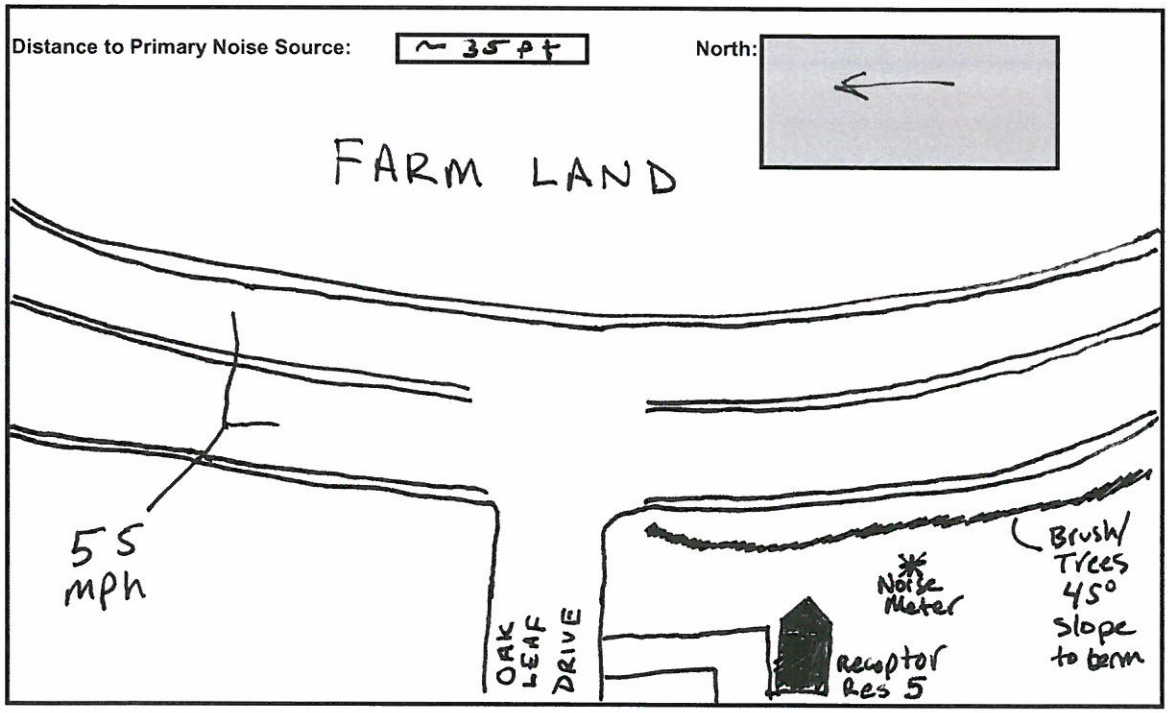
Start Time: 3:30 **End Time:** 3:45

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)	Estimated Speed
Automobiles:	214			
Medium Trucks:	13			
Heavy Trucks:	16			

Distance to Primary Noise Source: ~35 ft

North:



Background Noise: None

Major Sources: I-47

Unusual Events: Baby Crying 3:35 pm, Truck horn 3:42 pm

Other Notes:

Reading 2 of 3 at this receptor location.

Project: DOT Project No. ######## / Volkert Project No.######

Receptor Location (or #): Noise Monitoring Site V3: Receptor Res 5

Landuse Characteristics: Residence along I-47 and Oak Leaf Dr.

Equipment:	Meter:	Rion NL-21	Calibrator:	NOR-1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES

	Date:	4/12/17	Time:	3:46 p.m.
Weather Data:	Wind:	SSE 6mph	Temperature:	63°F
	Weather:	Sunny		

Start Time: 3:46 p.m. **End Time:** 4:01 p.m.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)	Estimated Speed
Automobiles:	225			
Medium Trucks:	8			
Heavy Trucks:	13			

Distance to Primary Noise Source:

North:

See Reading 0010

Background Noise: None

Major Sources: I-47

Unusual Events: Hydraulic brake noise 3:50 p.m., Car beep 4:00 p.m.

Other Notes:

Reading ____ of ____ at this receptor location.

Project: DOT Project No. ######## / Volkert Project No.######

Receptor Location (or #): Noise Monitoring Site V3: Receptor Res 5

Landuse Characteristics: Residence along I-47 and Oak Leaf Dr.

Equipment:	Meter:	Rion NL-21	Calibrator:	NOR-1251
Calibration:	Start Cal: (dB)	114	Finish Cal: (dB)	114
Response:	Fast:	NA	Slow:	YES
	A-Weighting?	YES	Battery Check?:	YES
Weather Data:	Date:	4/12/17	Time:	4:02 p.m.
	Wind:	SSE 6mph	Temperature:	63° F
	Weather:	Sunny		

Start Time: 4:02 pm. **End Time:** 4:17 p.m.

Traffic Count Data

Road:	Primary Noise Source	Other (Intersecting Street)	Other (Intersecting Street)	Estimated Speed
Automobiles:	199			
Medium Trucks:	10			
Heavy Trucks:	18			

Distance to Primary Noise Source:

North:

See Reading

0010

Background Noise: None

Major Sources: I-47

Unusual Events: Truck horn 5 minutes in

Other Notes: —

Volkert
Nik Simonson

23 May 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Model Validation Site V1
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	58.9	61.6	66	2.7	10	----	61.6	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Volkert
Nik Simonson

23 May 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: IL 47 at I 88 Interchange
RUN: Model Validation Site V2
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver												
Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc	Impact	LAeq1h	Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	63.7	66.3	66	2.6	10	Snd Lvl	66.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Volkert
Nik Simonson

23 May 2017
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: Il 47 at I 88 Interchange
RUN: Model Validation Site V 3
BARRIER DESIGN: INPUT HEIGHTS

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	63.0	63.5	66	0.5	10	----	63.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

CRASH ANALYSIS

A crash analysis was performed along an approximate three-mile section of Illinois Route 47 between Old Oaks Road/College Drive and Main Street over a five-year period between 2011 and 2015. Within these project limits and the study period, a total of 69 crashes occurred along both mainline Illinois Route 47 and along side street approaches (within approximately 500 feet of Illinois Route 47). A summary of the crash data throughout the project limits is provided in Figure S-3-1. As outlined in this figure, the number of crashes occurring is similar in each of the five years; however, approximately 48 percent of total crashes occurred in either 2011 (17 total crashes) or 2015 (16 total crashes).

Approximately 70 percent of crashes(48 total) resulted in property damage only. The remaining 30 percent of crashes (21 total) resulted in at least one injury. Accounting for all vehicle occupants among the 21 injury crashes, 1 type K, 4 type A, 18 type B, and 10 type C injuries occurred during the analysis period. The State of Illinois identifies injury types as follows:

- Type K: Fatal – victim dies within 30 days of crash
- Type A: Incapacitating – victim requires help from the scene
- Type B: Non-Incapacitating – visible signs of injury but victim is able to walk away from the scene
- Type C: Reported/Not evident – not visible but victim complains of pain

One fatality crash occurred within the study period at the intersection of Illinois Route 47 and the I-88 Eastbound Off-Ramp. This crash occurred when a passenger car attempted to make a left-turn onto northbound Illinois Route 47 from the off-ramp. According to the crash report, the passenger car disregarded the stop sign and was struck by an SUV traveling southbound on Illinois Route 47. The driver of the passenger car died on the scene. The three occupants of the SUV sustained type B injuries.

Out of the 4 type A crashes, two were rear end crashes at the intersection of Illinois Route 47 and Merrill Road. One crash occurred in 2011 and one occurred in 2015. Both crashes appear to have occurred due to a vehicle not stopping for another vehicle that was waiting in the southbound through lane to make a left-turn onto Merrill Road. Both crashes occurred during daylight and dry conditions, and both involved motorcycles. The third type A crash occurred in 2012 approximately 300 feet south of Finley Road. The crash occurred due to a vehicle attempting to make an illegal U-turn on Illinois Route 47. The fourth type A crash occurred in 2015 approximately 200 feet south of Seavey Road. This was a head-on crash that occurred when a pickup truck traveling southbound lost control and struck a northbound passenger car. This crash occurred during daylight and snowy conditions. It was documented that the roadway was covered with snow/slush.

Figure S-3-1. IL-47 Tabulated Data

Collision Type	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
Rear End	5	7	4	5	6	27	39%
Turning	4	3	2	3	3	15	22%
Fixed-Object	3	1	1	2	3	10	14%
Sideswipe - Same Direction	0	0	2	0	0	2	3%
Sideswipe - Opposite Direction	0	0	0	1	0	1	1%
Angle	0	1	0	0	2	4	4%
Animal	3	0	2	2	1	8	12%
Pedalcyclist	0	0	0	0	0	0	0%
Pedestrian	0	0	0	0	0	0	0%
Other Object	0	0	0	0	0	0	0%
Other Collisions	2	0	0	0	1	2	4%
Total	17	12	11	13	16	69	100%

Crash Severity and Number of Injuries	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
A Injury (Incapacitating)	1	1	0	0	2	4	5%
B Injury (Non-incapacitating)	1	2	3	6	6	18	22%
C Injury (Reported, not apparent)	6	2	0	1	1	10	12%
K Fatality	0	0	0	1	0	1	1%
Property Damage Only	13	9	9	8	9	48	59%
Total	21	14	12	16	18	81	100%

Peak Period	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
AM Peak	1	5	2	1	2	11	16%
PM Peak	3	2	2	3	4	14	20%
Off Peak	13	5	7	9	10	44	64%
Total	17	12	11	13	16	69	100%

Weather Condition	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
Clear	15	11	10	10	11	57	83%
Rain	1	0	1	1	3	6	9%
Snow	1	0	0	1	2	4	6%
Fog/smoke/haze	0	1	0	0	0	1	1%
Sleet/hail	0	0	0	0	0	0	0%
Severe cross wind	0	0	0	0	0	0	0%
Other	0	0	0	1	0	1	1%
Cloudy/overcast	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0%
Total	17	12	11	13	16	69	100%

Light Condition	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
Daylight	11	11	8	8	12	50	72%
Dawn	0	1	0	0	0	1	1%
Dusk	1	0	0	1	0	2	3%
Darkness	5	0	3	3	1	12	17%
Darkness; lighted road	0	0	0	1	3	4	6%
Unknown	0	0	0	0	0	0	0%
Total	17	12	11	13	16	69	100%

Rear end crashes are the most common type of crash within the project limits (approximately 39 percent), followed by turning crashes (approximately 22 percent), and fixed-object crashes (approximately 14 percent). It should also be noted that eight crashes, or 12 percent of total crashes, involved a vehicle striking an animal. This is presumably related to the rural environment within the project limits.

From the 27 total rear end crashes, approximately 44 percent (12 crashes) occurred at the intersection of Illinois Route 47 and I-88 Eastbound Off-Ramp. Eight of those 12 rear end crashes occurred along the off-ramp (eastbound approach). Approximately 22 percent (6 crashes) of total rear end crashes occurred when vehicles were struck from behind while waiting to make a left turn onto a side street or ramp from Illinois Route 47 without an exclusive left-turn lane provided. Providing exclusive left-turn lanes at these locations could limit the potential for similar rear end crashes from reoccurring.

All turning crashes occurred at intersections or driveways along Illinois Route 47, which is not atypical for this crash type. The fixed object crashes occurred sporadically throughout the project limits and do not appear to indicate any observable crash pattern.

Approximately 59 percent of total crashes (41 crashes) occurred at a key intersection within the project limits:

- Illinois Route 47 & Green Street (2 crashes)
- Illinois Route 47 & Green Road (4 crashes)
- Illinois Route 47 & Seavey Road (2 crashes)
- Illinois Route 47 & I-88 Westbound On-Ramp (1 crash)
- Illinois Route 47 & I-88 Eastbound Off-Ramp (15 crashes)
- Illinois Route 47 & Finley Road (2 crashes)
- Illinois Route 47 & Scott Road (2 crashes)
- Illinois Route 47 & Merrill Road (9 crashes)
- Illinois Route 47 & Old Oaks Road/College Drive (4 crashes)

Figure S-3-2 provides collision diagrams for the intersections listed above. The intersections that experienced the most crashes were the Illinois Route 47 and I-88 Eastbound Off-Ramp intersection and the Illinois Route 47 and Merrill Road intersection. As previously noted, I-88 Eastbound Off-Ramp intersection experienced a high number of rear end crashes, specifically on the eastbound approach, which is the off-ramp from I-88. The majority of crashes at the Merrill Road intersection were also rear end type collisions, most of which occurred along the southbound approach where vehicles were struck from behind while waiting to turn left from Illinois Route 47 onto Merrill Road. This was a common crash pattern observed during the study period.

The remaining 41 percent of total crashes (28 crashes) occurred along mainline Illinois Route 47 between each key intersection. Figure S-3-3 provides collision diagrams for the nine mainline segments. The segments are defined as follows:

- Segment 1 – Main Street to Green Road (3 crashes)
- Segment 2 – Green Road to Seavey Road (2 crashes)
- Segment 3 – Seavey Road to I-88 Westbound On-Ramp (2 crashes)
- Segment 4 – I-88 Westbound On-Ramp to I-88 Eastbound Off-Ramp (3 crashes)
- Segment 5 – I-88 Eastbound Off-Ramp to Finley Road (1 crash)
- Segment 6 – Finley Road to Scott Road (4 crashes)
- Segment 7 – Scott Road to Merrill Road (1 crash)
- Segment 8 – Merrill Road to Old Oaks Road/College Drive (12 crashes)

Segment 8 experienced more crashes than any other segment. The length of Segment 8 is 0.5 miles, which is not the longest segment, indicating it experienced the highest crash rate of any segment. Five crashes within Segment 8 involved vehicles striking animals – 3 of which took place during nighttime conditions. This segment of Illinois Route 47 does not currently have roadway lighting, which could limit drivers' ability to see animals when it is dark.

As part of the Highway Safety Improvement Program (HSIP), Illinois identifies five percent of the total highway segments statewide that exhibit the most pressing safety needs. This project is not located within a Five Percent segment.

The majority of crashes, approximately 70 percent, occurred during daylight conditions. Approximately 24 percent of the total crashes occurred during dark or lighted conditions, which suggests lighting may not be a contributing factor in the majority of crashes that occurred within the project limits. Certain crash types, however, occurred more frequently during dark conditions. Approximately 75 percent of the animal crashes and 30 percent of the fixed object crashes occurred under dark conditions where no roadway lighting is provided. This indicates a lack of roadway lighting could be limiting visibility of roadside objects and animals when it is dark.

Approximately 36 percent of total crashes occurred during the AM (6:00-9:00AM) and PM (6:00-9:00PM) peak periods (based on traffic volumes). Eleven crashes occurred during the AM peak period, while 14 occurred during the PM. The remaining 44 crashes occurred during off-peak hours.

FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 1 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Green Street

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

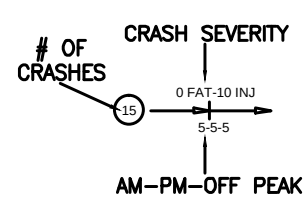


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 2 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Green Road

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

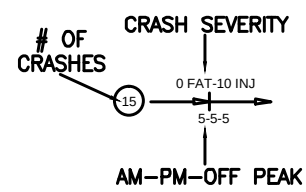


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 3 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Seavey Road

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

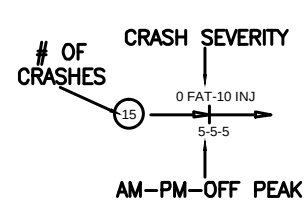


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 4 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and I-88 Westbound On-Ramp

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

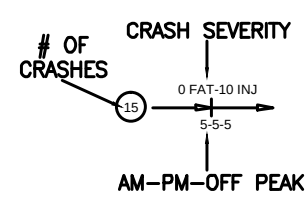


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 5 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and I-88 Eastbound Off-Ramp

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

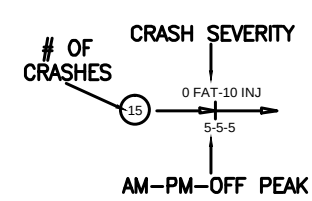


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 6 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Finley Road

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

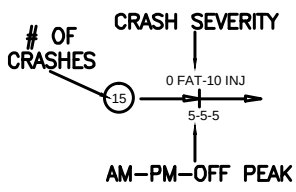


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 7 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Scott Road

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

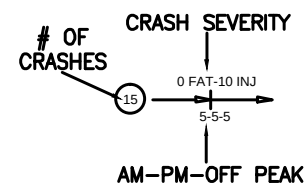


FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 8 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Merrill Road

LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

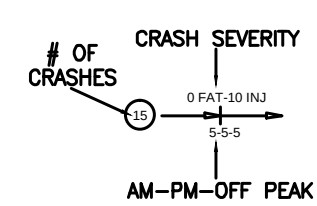


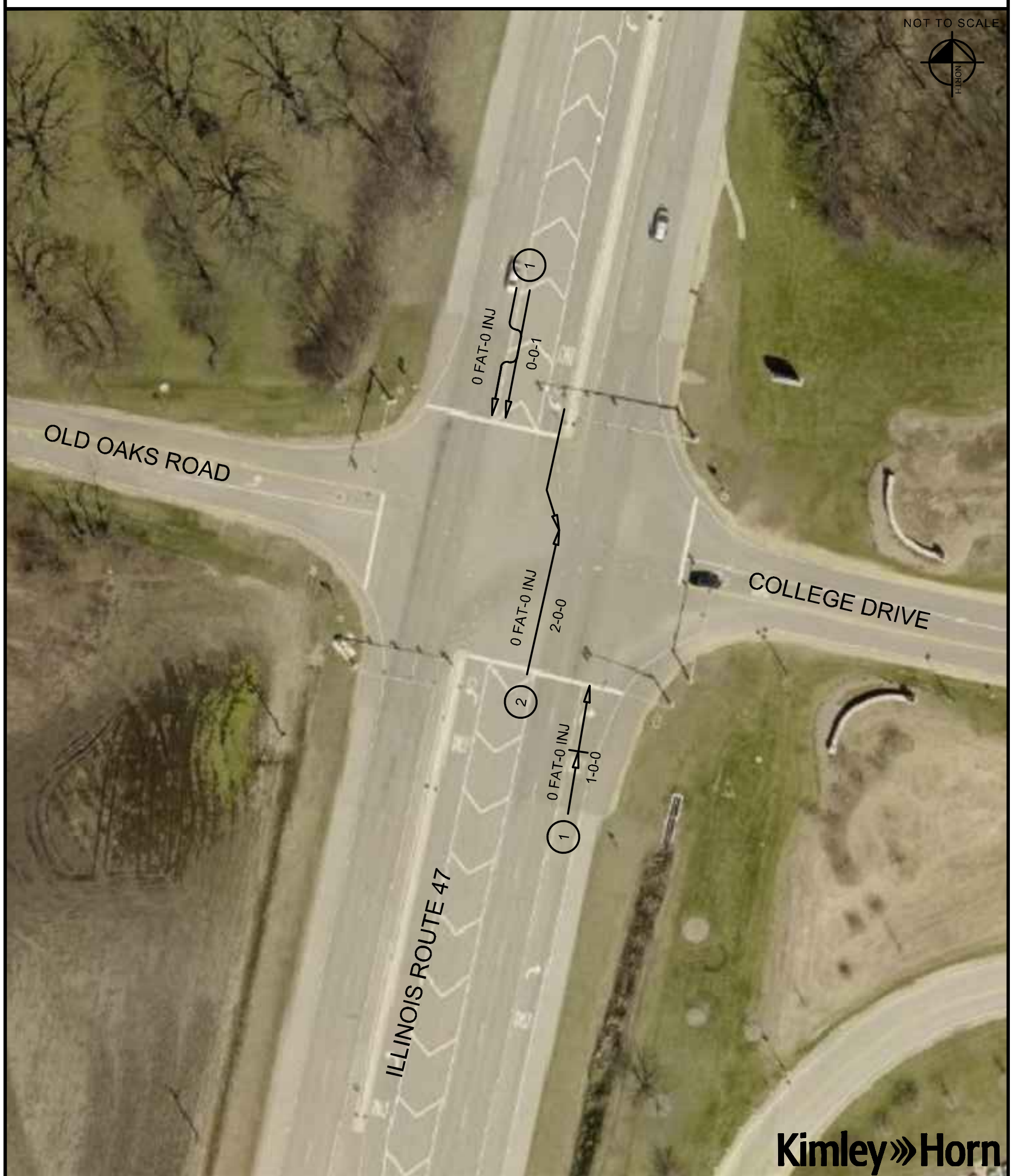
FIGURE S-3-2: COLLISION REPORT DIAGRAM

Sheet 9 of 9

STUDY PERIOD:

01/01/11 - 12/31/2015

IL Route 47 and Old Oaks Road/College Drive



LEGEND

- VEHICLE PATH
- FIXED OBJECT
- ANIMAL

COLLISION TYPES

- REAR-END
- HEAD-ON
- BACKED INTO
- ANGLE
- TURNING
- SIDESWIPE SAME DIRECTION
- SIDESWIPE OPPOSITE DIRECTION

EXAMPLE:

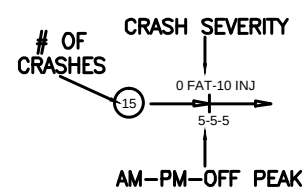


FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 1
Main Street to Green Road

FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 2
Green Road to Seavey Road

FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 3
Seavey Road to I-88 Westbound On-Ramp

FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 4
I-88 Westbound On-Ramp to I-88 Eastbound Off-Ramp

FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 5
I-88 Eastbound Off-Ramp to Finley Road

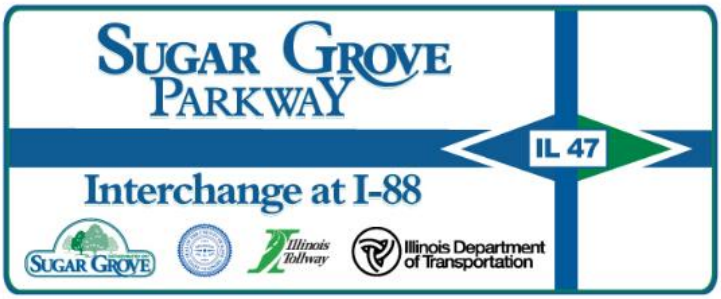
FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 6
Finley Road to Scott Road

FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 7
Scott Road to Merrill Road

FIGURE S-3-3: SEGMENT COLLISION DIAGRAM
Segment 8
Merrill Road to Old Oaks Road/College Drive

NEPA/404 COORDINATION

CONCURRENCE FOR ALTERNATIVES TO BE CARRIED FORWARD



FAP Route 326 Illinois Route 47 at Reagan Memorial Tollway (I-88)

Job Number: P-91-015-14

Kane County, Illinois

Prepared for:

Illinois Department of Transportation

Illinois Department of Transportation

Division of Highways/Region 1/District 1

January 2017

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Exhibit 2 Existing Land Use(1)
Exhibit 3 Proposed Land Use(1)
Exhibit 4 Bicycle Planning Map(2)
Exhibit 5 Projected No Build Traffic Volumes
Exhibit 6 Projected 2040 Build Traffic Volumes
Exhibit 7 Design Hourly Volumes
Exhibit 8 Level of Service Diagrams
Exhibit 9 Kane County Forest Preserve Land and Water Conservation Fund Properties

Appendices

Appendix A	Environmental Resource Map
Appendix B	State Historic Preservation Officer Cultural Concurrence
Appendix C	Typical Sections
Appendix D	IL 47 Bridge Typicals for Interchange Alternatives

(1) Source: *Village of Sugar Grove Comprehensive Plan*, *www.sugar-grove.il.us*
(2) Source: *2015 Kane/Kendall County Planning Map*, *www.kdot.countyofkane.org/publications/planning*

1. Introduction

The existing Illinois Route 47 (IL 47) interchange at Ronald Reagan Memorial Tollway (I-88) is a partial service interchange that provides access to and from the west only. Peace Road is the closest full access service interchange to the west of IL 47 (15.5 miles), while to the east the closest full access service interchange is Orchard Road (5.3 miles).

The purpose of the proposed project is to improve system linkage and accommodate land use and economic development within the IL 47 and I-88 project study area. The Purpose and Need (P&N) received concurrence on April 7, 2016.

The purpose of the document is to present the analysis and gain concurrence on the alternatives to be carried forward.

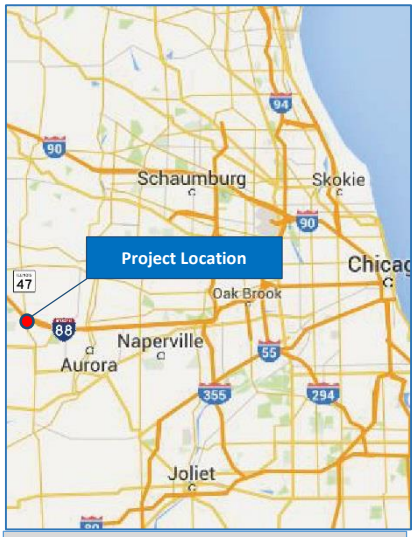


Figure 1: Project Location

2. Environmental Resources

The project study area has been established approximately 150 feet on both sides of IL 47 from the southern termini at Old Oaks Road/College Drive to the northern termini at Green Road and 300 feet on either side of the I-88 interchange ramps. The project limits are displayed in **Exhibit 1.** The study area includes sensitive environmental areas which may be impacted by any potential improvement of the roadway. Environmental studies are being completed pursuant to the Environmental Survey Request (ESR) for the project study area. The surveys conducted within the project study area are:

- Archaeological
- Historic Properties
- Natural Resources
- Preliminary Environmental Site Assessment (PESA)
- Wetlands

What is an Environmental Survey Request (ESR)? The ESR initiates the review for cultural, biological, wetland, and special waste resources within a specified study area.

See **Appendix A** for the Environmental Resource Map.

The environmental surveys found the following environmental resources within the project study area:

- Agricultural Land-The current Village of Sugar Grove Land Use Plan shows 58% of the project study area zoned for agricultural use. Agricultural properties are located directly south of I-88 on both sides of IL 47, north of I-88 on both sides of IL 47 to Seavey Road, and on the east side of IL 47 from Seavey Road to Green Road. Farmland was classified by the Natural Resource Conservation Service (NRCS) as either Prime Farmland of Statewide Importance, Prime Farmland, or Prime Farmland if Drained.

- Cultural/Archeological/Architectural Resources- Illinois Department of Transportation (IDOT) Bureau of Design and Environment (BDE) did not identify any archeological resources within the project study area. There are no properties listed in the National Register of Historic Places (NRHP) within the project study area. IDOT BDE did not identify any architecturally significant resources within the project study limits. Concurrence from the State Historic Preservation Officer (SHPO) was received on November 4, 2016. The concurrence letter is provided as Appendix B.

- Floodplains- There are two floodplains located within the project study area. See Appendix A for locations and limits of the floodplains and floodways.

- Section 4(f) Lands- The Hannaford Woods/Nickels Farm Forest Preserve is part of the Bliss Woods-Waubonsee College Forest Preserve. It is owned by the Forest Preserve District of Kane County. It is located within the project study area on both sides of IL 47 south of Merrill Road and north of Waubonsee Community College. The Preserve offers bike and nature trails, hiking, and picnic areas; however, none of the trails or picnic areas are located within the project study area.

  What are Section 4(f) Lands?

  Section 4(f) lands are publicly owned public parks, recreation lands, or wildlife and waterfowl refuges.

  The Kane County Forest Preserve purchased the portion of the forest preserve on the east side of IL 47 from Waubonsee Community College on August 9, 2012. As a part of the deed, a 60 foot strip was set aside along IL 47 to be purchased by IDOT at a fair market value, if IL 47 was ever widened. The portion of forest preserve west of IL 47 does not have land set aside, but the Kane County Forest Preserve has stated that the land has no restrictions preventing it from being purchased by IDOT.

- Section 6(f) Lands- Portions of the Bliss Woods-Waubonsee College Forest Preserve were purchased using Open Space Land Acquisition and Development (OSLAD) and Land and Water Conservation (LAWCON) funds. Portions of the Hannaford Woods/Nickels Farm Forest Preserve did utilize these funds; however, Kane County Forest Preserve has confirmed that the parcel bordering IL 47 was purchased from Waubonsee College after the OSLAD/LAWCON funds were used. A Map showing the border of OSLAD/LAWCON fund properties is included as **Exhibit 9**.

  What are Section 6(f) Lands?

  Section 6(f) lands are lands in which LAWCON and or OSLAD funds have been involved in its purchase or development.

- Threatened and Endangered Species-
  - Mammals: Northern Long-eared Bat *(Myotis septentrionalis)* is a federally threatened species that may occur within the corridor. The Illinois Department of Natural Resources (IDNR) has recommended a date restriction of April 1 – October 14 for any and all tree clearing.

  - Amphibians and Reptiles- A survey was conducted by the Illinois Natural History Survey (INHS) for the Blanding's turtle (*Emydoidea blandingii*). The Blanding's turtle is listed as an endangered species in Illinois. The survey was conducted August 8, 2016. Six sites were identified and examined for habitat suitability for the Blanding's turtle. No threatened and endangered reptiles or amphibians were encountered, and no suitable habitats for Blanding's turtle were documented in the project area.

  - Avian- The Wilson's phalarope *(Phalaropus tricolor)* is an Illinois listed endangered species. A three season avian survey is being conducted, report is due August 2017.

  - Botanical- A survey for the federally listed threatened eastern prairie fringed orchid (*Platanthera leucophaea*) was conducted, due to potential habitat identified at Wetland 8. Habitat for the eastern prairie fringed orchid includes mesic prairie, sedge meadows, marsh edges, and bogs in full sunlight. The survey was conducted on June 28 and 30 and July 6, 2016. No individual eastern prairie fringed orchids were found.

- Water Quality- Three parameter surveys are being conducted; macroinvertebrates, water quality sampling, and fish.

- Wetlands- A field survey was conducted for the project study area during April and May of 2016 by the INHS. All potential wetlands within the specified project area were examined. Nineteen sites met the criteria of a wetland. Of those, eight were identified as Advanced Identification (ADID) wetlands and seven were identified as high-quality aquatic resources (HQAR). Wetland locations are shown in Appendix A.

- Waters of the United States- A field survey was conducted for the project study area during April and May of 2016 by the INHS. All potential Waters of the U.S. (WOUS) within the specified project area were examined. Eight sites met the criteria of a WOUS. Blackberry Creek met the criteria of a HQAR.

3. Alternatives Overview

The following subsections provide design criteria for alternatives, the development and evaluation process for alternatives, and a description of alternatives being considered. The alternatives list includes the no-build and build alternatives that were studied in detail.

3.1. Proposed Highway Design Guidelines

Alternatives were developed utilizing design criteria as outlined in the IDOT BDE Manual. Within the IDOT BDE Manual, criteria are determined based on the functional classification designation and other basic conditions of the roadways, such as posted speed limits, terrain, and setting. Within the project corridor, IL 47 is designated as a State Other Principal Arterial and a Strategic Regional Arterial.

The design guidelines utilized for intersecting side roads were determined based on individual roadway's functional classification, projected traffic, and other existing conditions. The alternatives developed at the intersections utilized design criteria from the IDOT BDE Manual, as well as the IDOT Bureau of Local Roads (BLR) Manual for the side road locations. Side roads within the corridor are either a Local Street or a Local Major Collector.

The design guidelines utilized for I-88 were based on the Illinois State Toll Highway Authority's (Tollway) *Roadway Design Criteria.*

Table 1 shows basic elements of the design criteria utilized for both the mainline roadway and the side roads throughout the proposed project corridor.

Table 1: Roadway Design Criteria

Description	Illinois Tollway	Rural Strategic Regional Arterial Highway	Local Major Collector	Local Street
Design Speed Limit (mph)	70	45-60	30-45	30-35
Number of Lanes	4	4	2-4	2
Lane Width (feet)	12'	12'	10' Minimum 12' Desirable	10'-11' Minimum 12' Desirable
Median Width and Type	50' Minimum Depressed	50' Minimum Depressed	10'-14'/ 12'	N/A

3.2. Alternatives Development

Initial alternatives were developed through a collaborative effort between the Community Advisory Group (CAG), the public, the Project Study Group (PSG), and by utilizing the Feasibility Study conducted by the Village of Sugar Grove. The objective of this process is to develop an initial list of alternatives and reduce this list to the alternatives that will be carried forward for further study. Reduction of the list will occur by conducting rounds of screening analyses that continue to progress after each of the screenings. The goal of the process is to develop a Preferred Alternative.

Community Advisory Group: voluntary group of stakeholders that includes community officials, residents, business owners, and users of IL 47

Project Study Group: group of stakeholders consisting of IDOT, the Tollway, Kane County, and the Federal Highway Administration (FHWA)

Due to the nature of the project, it was decided that separate alternatives would be developed for IL 47 mainline and the IL 47 /I-88 interchange. These alternatives will be developed independently of each other and evaluated separately. The IL 47 mainline limits will be from Old Oaks Road to Finley Road on the south end and Seavey Road to Green Road on the north end. The interchange will be from Finley Road to Seavey Road. Finley Road and Seavey Road improvements were part of the IL 47 alternatives.

3.2.1 Illinois 47

3.2.1.1 Existing Conditions

Within the project study area, IL 47 is designated with a Principal Arterial classification. Since IL 47 is designated as a Class II truck route, it can legally carry 80,000 pounds maximum per vehicle. As **Table 2** shows, the existing lane configurations consist of a two-lane section south of Finley Road, a four-lane section between Finley Road and Seavey Road, and a two-lane section north of Seavey Road. The existing shoulder configurations are also conveyed in this table. A total of 13 roadways intersect IL 47 in the project study area, of which only one is signalized at Old Oaks Road and the Waubonsee Community College north entrance.

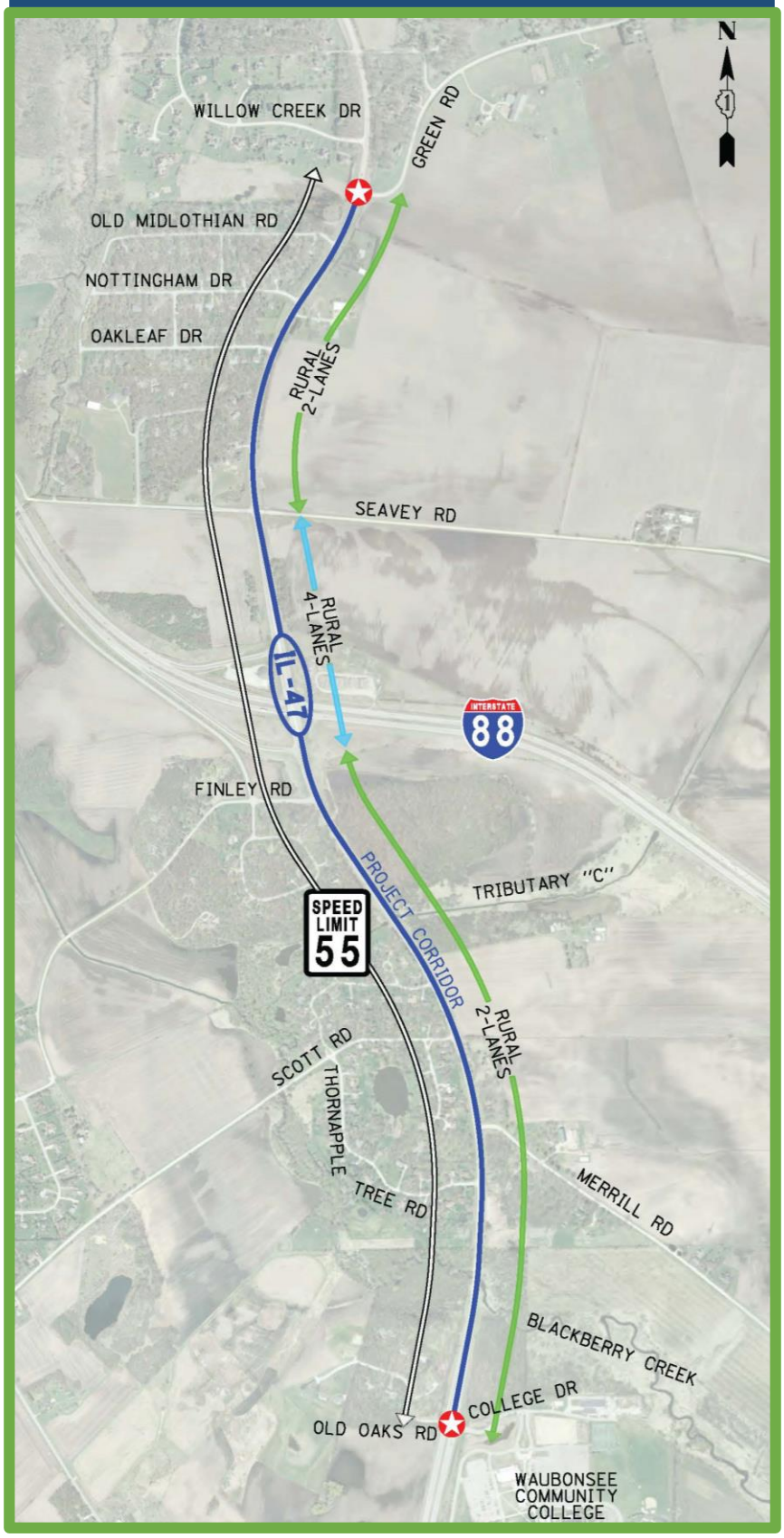
The existing IL 47 Bridge over I-88 provides two 12 foot through lanes in each direction separated by a 20 foot raised median and 9 foot 3 inch shoulders on each side. It is a four span bridge with a concrete deck supported by twelve precast, prestressed concrete I-Beams. The bridge superstructure was fully reconstructed in 2007.

There are existing bicycle and pedestrian paths both south and north of the project study limits. Near the south end of the project study area, the Virgil Gilman Trail in Kane County extends to the east side of Waubonsee Community College. North of the project limit at Green Road, the Anderson Road Trail exists at the south side of the Village of Elburn. No other significant paths are in the immediate vicinity of the interchange.

Table 2: Existing IL 47 Roadway Configuration

Section Location	Number of Lanes	Existing Shoulder Width	Speed Limit	Designation
North of Seavey Road	1-12' lane each direction	8’-12’ Shoulder – NB & SB Direction (4’ Hot-Mix Asphalt (HMA), 4’-8’ Aggregate)	55	Rural SRA
Seavey Road to Finley Road	2-12' lanes each direction	10’ HMA Shoulder – NB 11’ HMA Shoulder - SB	55	Rural SRA
South of Finley Road	1-12' lane each direction	12’-18’ Shoulder – NB & SB (4’-10’ HMA, 8’ Aggregate)	55	Rural SRA

Figure 2: Existing IL 47 Conditions



3.2.1.2 Proposed Alternatives

The IL 47 alternatives are from Old Oaks Road to Finley Road on the southern section and Seavey Road to Green Road on the northern section. Finley Road and Seavey Road improvements are included in these alternatives. The alternatives include the No-Build, widening to four lanes on existing centerline, widening to four lanes east of the existing centerline, a new alignment with four lanes to the east of the existing alignment, and a new alignment with four lanes to the west of the existing alignment. Each of the alignments, except the new alignment with four lanes to the west of the existing alignment, will be evaluated with a 50 foot depressed median. The widening on existing centerline and widening to the east alignments will also be evaluated using a 30 foot raised median. The new alignment with four lanes to the west of the existing alignment will only be evaluated with a 30 foot raised median. The 30 foot median allows for a reduction in environmental impacts.

The alternatives presented for the IL-47 corridor include provisions for bicycle/pedestrian accommodations. These accommodations include a 10-foot wide shelf on both sides of IL-47 for the future location of a multi-use path on one side and a 5-foot sidewalk on the other side. Anticipated right-of-way impacts have been accounted for due to the wider IL-47 section.

There are several adjacent residential areas to the west of IL-47 that would generate trail traffic. Waubonsee Community College on the east side of IL-47 would also generate trail traffic. The accommodations are primarily along the IL-47 corridor for future connection to the Virgil Gilman Trail on the south end of the project and for future connection to the Anderson Road Trail on the north end. The accommodations along the IL-47 corridor are consistent with the planning improvements identified in the 2015 Kane/Kendall County Bicycle Planning Map (see **Exhibit 4**). The plan identifies a future extension of the Virgil Gilman Trail, at the western terminus on the Waubonsee Community College campus. This trail extension would be connected from the north by a multi-use path along IL-47.

No Build Alternative	
Description	The No-Build Alternative would maintain the existing facility without any improvements except for routine maintenance (i.e. shoulder resurfacing or pavement patching and resurfacing) and those projects currently planned and programmed.
	The No-Build alternative would not include any lane widening or lane additions.

Alternative M-1A: 4-Lane on Existing Alignment with 30 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 30-foot raised median and 10-foot shoulders.
	The alternative maintains the existing centerline of IL 47.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

Alternative M-1B: 4-Lane on Existing Alignment with 50 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 50-foot depressed median and 10-foot shoulders.
	The alternative maintains the existing centerline of IL 47
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

Alternative M-1C: 4-Lane on Existing Alignment with Modified 30 foot Median	
Description	The alternative includes two 12-foot lanes in each direction with a 30 foot raised median through most of the corridor.
	The median is reduced to 6 foot through the Hannaford Woods/Nickels Farm Forest Preserve.
	The alternative maintains the existing centerline of IL 47.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

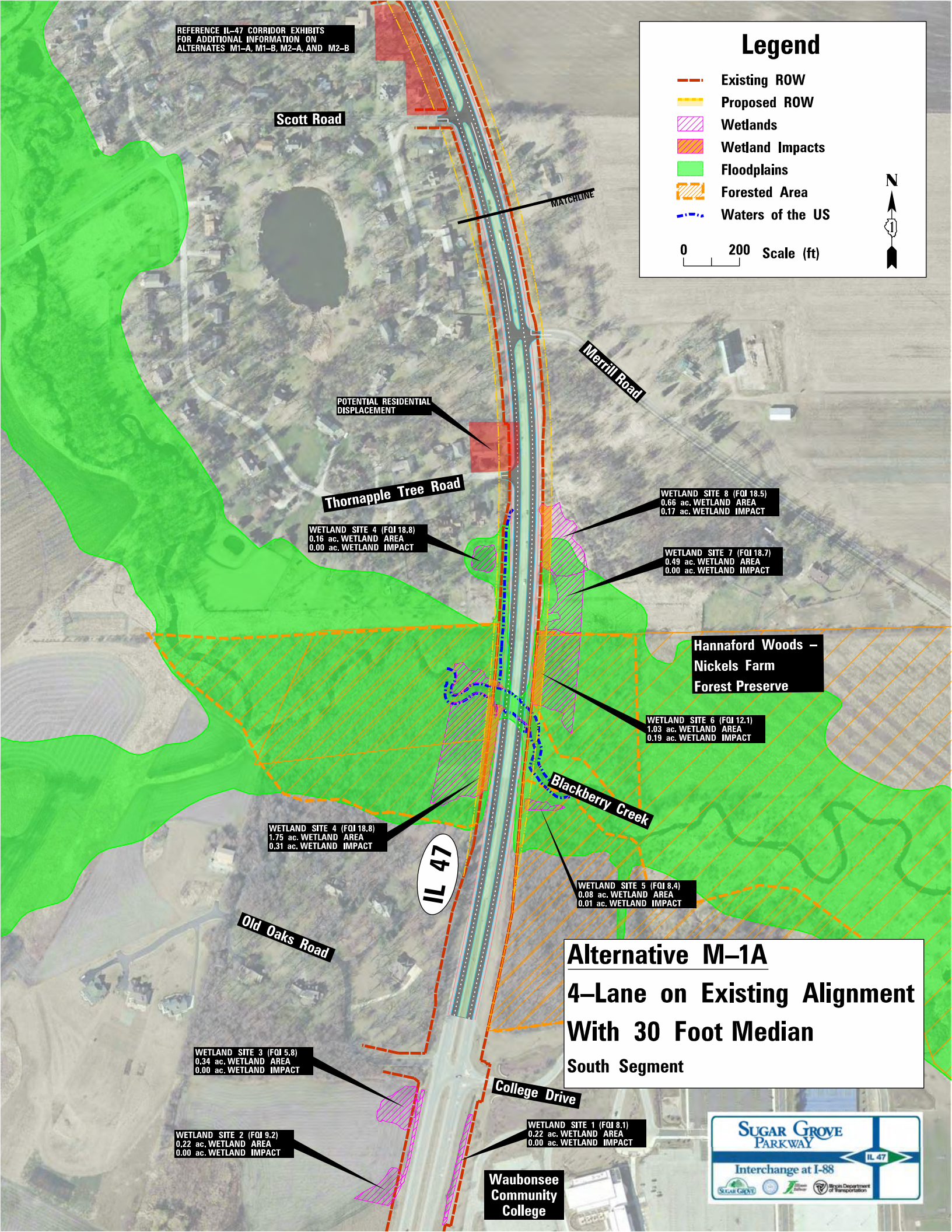
Alternative M-2A: 4-Lane Widened to the East with 30 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 30-foot raised median and 10-foot shoulders.
	The centerline is shifted 26 feet to the east.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

Alternative M-2B: 4-Lane Widened to the East with 50 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 50-foot depressed median and 10-foot shoulders.
	The centerline is shifted 36 feet to the east.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

Alternative M-2C: 4-Lane Widened to East with Modified 30 foot Median	
Description	The alternative includes two 12-foot lanes in each direction with a 30 foot raised median through most of the corridor.
	The median is reduced to 6 foot through the Hannaford Woods/Nickels Farm Forest Preserve.
	The alternative shifts the centerline north of the forest preserve to the east to avoid residences.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

Alternative M-3: 4-Lane New Alignment East	
Description	This alternative includes two 12-foot lanes in each direction with a 50-foot depressed median and 10-foot shoulders.
	The centerline is shifted 1,050 feet to the east.
	The new alignment would begin at Merrill Road and end at Green Road.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
	The new alignment would have new intersections at Seavey Road, Thornapple Tree Road, and Scott Road.

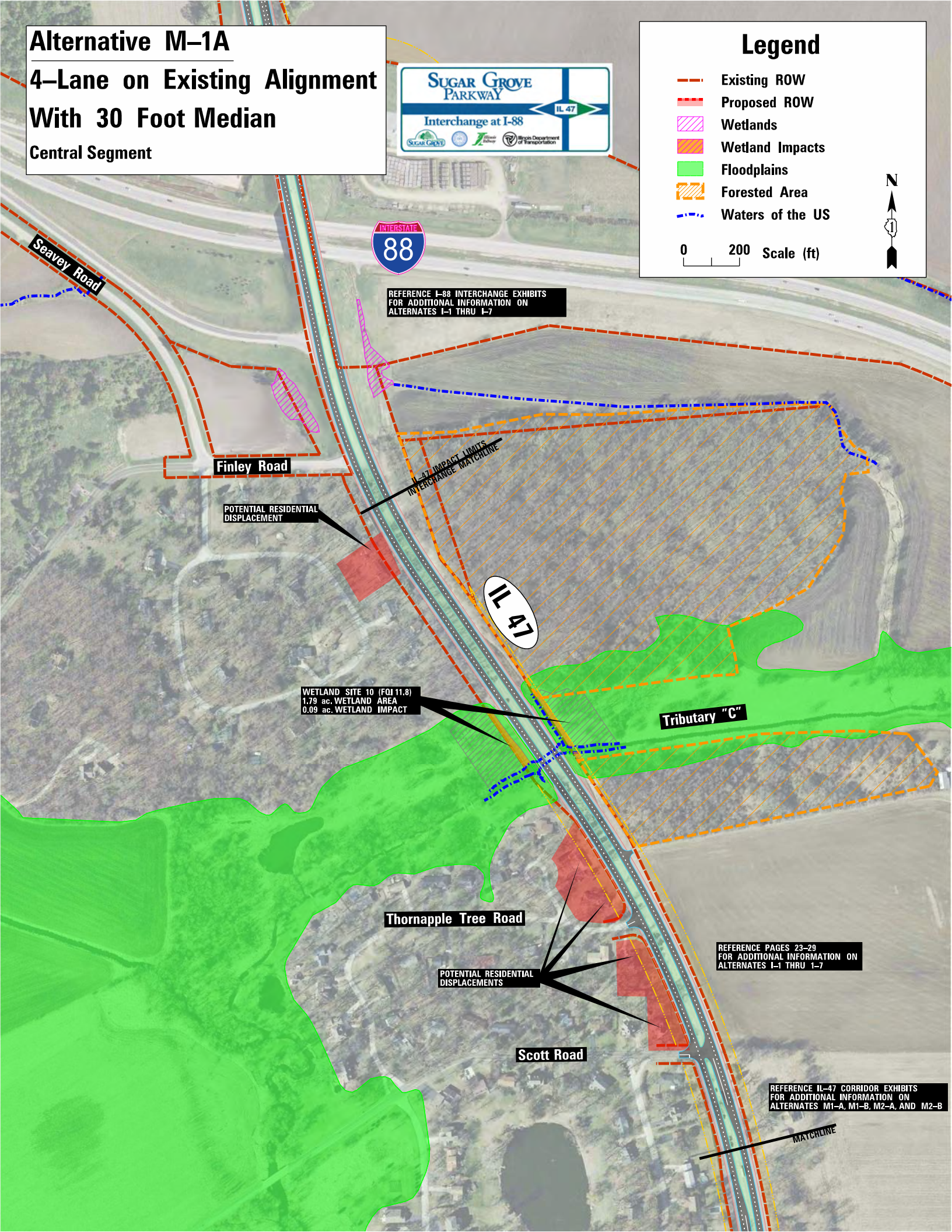
Alternative M-4: 4-Lane New Alignment West (Hannaford Woods Avoidance Alternative)	
Description	This alternative includes two 12-foot lanes in each direction with a 30-foot raised median and 10-foot shoulders.
	The alignment is shifted west south of Old Oaks Road and merges back on existing alignment just south of the I-88 ramps.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.

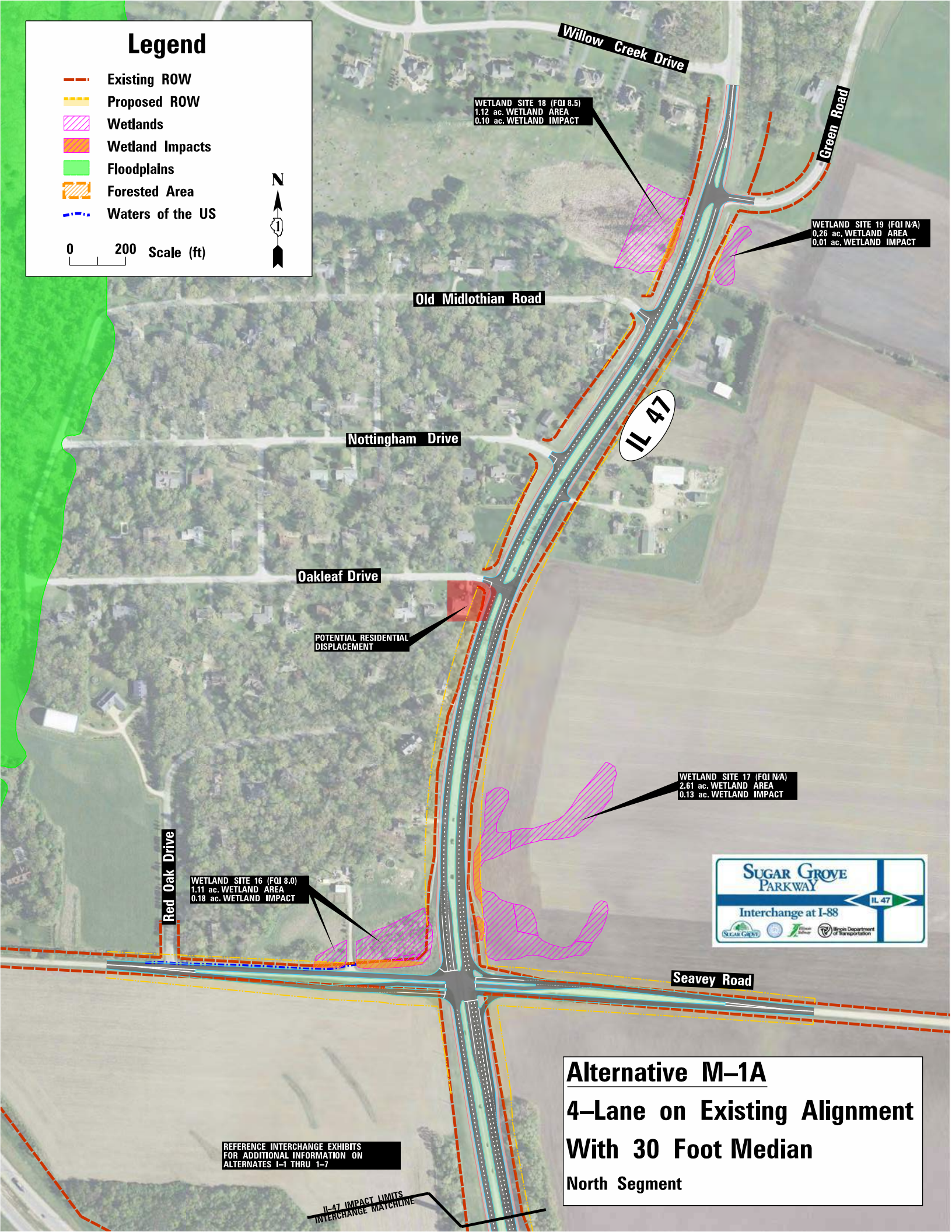

REFERENCE IL–47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M1–A, M1–B, M2–A, AND M2–B
Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Scott Road
MATCHLINE
Merrill Road
POTENTIAL RESIDENTIAL DISPLACEMENT
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.17 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.19 ac. WETLAND IMPACT
Blackberry Creek
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.31 ac. WETLAND IMPACT
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
Old Oaks Road
Alternative M–1A
4–Lane on Existing Alignment
With 30 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee Community College
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

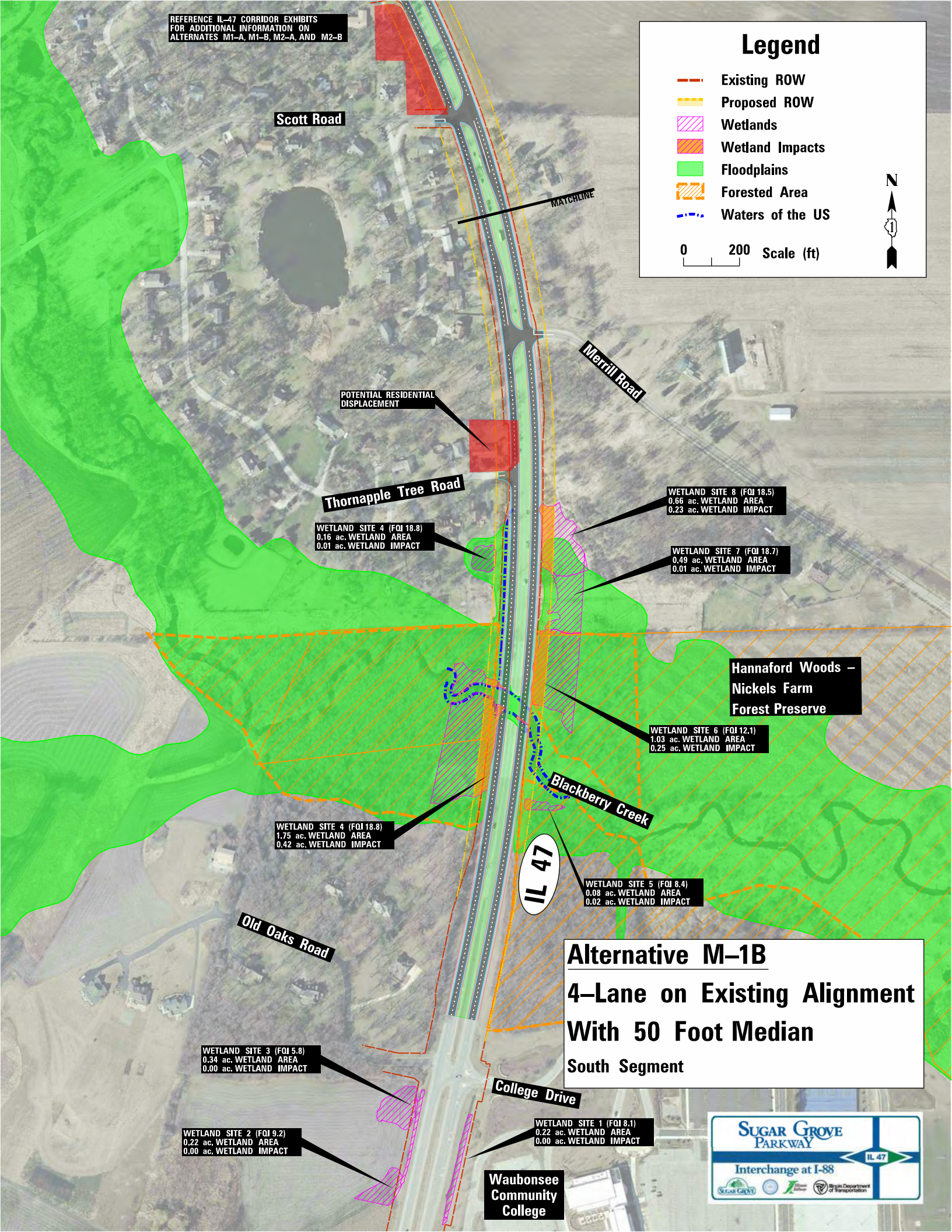
Alternative M–1A

4–Lane on Existing Alignment With 30 Foot Median

Central Segment



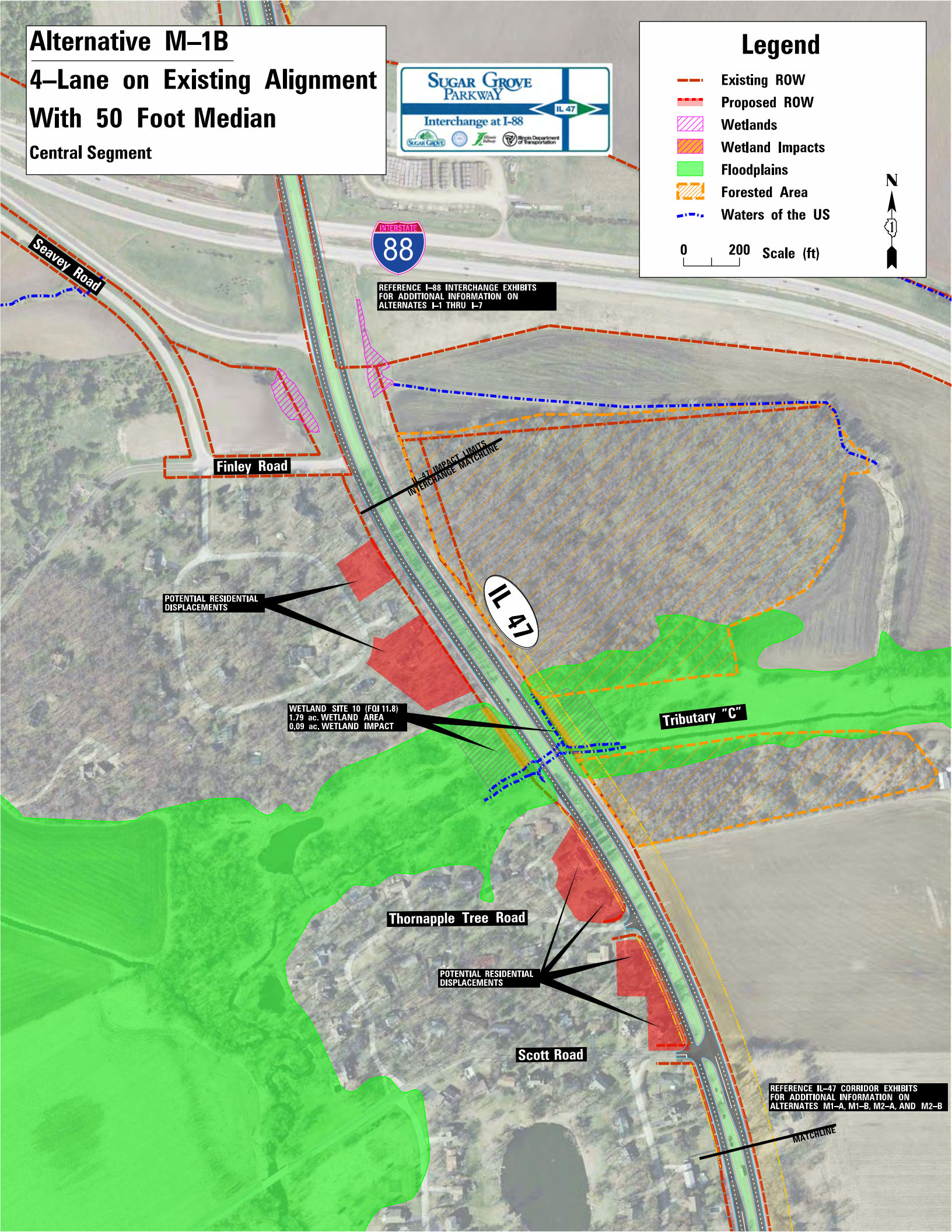

Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.10 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
POTENTIAL RESIDENTIAL DISPLACEMENT
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.13 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.18 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Seavey Road
REFERENCE INTERCHANGE EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES I-1 THRU I-7
IL-47 IMPACT LIMITS
INTERCHANGE MATCHLINE
Alternative M-1A
4-Lane on Existing Alignment
With 30 Foot Median
North Segment

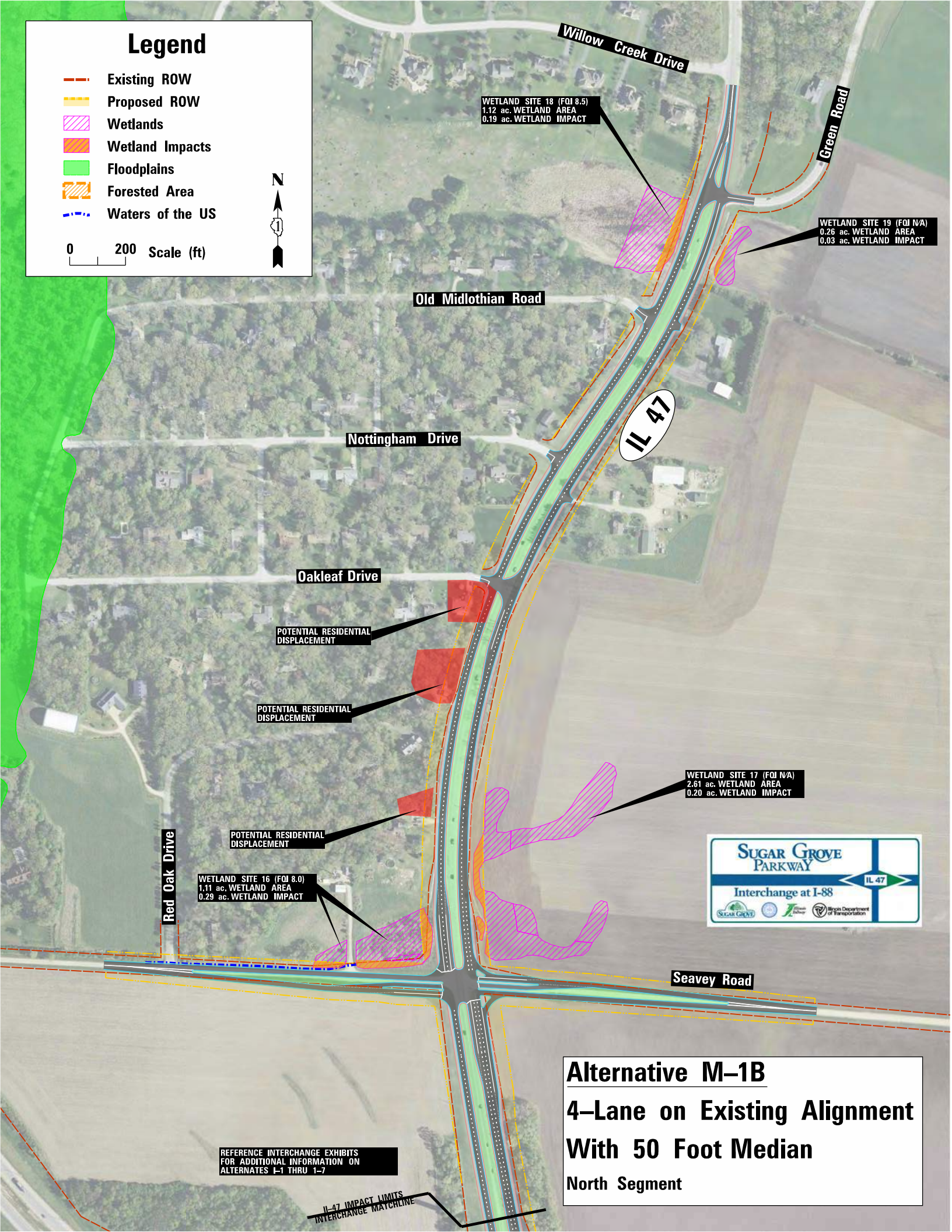

REFERENCE IL-47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M1-A, M1-B, M2-A, AND M2-B
Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Scott Road
MATCHLINE
Merrill Road
POTENTIAL RESIDENTIAL DISPLACEMENT
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.23 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.25 ac. WETLAND IMPACT
Blackberry Creek
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.42 ac. WETLAND IMPACT
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.02 ac. WETLAND IMPACT
Old Oaks Road
Alternative M-1B
4-Lane on Existing Alignment
With 50 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee Community College
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

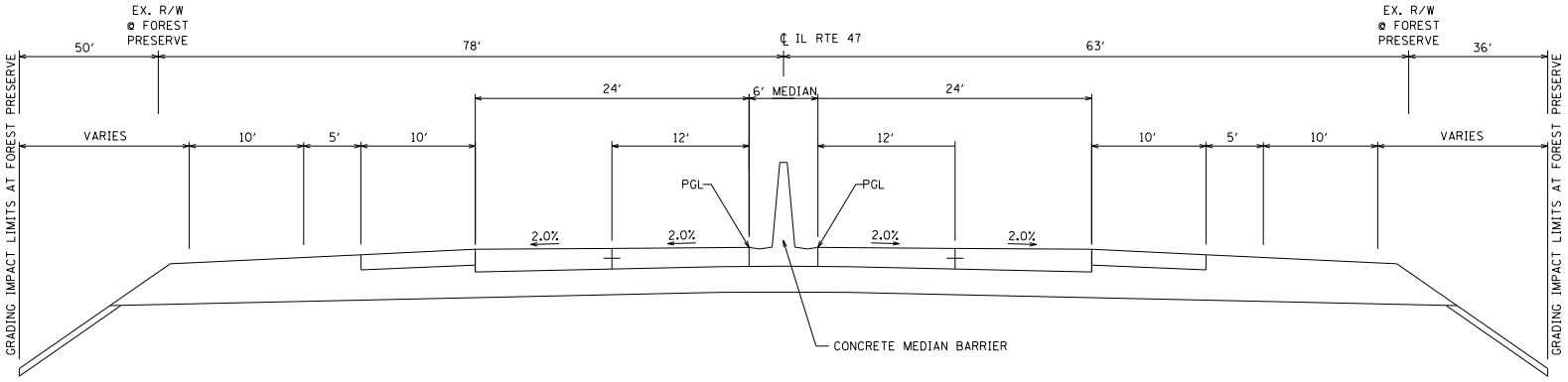
Alternative M–1B

4–Lane on Existing Alignment With 50 Foot Median

Central Segment

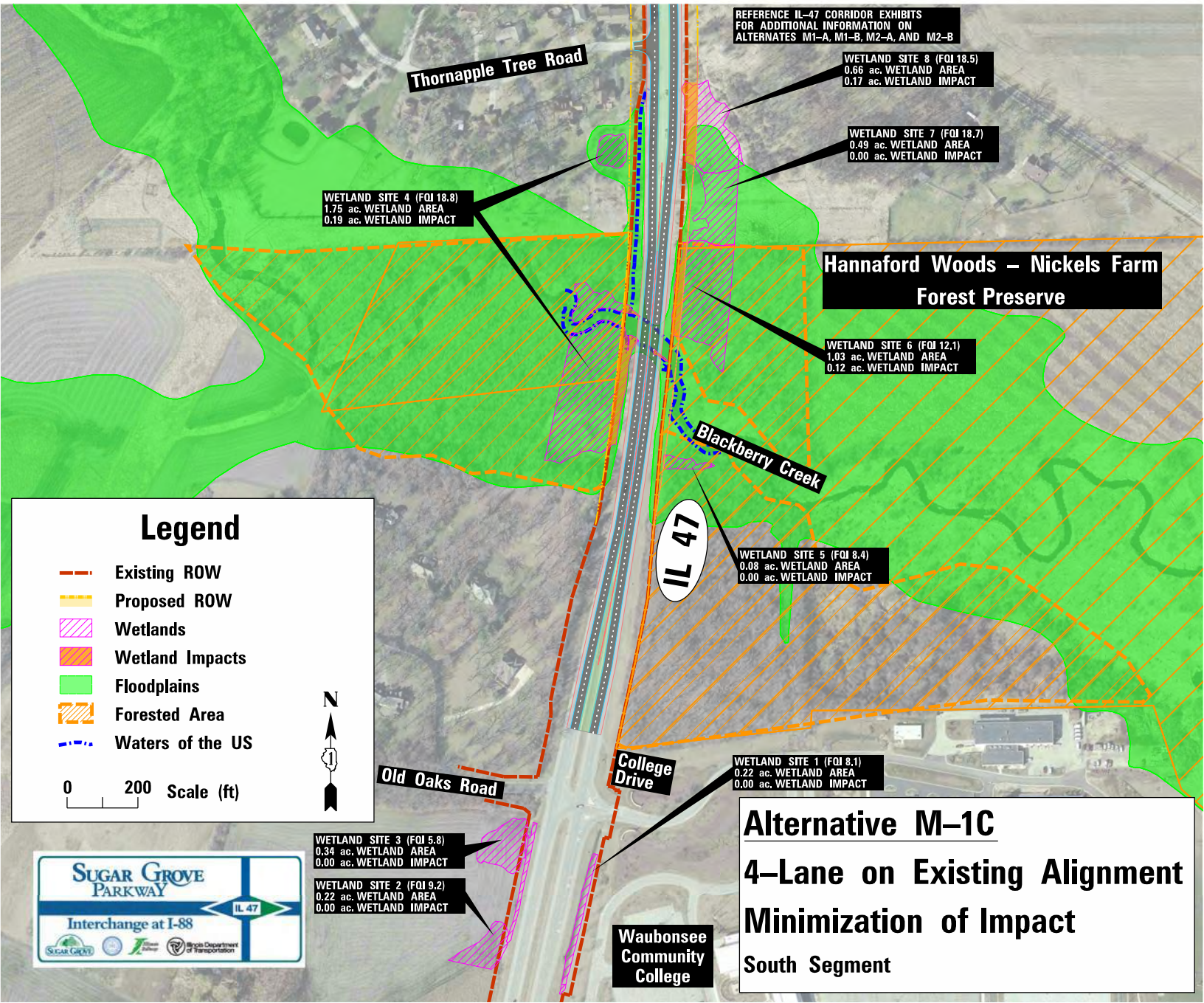


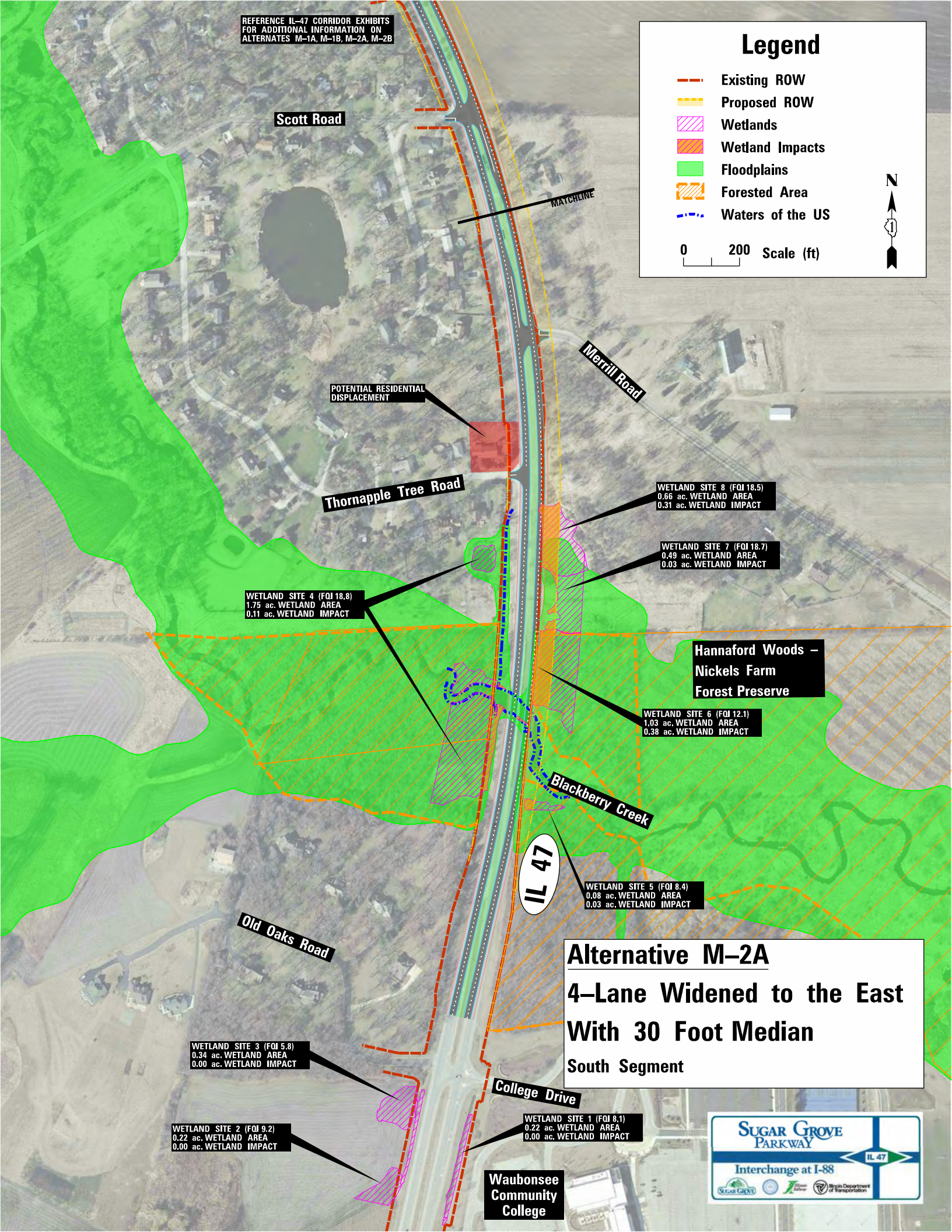

Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.19 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.03 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
POTENTIAL RESIDENTIAL DISPLACEMENT
POTENTIAL RESIDENTIAL DISPLACEMENT
POTENTIAL RESIDENTIAL DISPLACEMENT
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.20 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.29 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Seavey Road
Alternative M–1B
4–Lane on Existing Alignment
With 50 Foot Median
North Segment
REFERENCE INTERCHANGE EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES I–1 THRU I–7
IL 47 IMPACT LIMITS
INTERCHANGE MATCHLINE



PROPOSED TYPICAL SECTION
IL RTE 47 - THROUGH HANNAFORD WOODS - NICKELS FARM FOREST PRESERVE

REDUCED MEDIAN WIDTH W/ CONCRETE BARRIER SEPARATION

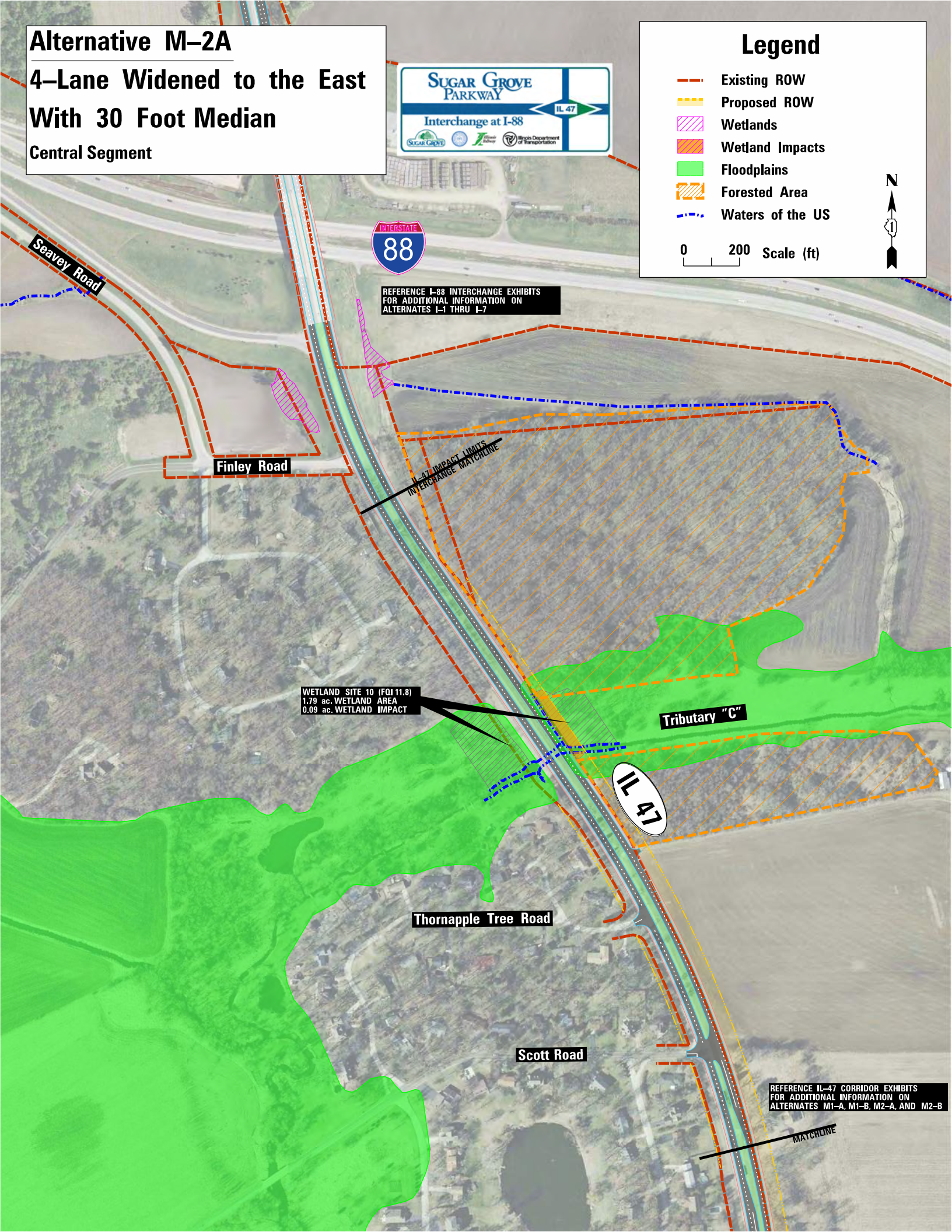


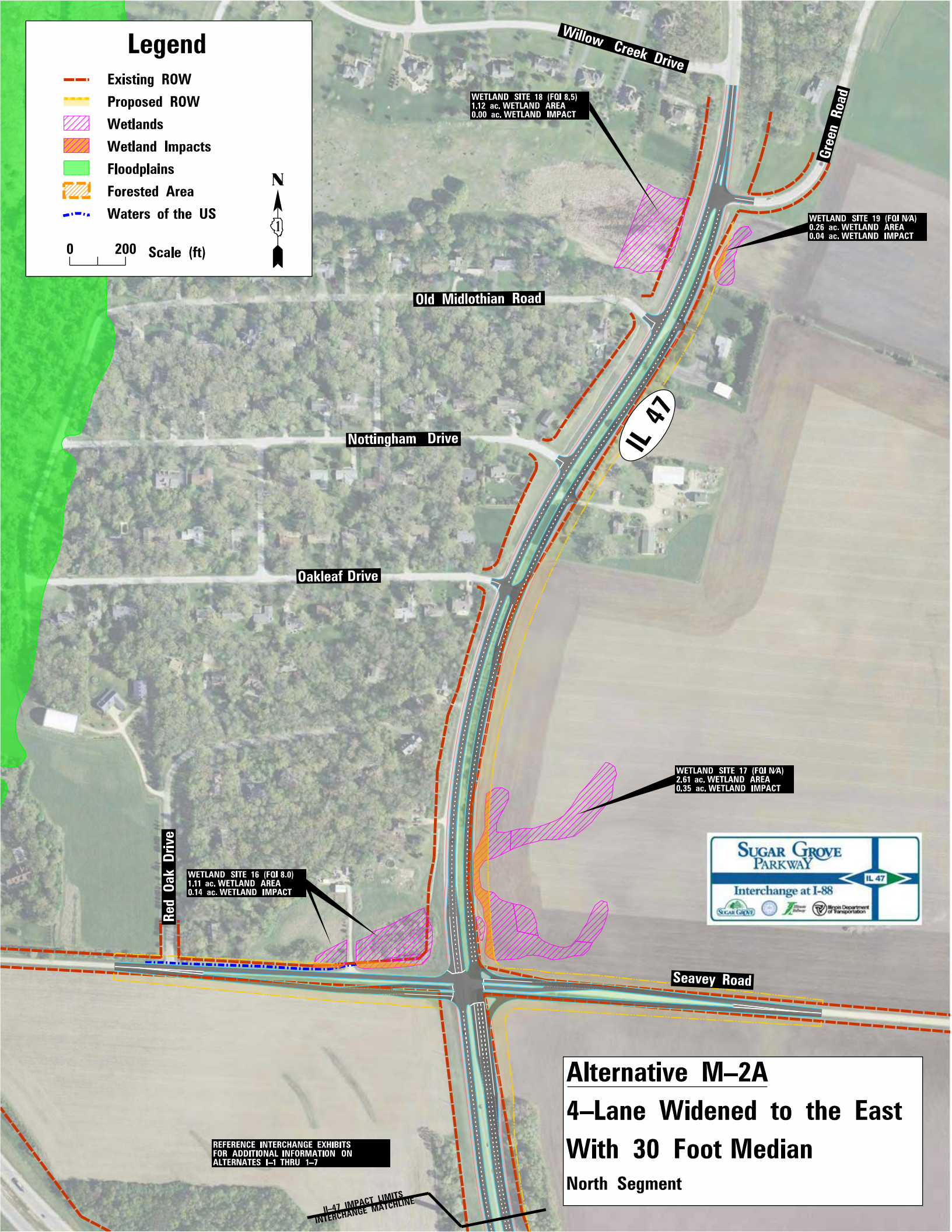

REFERENCE IL-47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M-1A, M-1B, M-2A, M-2B
Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Scott Road
MATCHLINE
Merrill Road
POTENTIAL RESIDENTIAL DISPLACEMENT
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.31 ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.03 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.11 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.38 ac. WETLAND IMPACT
Blackberry Creek
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.03 ac. WETLAND IMPACT
Old Oaks Road
Alternative M-2A
4-Lane Widened to the East
With 30 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee Community College
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

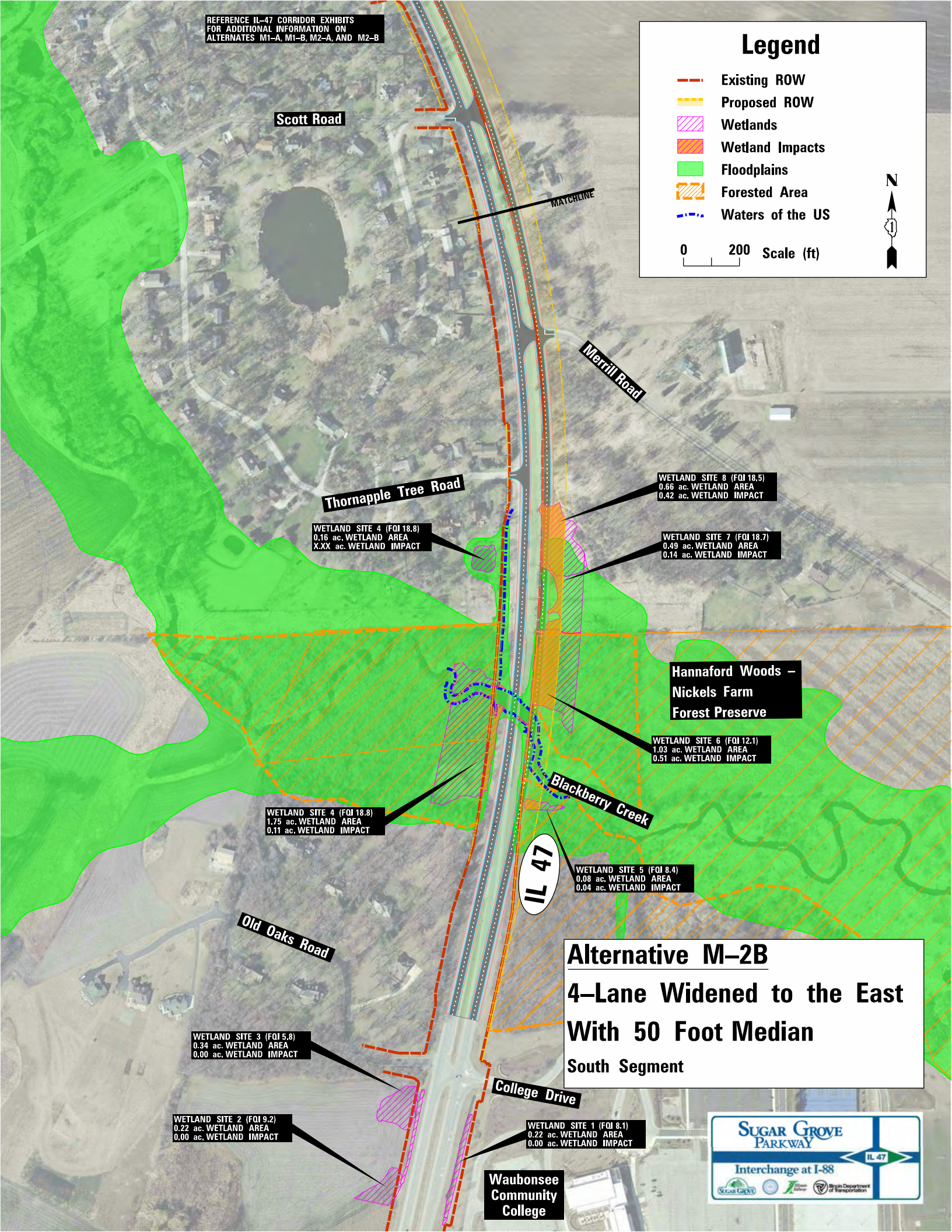
Alternative M–2A

4–Lane Widened to the East With 30 Foot Median

Central Segment



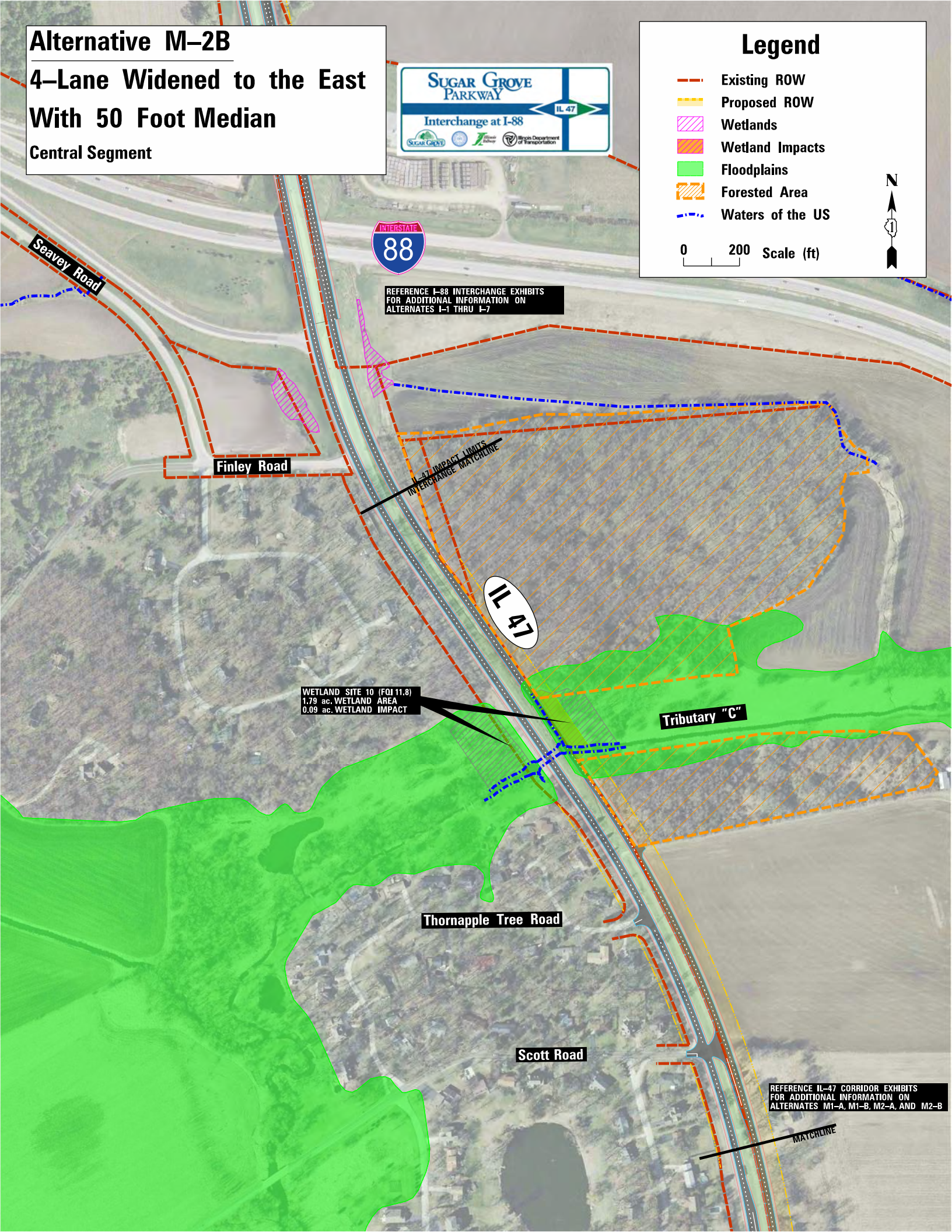

Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0
200
Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.04 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.35 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.14 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Seavey Road
REFERENCE INTERCHANGE EXHIBITS
FOR ADDITIONAL INFORMATION ON
ALTERNATES I-1 THRU 1-7
IL-47 IMPACT LIMITS
INTERCHANGE MATCHLINE
Alternative M-2A
4-Lane Widened to the East
With 30 Foot Median
North Segment

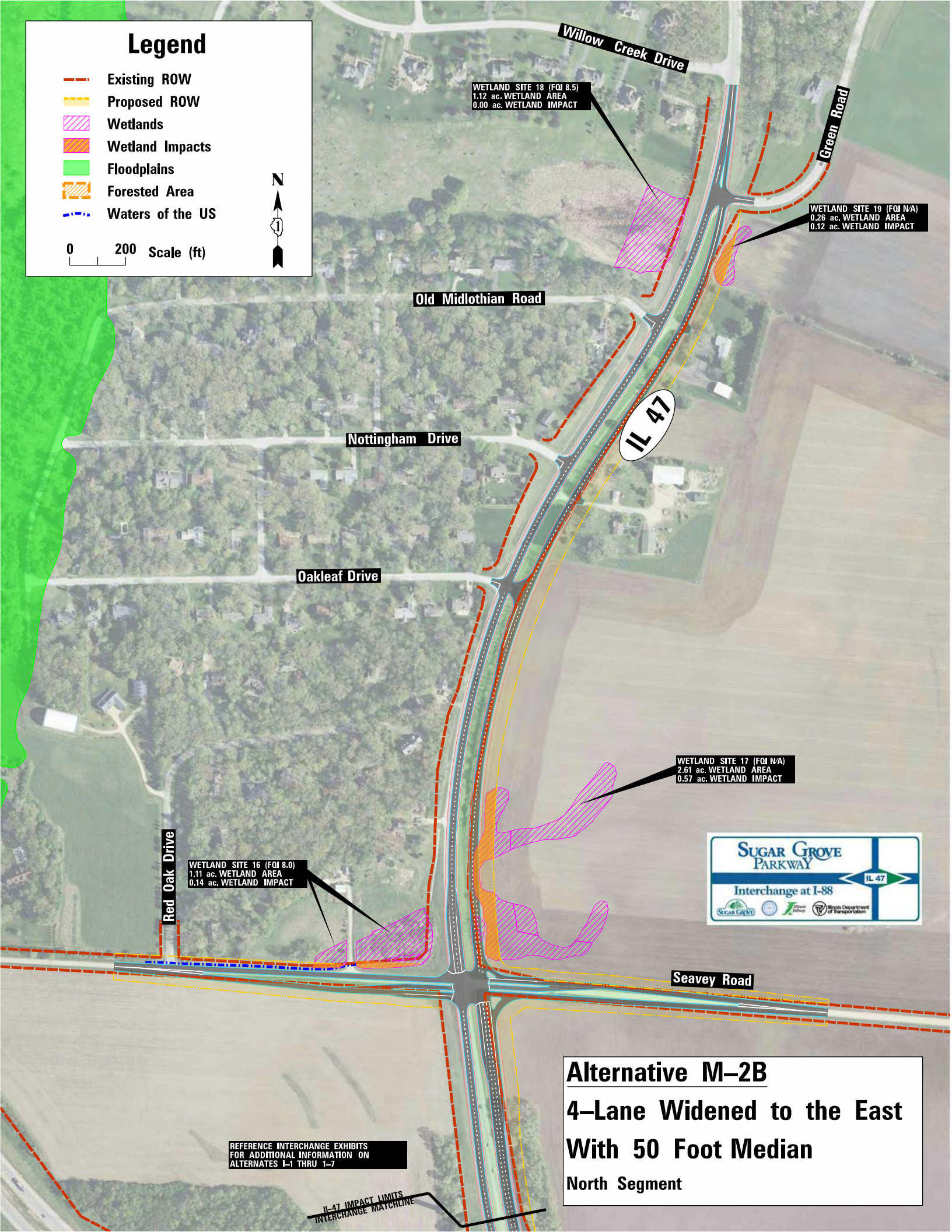

REFERENCE IL-47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M1-A, M1-B, M2-A, AND M2-B
Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0
200
Scale (ft)
N
Scott Road
MATCHLINE
Merrill Road
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.42 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
X.XX ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.14 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.51 ac. WETLAND IMPACT
Blackberry Creek
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.11 ac. WETLAND IMPACT
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.04 ac. WETLAND IMPACT
Old Oaks Road
Alternative M-2B
4-Lane Widened to the East
With 50 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee Community College
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

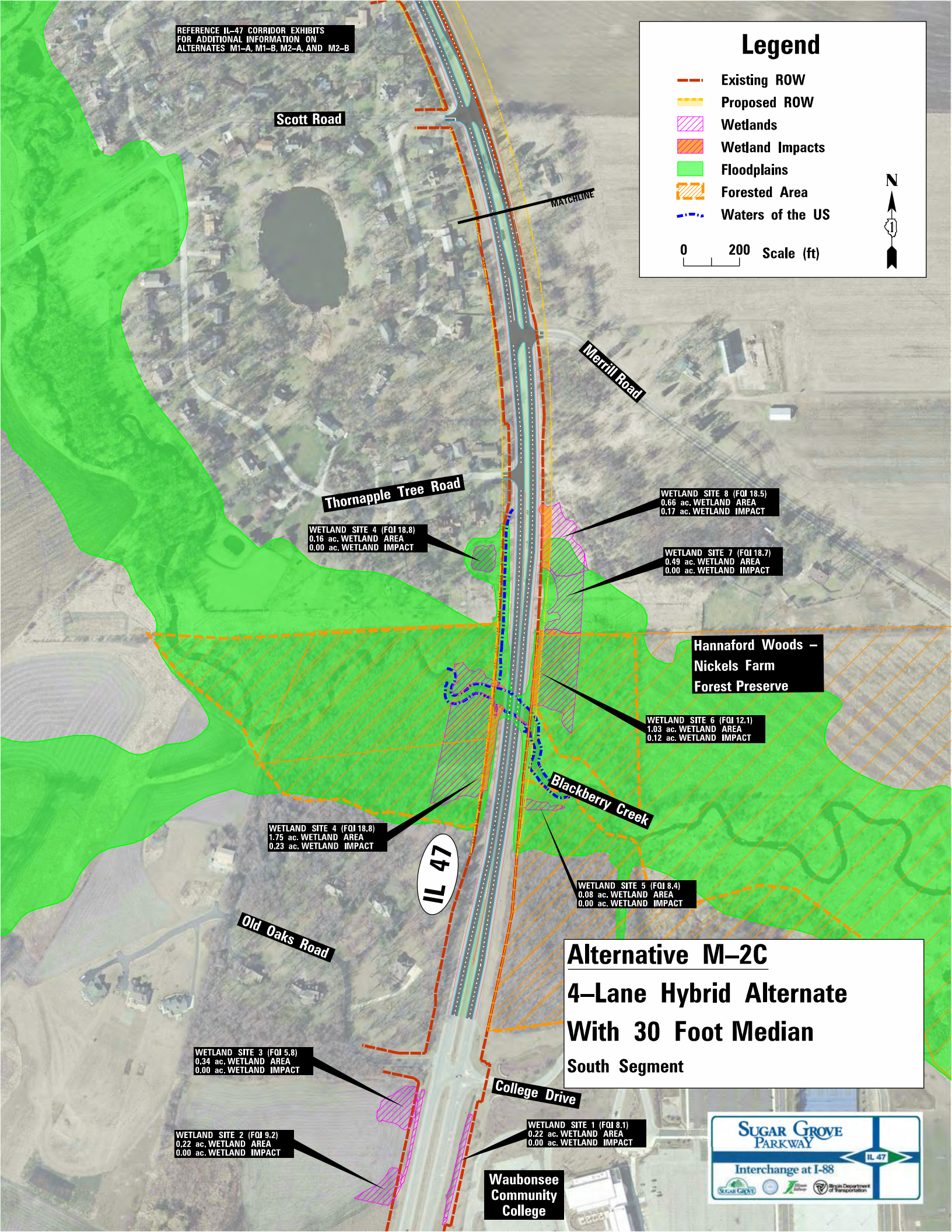
Alternative M–2B

4–Lane Widened to the East With 50 Foot Median

Central Segment



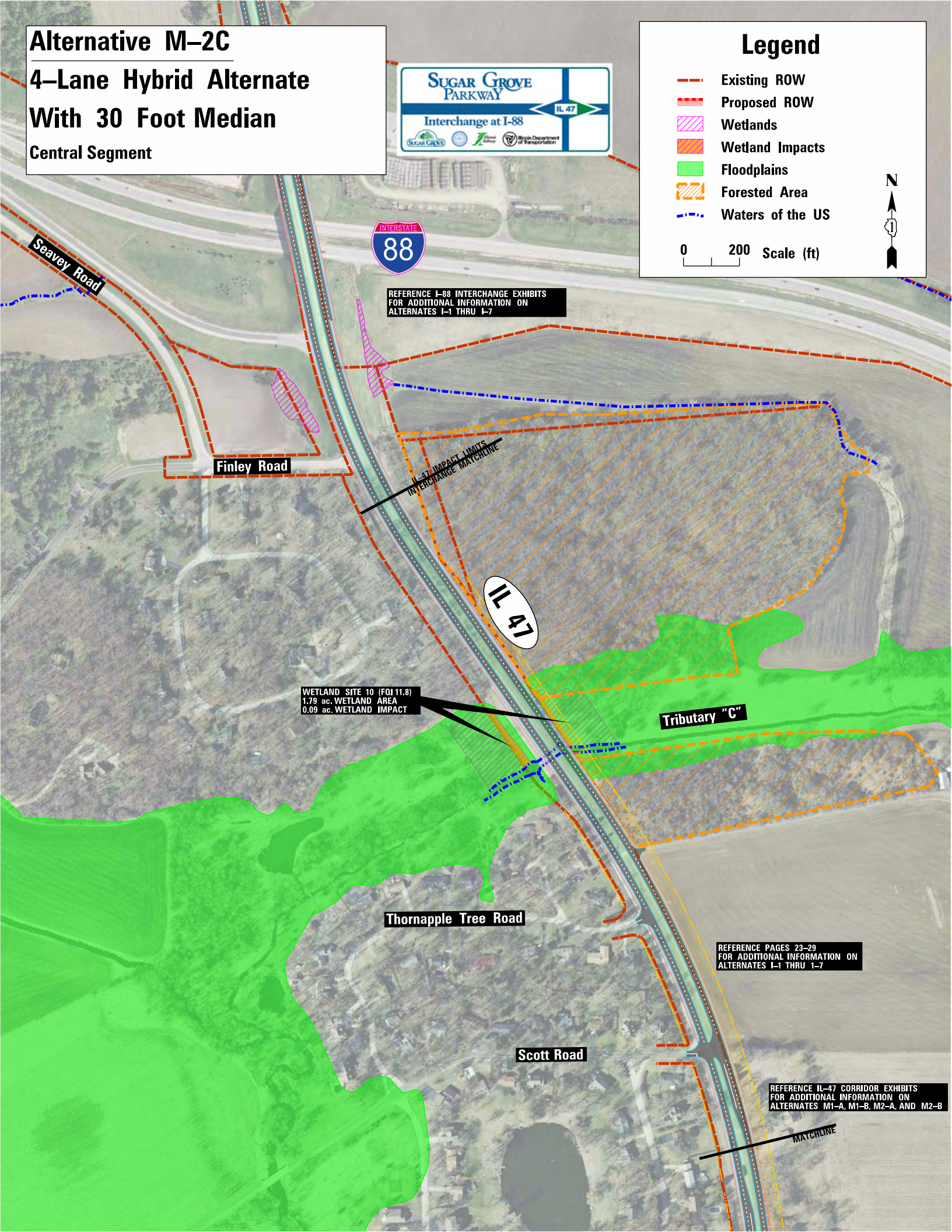

Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.12 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.57 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.14 ac. WETLAND IMPACT
Sugar Grove Parkway
IL 47
Interchange at I-88
Seavey Road
Alternative M–2B
4–Lane Widened to the East
With 50 Foot Median
North Segment
REFERENCE INTERCHANGE EXHIBITS
FOR ADDITIONAL INFORMATION ON
ALTERNATES I–1 THRU 1–7
IL–47 IMPACT LIMITS
INTERCHANGE MATCHLINE

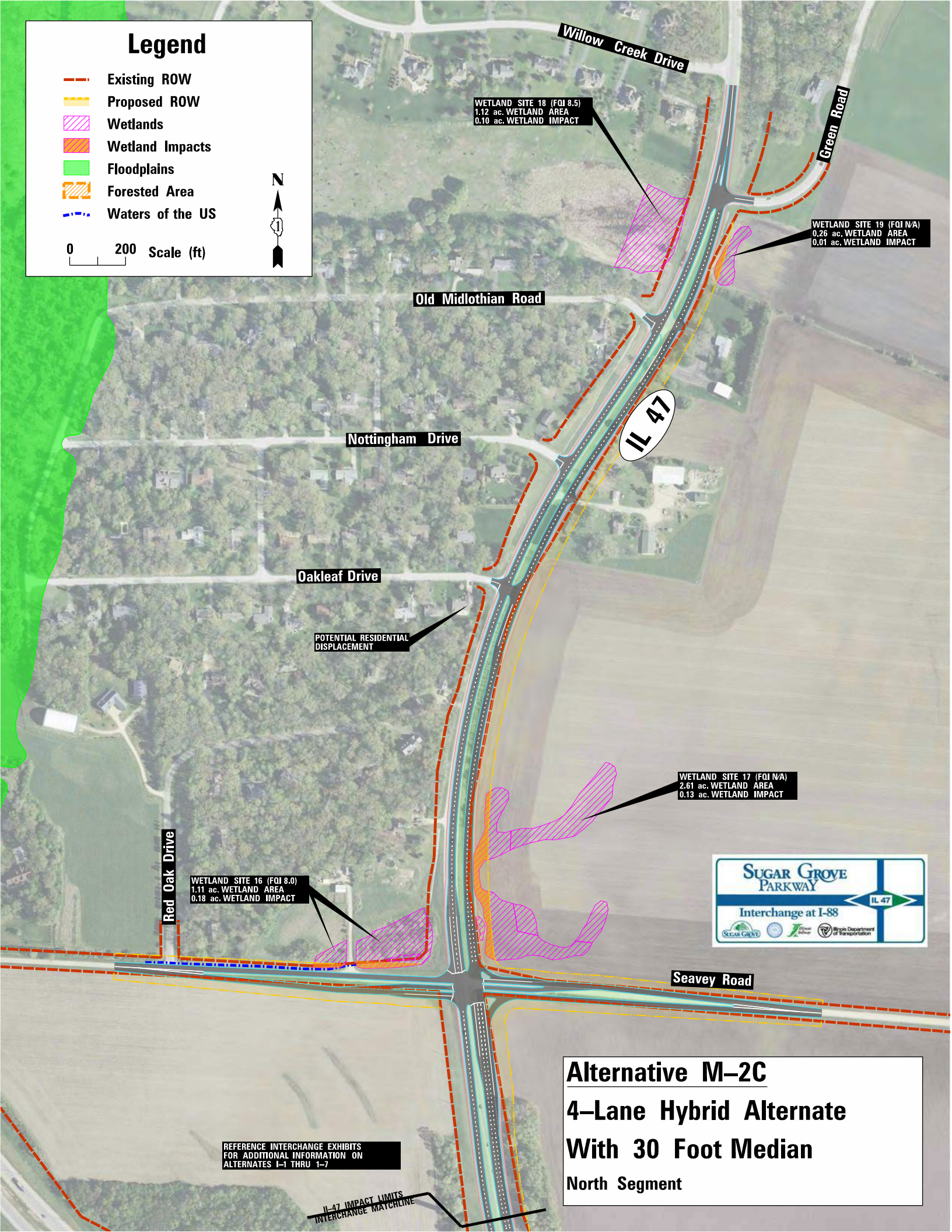

REFERENCE IL–47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M1–A, M1–B, M2–A, AND M2–B
Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 200 Scale (ft)
N
Scott Road
MATCHLINE
Merrill Road
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.17 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.12 ac. WETLAND IMPACT
Blackberry Creek
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.23 ac. WETLAND IMPACT
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Old Oaks Road
Alternative M–2C
4–Lane Hybrid Alternate
With 30 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee Community College
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

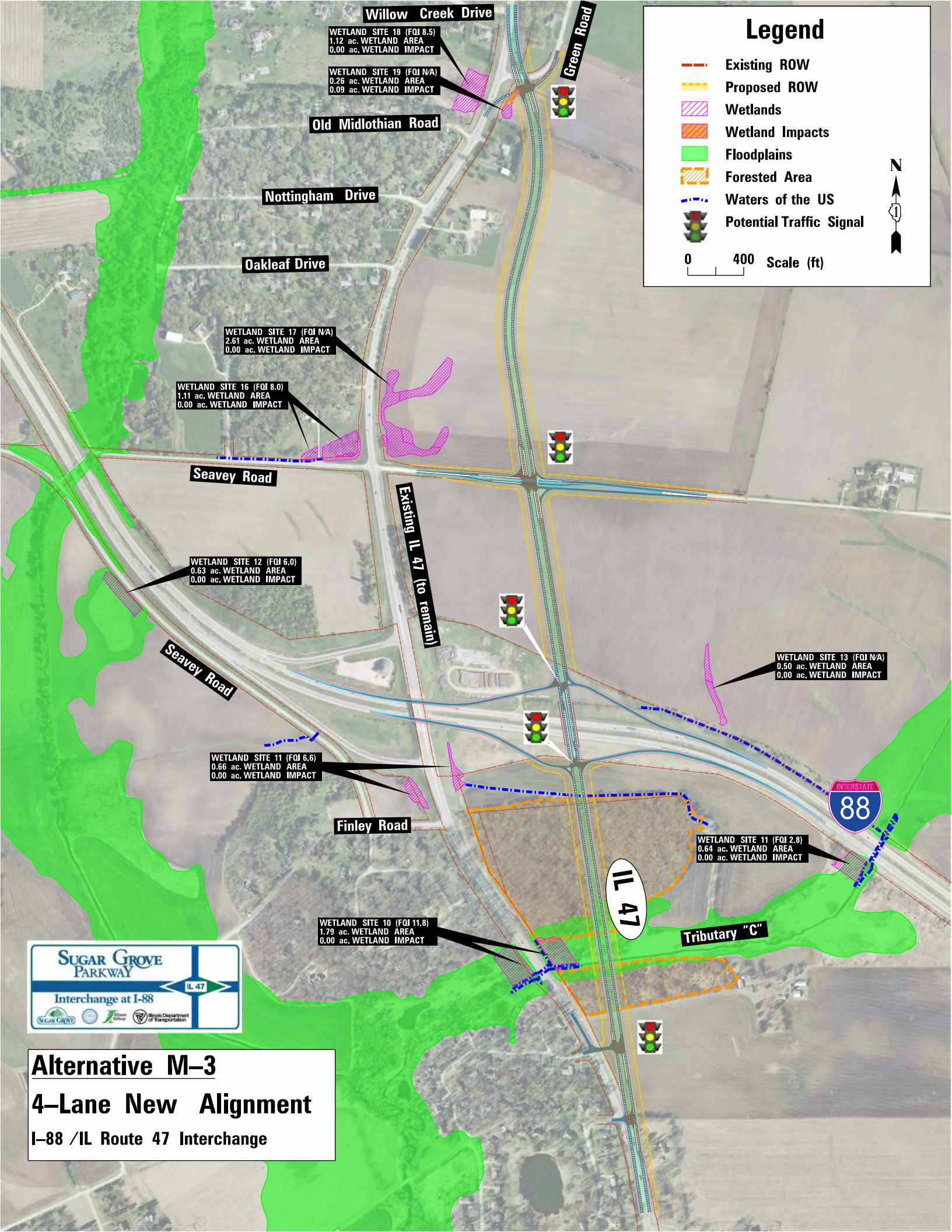
Alternative M–2C

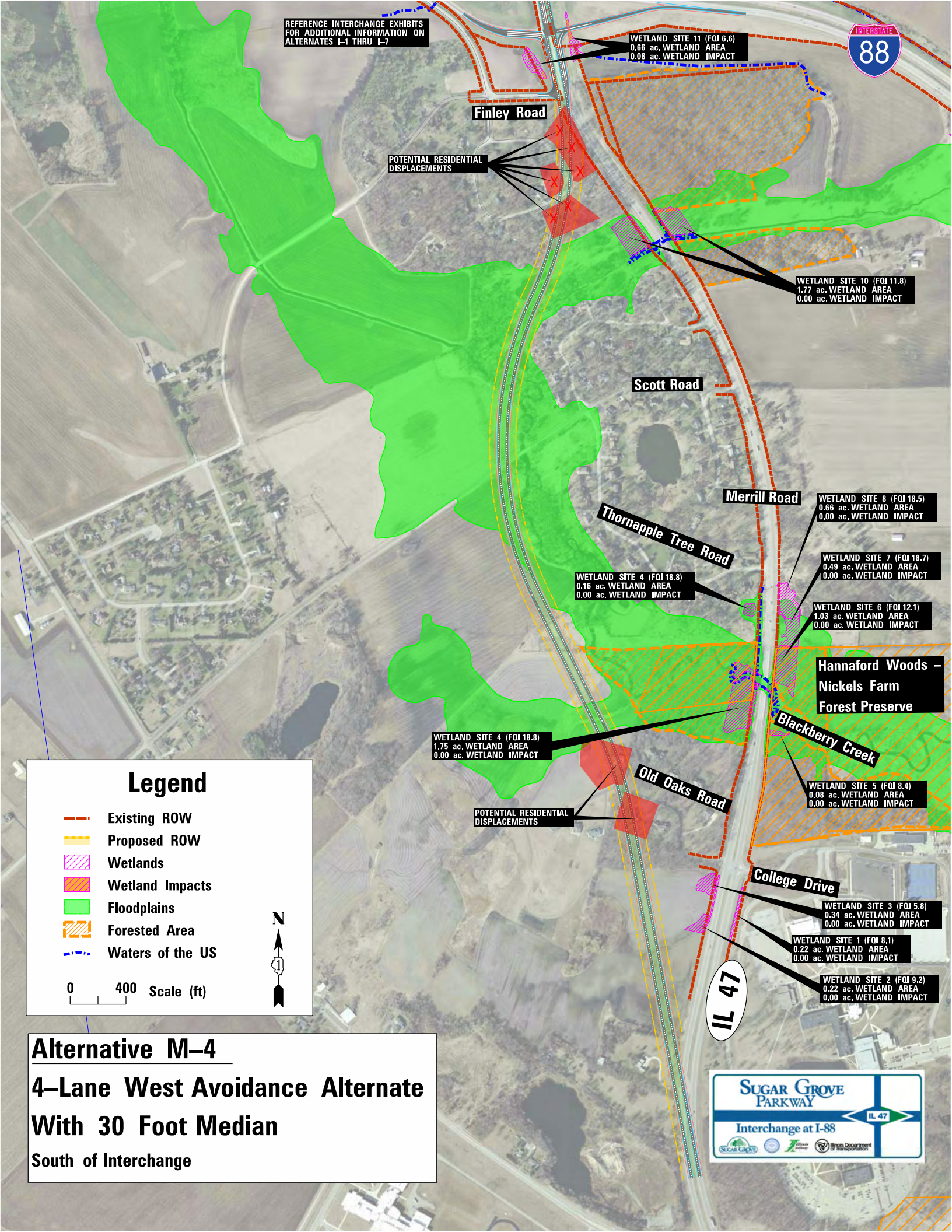
4–Lane Hybrid Alternate With 30 Foot Median

Central Segment




Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0
200
Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.10 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
POTENTIAL RESIDENTIAL DISPLACEMENT
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.13 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.18 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Seavey Road
REFERENCE INTERCHANGE EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES I-1 THRU I-7
IL-47 IMPACT LIMITS
INTERCHANGE MATCHLINE
Alternative M-2C
4-Lane Hybrid Alternate
With 30 Foot Median
North Segment


Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Potential Traffic Signal
0 400 Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.09 ac. WETLAND IMPACT
Old Midlothian Road
Nottingham Drive
Oakleaf Drive
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Seavey Road
Existing IL 47 (to remain)
WETLAND SITE 12 (FQI 6.0)
0.63 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Seavey Road
WETLAND SITE 13 (FQI N/A)
0.50 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 11 (FQI 6.6)
0.66 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Finley Road
INTERSTATE 88
WETLAND SITE 11 (FQI 2.8)
0.64 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
IL 47
Tributary "C"
WETLAND SITE 10 (FQI 11.8)
1.79 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Illinois Department of Transportation
Alternative M–3
4–Lane New Alignment
I–88 /IL Route 47 Interchange


REFERENCE INTERCHANGE EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES I–1 THRU I–7
WETLAND SITE 11 (FQI 6.6)
0.66 ac. WETLAND AREA
0.08 ac. WETLAND IMPACT
INTERSTATE 88
Finley Road
POTENTIAL RESIDENTIAL DISPLACEMENTS
WETLAND SITE 10 (FQI 11.8)
1.77 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Scott Road
Merrill Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Thornapple Tree Road
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
Blackberry Creek
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Old Oaks Road
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
POTENTIAL RESIDENTIAL DISPLACEMENTS
College Drive
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
IL 47
Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
0 400 Scale (ft)
N
Alternative M–4
4–Lane West Avoidance Alternate
With 30 Foot Median
South of Interchange
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

3.2.2 Illinois 47/ Interstate-88 Interchange

3.2.2.1 Existing Conditions

The existing IL 47 interchange at I-88 is a partial service interchange that provides access to and from the west only. Peace Road is the closest full access service interchange to the west of IL 47 (15.5 miles), while to the east the closest full access service interchange is Orchard Road (5.3 miles).

There is a Tollway salt dome located in the northwest quadrant of the interchange. The northeast quadrant is currently being used as a stockpile yard for the Tollway.

As mentioned in Section 3.2.1.1, the existing IL 47 Bridge over I-88 provides two-12 foot through lanes in each direction separated by a 20 foot raised median and 9.25 foot shoulders on each side. There is an existing 12 foot left turn lane on northbound IL 47 to west bound I-88. It is a four span bridge with a concrete deck supported by twelve precast, prestressed concrete I-Beams. The bridge superstructure was fully reconstructed in 2007. Due to the recent reconstruction of the bridge, preservation of the structure is a factor in the interchange alternative selection.

Currently, there are no bicycle trails that cross I-88 in this area.

3.2.2.2 Proposed Alternatives

The interchange alternatives provide an entrance ramp from IL 47 to eastbound I-88 and an exit ramp from westbound I-88 to IL 47. The alternatives also require other factors to be considered, such as back to back left turn lanes on the existing IL 47 bridge over I-88 and the proximity of intersections south of the interchange.

All alternatives have considered bike accommodations across the IL 47 bridge over I-88. This amenity is necessitating widening of the structure for most of the alternatives. At this point, a 10’ wide path on each side of the bridge has been assumed. The exception to this is I-3, the Diverging Diamond alternative which incorporates a 10 foot wide path in the center of the bridge. As the designs progress on alternatives carried forward, minimizing any widening needed to this recently reconstructed deck will be a goal.

No Build Alternative	
Description	The No-Build Alternative would maintain the existing facility without any improvements except for routine maintenance (i.e. shoulder resurfacing or pavement patching and resurfacing) and those projects currently planned and programmed.
	The No-Build Alternative would continue to operate as a partial interchange.

Alternative I-1: Conventional Diamond Interchange	
Description	The conventional diamond interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	Finley Road will be a right-in/right-out road onto IL 47.
	The existing bridge over I-88 will need to be widened approximately 8 feet on each side of the bridge to accommodate shared use paths on each side of the bridge. This includes adding a new girder on each side of the bridge. See Appendix D for exhibit depicting widening.
	Traffic signals would be needed at the ramp termini both north and south of the bridge.
	The northeast quadrant will be designed to facilitate a loop ramp in the future. The loop ramp would carry northbound IL 47 traffic to westbound I-88. This loop ramp would only be added should operational issues become present due to traffic demands that become higher than anticipated.

Alternative I-2: Conventional Diamond with Roundabouts	
Description	The conventional diamond with roundabouts interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	Roundabouts would be provided at both ramp terminals.
	Finley Road would be a right-in/right-out road onto IL 47.
	The existing bridge over I-88 will need to be widened approximately 4 feet on each side of the bridge to accommodate shared use paths on each side of the bridge. See Appendix D for exhibit depicting widening.

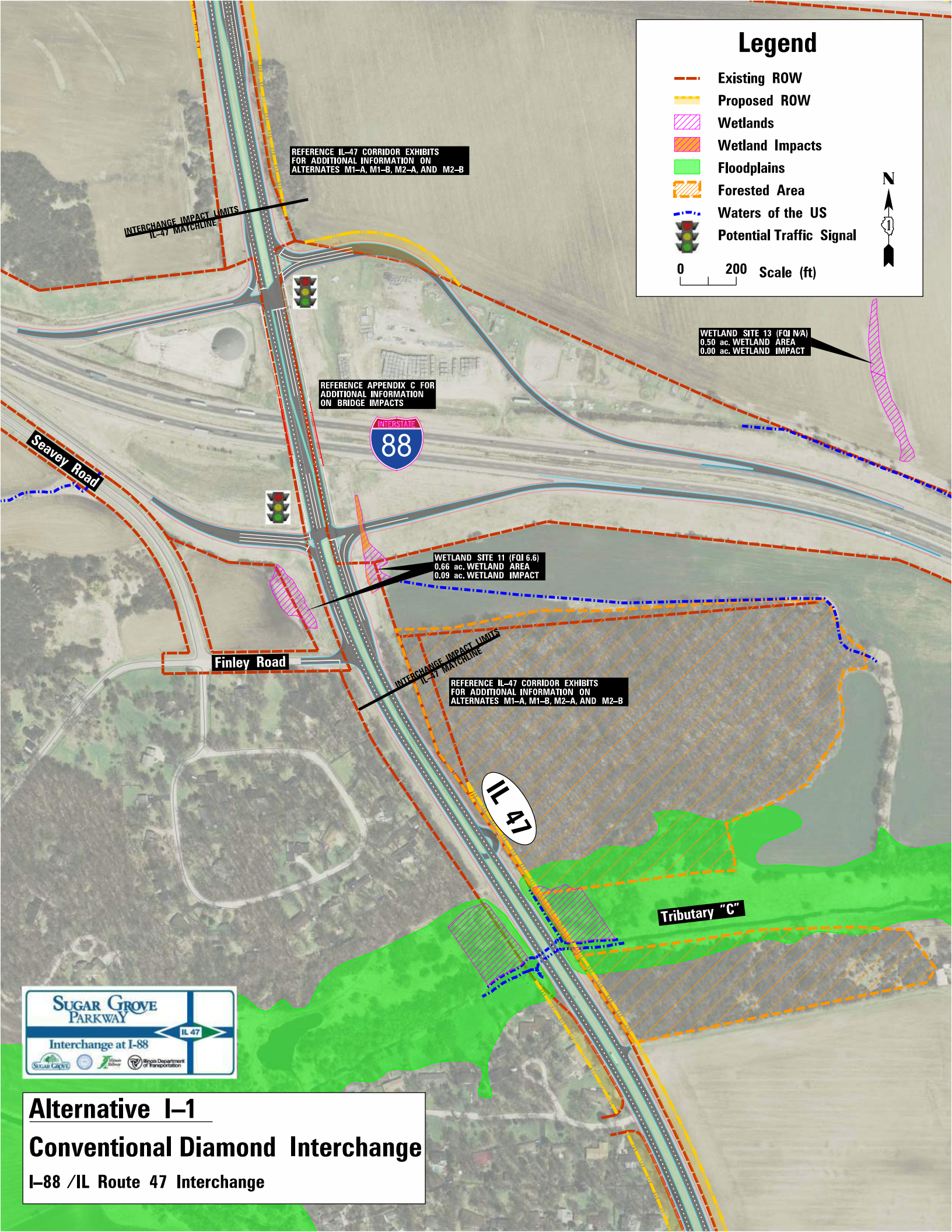
Alternative I-3: Diverging Diamond Interchange	
Description	The diverging diamond interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	Finley Road would be a right-in/right-out road onto IL 47.
	Traffic signals would be needed at the ramp termini both north and south of the bridge where lanes crisscross.
	The existing raised median will need to be modified to incorporate a 10 feet shared use path across the bridge. See Appendix D for exhibit depicting widening.

Alternative I-4: Partial Cloverleaf with Loop Ramp in Northeast Quadrant	
Description	The partial cloverleaf with loop ramp in the northeast quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It also includes a loop ramp for northbound IL 47 traffic to enter I-88 westbound.
	Finley Road would be a right-in/right-out road onto IL 47.
	Traffic signals would be needed at the ramp termini both north and south of the bridge.
	Bridge widening on both sides are necessary to accommodate a shared use path on each side of the bridge. This includes adding a new girder on each side of the bridge. Additionally, the widening that occurs on the northbound side of the bridge will be tapered in order to add a loop ramp in the NE corner of the bridge. See Appendix D for exhibit depicting widening.

Alternative I-5: Partial Cloverleaf with Loop Ramp in Northeast and Southwest Quadrants	
Description	The partial cloverleaf with loop ramp in the northeast and southwest quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It also includes a loop ramp for northbound IL 47 traffic to enter I-88 westbound, and a loop ramp for southbound IL 47 traffic to enter I-88 eastbound.
	Finley Road would be a right-in/right-out road onto IL 47.
	Traffic signals would be needed at the ramp termini both north and south of the bridge.
	Bridge widening on both sides are necessary to accommodate a shared use path on each side of the bridge. This includes adding a new girder on each side of the bridge. Additionally, the widening that occurs on the southbound side of the bridge will be tapered in order to add a loop ramp in the SW corner of the bridge. See Appendix D for exhibit depicting widening.

Alternative I-6: Partial Cloverleaf with Loop Ramp in Southwest Quadrant	
Description	The partial cloverleaf with loop ramp in the southwest quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It also includes a loop ramp for southbound IL 47 traffic to enter I-88 eastbound.
	Finley Road would be a right-in/right-out road onto IL 47.
	Traffic signals would be needed at the ramp termini both north and south of the bridge.
	The existing bridge over I-88 will need to be widened approximately 8 feet on each side of the bridge to accommodate shared use paths on each side of the bridge. This includes adding a new girder on each side of the bridge. See Appendix D for exhibit depicting widening.

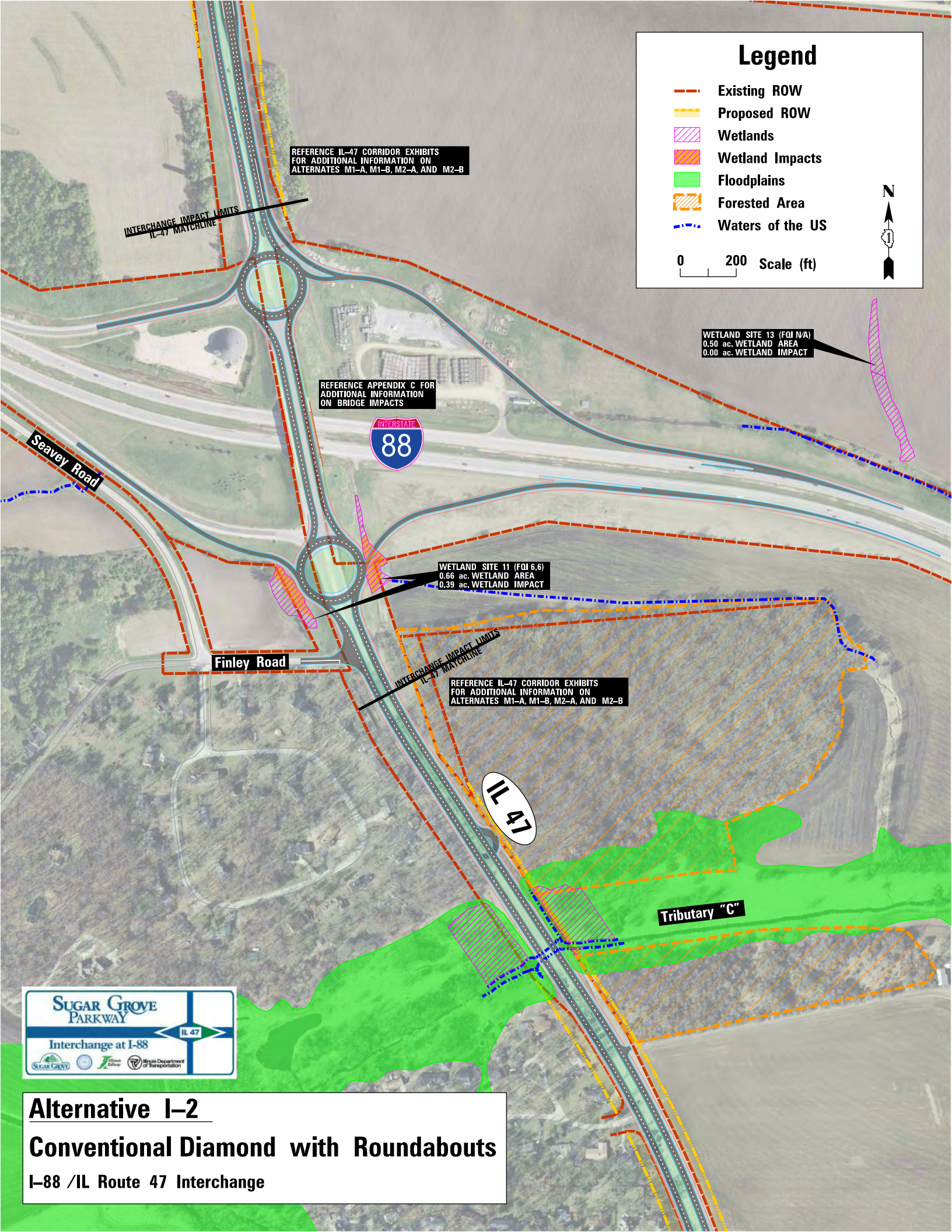
Alternative I-7: Partial Cloverleaf with Loop Ramp Terminating at Finley Road Intersection	
Description	The partial cloverleaf with loop ramp terminating at Finley Road intersection would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It modifies the I-88 east bound exit ramp to IL 47 into a loop ramp that terminates at an intersection with Finley Road.
	Traffic signals would be needed at the ramp termini both north and south of the bridge.
	The existing bridge over I-88 will need to be widened approximately 8 feet on each side of the bridge to accommodate shared use paths on each side of the bridge. This includes adding a new girder on each side of the bridge. See Appendix D for exhibit depicting widening.



Alternative I–1

Conventional Diamond Interchange

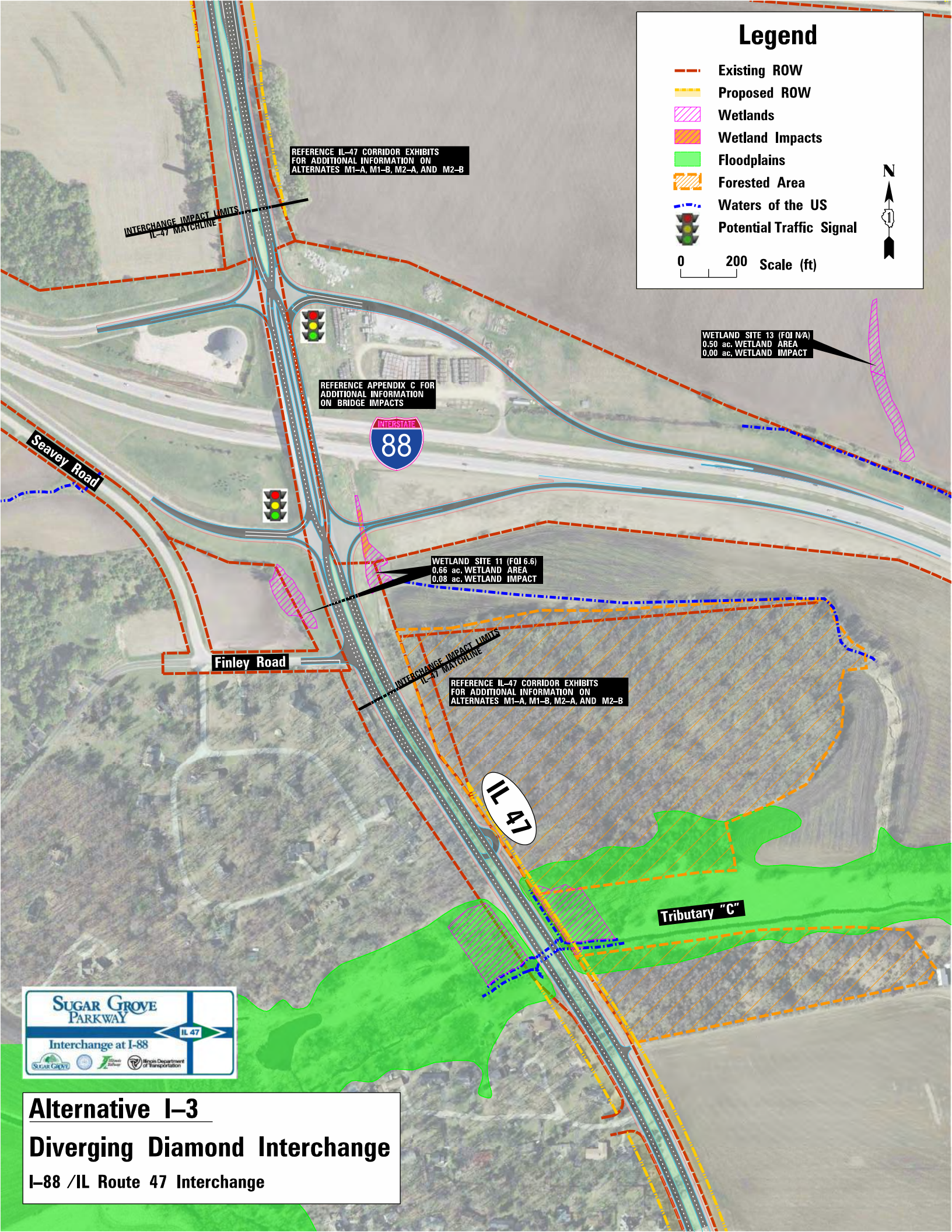
I–88 /IL Route 47 Interchange



Alternative I–2

Conventional Diamond with Roundabouts

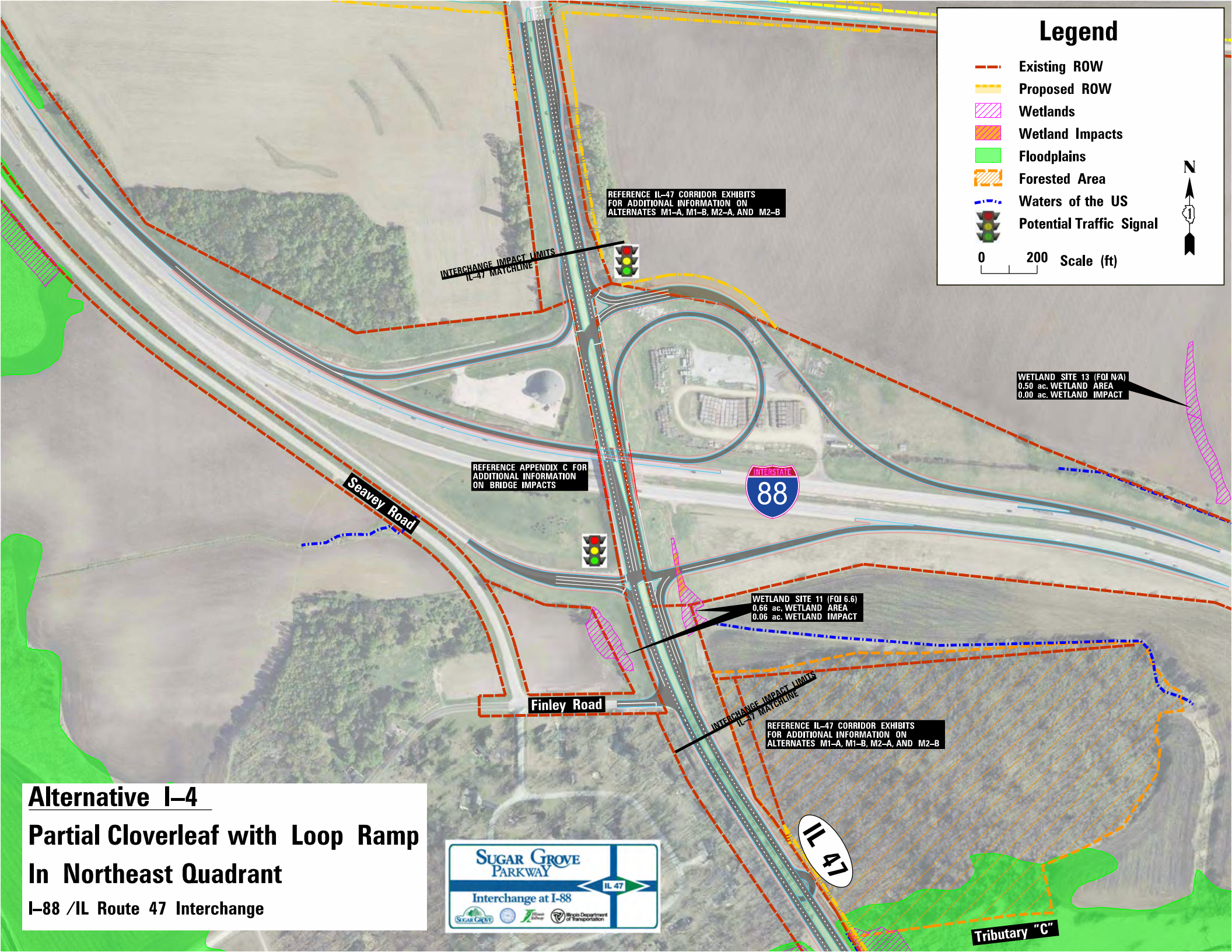
I–88 /IL Route 47 Interchange



Alternative I–3

Diverging Diamond Interchange

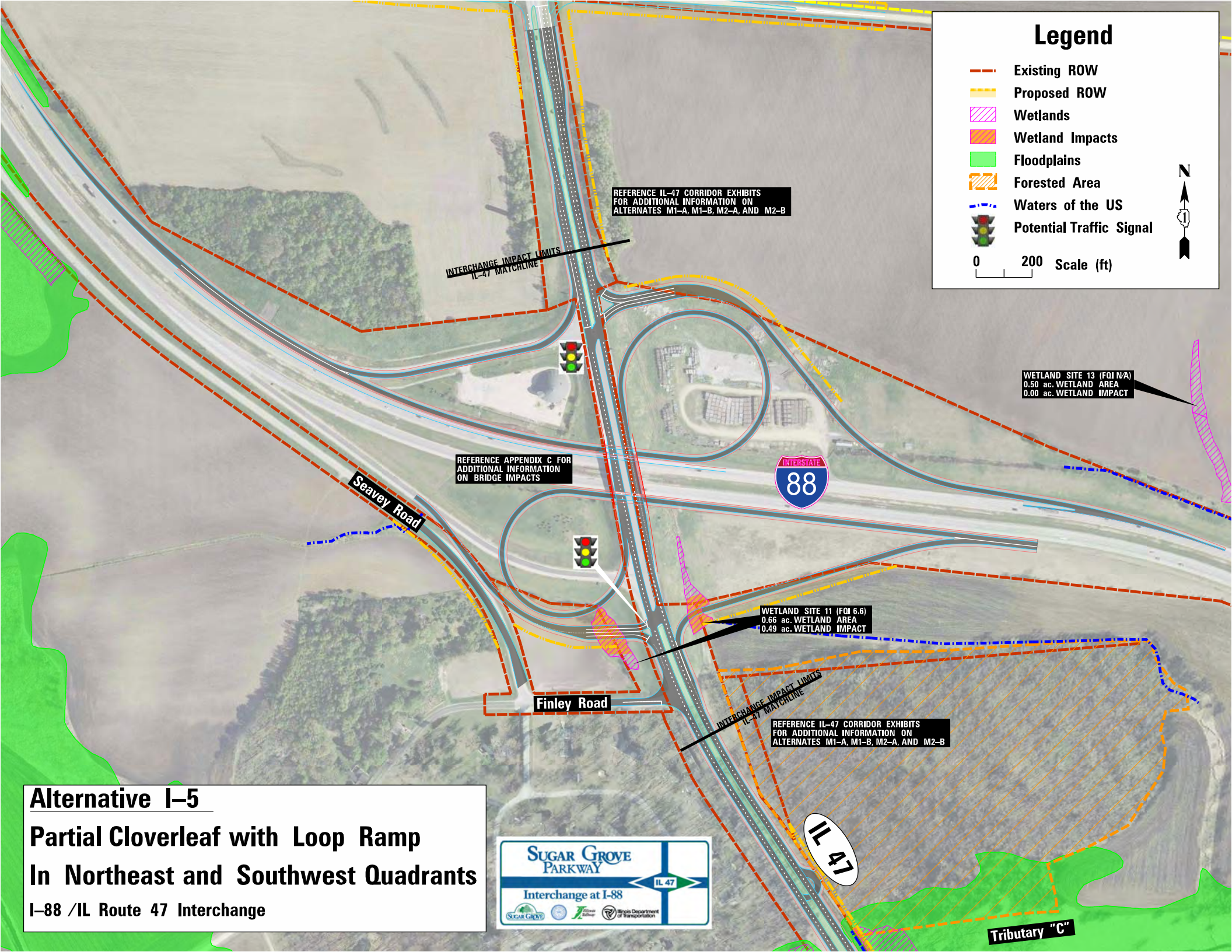
I–88 /IL Route 47 Interchange



Alternative I–4

Partial Cloverleaf with Loop Ramp In Northeast Quadrant

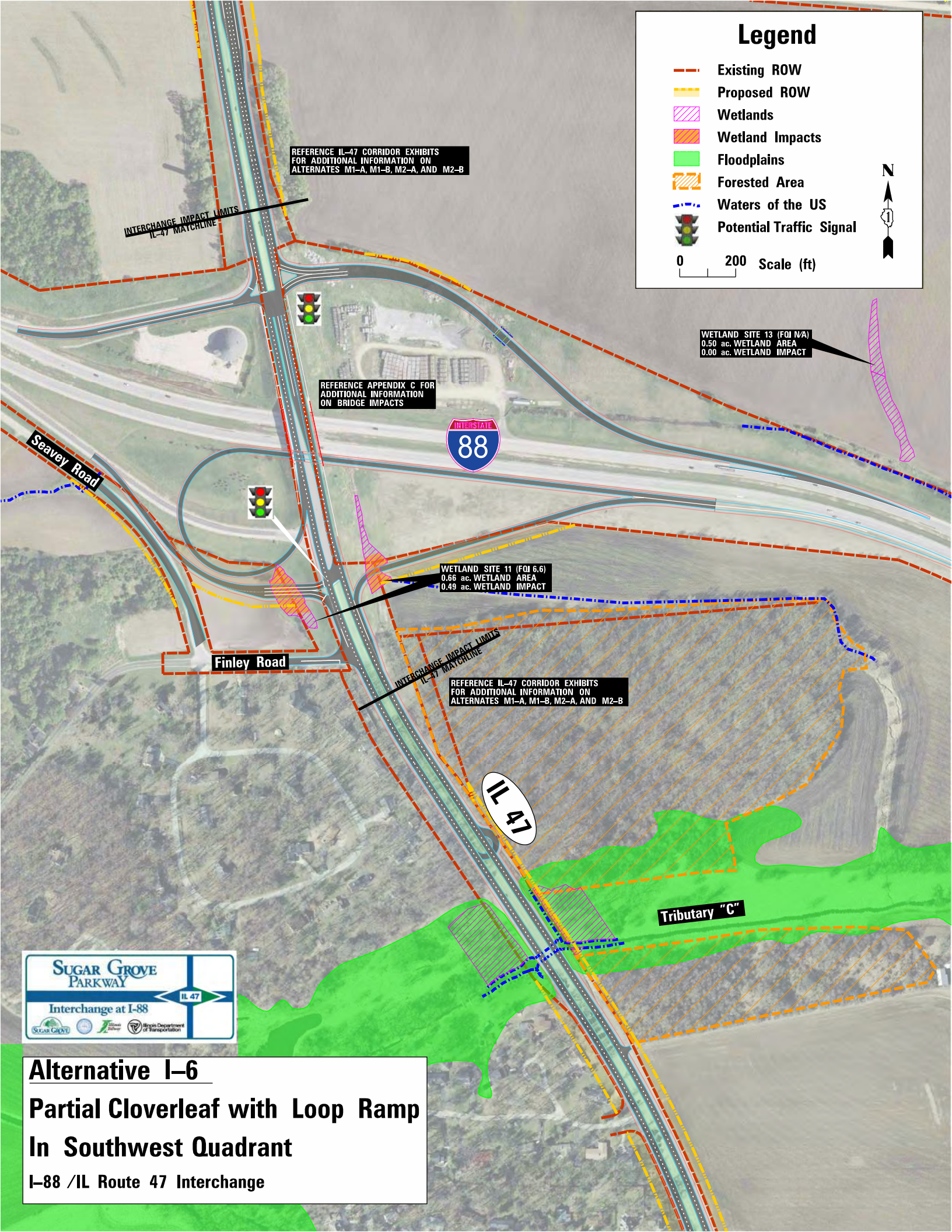
I–88 /IL Route 47 Interchange



Alternative I–5

Partial Cloverleaf with Loop Ramp In Northeast and Southwest Quadrants

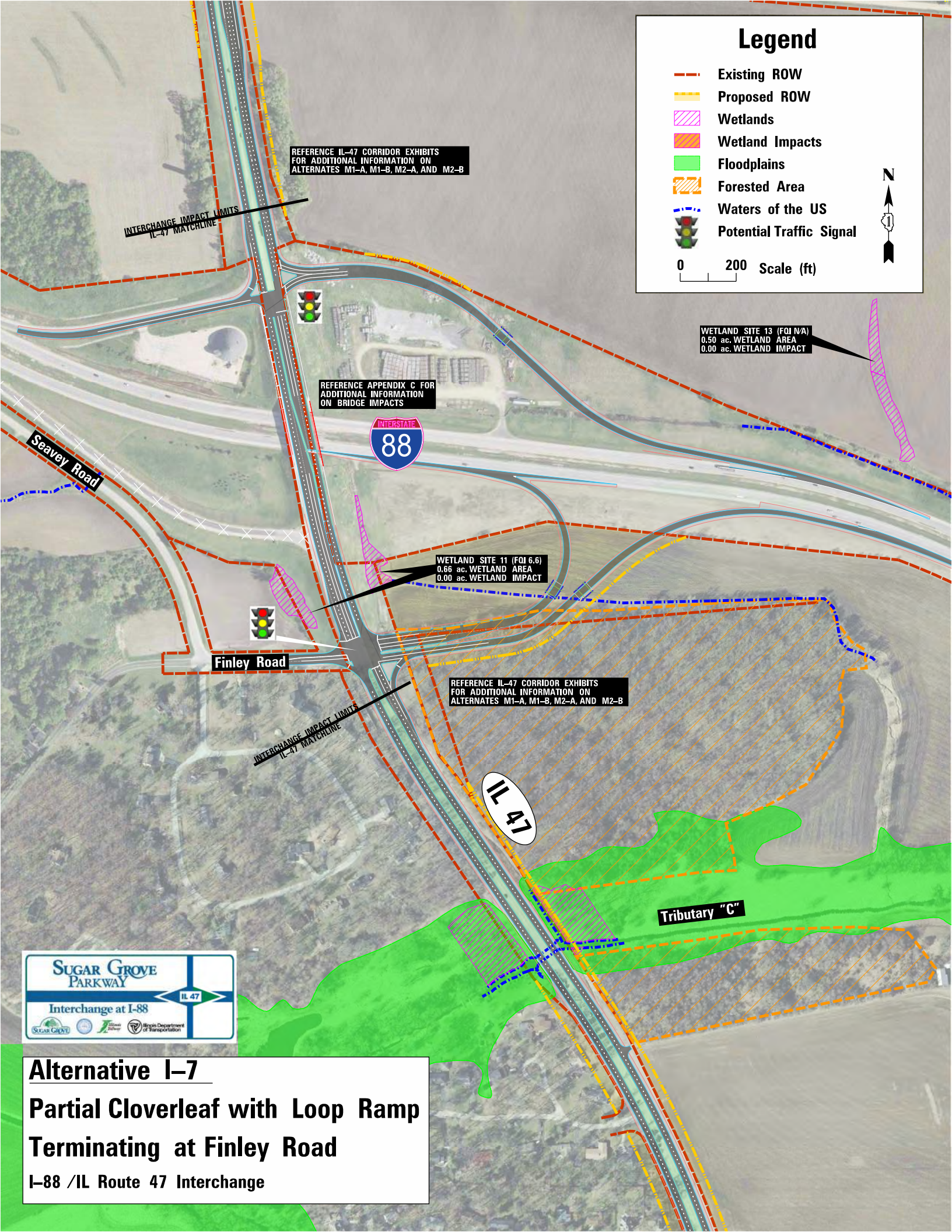
I–88 /IL Route 47 Interchange



Alternative I–6

Partial Cloverleaf with Loop Ramp In Southwest Quadrant

I–88 /IL Route 47 Interchange


Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Potential Traffic Signal
0
200
Scale (ft)
N
REFERENCE IL–47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M1–A, M1–B, M2–A, AND M2–B
INTERCHANGE IMPACT LIMITS IL–47 MATCHLINE
WETLAND SITE 13 (FQI N/A) 0.50 ac. WETLAND AREA 0.00 ac. WETLAND IMPACT
REFERENCE APPENDIX C FOR ADDITIONAL INFORMATION ON BRIDGE IMPACTS
INTERSTATE 88
Seavey Road
WETLAND SITE 11 (FQI 6.6) 0.66 ac. WETLAND AREA 0.00 ac. WETLAND IMPACT
Finley Road
REFERENCE IL–47 CORRIDOR EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES M1–A, M1–B, M2–A, AND M2–B
INTERCHANGE IMPACT LIMITS IL–47 MATCHLINE
IL 47
Tributary "C"
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Alternative I–7
Partial Cloverleaf with Loop Ramp Terminating at Finley Road
I–88 /IL Route 47 Interchange

4. Alternative Analysis

The alternatives were reviewed in detail to determine if they meet the project's Purpose and Need. There were two critical components of the Purpose and Need: (1) improve system linkage and (2) accommodate land use and economic development within the IL 47 and I-88 project study area. The first criteria was evaluated based on the design of the interchange. The second criteria was evaluated based on review of future land use plans of Sugar Grove (see **Exhibit 5**), separation of land parcels zoned for future commercial development, and an operational review.

Alternatives that met purpose and need were then evaluated using cost, operational reviews, design constraints, environmental resources, and socioeconomic resources.

The IL 47 alternatives and the interchange alternatives were evaluated separately and independently of each other. The evaluations of each are discussed in the subsections below.

4.1. Illinois 47 Alternatives

The IL 47 alternatives, described in detail in Section 3.2.1.2, include the no-build, widening along the existing centerline, widening east of the centerline and new alignments to the east and west. Each build alternative except the new alignment with four lanes to the west of the existing alignment, was designed and evaluated with a 50 foot depressed median. The widening on the existing centerline and the widening to the east alignments were also evaluated with a 30 foot raised median. The new alignment with four lanes to the west of the existing alignment was evaluated only with a 30 foot raised median.

4.1.1 Analysis and Evaluation

In order for IL 47 to meet the purpose and need, it needs to be able to facilitate the 2040 traffic projects. The IL 47 corridor alternatives were analyzed with Highway Capacity Software (HCS) 2010, which considered factors like directional traffic volume, heavy vehicle percentage, and aspects of the roadway design to identify a directional Level of Service (LOS) for each segment during the morning and evening peak hours. LOS grades range from A to F with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions). Given IL 47's status as a Strategic Regional Arterial (SRA), LOS C or better is desirable for corridor operation.

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
FREE FLOW	FREE FLOW	NEAR FREE FLOW	TRAFFIC FLOW BREAKS DOWN	CONGESTION	GRIDLOCK

As the basis for capacity analysis of the IL 47 corridor, the Chicago Metropolitan Agency for Planning (CMAP) developed Average Daily Traffic (ADT) volumes for each segment of IL 47, for I-88 and the interchange ramps, and for each side street within the study area. These ADTs are illustrated in **Exhibits 5 and 6** for 2040 No-Build and 2040 Build conditions, respectively. Based on these ADTs, AECOM prepared Design Hourly Volumes (DHVs) in conjunction with IDOT staff for each study intersection during the weekday morning and evening peak hours. These DHVs, which are presented in **Exhibit 7**, were provided to the project team for use in analyzing corridor operation at this stage of the Phase I study.

Who is Chicago Metropolitan Agency for Planning (CMAP):

CMAP is the official regional planning organization for the northeastern Illinois counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will. CMAP establishes coordinated strategies that help the region's 284 communities address transportation, housing, economic development, open space, the environment, and other quality-of-life issues.

The existing IL 47 cross-section provides two lanes in each direction at the interchange ramps and, in the northbound direction only, between the I-88 E ramp and Finley Road. The remainder of IL 47 is one lane in each direction through the study area. It is assumed that this cross-section would be maintained under 2040 No-Build Conditions. Based on these assumptions and the DHVs provided by IDOT, projected LOS for IL 47 under 2040 No-Build conditions are summarized below.

Table 3: IL 47 Operational Review-2040 No-Build Conditions

Roadway Segment	Number of Lanes[1]		Operational Review – 2040 No-Build Conditions			
			Weekday AM Peak Hour		Weekday PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Green Road to Seavey Road	1	1	LOS E	LOS E	LOS E	LOS D
Seavey Road to I-88 W On-Ramp	1	1	LOS E	LOS E	LOS E	LOS D
I-88 W On-Ramp to I-88 E Off-Ramp	2	2	LOS B	LOS A	LOS B	LOS A
I-88 E Off-Ramp to Finley Road	2	1	LOS A	LOS E	LOS A	LOS E
Finley Road to Scott Road	1	1	LOS E	LOS E	LOS E	LOS E

Roadway Segment	Number of Lanes[1]		Operational Review – 2040 No-Build Conditions			
			Weekday AM Peak Hour		Weekday PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Scott Road to Merrill Road	1	1	LOS E	LOS E	LOS E	LOS E
Merrill Road to Old Oaks Road/ College Drive	1	1	LOS D	LOS E	LOS D	LOS D

[1]On segments where the number of directional lanes varies, the narrower cross-section was used in analysis for a conservative result.

As shown, HCS 2010 roadway segment analyses indicate that nearly all portions of IL 47 providing a single directional travel lane will operate at LOS E during one or both peak hours under 2040 No-Build conditions. The remaining one-lane directional segments are projected at LOS D. As such, all build alternatives are proposing to build IL 47 with two lanes in each direction from Old Oaks Road to Green Road. Since all build alternatives are proposing the same number of lanes, they will be evaluated together. HCS 2010 analyses of the 2040 Build condition indicate that this cross-section will allow all study segments of IL 47 to operate at LOS C or better, as shown below. As long as two lanes are provided in each direction, the median width or specific alignment are unlikely to have meaningful impact on the LOS results shown (see **Exhibit 8**).

Table 4: IL 47 Operational Review-2040 Build Conditions

Roadway Segment	Number of Lanes		Operational Review – 2040 Build Conditions			
			Weekday AM Peak Hour		Weekday PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Green Road to Seavey Road	2	2	LOS B	LOS A	LOS B	LOS A
Seavey Road to I-88 W On-Ramp	2	2	LOS B	LOS B	LOS B	LOS A
I-88 W On-Ramp to I-88 E Off-Ramp	2	2	LOS B	LOS B	LOS B	LOS B

Roadway Segment	Number of Lanes		Operational Review – 2040 Build Conditions			
			Weekday AM Peak Hour		Weekday PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
I-88 E Off-Ramp to Finley Road	2	2	LOS B	LOS C	LOS B	LOS B
Finley Road to Scott Road	2	2	LOS B	LOS B	LOS B	LOS B
Scott Road to Merrill Road	2	2	LOS A	LOS B	LOS A	LOS A
Merrill Road to Old Oaks Road/ College Drive	2	2	LOS A	LOS B	LOS A	LOS A

Based on the results of the operational review, IL 47 should be widened to support projected future traffic volumes and to facilitate the anticipated economic development. The No-Build alternative is not expected to adequately support traffic volumes from a capacity perspective, nor does it meet purpose and need because it does not facilitate economic development. However, for comparison it will be carried forward.

All of the Build Alternatives met purpose and need by facilitating 2040 traffic projections. The alternatives were then subjected to two separate screening processes. In Round 1 of the screening process, alternatives were screened against residential and commercial displacements, Right-of-Way required, and environmental resource including National Wetland Inventory (NWI) wetlands, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, lands currently being farmed, and forested areas. The results of this screening can be seen in **Table 5.** Alternatives that were carried forward to the next screening process were screened against cost, operational review data, and Environmental Survey Request data such as 4(f) property and Illinois Natural History Survey wetlands and waters of the U.S. Some categories from Round 1 were also carried forward, such as displacements, Right-of-Way required and floodplains, for comparison. The results of this screening can be seen in **Table 6.**

Table 5: IL 47 Impact Matrix (Round 1)

	Residential Displacements[1]	Right of Way (acres)	NWI Wetlands (acres)[2]	Floodplains (acres)[3]	Forest (acres)	Farmland (acres)[4]	Forest Preserve – 4(f) (acres)	Carry Forward to Round 2
No-Build	0	0	0	0	0	0	0	Yes
M-1A 30 Foot Median on Alignment	7	11.1	0.2	3.5	1.1	5.8	0.8	Yes
M-1B 50 Foot Median on Alignment	11	15.1	0.3	4.2	1.6	6.5	1.2	Yes
M-1C Modified 30 Foot Median	7	10.6	0.2	2.8	0.6	5.8	0.3	Yes
M-2A 30 Foot Median Widened to East	1	12.7	0.3	3.5	1.6	7.4	1.1	Yes
M-2B 50 Foot Median Widened to East	1	15.1	0.4	4.2	2.7	8.6	1.6	Yes
M-2C Modified 30 Foot Median Widened to East	0	11.7	0.3	2.6	1.2	7.3	0.3	Yes
M-3 50 Foot Median New Alignment-East	1	37.5	1.2	5.1	6.7	25.9	1.2	No
M-4 30 Foot Median New Alignment-West (Hannaford Woods Avoidance Alternative)	11	40.7	2.5	9.2	5.2	17.2	0	No

Note: Impacts based on 45 foot buffer off of the edge of pavement for each alternative

1. Residential displacements were calculated based on structures within 10 feet of the buffer.
2. Wetlands were determined based on the US Fish and Wildlife Service's National Wetland Inventory.
3. Floodplains were based on Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM).
4. Farmland was based on current land use.

	Low Impact	Impacts are calculated based on the range of the numbers in each category, excluding the No-Build. Those impacts falling in the lower 33rd Percentile are considered low impact, those between 33rd and 66th Percentiles are considered moderate and those above the 66th Percentile of the range are considered high impact. No-Build numbers were not included in the range.
	Moderate Impact	
	High Impact	

Table 6: IL 47 Impact Matrix (Round 2)

	Residential Displacements[1]	Right of Way (acres)	Estimated Cost in Millions (2016 Dollars)[2]	Operational Review	INHS Wetlands (acres)[3]	Floodplains (acres)[4]	Farmland (acres)[5]	INHS Waters of the U.S. (linear feet)	Forest Preserve – 4(f) (acres)	Carry Forward
No-Build	0	0	0	Unacceptable	0	0	0	0	0	Yes
M-1A 30 Foot Median	7	11.1	$16.5	Acceptable	1.9	3.5	5.8	2000-3000	0.8	Yes
M-1B 50 Foot Median	11	15.1	$17.2	Acceptable	2.2	4.2	6.5	2000-3000	1.2	No
M-1C Modified 30 Foot Median	7	10.6	$16.5	Acceptable	1.3	2.8	5.8	2000-3000	0.3	Yes
M-2A 30 Foot Median	1	12.7	$18.3	Acceptable	2.1	3.5	7.4	2000-3000	1.1	No
M-2B 50 Foot Median	1	15.1	$18.8	Acceptable	2.5	4.2	8.6	2000-3000	1.6	No
M-2C Modified 30 Foot Median	0	11.7	$18.3	Acceptable	1.3	2.6	7.3	2000-3000	0.3	Yes

Note: Impacts based on 30 foot buffer off of the edge of pavement for each alternative

1. Residential displacements were calculated based on structures within 10 feet of the buffer.
2. Cost was estimated for improving IL 47 from Old Oaks Road/College Drive to Green Road.
3. Wetlands and Waters of the U.S. were determined based on the INHS 2016 survey.
4. Floodplains were based on Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM)
5. Farmland was based on current land use.

	Low Impact	Impacts are calculated based on the range of the numbers in each category for Round 2 alternatives only, excluding the No-Build. Those impacts falling in the lower 33rd Percentile are considered low impact, those between 33rd and 66th Percentiles are considered moderate and those above the 66th Percentile of the range are considered high impact. No-Build numbers were not included in the range.
	Moderate Impact	
	High Impact	

4.1.2 Illinois 47 Alternatives Eliminated

4.1.2.1 Round 1 Elimination

The alternatives eliminated during Round 1 contained high amounts of farmland, floodplain, and forest impacts and right of way required. Each of the alternatives eliminated during Round 1 are described below.

Alternative M-3: 4-Lane New Alignment East	
Description	This alternative includes two 12-foot lanes in each direction with a 50-foot depressed median and 10-foot shoulders.
	The centerline is shifted 1,050 feet to the east.
	The new alignment would begin at Merrill Road and end at Green Road.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
	The new alignment would have new intersections at Seavey Road, Thornapple Tree Road, and Scott Road.
Reasons for Elimination	This alternative had the second highest amount of right of way required (37.5 acres).
	This alternative had the highest amount of impacts to farmland (25.9 acres), and forest (6.7 acres), and moderate impacts to floodplain (5.1 acres) and wetlands (1.2 acres) compared to other alternatives.
	It would create an entirely new crossing of Tributary C of Blackberry Creek.

Alternative M-4: 4-Lane New Alignment West (Hannaford Woods Avoidance Alternative)	
Description	This alternative includes two 12-foot lanes in each direction with a 30-foot depressed median and 10-foot shoulders.
	The alignment is shifted west south of Old Oaks Road and merges back on existing alignment just south of the I-88 ramps.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Reasons for Elimination	This alternative impacts the highest number of residential properties (11).
	This alternative requires the highest amount of right of way (40.7 acres).
	This alternative had the highest amount of impacts to wetlands (2.5 acres) and floodplains (9.2 acres), high impacts to forest (5.2 acres) and moderate impacts to farmland (17.2 acres) as compared to other alternatives.

4.1.2.2 Round 2 Elimination

The alternatives eliminated during Round 2 had high costs and higher amounts of impacts to the Hannaford Woods/Nickels Farm Forest Preserve, and wetlands. Each of the alternatives eliminated during Round 2 are described below.

Alternative M-1B: 4-Lane on Existing Alignment with 50 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 50-foot depressed median and 10-foot shoulders.
	The alternative maintains the existing centerline of IL 47.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Reasons for Elimination	This alternative had the highest of potential residential displacements (11).
	Among the alternatives carried to Round 2, it tied for the highest amount of right of way (15.1 acres).
	This alternative tied for the highest impacts to floodplains (4.2 acres) and had high impacts to wetlands (2.2 acres) and Hannaford Woods/Nickels Farm Forest Preserve (1.2 acres) as compared to other alternatives carried to Round 2.

Alternative M-2A: 4-Lane Widened to the East with 30 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 30-foot raised median and 10-foot shoulders.
	The centerline is shifted 26 feet to the east.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Reasons for Elimination	Among the alternatives carried to Round 2, it had the second highest amount of right of way (12.7 acres).
	This alternative has the second highest cost of those advanced to Round 2 ($18.3 Million).
	This alternative had moderate impacts to wetlands (2.1 acres), floodplains (3.5 acres), farmland (7.4 acres), and Hannaford Woods/Nickels Farm Forest Preserve (1.1 acres) as compared to other alternatives carried to Round 2.

Alternative M-2B: 4-Lane Widened to the East with 50 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 50-foot depressed median and 10-foot shoulders.
	The centerline is shifted 36 feet to the east.
	The alternative takes into account the potential for a 10-ft wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Reasons for Elimination	Among the alternatives carried to Round 2, it tied for the highest amount of right of way (15.1 acres).
	This alternative has the highest cost for those advanced to Round 2 ($18.8 Million).
	This alternative had the highest impacts to farmland (8.6 acres), wetlands (2.5 acres), floodplains (4.2 acres), and Hannaford Woods/Nickels Farm Forest Preserve (1.6 acres) as compared to other alternatives carried to Round 2.

4.1.3 Illinois 47 Alternatives to be Carried Forward

The IL 47 alternatives to carry forward were based on the design's ability to facilitate the purpose and need. The purpose of the project is to accommodate land use and economic development. This can be achieved by meeting 2040 traffic projections. The alternatives to carry forward were also based on minimizing environmental and socioeconomic impacts. The following alternatives will be carried forward:

No Build Alternative	
Description	The No-Build Alternative would maintain the existing facility without any improvements except for routine maintenance (i.e. shoulder resurfacing or pavement patching and resurfacing) and those projects currently planned and programmed.
	The No-Build alternative would not include any lane widening or lane additions.
Comments	Based on 2040 No-Build DHVs provided by IDOT, the IL 47 corridor is projected to operate at LOS E on most study segments under this alternative.
	The No-Build is being carried forward for comparison.

Alternative M-1A: 4-Lane on Existing Alignment with 30 foot Median	
Description	This alternative includes two 12-foot lanes in each direction with a 30-foot raised median and 10-foot shoulders.
	The alternative maintains the existing centerline of IL 47.
	The alternative takes into account the potential for a 10-ft wide multi-use trail to be located on either side of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Comments	Based on 2040 Build DHVs provided by IDOT, the IL 47 corridor is projected to operate at LOS C or better on all study segments under this alternative.
	This alternative tied for the lowest cost ($16.5 Million).
	This alternative has low impacts to right of way (11.1 acres).
	This alternative has tied for lowest impacts to farmland (5.8 acres) and has moderate impacts to wetlands (1.9 acres) and floodplains (3.5 acres) as compared to other alternatives carried to Round 2.

Alternative M-1C: 4-Lane on Existing Alignment with Modified 30 food Median	
Description	The alternative includes two 12-foot lanes in each direction with a 30 foot raised median through most of the corridor.
	The median is reduced to 6 foot through the Hannaford Woods/Nickels Farm Forest Preserve.
	The alternative maintains the existing centerline of IL 47.
	The alternative takes into account the potential for a 10-ft wide multi-use trail to be located on either side of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Comments	Based on 2040 Build DHVs provided by IDOT, the IL 47 corridor is projected to operate at LOS C or better on all study segments under this alternative.
	This alternative has the lowest impacts to right of way (10.6 acres).
	This alternative tied for the lowest cost ($16.5 Million).
	This alternative tied for the lowest impacts to wetlands (1.3 acres), Hannaford Woods/Nickels Farm Forest Preserve (0.3 acres) and farmland (5.8 acres) as compared to other alternatives carried to Round 2.

Alternative M-2C: 4-Lane Widened to East with Modified 30 foot Median	
Description	The alternative includes two 12-foot lanes in each direction with a 30 foot raised median through most of the corridor.
	The median is reduced to 6 foot through the Hannaford Woods/Nickels Farm Forest Preserve.
	The alternative shifts the centerline north of the forest preserve to the east to avoid residences.
	The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.
	All intersections would be improved geometrically to accommodate design traffic volumes and design vehicles.
Comments	Based on 2040 Build DHVs provided by IDOT, the IL 47 corridor is projected to operate at LOS C or better on all study segments under this alternative.
	This alternative has a low impacts to right of way (11.7 acres).
	This alternative has the second highest cost of the alternatives in Round 2 ($18.3 M)
	This alternative tied for the lowest impacts to wetlands (1.3 acres) and Hannaford Woods/Nickels Farm Forest Preserve (0.3 acres. It has the lowest impacts to floodplains (2.6 acres) as compared to other alternatives carried to Round 2.
	This alternative impacts no residential displacements.

The IL 47 alternatives being carried forward are the No-build, M-1A, M-1C, and M-2C.

- The No-Build does not meet purpose and need; however it is being carried forward for comparison purposes.
- The M-1A alternative is a 30 foot median on the existing alignment. The 30 foot median reduces impacts throughout the corridor compared to the 50 foot median. Two through lanes in each direction meet the 2040 traffic needs for the corridor and therefore will help facilitate economic development which is a main component of the purpose and need of the project. It has a low cost and requires less right of way. It has the second lowest impact to natural resources compared with other alternatives carried to Round 2 of the screening process. It does have the potential to impact residences on the west side of IL 47.
- The M-1C alternative is a 30 foot median on the existing alignment; however, the median is reduced to 6 feet through the Hannaford Woods/Nickels Farm Forest Preserve. The 30 foot median reduces impacts throughout the corridor compared to the 50 foot median. Two through lanes in each direction meet the 2040 traffic needs for the corridor and therefore will help facilitate economic development which is a main component of the purpose and need of the project. The 6 foot median through the forest preserve reduces impacts to the forest Preserve, flood plain, wetlands, and Waters of the U.S. This alternative does have the potential to impact residences on the west side of Il 47.
- The M-2C alternative is a 30 foot median with the centerline shifted to the east north of Thornapple Tree Road; however, the median is reduced to 6 feet through the Hannaford Woods/Nickels Farm Forest Preserve and stays on the existing alignment. The 30 foot median reduces impacts throughout the corridor compared to the 50 foot median. Two through lanes in each direction meet the 2040 traffic needs for the corridor and therefore will help facilitate economic development which is a main component of the purpose and need of the project. The 6 foot median through the forest preserve and staying on the existing alignment reduces impacts to the forest preserve, flood

plain, wetlands, and Waters of the U.S. Shifting the alternative to the east allows the alternative to avoid residential displacements.

Moving forward, these four IL 47 alternatives will be further evaluated based on their operations, safety, geometry, and impacts to resources.

4.2. Interchange Alternatives

The IL 47 and I-88 interchange alternatives, described in detail in Section 3.3.2.2, include the no-build, conventional diamond interchange, conventional diamond interchange with roundabouts, diverging diamond interchange, partial cloverleaf in the northeast quadrant, partial cloverleaf in the northeast and southwest quadrants, partial cloverleaf in the southwest quadrant, and a partial cloverleaf with a loop ramp terminating at Finley Road.

4.2.1 Interchange Analysis and Evaluation

All of the Build interchange alternatives meet the Purpose and Need to improve system linkage by providing a full access interchange between IL 47 and I-88 and facilitate future economic development and land use. The No-Build Alternative does not meet the Purpose and Need because it does not provide improved access at the IL 47/I-88 interchange; however, for comparison, it will be carried forward.

The alternatives were then screened against Right-of-Way required, operational reviews, cost, impacts to the existing IL 47 Bridge, environmental resources, and socio-economic impacts. For the interchange design alternatives, the operational review for the ramp intersections was based on BDE design standards and a preliminary opinion of the probable geometric configurations that would be required to accommodate the projected DHVs. Note that Level of Service analyses were not performed as a part of this initial screening process, since the selected geometric layouts for each alternative are expected to yield acceptable operational characteristics and conform to BDE criteria. The impacts are presented in **Table 7** and do not include impacts for the IL 47 widening.

Table 7: Interchange 47 Impact Matrix

	Right of Way (acres)	Operational Review	Estimated Cost in Millions (2016 Dollars)	Existing IL 47 over I-88 Bridge Impacts (square feet)[1]	Wetlands (acres)[2]	Waters of the U.S. (linear feet)	Floodplains (acres)[3]	Forest (acres)	Farmland (acres)[4]	Carry Forward
No-Build	0	Not Acceptable	0	None	0	0	0	0	0	Yes
Alternative I-1: Conventional Diamond	0.7	Acceptable	$16.2	2622	<0.1	0	0	<0.1	0.9	Yes
Alternative I-2: Conventional Diamond w/ Roundabouts	0	Acceptable	$15.9	1261	<0.5	10	0	<0.1	<0.1	Yes
Alternative I-3: Diverging Diamond	0	Acceptable	$15.8	0	<0.1	0	0	<0.1	0	Yes
Alternative I-4: Partial Cloverleaf-NE Quadrant	0.7	Acceptable	$19.8	2606	<0.1	0	0.1	0	0.8	Yes
Alternative I-5: Partial Cloverleaf-NE and SW Quadrant	2.9	Acceptable	$21.7	3218	<0.6	<100	0.1	0.2	3.3	No
Alternative I-6: Partial Cloverleaf-SW Quadrant	2.3	Acceptable	$20.3	2608	<0.6	<100	0	0.2	2.5	No
Alternative I-7: Partial Cloverleaf-Loop Ramp terminating at Finley Road intersection	7.5	Acceptable	$20.2	2608	<0.1	<1000	0	2.4	6.1	No

1. Additional square feet of bridge surface area required. See **Appendix D** for more details.
2. Wetlands and Waters of the U.S. were determined based on the INHS Wetland Survey conducted in 2016.
3. Floodplains were based on Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM)
4. Farmland was based on current land use.

	Low Impact	Impacts are calculated based on the range of the numbers in each category excluding the No-Build. Those impacts falling in the lower 33rd Percentile are considered low impact, those between 33rd and 66th Percentiles are considered moderate and those above the 66th Percentile of the range are considered high impact. No-Build numbers were not included in the range.
	Moderate Impact	
	High Impact	

4.2.2 Interchange Alternatives Eliminated

All of the proposed build alternatives for the interchange meet purpose and need by improving system linkage and accommodating land use and economic development within the IL 47 and I-88 project study area. All interchange build alternatives are expected to meet future traffic demands. Therefore, operational studies are not the basis for elimination. Environmental and socioeconomic impacts were also minutely different between interchange alternatives and are weighted less in the evaluation due to their small ranges of impacts. The impacts with the most weight include impacts to the existing bridge, cost, and right of way required. Each interchange alternative eliminated is described below:

Alternative I-5: Partial Cloverleaf with Loop Ramp in Northeast and Southwest Quadrants	
Description	The partial cloverleaf with loop ramp in the northeast and southwest quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It also includes a loop ramp for northbound IL 47 traffic to enter I-88 westbound, and a loop ramp for southbound IL 47 traffic to enter I-88 eastbound.
	Finley Road would be a right-in/right-out road onto IL 47.
	This alternative requires a tapered exit lane for southbound vehicles to access the I-88 EB entrance loop ramp. The taper begins on the bridge, and requires additional widening beyond the existing structure. To provide the required lane geometry and 10-ft multi-use path on both sides of the roadway, the existing structure will require an additional 3,218-SF of bridge surface area.
Reasons for Elimination	This alternative has the highest cost ($21.7 Million).
	This alternative has the highest impacts to the existing IL 47 bridge over I-88 (3,218 square feet).
	This alternative has moderate impacts to right of way (2.9 acres).
	This alternative ties for the highest impacts to wetlands (<0.6 acres) and floodplains (0.1 acres) and has moderate impacts to farmland (3.3 acres).
	There is no operational need for a loop ramp in the northeast or southwest quadrants based on 2040 traffic data. Due to the increased cost, impacts to the bridge, and environmental impacts, it is eliminated.

Alternative I-6: Partial Cloverleaf with Loop Ramp in Southwest Quadrant	
Description	The partial cloverleaf with loop ramp in the southwest quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It also includes a loop ramp for southbound IL 47 traffic to enter I-88 eastbound.
	Finley Road would be a right-in/right-out road onto IL 47.
	The SW quadrant requires a tapered exit lane for southbound vehicles to access the I-88 EB entrance loop ramp. The taper begins on the bridge, and requires additional widening beyond the limits of the existing structure. To provide the required lane geometry and 10-ft multi-use path on both sides of the roadway, the existing structure will require an additional 2,608-SF of bridge surface area.
Reasons for Elimination	This alternative has the second highest cost ($20.3 Million).
	This alternative has high impacts to the existing IL 47 bridge over I-88 (2,608 square feet).
	This alternative ties for the highest impacts to wetlands (<0.6 acres) and has moderate impacts to farmland (2.5 acres).
	There is no operational need for a loop ramp in the southwest quadrant based on 2040 traffic data. Due to the increased cost, impacts to the bridge, and environmental impacts, it is eliminated.

Alternative I-7: Partial Cloverleaf with Loop Ramp Terminating at Finley Road Intersection	
Description	The partial cloverleaf with loop ramp terminating at Finley Road intersection would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It modifies the I-88 east bound exit ramp to IL 47 into a loop ramp that terminates at an intersection with Finley Road.
	This alternative requires dual-left turn lanes for IL-47 traffic to access the I-88 entrance ramps at both ends of the bridge. The existing structure width of 91'-8" is insufficient and will need to be widened 7.75-ft on both sides in order to accommodate the proposed IL-47 lane geometry, as well as a 10-ft multi-use path on both sides. This results in an additional 2,608-SF of bridge surface area.
Reasons for Elimination	This alternative has the highest impacts to right of way, more than twice as much as the next closest alternative (7.5 acres).
	This alternative has a high cost ($20.2 Million).
	This alternative has high impacts to the existing IL 47 bridge over I-88 (2,608 square feet).
	This alternative has the highest impacts to Waters of the U.S. (<1000 linear feet), forest (2.4 acres), and farmland (6.1 acres) and low impacts to wetlands (<0.1 acres).
	There is no operational need for a loop ramp in the southeast quadrant based on 2040 traffic data. Due to the increased right of way, cost, impacts to the bridge, and environmental impacts, it is eliminated.

4.2.3 Interchange Alternatives to be Carried Forward

The interchange alternatives to carry forward were based on the design's ability to facilitate the purpose and need. The purpose of the project is to improve system linkage and accommodate land use and economic development; all proposed interchange alternatives will meet purpose and need. The interchange alternatives to carry forward were also based on minimizing right of way, cost, bridge impacts, and environmental and socioeconomic impacts.

No Build Alternative	
Description	The No-Build Alternative would maintain the existing facility without any improvements except for routine maintenance (i.e. shoulder resurfacing or pavement patching and resurfacing) and those projects currently planned and programmed.
	The No-Build Alternative would continue to operate as a partial interchange.
Comments	This alternative does not meet purpose and need as it does not improve system linkage by providing a full access interchange however; for comparison, it will be carried forward.

Alternative I-1: Conventional Diamond Interchange	
Description	The conventional diamond interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	Finley Road will be a right-in/right-out road onto IL 47.
	This alternative requires dual-left turn lanes for IL-47 traffic to access the I-88 entrance ramps at both ends of the bridge. The existing structure width of 91'-8" is insufficient and will need to be widened 7.9-ft on both sides in order to accommodate the proposed IL-47 lane geometry, as well as a 10-ft multi-use path on both sides. This results in an additional 2,622-SF of bridge surface area.
Comments	This alternative has low impacts to right of way (0.7 acres).
	This alternative has a low cost ($16.2 Million).
	This alternative has high impacts to the existing IL 47 bridge over I-88 (2622 square feet).
	This alternative has no impacts to Waters of the U.S. or floodplains and ties for the lowest impacts to wetlands (<0.1 acre) and has low impacts to forest (<0.1 acre) and farmland (0.9 acres).

Alternative I-2: Conventional Diamond with Roundabouts	
Description	The conventional diamond with roundabouts interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	Roundabouts would be provided at both ramp terminals.
	Finley Road would be a right-in/right-out road onto IL 47.
	This alternative provides for a 95-ft wide roadway section for IL-47, which includes a 10-ft multi-use path on both sides. The existing structure width of 91'-8" is insufficient and will need to be widened 3.8-ft on both sides in order to accommodate the proposed IL-47 lane geometry, as well as a 10-ft multi-use path on both sides. This results in an additional 1,261-SF of bridge surface area.
Comments	This alternative has no impacts to right of way.
	This alternative has the second lowest cost ($15.9 Million).
	This alternative has moderate impacts to the existing IL 47 bridge over I-88 (1261 square feet).
	This alternative has no impacts to floodplains and low impacts to Waters of the U.S. (10 linear feet), forest (<0.1 acres), and farmland (<0.1 acres).

Alternative I-3: Diverging Diamond Interchange	
Description	The diverging diamond interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	Opposing lanes of IL 47 crisscross at traffic signals on the north and south side of I-88.
	Finley Road would be a right-in/right-out road onto IL 47.
	This alternative provides for an 88-ft wide roadway section for IL-47, which includes a 10-ft multi-use path within the median. The existing structure width of 91'-8" is sufficient and will not require widening in order to accommodate the proposed IL-47 lane geometry.
Comments	This alternative has no impacts to right of way.
	This alternative has the lowest cost ($15.8 Million).
	This alternative has the no impacts to the existing IL 47 bridge over I-88.
	This alternative has no impacts to Waters of the U.S., floodplains and farmland and ties for the lowest impacts to wetlands (<0.1 acre) and has low impacts to forest (<0.1 acre).

Alternative I-4: Partial Cloverleaf with Loop Ramp in Northeast Quadrant	
Description	The partial cloverleaf with loop ramp in the northeast quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
	It also includes a loop ramp for northbound IL 47 traffic to enter I-88 westbound.
	Finley Road would be a right-in/right-out road onto IL 47.
	The NE quadrant requires a tapered exit lane for northbound vehicles to access the I-88 WB entrance loop ramp. The taper begins on the bridge, and requires additional widening beyond the limits of the existing structure. To provide the required lane geometry and 10-ft multi-use path on both sides of the roadway, the existing structure will require an additional 2,606-SF of bridge surface area.
Comments	This alternative has a high cost ($19.8 Million).
	This alternative has high impacts to the existing IL 47 bridge over I-88 (2,606 square feet).
	This alternative ties for the highest impacts to floodplains (0.1 acres).

The I-88/ IL 47 Interchange Alternatives carried forward are the No-Build, I-1: Conventional Diamond Interchange, I-2: Conventional Diamond Interchange with Roundabouts, I-3: Diverging Diamond Interchange and I-4 Partial Cloverleaf with Loop Ramp in Northeast Quadrant.

- The No-Build does not meet purpose and need; however it is being carried forward for comparison purposes.
- The I-1: Conventional Diamond Interchange creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. This fulfills the purpose and need by providing system linkage between the two roadways. The Conventional Diamond accommodates the anticipated 2040 traffic. The conventional diamond interchange is being designed to allow a loop ramp to be constructed in the northeast quadrant should the traffic demand warrant it in the future. The conventional diamond has high impacts to the existing IL 47 bridge over I-88, but low impacts for all natural resources evaluated and proposed right of way.
- The I-2: Conventional Diamond Interchange with Roundabouts creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. Roundabouts would be on both the north and south side of the existing bridge. Each roundabout will be two lanes and will meet needs of the projected 2040 traffic data. This interchange fulfills purpose and need by providing system linkage between I-88 and IL 47. The conventional diamond interchange with roundabouts has a moderate impact to the bridge and impacts Wetland Site 11; however, it has a low cost estimate and low impacts to other natural resources.
- The I-3: Diverging Diamond Interchange creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. The diverging diamond will meet the needs of the projected 2040 traffic data. This interchange fulfills purpose and need by providing system linkage between I-88 and IL 47. The crossing of lanes eliminates back to back left turns on the bridge. This option has the lowest cost and impacts to natural resources.

- The I-4: Partial Cloverleaf with Loop Ramp in Northeast Quadrant Interchange creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. It also includes a loop ramp in the northeast quadrant for northbound IL 47 traffic to enter I-88 westbound. The partial cloverleaf with loop ramp in the northeast quadrant will meet the needs of the projected 2040 traffic data. This interchange fulfills purpose and need by providing system linkage between I-88 and IL 47. This interchange would have a slight impact to the Blackberry Creek floodplain due to the merge of the aforementioned loop ramp with WB I-88.

Moving forward, these four interchange alternatives will be further evaluated based on their operations, safety, geometry, and impacts to resources.

IL 47/ I-88 Interchange Study

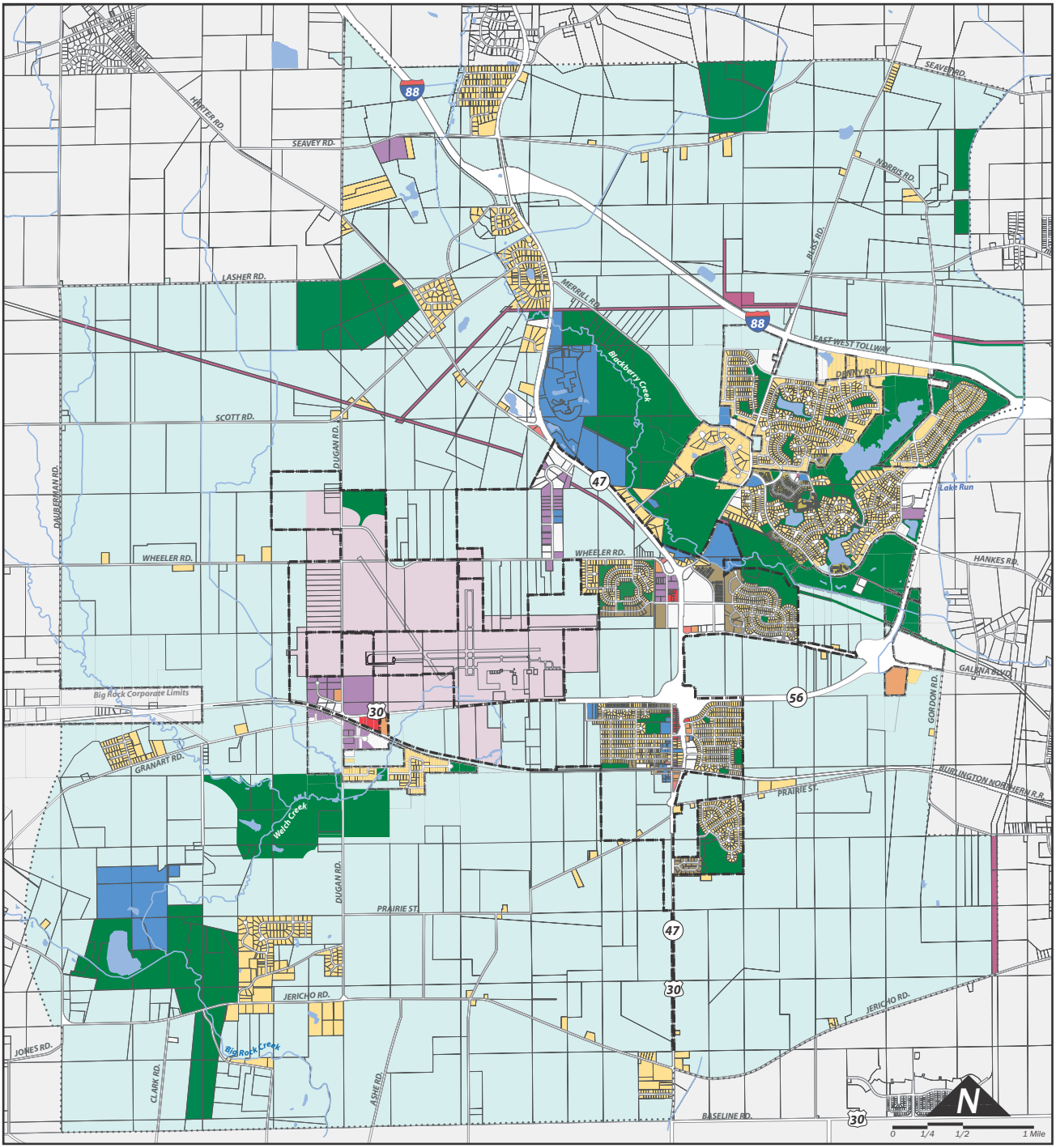
Alternatives to be Carried Forward

Exhibits

Blackberry Maples Forest Preserve
Grunwald Farms Forest Preserve
47
Green Rd
Northern Project Termini
88
Seavey Rd
Seavey Rd
I-88 Western Project Termini
I-88 Eastern Project Termini
Blackberry Creek
Tributary "C"
88
Merrill Rd
Hannaford Woods/ Nickels Farm Forest Preserve
Blackberry Creek
Southern Project Termini
Waubonsee Community College
47
Project Study Limits
Illinois Route 47 @ I-88
Project P-91-015-13
EXHIBIT 1

- Detached Single Family Residential
- Attached Single-Family Residential
- Multi-Family Residential
- Commercial Retail
- Commercial Service
- Mixed Commercial
- Industrial
- Aurora Municipal Airport
- Public/Semi Public & Instutional Property
- Parks/Recreation/Open Space
- Utility
- Vacant Land
- Agricultural Land
- Village of Sugar Grove Corporate Limits
- Planning Boundary
- Stream/Watercourse

Existing Land Use



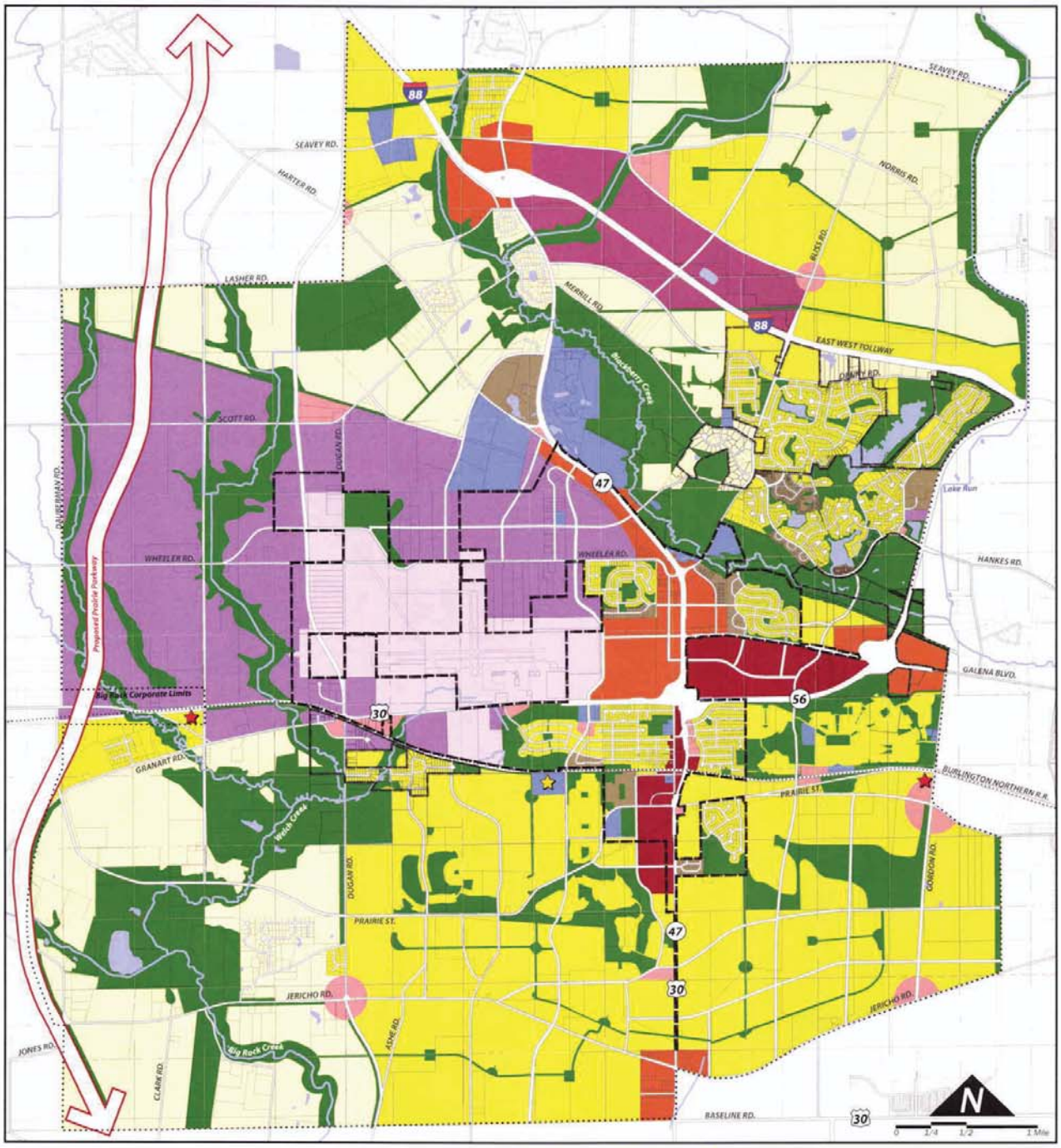
Village of Sugar Grove Comprehensive Plan

Prepared By: URS • TPAP

EXHIBIT 2

- Estate Residential
- Single Family Residential
- Multi-Family Residential
- Neighborhood Commercial
- Town Center Commercial
- Corridor Commercial
- Corporate Campus
- Business Park
- Open Space
- Public/Semi-Public
- Airport
- Stream/Watercourse
- Village of Sugar Grove Planning Area
- Existing Corporate Limits
- Metra Station
- Alternate Metra Stations

Land Use Plan



Village of Sugar Grove **Comprehensive Plan**

Prepared By: URS • TPAP

EXHIBIT 3

2015 Kane/Kendall County Planning Map

DRAFT

0 1.25 2.5 3.75 5 Miles
0 6,600 13,200 19,800 26,400 Feet

Created: 5/5/2015
KKCOM/KDOT - PMK

N W E S

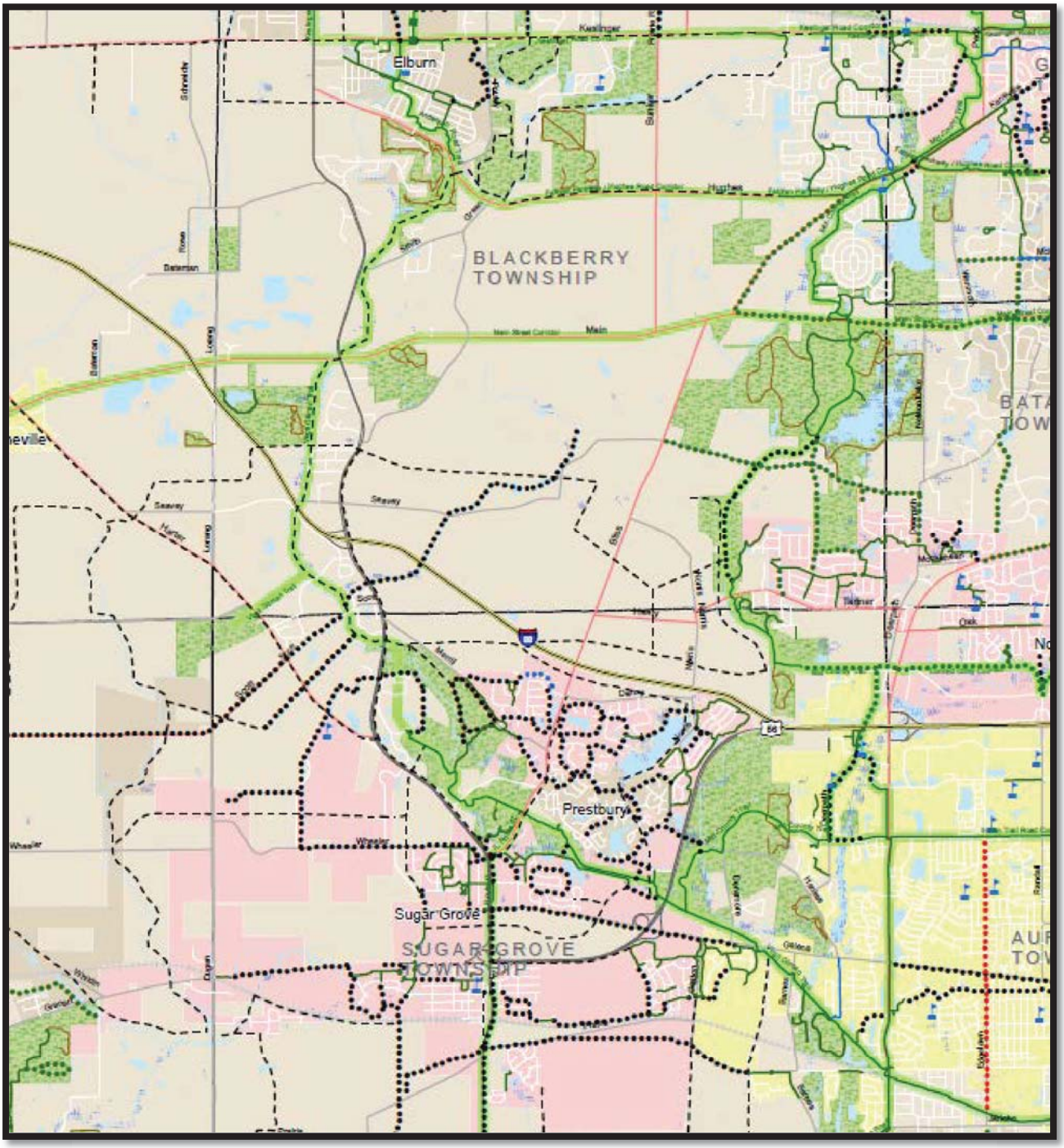
Bike Facilities
- Existing Bike Route
- Existing Bike Lane
- Existing Path
- Forest Preserve Path
- Programmed Bike Route
- Programmed Bike Lane
- Programmed Path
- Planned Unknown
- Planned Bike Route
- Planned Bike Lane
- Planned Path
- Future
- Regional Trail

Roads
- Interstate
- US/State Road
- County Road
- Township Road

Railroad
- Railroad
- Metra Station

Schools

Land Use
- Townships
- Counties
- Forest Preserves
- Water



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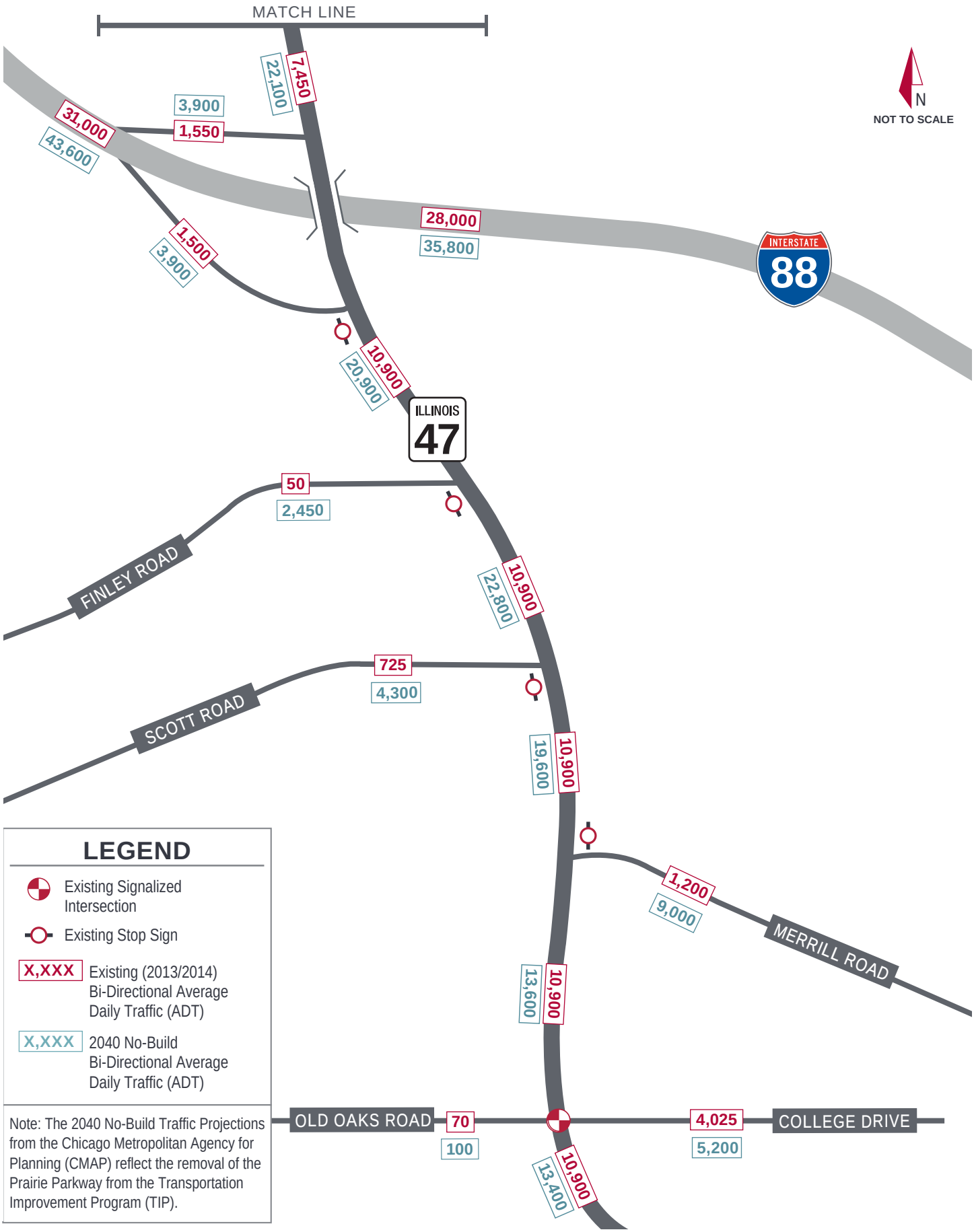
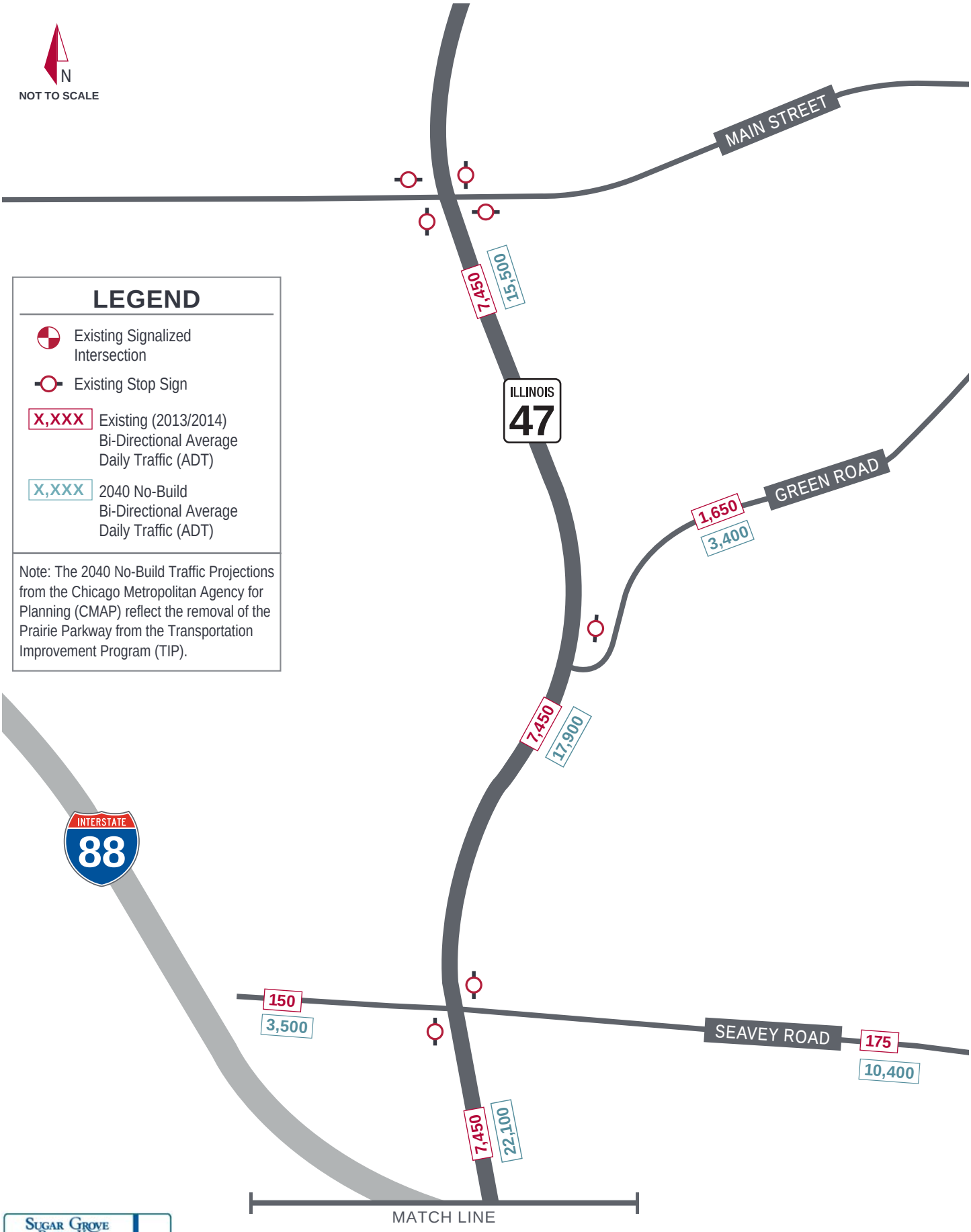


Sugar Grove Parkway
Interchange at I-88
IL 47

EXHIBIT 5 - SOUTH STUDY INTERSECTIONS

EXISTING TRAFFIC VOLUMES - PROJECTED NO-BUILD TRAFFIC VOLUMES



Sugar Grove Parkway
Interchange at I-88

EXHIBIT 5 - NORTH STUDY INTERSECTIONS

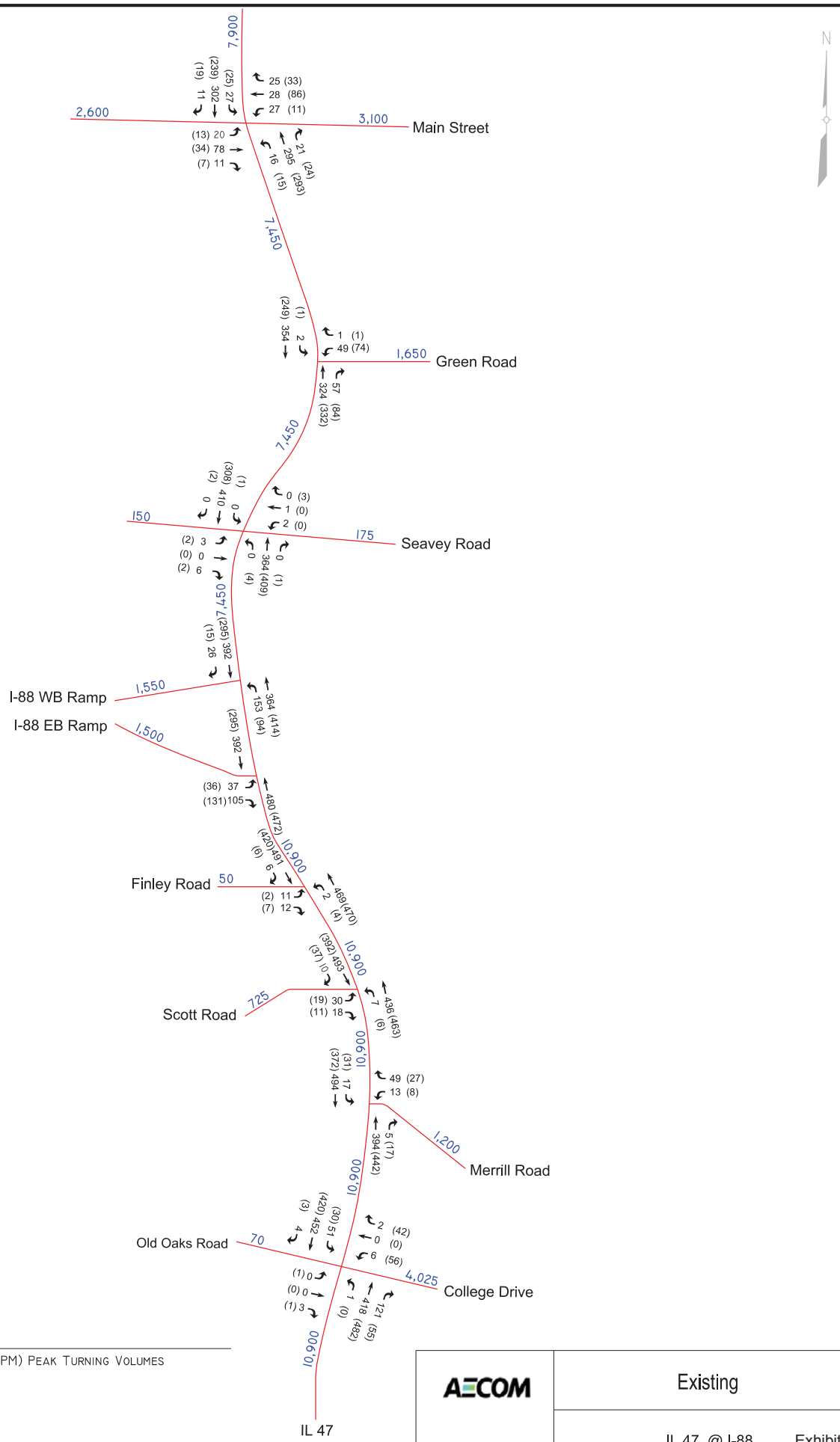
EXISTING TRAFFIC VOLUMES - PROJECTED NO-BUILD TRAFFIC VOLUMES

EXHIBIT 6 - SOUTH STUDY INTERSECTIONS

PROJECTED 2040 BUILD TRAFFIC VOLUMES

Sugar Grove Parkway
Interchange at I-88
IL 47

EXHIBIT 6 - NORTH STUDY INTERSECTIONS
PROJECTED 2040 BUILD TRAFFIC VOLUMES



LEGEND

(##) AM (PM) PEAK TURNING VOLUMES

ADT

DRAWING NOT TO SCALE

AECOM

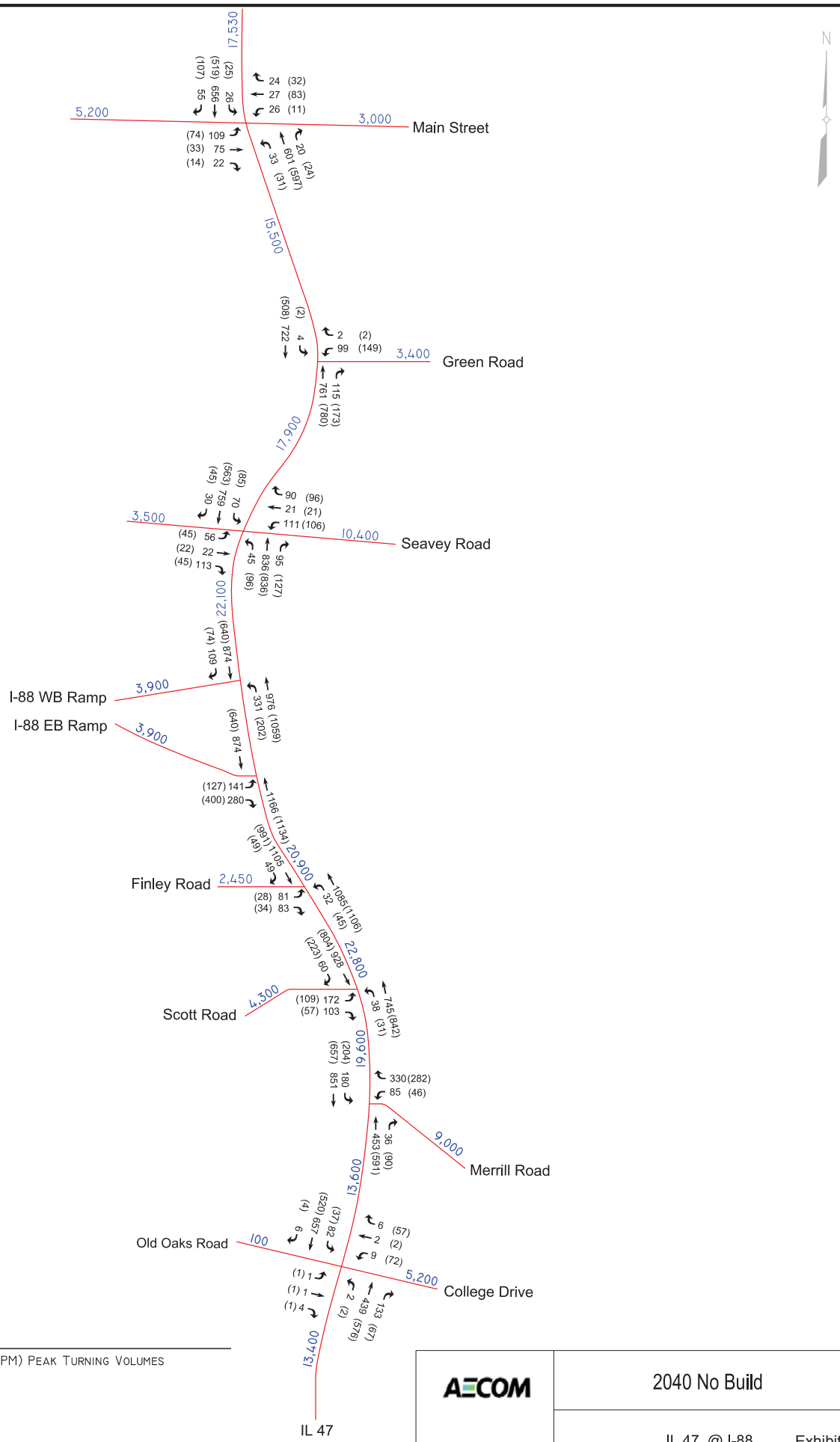
June 2016

Existing

IL 47 @ I-88

Exhibit 7

1 of 3



LEGEND

(##) AM (PM) PEAK TURNING VOLUMES

ADT

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AECOM

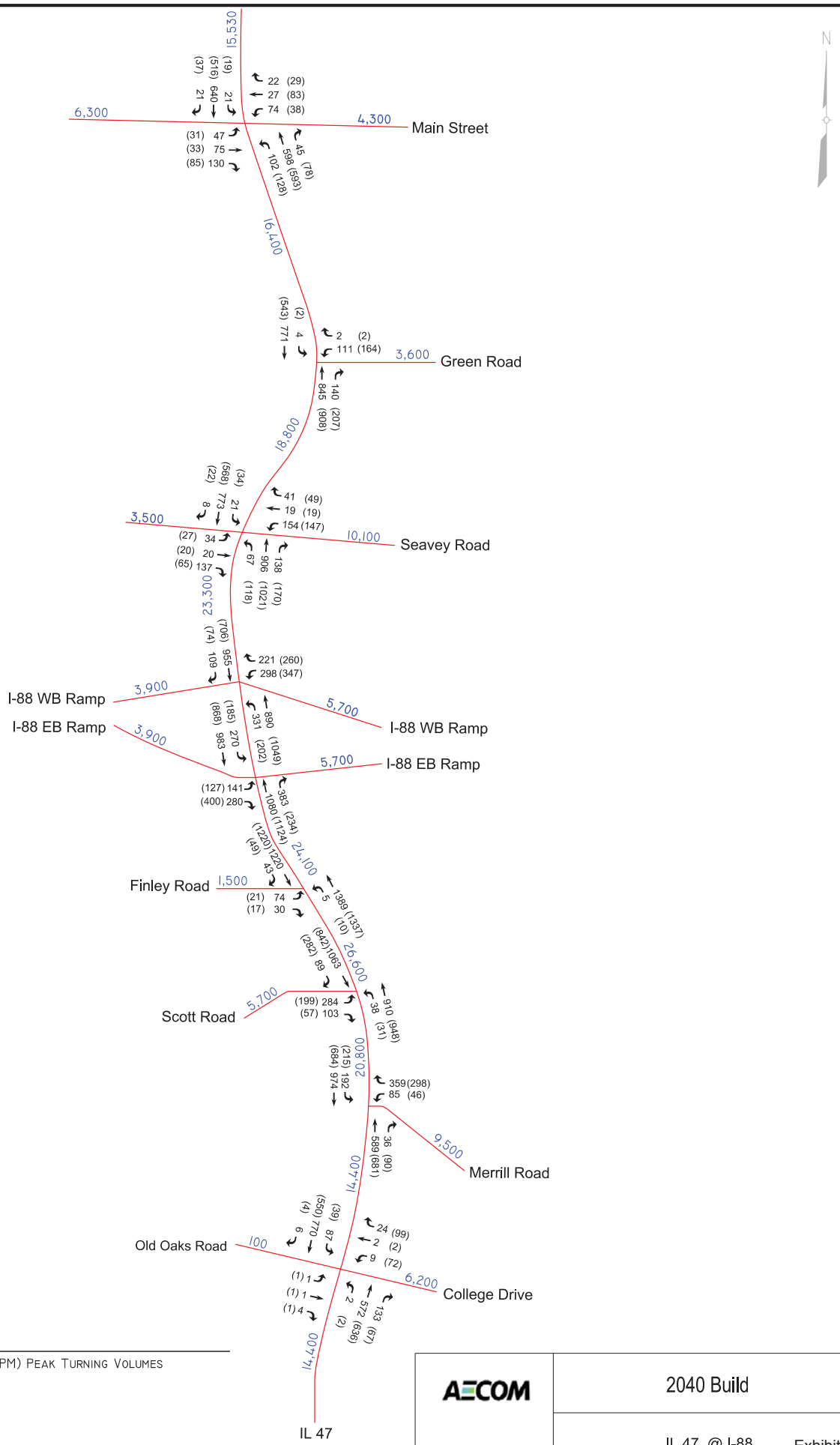
June 2016

2040 No Build

IL 47 @ I-88

Exhibit 7

2 of 3



LEGEND

(##) AM (PM) PEAK TURNING VOLUMES

ADT

DRAWING NOT TO SCALE

AECOM

June 2016

2040 Build

IL 47 @ I-88

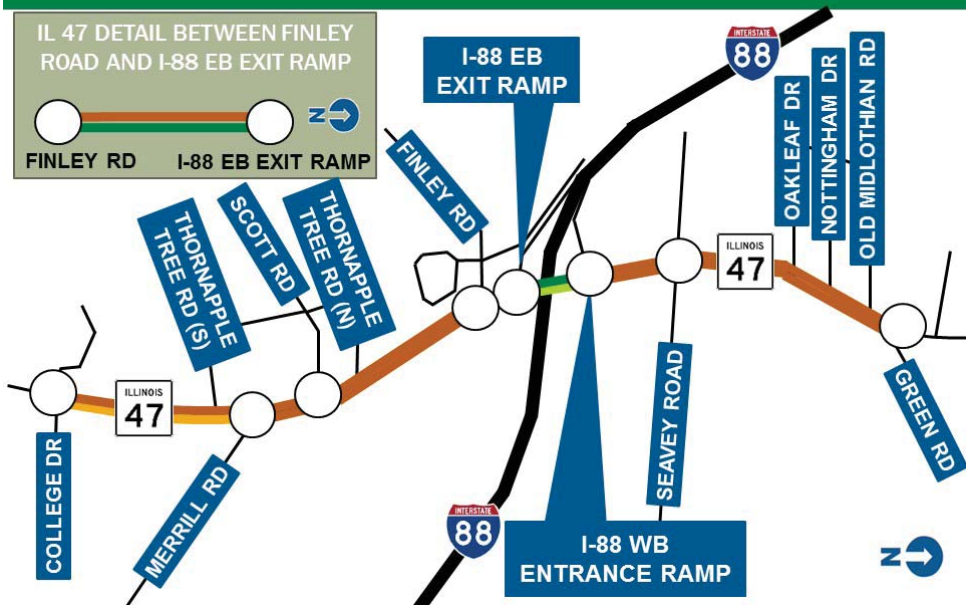
Exhibit 7

3 of 3

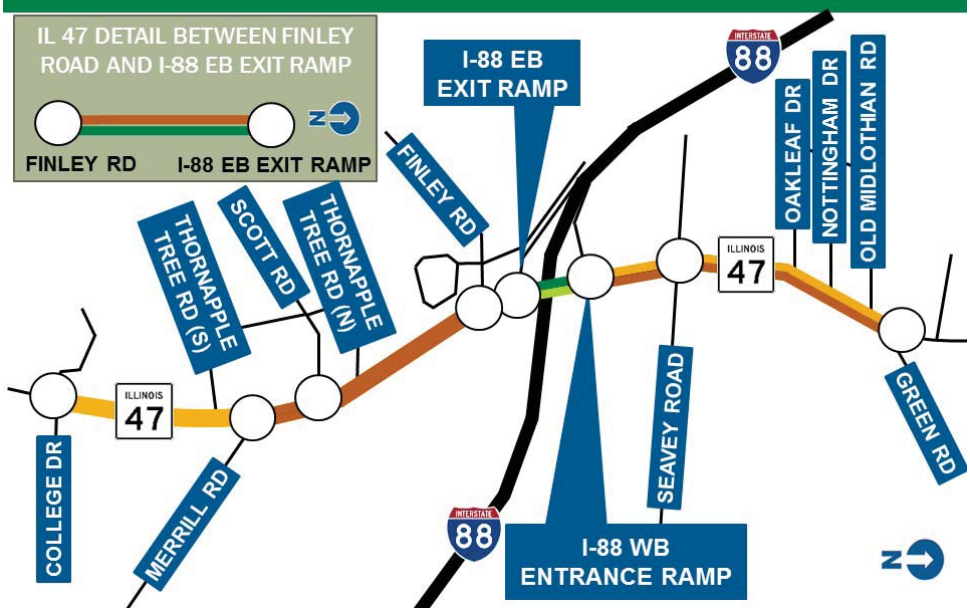
CAPACITY - LEVEL OF SERVICE (LOS)

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
FREE FLOW	FREE FLOW	NEAR FREE FLOW	TRAFFIC FLOW BREAKS DOWN	CONGESTION	GRIDLOCK

CAPACITY - 2040 NO-BUILD AM PEAK LOS



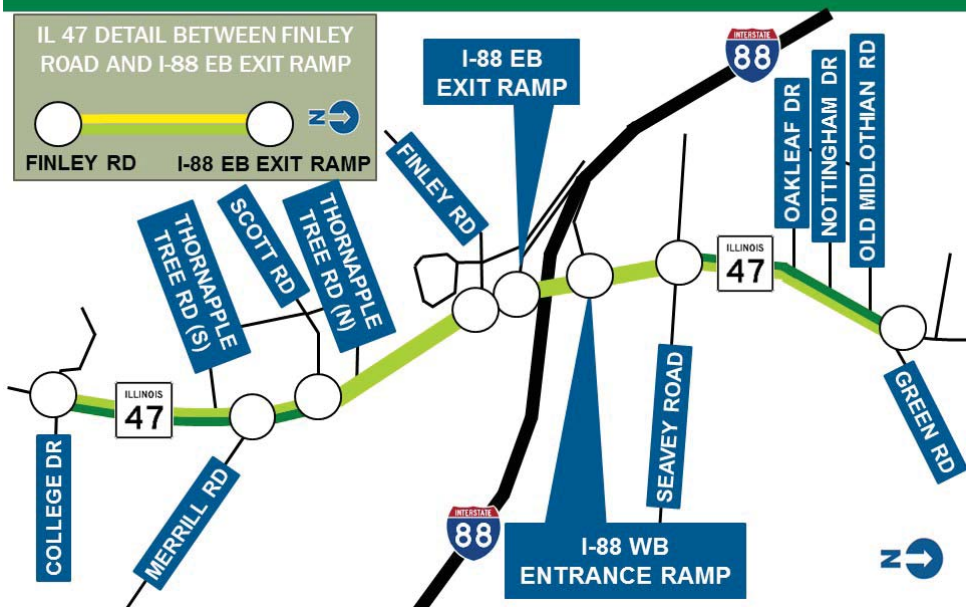
CAPACITY - 2040 NO-BUILD PM PEAK LOS



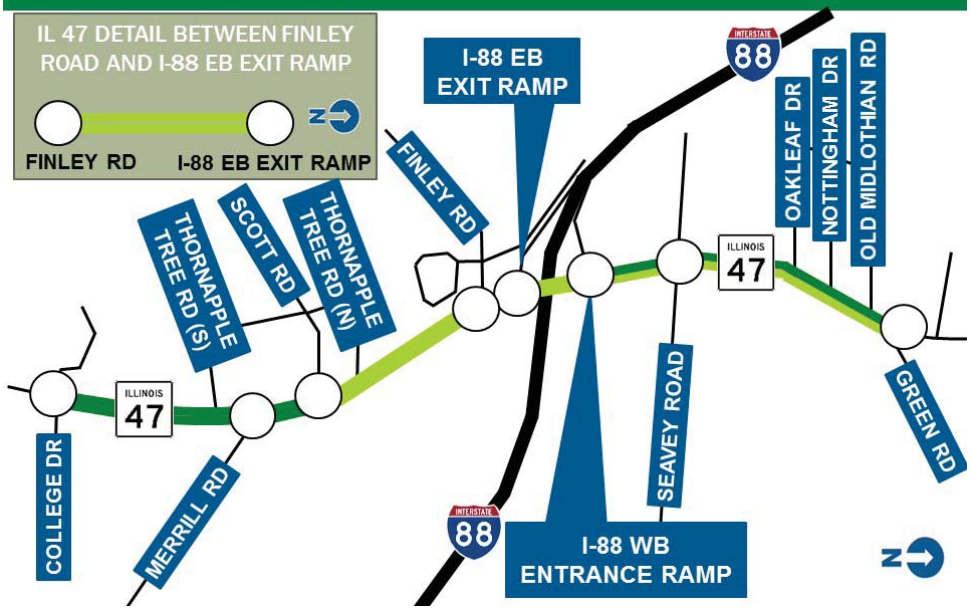
CAPACITY - LEVEL OF SERVICE (LOS)

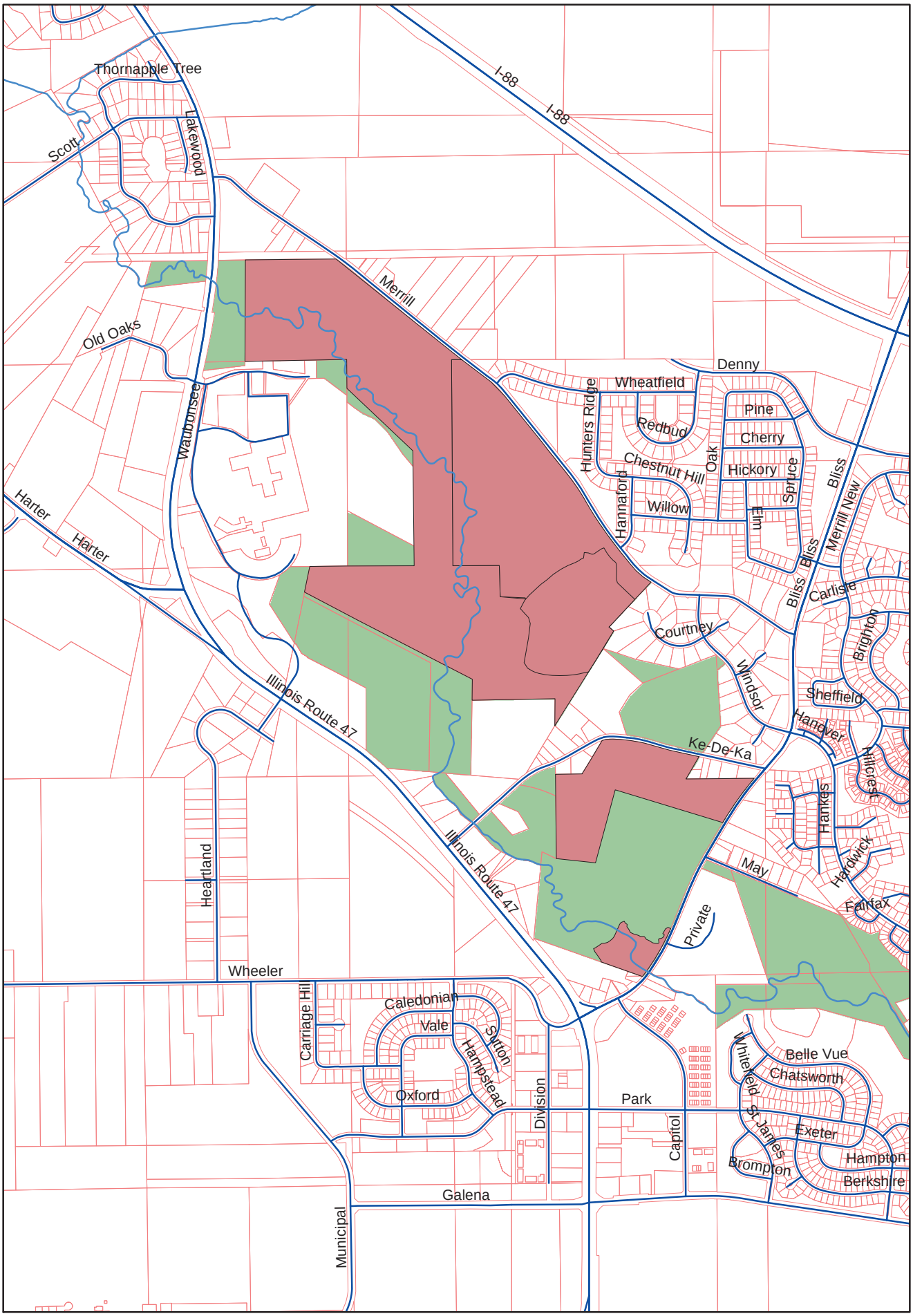
LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
FREE FLOW	FREE FLOW	NEAR FREE FLOW	TRAFFIC FLOW BREAKS DOWN	CONGESTION	GRIDLOCK

CAPACITY - 2040 BUILD AM PEAK LOS



CAPACITY - 2040 BUILD PM PEAK LOS





Kane County Forest Preserve LAWCON / OSLAD Fund Properties

Exhibit 9

No LAWCON / OSLAD Funding

LAWCON / OSLAD Funding

0.95 0.475 0 0.95 Miles

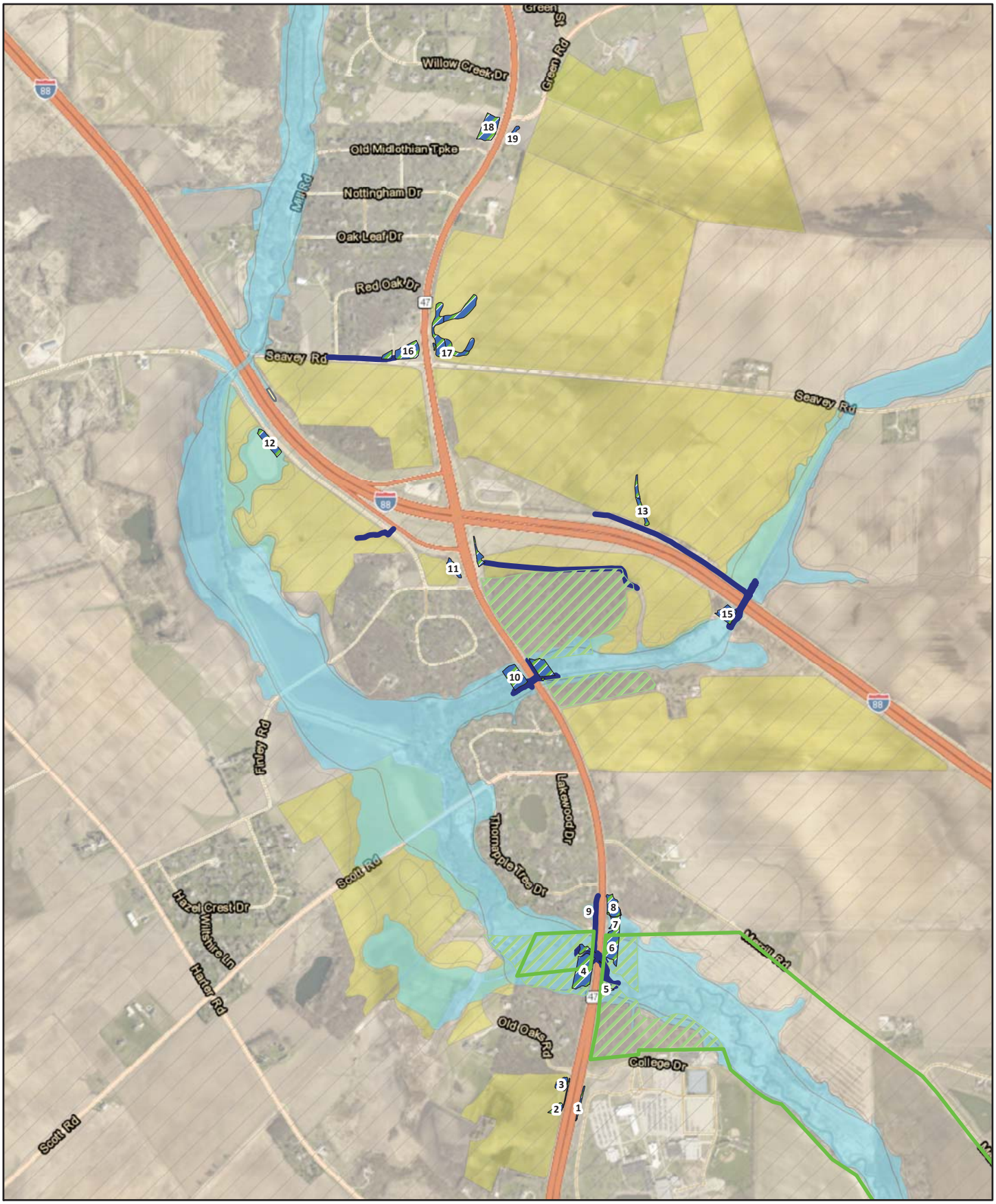
N

IL 47/ I-88 Interchange Study

Alternatives to be Carried Forward

Appendix A

Environmental Resource Map



Forest Preserve
Forested Area
Wetland Sites
Farmland
Waters of the U.S.
Flood Hazard AE
Flood Hazard X

0 500 1,000
Feet

Natural Resource Map

Sugar Grove Parkway
Interchange at I-88 and IL 47
FAP Route 326 Illinois Route 47
at Reagan Memorial Tollway (I-88)
P-91-015-13

09/22/2015

Data Provided by: http://http://www.fema.gov/national-flood-hazard-layer-nfhl
Service Layer Credits:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors

IL 47/ I-88 Interchange Study

Alternatives to be Carried Forward

Appendix B

State Historic Preservation Officer Cultural Concurrence

Illinois Department of Transportation

Memorandum

To:	John Fortmann	Attn:	Pete Harmet
From:	Maureen Addis	By:	Brad Koldehoff
Subject:	Cultural Resource Concurrence		
Date:	November 4, 2016		

Kane County
FAP 326/FAI 88, IL 47 – Sugar Grove
Job No. P-91-015-14
Seq. # 19435

The attached letter documents the concurrence of the State Historic Preservation Officer in the following determination by IDOT's professional cultural resources staff: "No Historic Properties Affected." This concurrence completes the necessary cultural resource coordination for the above referenced project.

Brad Koldehoff

Attachment

BK:km

Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

RECEIVED
OCT 21 2016
005102116
Preservation Services

Kane County
FAP 326, FAI 88, IL 47
Sugar Grove
Interchange Improvements
IDOT Sequence #19435
ISAS Log #15144

October 21, 2016

IHPA REVIEW
H/A
AC Conc P 10/25/16
AR
File

FEDERAL - Section 106 Project

2 copies + CD rcvd.

NO HISTORIC PROPERTIES AFFECTED

Dr. Rachel Leibowitz
Deputy State Historic Preservation Officer
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701

Dear Dr. Leibowitz:

Enclosed are copies of the Phase I Survey Report completed by Illinois State Archaeological Survey personnel concerning archaeological and historical resources potentially impacted by the above referenced project. Survey of the 291-acre project area, or Area of Potential Effect (APE), resulted in the identification of two archaeological sites (11K965 and 11K1404), which lack integrity and information potential and do not warrant National Register consideration or preservation in place. No architectural resources eligible for National Register consideration were identified by IDOT's Cultural Resources staff.

In coordination with the Federal Highway Administration (FHWA) and in accordance with the ***Programmatic Agreement for Minor Projects of the Federal Aid Highway Program in Illinois***, we requests the concurrence of the State Historic Preservation Officer in our determination that no historic properties subject to protection under Section 106 of the National Historic Preservation Act of 1966 will be affected by the project. If SHPO does not object to the "no historic properties affected" finding within 30 days, FHWA's responsibilities under section 106 are fulfilled (36 CFR 800.4(d)(1)(i)).

Sincerely,

Brad Koldehoff

Brad H. Koldehoff
Cultural Resources Unit
Bureau of Design & Environment

CONCUR
By: Rachel Leibowitz
Deputy State Historic Preservation Officer
Date: 11-2-16

IL 47/ I-88 Interchange Study

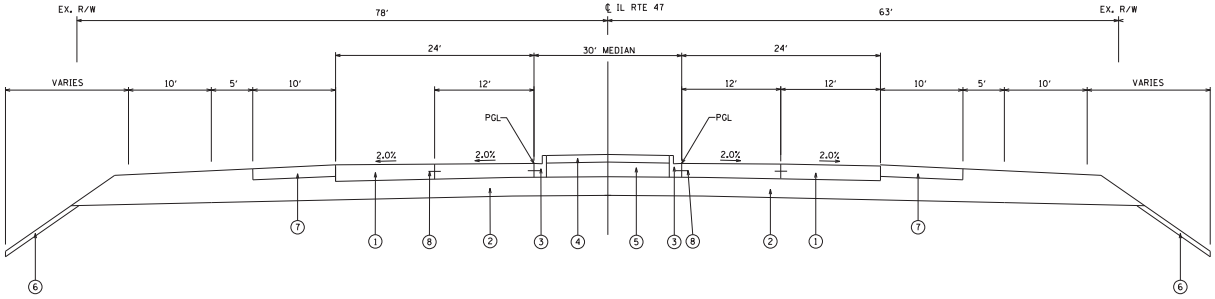
Alternatives to be Carried Forward

Appendix C

Typical Section

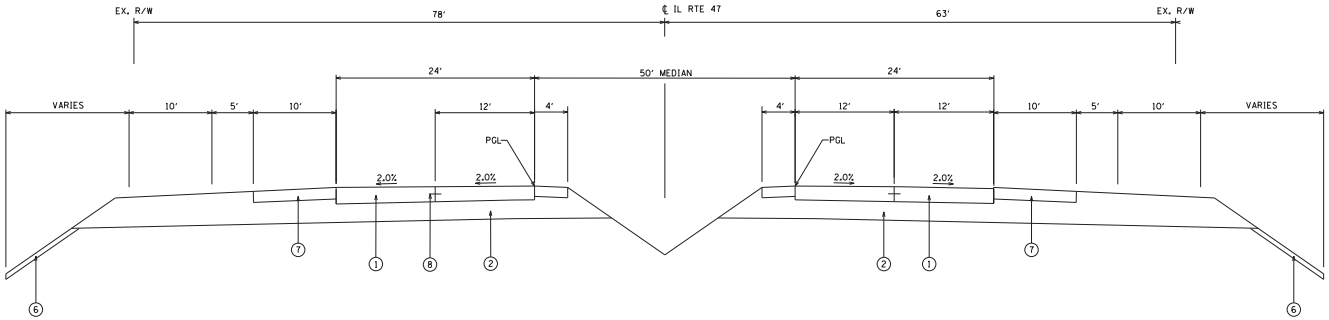
PROPOSED LEGEND

1. PORTLAND CEMENT CONCRETE PAVEMENT, 8"
2. AGGREGATE BASE COURSE, TYPE B, 12"
3. COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12
4. CONCRETE MEDIAN SURFACE, 4 INCH
5. AGGREGATE FILL
6. TOPSOIL SPREADING, 4"
7. BITUMINOUS CONCRETE SHOULDERS, 6"
8. # 6 TIE BAR



PROPOSED TYPICAL SECTION
IL RTE 47

ALTERNATIVE #1 - 30' RAISED MEDIAN



PROPOSED TYPICAL SECTION
IL RTE 47

ALTERNATIVE #2 - 50' DEPRESSED MEDIAN

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GRAEF 8501 W. Higgins Road, Suite 280 Chicago, Illinois 60631 (773) 399-0112

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	DRAWN -	REVISED -	
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PLOT DATE = 9/12/2016	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ILLINOIS ROUTE 47
ALTERNATE TYPICAL SECTIONS

SCALE: ____ SHEET ___ OF ___ SHEETS STA. ____ TO STA. ____

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. ____

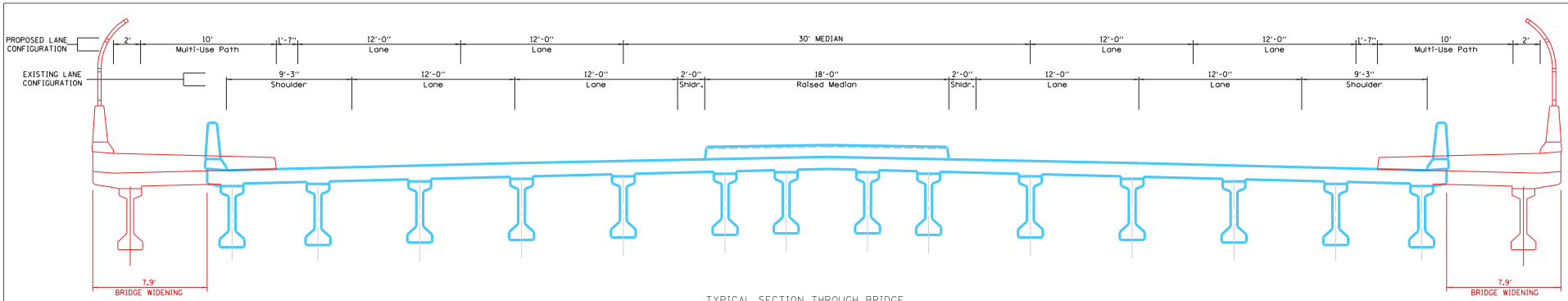
ILLINOIS FED. AID PROJECT

IL 47/ I-88 Interchange Study

Alternatives to be Carried Forward

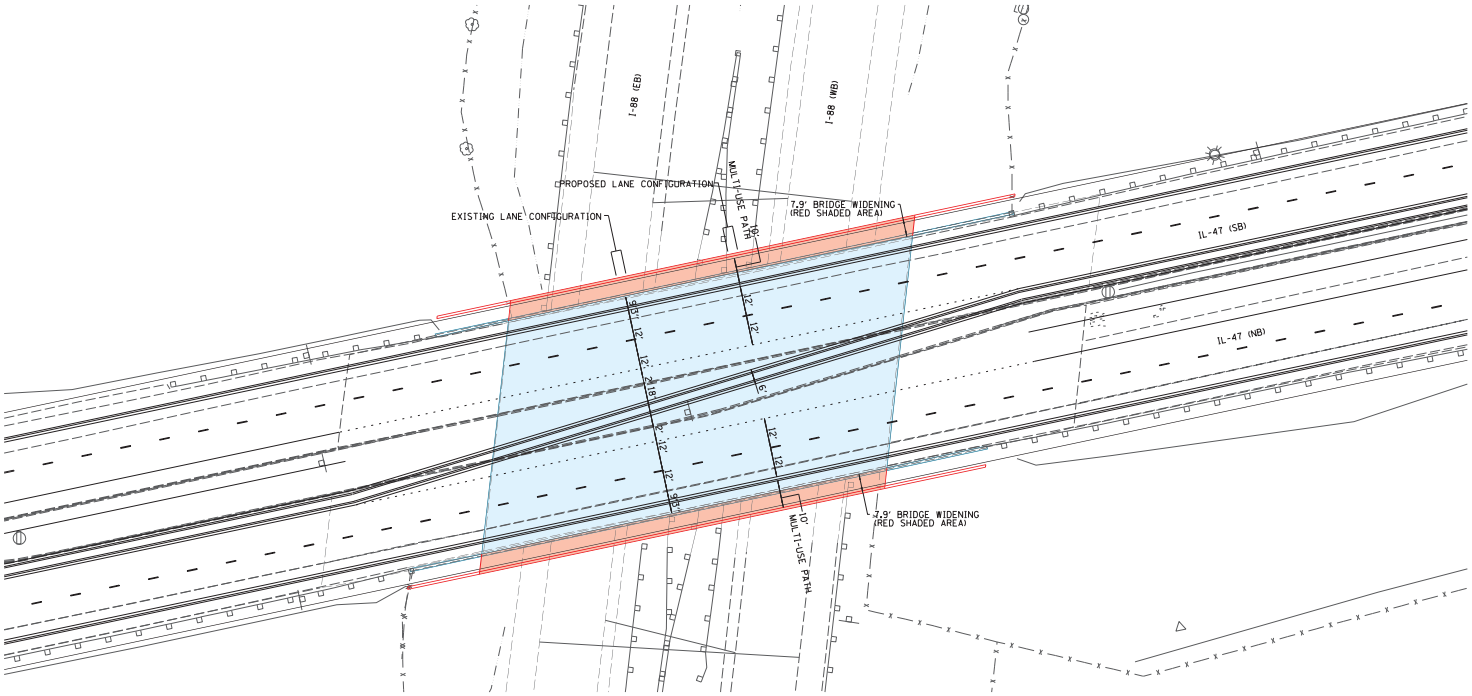
Appendix D

IL 47 Bridge Typical Sections for Interchange Alternatives



TYPICAL SECTION THROUGH BRIDGE

(Looking North)



$TIME$

$FILE$
$DATE$

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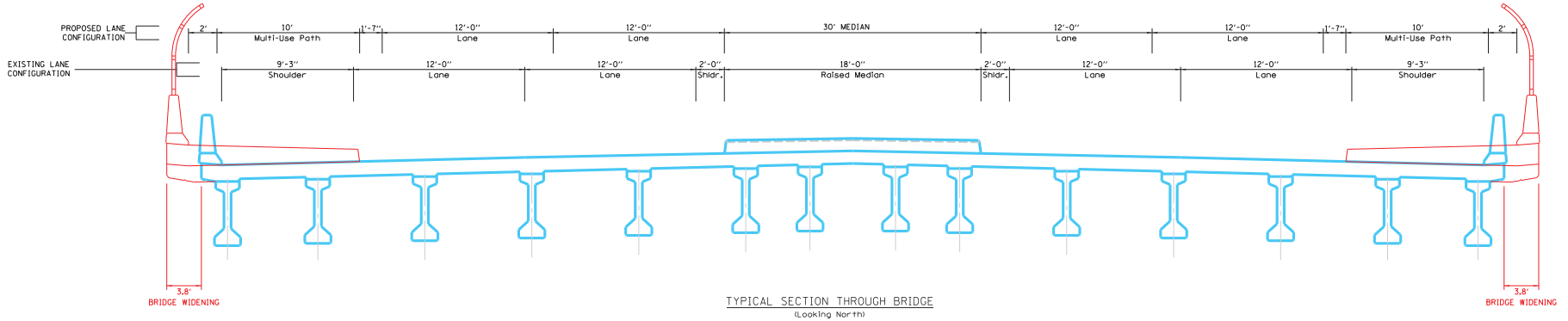
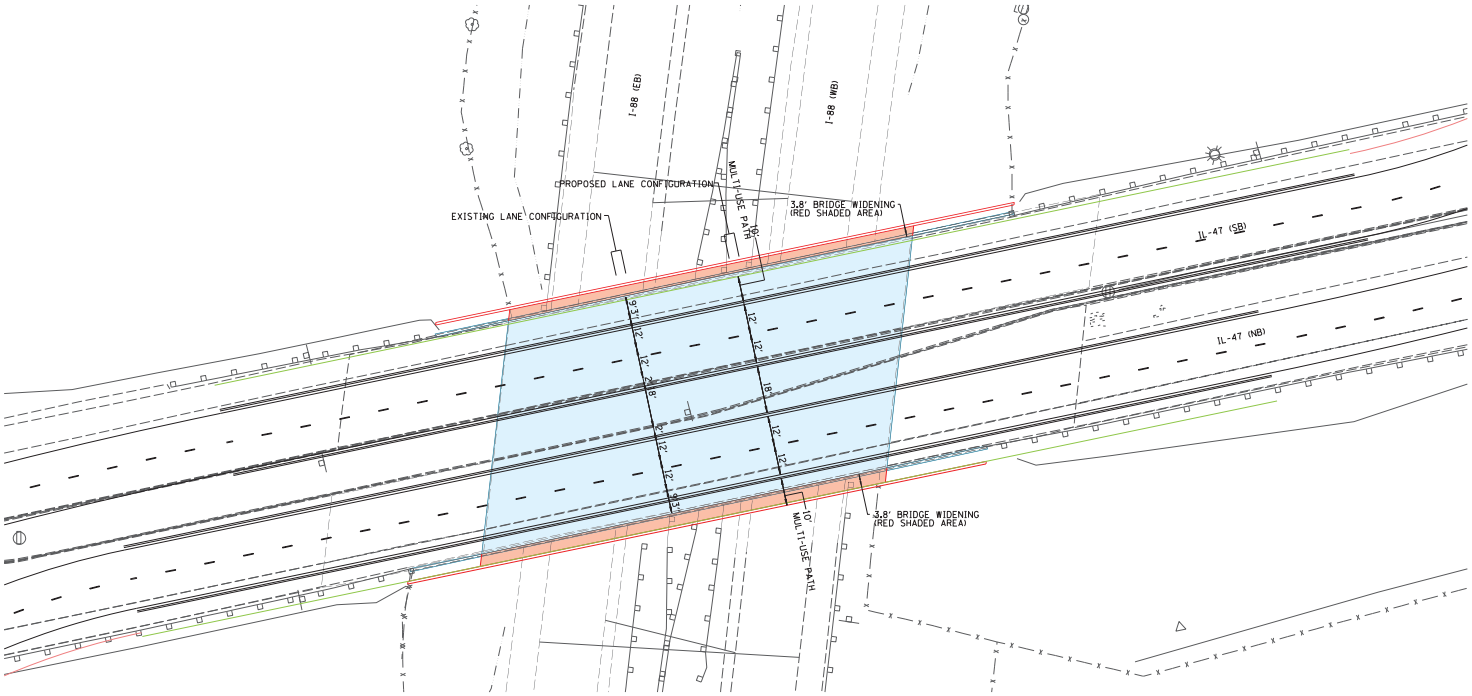


TYPICAL SECTION THROUGH BRIDGE

(Looking North)



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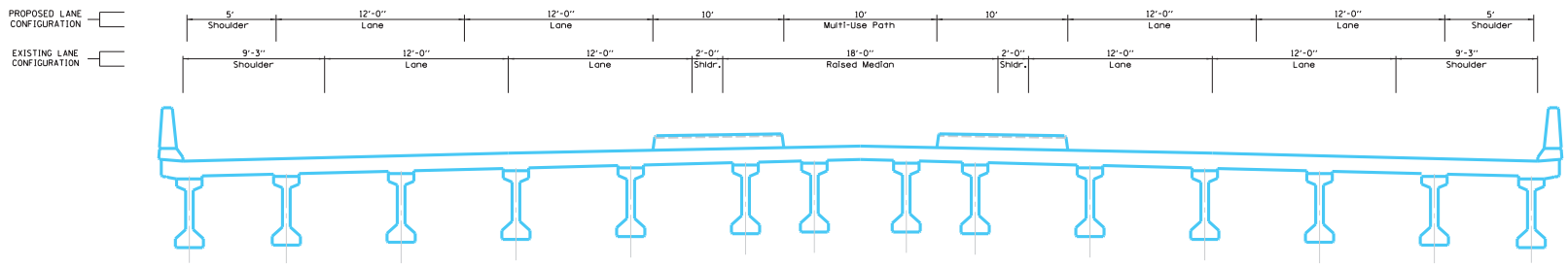
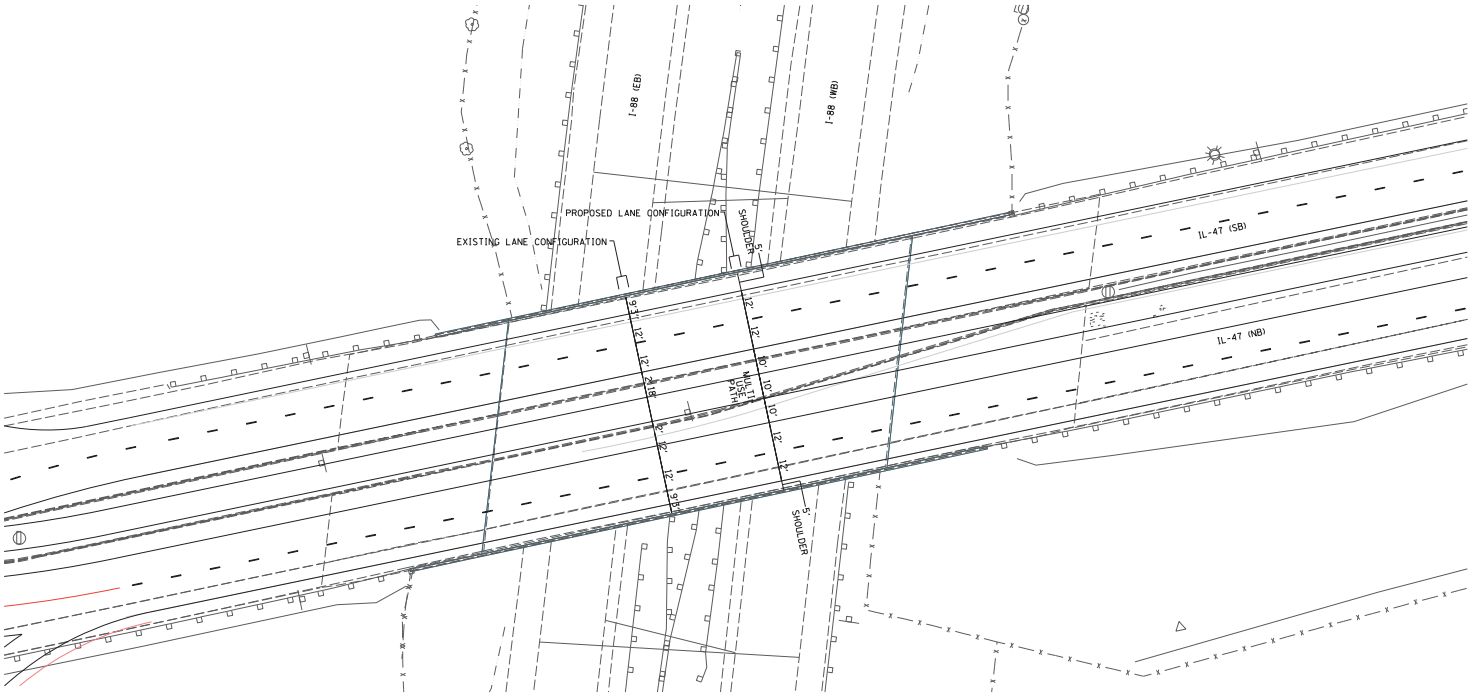


TYPICAL SECTION THROUGH BRIDGE
(Looking North)



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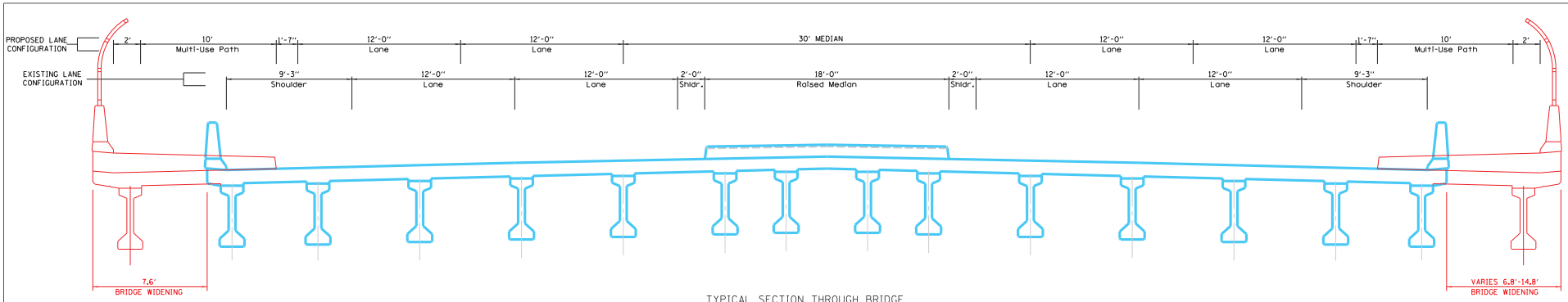
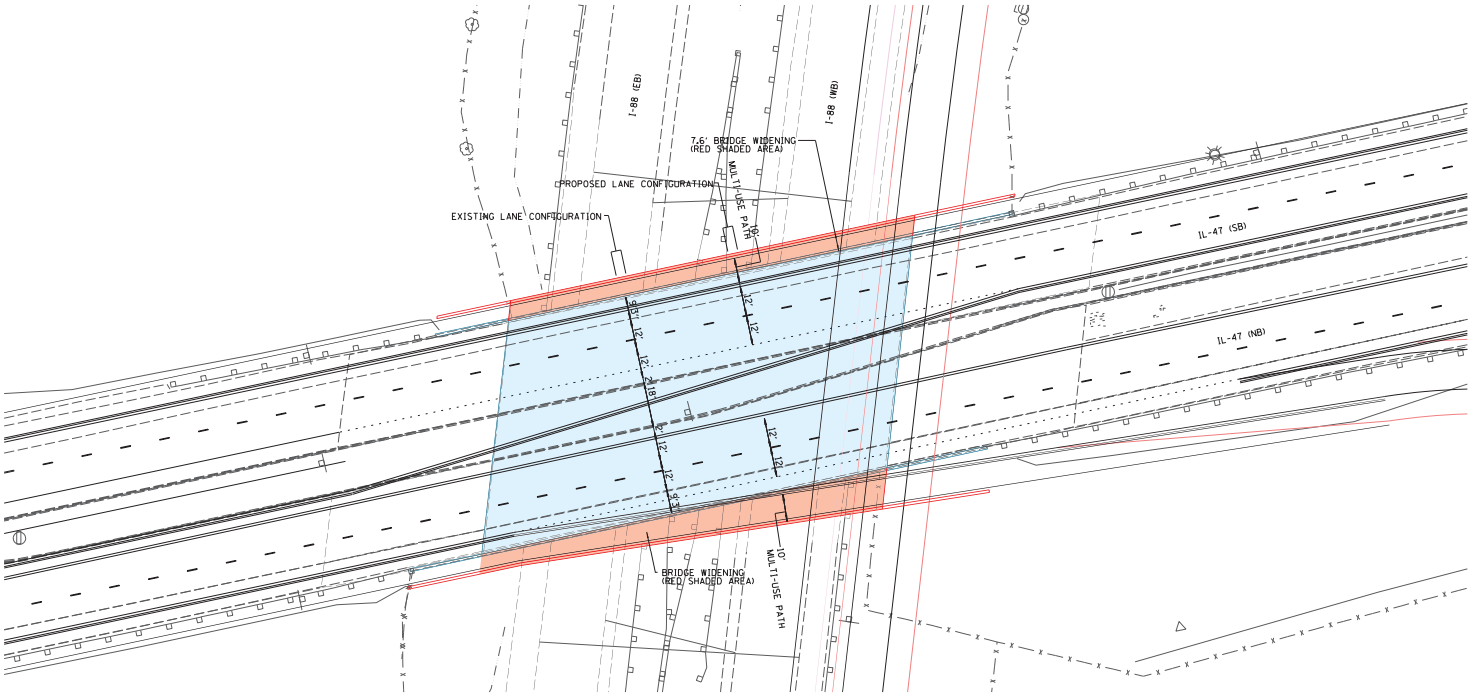


TYPICAL SECTION THROUGH BRIDGE

(Looking North)



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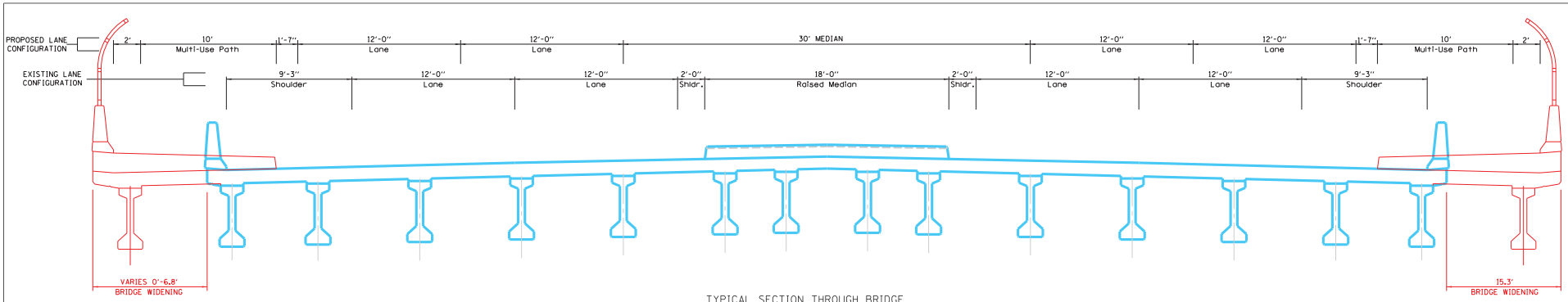
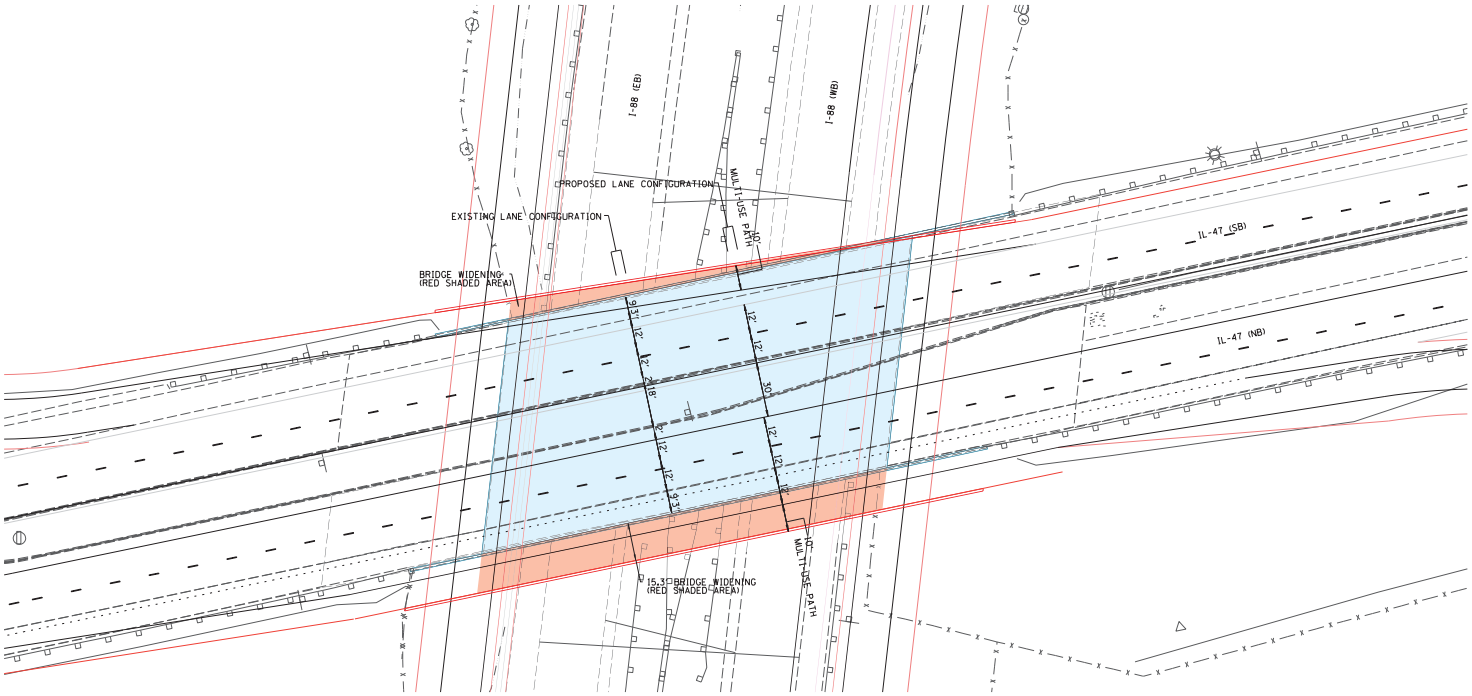


TYPICAL SECTION THROUGH BRIDGE

(Looking North)



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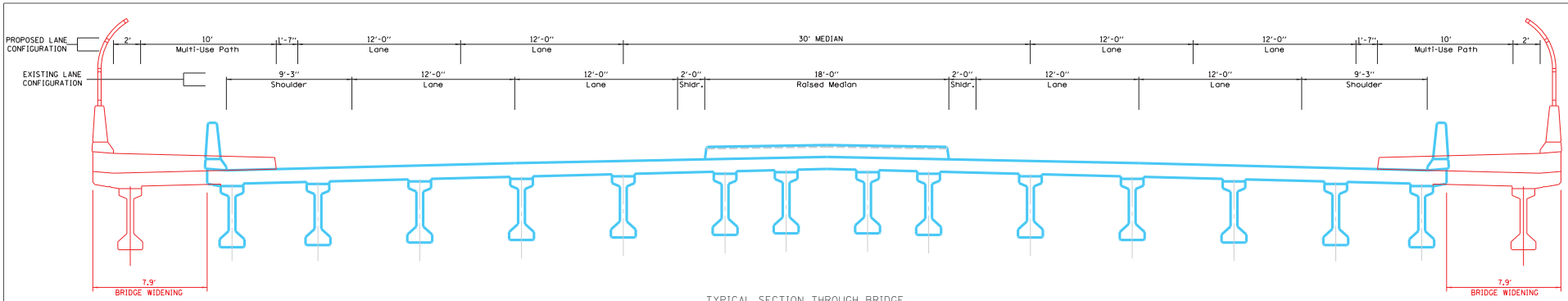

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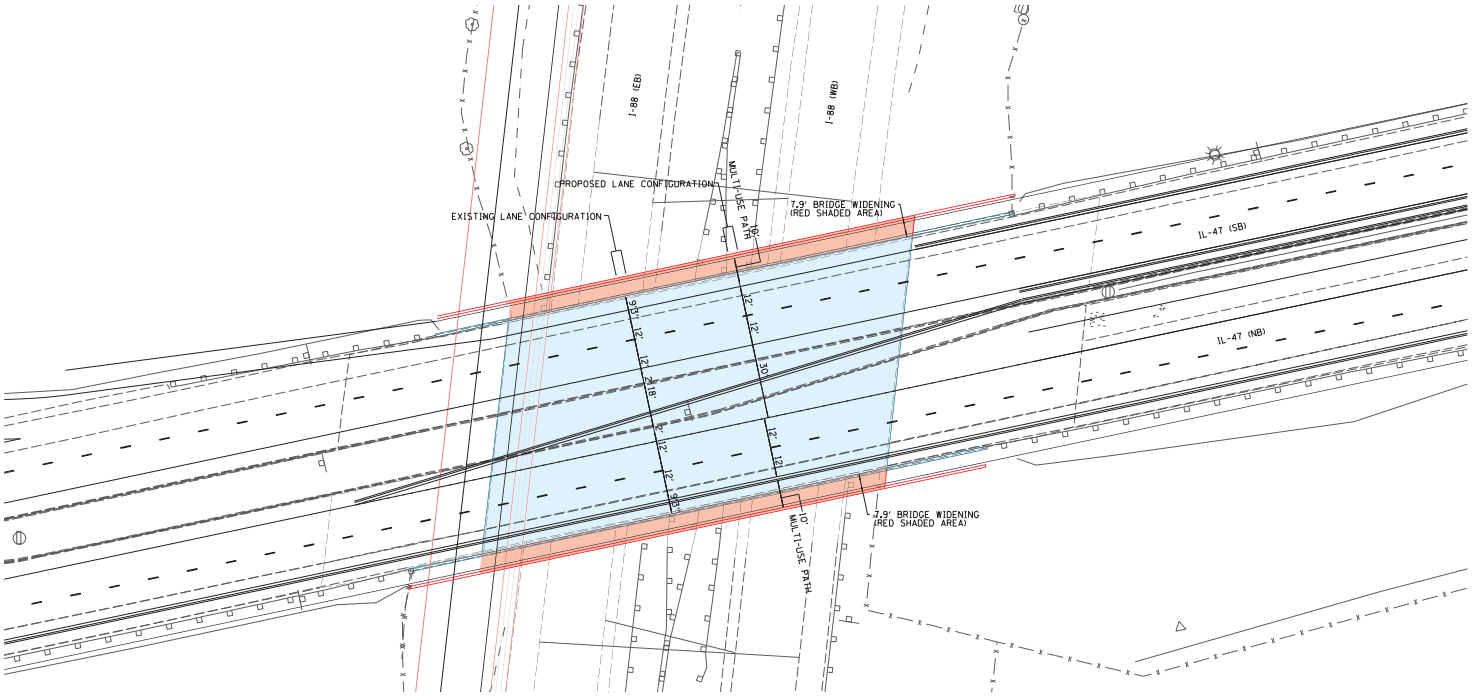

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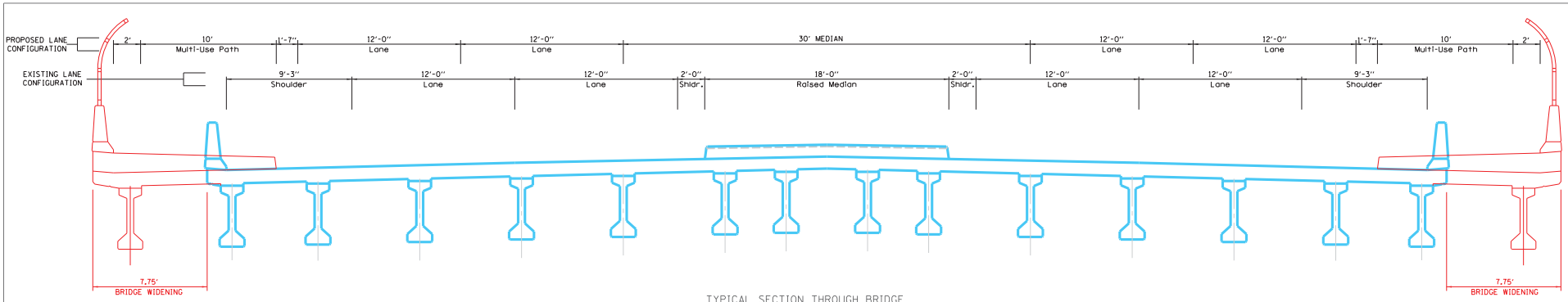

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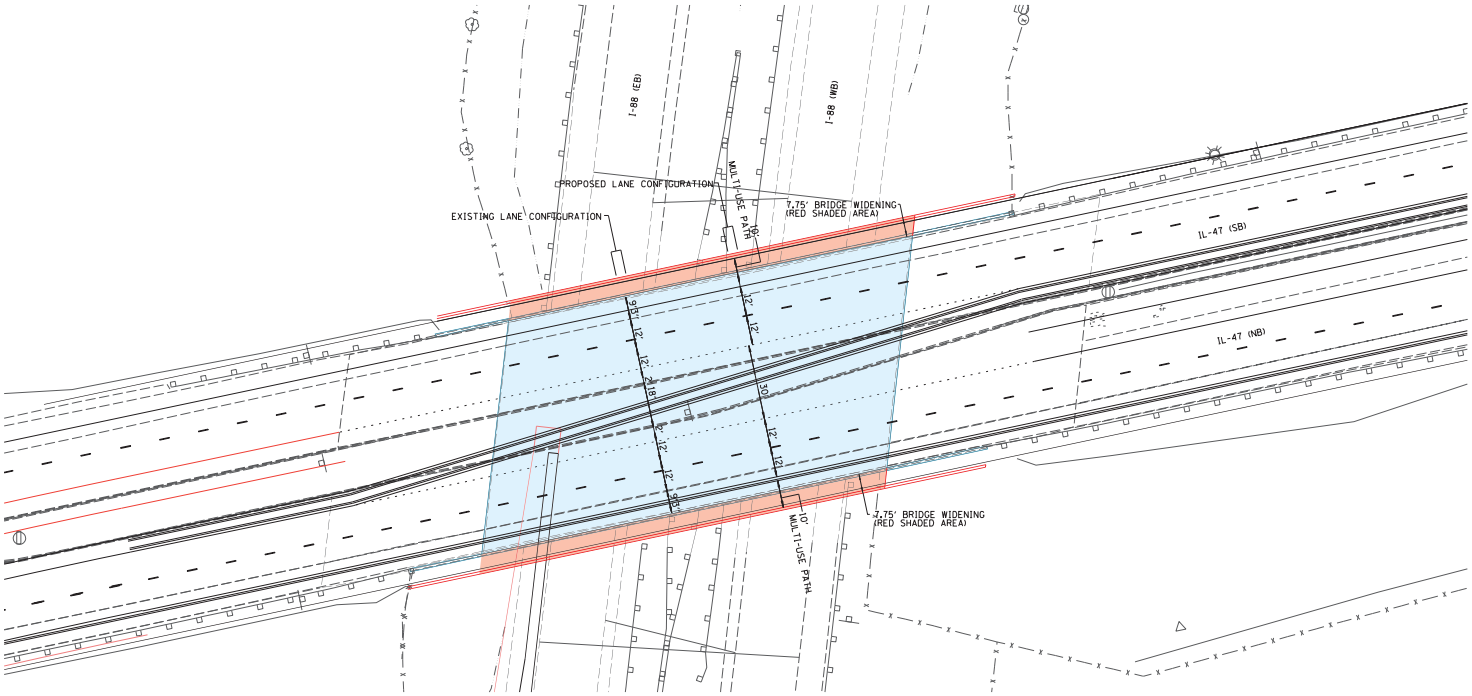

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

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ILLINOIS FED. AID PROJECT

NEPA/404 COORDINATION

CONCURRENCE FOR PREFERRED ALTERNATIVE

FAP Route 326 Illinois Route 47 at Reagan Memorial Tollway (I-88)

Job Number: P-91-015-14

Kane County, Illinois

Prepared for:

Illinois Department of Transportation

Division of Highways/Region 1/District 1

June 2017

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1. Introduction

The existing Illinois Route 47 (IL 47) Interchange at Ronald Reagan Memorial Tollway (I-88) is a partial service interchange that provides access to and from the west only. Peace Road is the closest full access service interchange to the west of IL 47 (15.5 miles), while to the east the closest full access service interchange is Orchard Road (5.3 miles).

The purpose of this document is to identify and gain concurrence on the preferred alternative for IL 47 mainline and for the interchange.

1.1. Purpose and Need

The purpose of the proposed project is to improve system linkage and accommodate land use and economic development within the IL 47 and I-88 project study area. The Purpose and Need (P&N) received concurrence on April 7, 2016.

1.2. Project Study Limits

The project is located at the IL 47 and I-88 Interchange in Sugar Grove, Illinois. Both the IL 47 Mainline regional arterial route and the IL 47/I-88 Interchange are being studied as part of this project. Alternatives for the IL 47 Mainline and the IL 47/I-88 Interchange have designs that are independent of each other; therefore, the mainline and interchange alternatives are evaluated separately. The IL 47 Mainline limits are from Old Oaks Road on the south to Green Road on the north end. The interchange alternative limits overlap the IL 47 limits from 845 feet south of Finley Road to 828 feet north of Seavey Road. Finley Road and Seavey Road improvements are part of the IL 47 alternatives. Finley Road access options are part of the interchange alternatives.

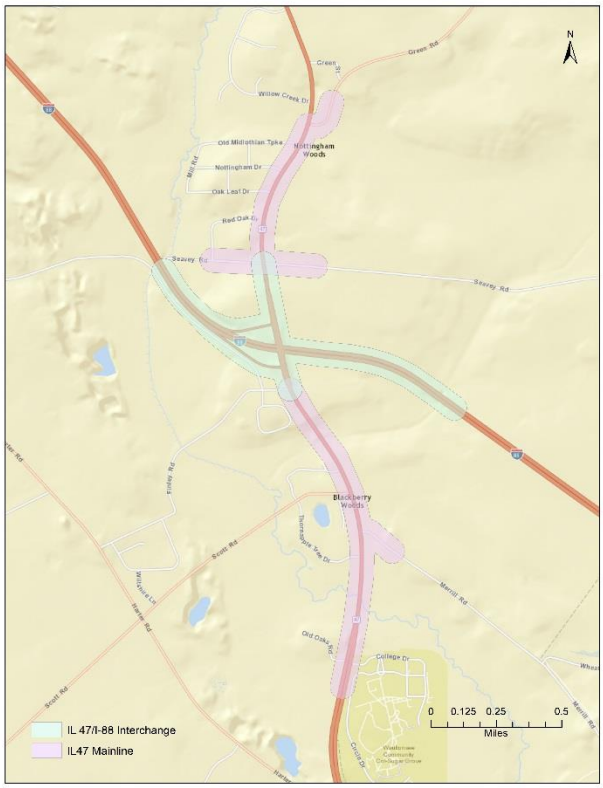


Figure 1: Project Study Limits

The study area limits on I-88 extend a half mile both east and west of IL 47. The interchange limits on IL 47 are from 845 feet south of Finley Road to 828 feet north of Seavey Road.

2. Alternatives Development and Evaluation

2.1. Alternatives Development

After concurrence on the Purpose and Need, a list of alternatives was developed for both the IL 47 Mainline and the IL 47/I-88 Interchange. Initial alternatives were developed through a collaborative effort between the Community Advisory Group (CAG), the public, the Project

Community Advisory Group: voluntary group of community leaders, including elected officials, representatives from local municipalities, homeowners, business owners, and local special interest groups.

Study Group (PSG), and by utilizing the Feasibility Study conducted by the Village of Sugar Grove. The objective of this process was to develop an initial list of alternatives and reduce this list to the alternatives that were then carried forward for further study.

Project Study Group: group of stakeholders consisting of IDOT, Tollway, Kane County, and the Federal Highway Administration (FHWA).

The IL 47 alternatives include the No-Build, widening along the existing centerline, widening east of the centerline and new alignments to the east and west. All alternatives with the exception of the no-build require a 4-lane roadway to accommodate projected traffic. Each build alternative except the new alignment with four lanes to the west of the existing alignment, was designed and evaluated with a 50 foot depressed median. The widening on the existing centerline and the widening to the east alignments were also evaluated with a 30 foot raised median. The new alignment with four lanes to the west of the existing alignment was evaluated only with a 30 foot raised median.

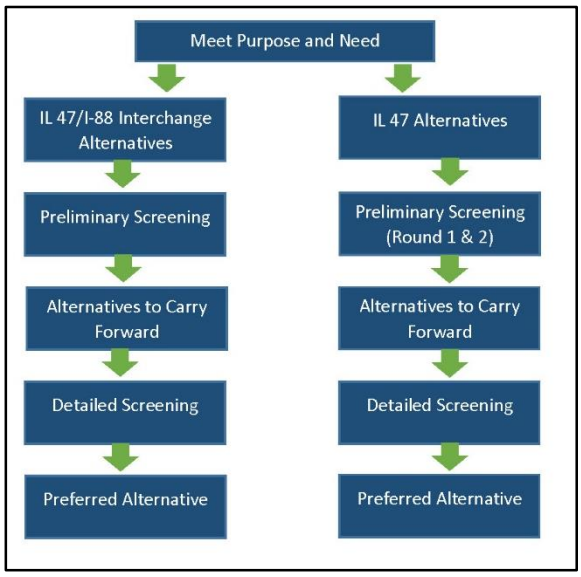
The IL 47 and I-88 Interchange alternatives include the No-Build, conventional diamond interchange, conventional diamond interchange with roundabouts, diverging diamond interchange, partial cloverleaf in the northeast quadrant, partial cloverleaf in the northeast and southwest quadrants, partial cloverleaf in the southwest quadrant, and a partial cloverleaf in the southeast quadrant with a loop ramp terminating at Finley Road.

2.2. Evaluation Process

An evaluation and screening process was developed through a collaborative effort with stakeholders and the PSG. The objective of this process was to develop an initial list of alternatives and reduce this list from plausible alternatives to feasible alternatives by conducting rounds of screening analyses. The goal of the process was to refine the number of alternatives and develop a Preferred Alternative for both the IL 47 Mainline and the IL 47/I-88 Interchange.

Each set of alternatives was screened against the Purpose and Need. All build alternatives were determined to meet the Purpose and Need by improving system linkage and accommodating future land use and economic development.

Figure 2: Evaluation Process



The IL 47 Mainline alternatives were then subjected to two separate screening processes. In Round 1 of the screening process, alternatives were screened against residential and commercial displacements, right-of-way required, and environmental resource impacts including National Wetland Inventory (NWI) wetlands, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), lands currently being farmed, and forested areas. Alternatives that were carried forward to the next screening process were screened against cost, operational review data, and Environmental Survey Request data such as 4(f) property and Illinois Natural History Survey (INHS) wetlands and Waters of the U.S. Some categories from Round 1 were also carried forward, such as displacements, Right-of-Way required and floodplains, for comparison.

The IL 47/I-88 Interchange alternatives were subjected to one round of screening, which included right-of-way required, operational reviews, cost, impacts to the existing IL 47 Bridge, and environmental resources.

From the results of these screening processes, the No-Build and three build alternatives were carried forward for IL 47 Mainline and the No-Build and four build alternatives were carried forward for the IL 47/I-88 Interchange.

The next step in the evaluation and screening process will be to subject the alternatives to another round of screening which will evaluate alternatives against further engineering and environmental review. This document will describe this next screening process and the result will be the preferred alternative for both IL 47 Mainline and the IL 47/I-88 Interchange.

3. Alternatives Carried Forward

As stated in the previous section, the No-Build and three build alternatives were carried forward for IL 47 Mainline and the No-Build and four build alternatives were carried forward for the IL 47/I-88 Interchange. Concurrence was reached on the Alternatives to be Carried Forward in a February 22, 2017 NEPA/404 Merger Meeting.

3.1. Description of IL 47 Alternatives Carried Forward

The alternatives presented for the IL-47 corridor include provisions for bicycle/pedestrian facilities. Sufficient right-of-way will be secured to accommodate a 10-foot wide multi-use path on the east side and a 5-foot wide sidewalk on the west side of IL 47. Anticipated right-of-way impacts have been accounted for due to the wider IL-47 section. A brief description of the No-Build and the three build alternatives for the IL 47 Mainline are provided below. **Appendix A** includes a detailed aerial layout of each of the three build alternatives. **Appendix B** contains IL 47 Typical Sections of each of the three build alternatives.

- The No-Build maintains the existing alignment through the corridor. The current alignment has one through lane in each direction from Old Oaks Road to Finley Road, two lanes in each direction from Finley Road to Seavey Road and one lane in each direction from Seavey Road to Green Road. It does not meet the project P&N; however it is being carried forward for comparison purposes.
- The M-1A alternative is a 30 foot raised median on the existing alignment with two 12 foot lanes in each direction from Old Oaks Road to Green Road and 10-foot shoulders.
- The M-1C alternative is a 30 foot raised median on the existing alignment; however, the median is reduced to a 14 foot raised median with 4 foot inside shoulders through the Hannaford Woods/Nickels Farm Forest Preserve. M-1C has two 12 foot lanes in each direction from Old Oaks Road to Green Road with 10 foot shoulders.
- The M-2C alternative is a 30 foot raised median on the existing alignment from Old Oaks Road to Thornapple Tree Road, then the alignment shifts to the east. The median is reduced to a 14 foot raised median with 4 foot inside shoulders through the Hannaford Woods/Nickels Farm Forest Preserve.

3.2. Description of IL 47/I-88 Interchange Alternatives Carried Forward

A brief description of the No-Build and the four build alternatives for the IL 47/I-88 Interchange are provided below. **Appendix C** includes a detailed aerial layout of each of the four build alternatives. **Appendix D** contains IL 47 Bridge Typical Sections of each of the four build alternatives.

- The No-Build consists of an entrance ramp to westbound I-88 from IL 47 and an exit ramp from eastbound I-88 to IL 47. It does not meet P&N; however it is being carried forward for comparison purposes.
- The I-1: Conventional Diamond Interchange creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. The conventional diamond interchange is designed to allow a loop ramp to be constructed in the northeast quadrant should the traffic demand warrant it in the future.
- The I-2: Conventional Diamond Interchange with Roundabouts creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. Roundabouts would be located on both the north and south side of the existing bridge at the ramp termini. Each roundabout will be two lanes.
- The I-3: Diverging Diamond Interchange would create a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.
- The I-4: Partial Cloverleaf with Loop Ramp in Northeast Quadrant Interchange creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47.

4. Traffic and Geometric Studies

During the preliminary screening of alternatives, traffic was studied utilizing 2040 traffic projections from Chicago Metropolitan Agency for Planning (CMAP) and geometry was developed using applicable Bureau of Design and Environment (BDE) Manual guidelines. As a basis for capacity analysis of the IL 47 corridor, CMAP developed Average Daily Traffic Volumes for each segment of IL 47, for I-88 and the interchange ramps, and for each side street within the study area.

The IL 47/I-88 Interchange was analyzed by an operational review for the ramp intersections based on BDE design standards and a preliminary opinion of the probable geometric configurations that would be required to accommodate the projected Design Hourly Volumes (DHVs). The selected geometric layouts for each alternative are expected to yield acceptable operational characteristics and conform to BDE criteria, therefore, Level of Service (LOS) analyses were not performed as a part of the initial screening process.

During this round of screening, the alternatives carried forward for both IL 47 Mainline and the IL 47/I-88 Interchange were screened against detailed traffic and geometric studies discussed in the following subsections.

4.1. IL 47 Mainline Traffic Studies

The existing IL 47 cross-section provides two lanes in each direction at the interchange ramps and, in the northbound direction only, between the I-88 exit ramp and Finley Road. Two through lanes are also provided through the IL 47 intersection at Old Oaks Road/College Drive, with the southbound add-lane and northbound drop-lane extending roughly 600 feet north of this intersection. The remainder of IL 47 is one lane in each direction through the study area. It is assumed that this cross-section would be maintained under 2040 No-Build Conditions. The IL 47 Mainline alternatives all consist of two 12-foot through lanes in each direction from Old Oaks Road to Green Road. The cross section for all three build alternatives is similar with the exception of the location of the centerline and reduced median through Hannaford Woods/Nickels Farm Forest Preserve; therefore all three build alternatives were examined as a single build alternative for the purpose of traffic studies. The build alternative was analyzed with Highway Capacity Software (HCS) 2010, which considered factors like directional traffic volume, heavy vehicle percentage,

and aspects of the roadway design to identify a directional LOS for each segment during the morning and evening peak hours. LOS grades range from A to F with LOS A as the highest (best traffic flow and least delay), LOS E as saturated or at-capacity conditions, and LOS F as the lowest (oversaturated conditions). Given IL 47's status as a Strategic Regional Arterial (SRA), LOS C or better is desirable for corridor operation.

Strategic Regional Arterial: a network of roadways designed to carry heavier volumes of traffic at higher speeds in order to supplement the region's expressways. Mobility on these routes is promoted through various strategies, including access control and limited signalization.

The HCS 2010 roadway segment analyses indicate that nearly all portions of IL 47 providing a single directional travel lane will operate at LOS E during one or both peak hours under 2040 No-Build conditions. The remaining one-lane directional segments are projected at LOS D. As such, all the 2040 Build Alternatives for the IL 47 Mainline are proposed with two lanes in each direction from Old Oaks Road to Green Road. HCS 2010 analyses of the 2040 Build condition indicate that this cross-section will allow all study segments of IL 47 to operate at LOS B or better. The results of the HCS 2010 analysis are provided in **Appendix E**.

Based on the results of the operational review, all IL 47 Mainline build alternatives are expected to adequately support projected future traffic volumes and to facilitate the anticipated economic development. The No-Build alternative is not expected to adequately support traffic volumes from a capacity perspective, nor does it meet Purpose and Need because it does not facilitate economic development. Capacity reports for the roadway segment analyses are available upon request.

4.2. IL 47 Intersection Geometries

As stated in Section 4.1, the IL 47 build alternatives consist of two 12 foot through lanes in each direction with a 30 foot median. These alternatives are being considered a single build alternative for traffic studies due to their similar cross sections. Intersection geometries outside of the interchange area (study intersections are defined as the IL 47 intersections at Green Road, Scott Road, Merrill Road, and Old Oaks Road/College Drive) were studied in more detail for the build alternative. As part of this assessment, signal warrant analyses were conducted for all unsignalized study intersections under Year 2025 conditions (presumed to coincide with Opening Day plus five years) and Year 2040 conditions. This approach included the development of a straight-line growth rate for each turning movement (based on existing volumes compared to 2040 DHVs) and applying these rates to 12-hour count data collected in March 2015 in order to yield projected traffic volumes for the two design years being considered. The resulting 12-hour traffic projections were then used to perform signal warrant analyses in accordance with criteria in the *Manual on Uniform Traffic Control Devices (2009)* and IDOT standards for signalization on a SRA route. The results of signal warrant analyses revealed that none of the study intersections are expected to meet signal warrant criteria in Year 2025; as a result, no new traffic signals are expected to be installed for Opening Day of the improved IL 47 corridor. Under Year 2040 conditions, non-interchange area intersections that are expected to warrant the installation of a new traffic signal include IL 47/Scott Road and IL 47/Merrill Road. IL 47 at Green Road is assumed to operate under minor-leg stop control in Year 2040. Given that the IL 47/Old Oaks Road/College Drive intersection is currently signalized, no change in intersection control was contemplated at this location.

In order to develop recommended intersection geometry for the IL 47 corridor that lies outside of the interchange area, reference was made to BDE criteria and to the results of Year 2040 capacity analyses (prepared in both Synchro and HCS 2010 software). As a baseline, it was assumed that left-turn lanes would be provided on IL 47 at all study intersections due to the 30-foot median width proposed as a part of all

three build alternatives. Similarly, it was assumed that dedicated right-turn lanes would be provided on IL 47 at all study intersections given the shoulder width proposed for this corridor. The resulting intersection geometrics for Year 2040 conditions are listed below:

- IL 47/Green Road:
  - North leg – Dedicated left-turn lane and two through lanes
  - South leg – Two through lanes and dedicated right-turn lane
  - East leg – Separate left and right-turn lanes
- IL 47/Scott Road:
  - North leg – Two through lanes and a dedicated right-turn lane
  - South leg – Dedicated left-turn lane and two through lanes
  - West leg – Separate left and right-turn lanes
- IL 47/Merrill Road:
  - North leg – Dedicated left-turn lane and two through lanes
  - South leg – Two through lanes and dedicated right-turn lane
  - East leg – Separate left and right-turn lanes
- IL 47/Old Oaks Road/College Drive:
  - No change from existing geometry

4.3. IL 47/ I-88 Interchange Traffic and Geometric Studies

The existing IL 47/I-88 interchange consists of two lanes in each direction on IL 47 with an entrance ramp to westbound I-88 from IL 47 and an exit ramp from eastbound I-88 to IL 47. The partial interchange does not allow full access between IL 47 and I-88. The IL 47/I-88 interchange build alternatives all complete the interchange to allow full access between the two roadways. Each of these full access interchanges was evaluated based on its ability to handle 2040 traffic projections. The results of this analysis and the potential drawbacks of each build alternative are described below:

<u>Alternative I-1Conventional Diamond:</u>

In order to assess the ability to accommodate 2040 DHVs with Alternative I-1, an analysis was performed to determine appropriate intersection control within the interchange area. Using the same signal warrant methodology detailed in *Section 4.1. IL 47 Mainline Traffic and Geometric Studies*, signal warrant analyses were performed for each intersection that comprises the interchange area under Alternative I-1. Based on this review, it was determined that traffic signals will not be warranted at the two interchange ramps or at Seavey Road under Year 2025 conditions. As such, it is anticipated that these intersections would operate under minor-leg stop control on Opening Day. By Year 2040, it is anticipated that signal warranting criteria will be met at all three of these intersections. Given the expectation that the IL 47/Finley intersection will not provide full access to/from the minor street (as discussed further in *Section 4.4. Finley Road Access*), this intersection was not evaluated for signalization.

Based on a preliminary review, it is anticipated that adequate capacity could be provided for a Conventional Diamond Interchange to accommodate 2040 DHVs. A drawback of the Conventional Diamond Interchange is the back to back left turn lanes that would be necessary to access the on-ramps. There is a limited distance between these on-ramps within which the left turn lanes and taper lengths need to be placed. If development occurs at a more accelerated pace than anticipated by CMAP growth projections or if travel patterns differ from the IDOT developed DHVs in a manner that results in more traffic traveling from the north to use the subject interchange then the back to back left turn lanes may very well prove inadequate to accommodate

the IL 47 traffic accessing I-88. Based on a preliminary assessment of capacity threshold of this alternative, it is estimated that the Conventional Diamond Interchange could accommodate 30 to 40 percent additional traffic beyond the 2040 DHVs estimated by IDOT.

Alternative I-2 Conventional Diamond with Roundabouts:

Based on a preliminary review (including SIDRA roundabout analysis performed by IDOT), it is anticipated that adequate capacity could be provided for a Conventional Diamond with Roundabouts to accommodate 2040 DHVs. It is worth noting that concerns exist regarding the ability to manage ramp queues under this configuration, particularly for the I-88 westbound exit ramp. In the event of excessive queues, roundabouts would not provide the option to flush traffic from the ramps (as could be done under signalized control) to prevent backups onto the I-88 Mainline. Additionally, concerns were raised regarding potential wrong way drivers on the ramps.

Alternative I-3 Diverging Diamond:

Based on a preliminary review, it is anticipated that adequate capacity could be provided for a Diverging Diamond Interchange (DDI) to accommodate 2040 DHVs. This design would be expected to include two travel lanes in each direction through the interchange area and signalization would be necessary at the crossover intersections.

Since IL 47 is an SRA Route with a 55 mph speed limit, IDOT has requested that the crossover intersection angles for the DDI be 45 degrees. This is advisable based on IDOT's recent experience with other DDI intersections. Additionally, the geometrics through the crossover intersections should assume a 45 mph design speed. These requirements lead to curve radii in excess of 1,000 feet, which will impact the existing bridge and would lead to the construction of a new bridge to accommodate one direction of travel. There would also be significant earthwork requirements and new alignment of the roadway.

Alternative I-4 Partial Cloverleaf- NE Quadrant:

In order to assess the ability to accommodate 2040 DHVs with Alternative I-4, an analysis was performed to determine appropriate intersection control within the interchange area. Using the same signal warrant methodology detailed in *Section 4.1. IL 47 Mainline Traffic and Geometric Studies*, signal warrant analyses were performed for each intersection that comprises the interchange area under Alternative I-4. Based on this review, it was determined that traffic signals will not be warranted at the two interchange ramps or at Seavey Road under Year 2025 conditions. As such, it is anticipated that these intersections would operate under minor-leg stop control on Opening Day. By Year 2040, it is anticipated that signal warranting criteria will be met at all three of these intersections. As noted in the discussion of signal warrants for Alternative I-1, the IL 47/Finley Road intersection was not evaluated for signalization.

Based on a preliminary review, it is anticipated that adequate capacity could be provided for a Partial Cloverleaf with a loop ramp in the northeast quadrant to accommodate 2040 DHVs. This alternative attempts to remediate the drawbacks of the other three alternatives. The loop ramp in the northeast quadrant eliminates the concern of back to back left turn lanes. It would provide signalized interchanges to prevent backups onto I-88. It would also be able to utilize the existing bridge with minimal impacts.

4.4. Finley Road Access

The access at the Finley Road/IL 47 intersection will need to be evaluated for all interchanges under consideration. Since Finley Road will be within the Access Control limits of the interchange, access will need to be restricted. Access to Finley Rd. for the various interchange options is discussed below:

- Conventional Diamond: A raised median will be placed on IL 47 at Finley Road, thus restricting Finley Rd. access to a Right-In/Right-Out at the intersection.
- Conventional Diamond with Roundabouts: A raised median will be placed on IL 47 at Finley Road, thus restricting Finley Rd. access to a Right-In/Right-Out at the intersection.
- Diverging Diamond Interchange: The NB and SB directions of IL 47 will be significantly apart at the Finley Road intersection, thus restricting Finley Rd. access to a Right-In/Right-Out at the intersection.
- Partial Cloverleaf with Loop Ramp: A three-quarters access may be permitted at the Finley Road intersection in this configuration. The movement not permitted would be a left turn from eastbound Finley Rd. to northbound IL 47.

4.5. Alternative I-4 Partial Cloverleaf Capacity Analysis

In order to develop recommended geometrics for a partial cloverleaf interchange with a loop ramp in the northeast quadrant, capacity analyses were prepared for the IL 47/I-88 ramp intersections and for the adjacent IL 47 intersections at Seavey Road and at Finley Road. For this capacity assessment, intersection control was assumed to conform to the signal warrant analysis results detailed previously in *Section 4.3. IL 47/I-88 Interchange Traffic and Geometric Studies*; in other words, no signals would be in place on Opening Day, but signalization is assumed at the interchange ramps and at IL 47/Seavey Road under Year 2040 conditions. As noted in Section 4.4, Finley Road will be within the Access Control limits of the interchange, resulting in the need to restrict movements at the IL 47/Finley Road intersection. Under Alternative I-4, it is anticipated that the raised median on IL 47 could be designed to accommodate a northbound left-turn lane at Finley Road. This three-quarters access configuration would prohibit eastbound left-turning movements. In order to accommodate eastbound left turns indirectly, the IL 47 corridor would be designed to allow southbound U-turns at a designated location between Finley Road and Scott Road.

Recommended lane geometrics were then developed for the interchange area with reference to BDE criteria and to the results of Year 2040 capacity analyses (prepared in Synchro and HCS 2010 software).

Highway Capacity Software (HCS) 2010 directly applies the principles in the latest version of Highway Capacity Manual (HCM). Through the various HCS 2010 modules, traffic operation can be analyzed at intersections, on roadway segments, and for various aspects of a freeway system.

Synchro builds on the HCM methodologies by incorporating a proprietary algorithm for evaluating progression between coordinated traffic signals. This algorithm is often used to develop optimized signal timings as a part of intersection capacity analyses on a given roadway corridor.

When used for intersection analysis, both software packages provide an average delay per vehicle for use in assigning a Level of Service (LOS) grade.

As a baseline, it was assumed that left-turn lanes would be provided on IL 47 at all study intersections due to the 30 foot median width proposed as a part of Alternative M-2C. Similarly, it was assumed that dedicated right-turn lanes would be provided on IL 47 at all study intersections given the shoulder width proposed for this corridor. The resulting intersection geometrics for Year 2040 conditions are listed below:

- IL 47/Seavey Road:
  - North leg – Dedicated left-turn lane, two through lanes, and an exclusive right-turn lane
  - South leg – Dedicated left-turn lane, two through lanes, and an exclusive right-turn lane
  - East leg – Dedicated left-turn lane and shared through/right-turn lane
  - West leg – Dedicated left-turn lane and shared through/right-turn lane
- IL 47/I-88 W ramps:
  - North leg – Two through lanes and a dedicated right-turn lane
  - South leg – Two through lanes and a dedicated right-turn lane

    - East leg – Dual left-turn lanes and a dedicated right-turn lane
- IL 47/I-88 E ramps:
    - North leg – Dedicated left-turn lane and two through lanes
    - South leg – Two through lanes and a dedicated right-turn lane
    - West leg – Dedicated left-turn lane and dual right-turn lanes

These intersection geometrics were also analyzed for Year 2025 conditions in both Synchro and HCS 2010 software; this analysis assumed that any dual turn lanes recommended for 2040 conditions would be striped as a single lane in Year 2025.

5. Environmental Resources Impact Analysis

As shown on the Environmental Inventory Map included in **Appendix F**, there are several environmental resource areas within the IL 47/ I-88 study area including the Hannaford Woods/ Nickels Farm Forest Preserve, Blackberry Creek and Tributary C (Seavey Road Run), wetlands, floodplains, and farmland. The majority of these environmentally sensitive areas are located south of the IL 47/I-88 Interchange. Environmental resources were evaluated for potential impacts from the alternatives to be carried forward.

As stated in Section 3.1 previously, the IL 47 Mainline had three build alternatives and the no build carried forward to the detailed screening round. The IL 47/I-88 Interchange had four build alternatives and the No Build carried forward to the detailed screening round.

Resource impacts were calculated for the IL 47 Mainline alternatives from Old Oaks Road to Green Road. The IL 47/I-88 alternatives overlap the IL 47 alternatives from 845 feet south of Finley Road to 828 feet north of Seavey Road. Where overlap occurs, interchange alternative impacts were assumed to be in addition to impacts already identified with IL 47 alternatives. **Table 1** IL 47 Impact Matrix and **Table 2** Interchange Impact Matrix are the result of the Detailed Screening Round for each alternative. They are found on the next two pages, and were developed independently of each other and are evaluated separately. Impacts were calculated based upon preliminary proposed right-of-way shown on the exhibits in Appendices A and C.

Table 1: IL 47 Impact Matrix

	Residential Displacements	Right of Way Required (acres)	Estimated Cost in Millions (2016 Dollars)	Operational Review	INHS Wetlands (acres)[1]	Floodplains (acres)[2]	Farmland (acres)[3]	INHS Waters of the U.S. (acres)	Forest Preserve – 4(f) (acres)
No-Build	0	0	0	Unacceptable	0	0	0	0	0
M-1A 30 Foot Median	6	11.4	$16.7	Acceptable	1.6	3.5	4.5	0.7	0.9
M-1C Modified 30 Foot Median	6	10.9	$16.7	Acceptable	1.4	3.0	4.4	0.6	0.6
M-2C Modified 30 Foot Median	0	12.0	$18.5	Acceptable	1.3	3.0	6.2	0.6	0.6

1. Wetlands and Waters of the U.S. were determined based on the INHS 2016 survey.
2. Floodplains were based on Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM).
3. Farmland was based on current land use.

Table 2: Interchange Impact Matrix

	Right of Way Required (acres)	Estimated Cost in Millions (2016 Dollars)	Operational Review	Existing IL 47 over I-88 Bridge Widening (square feet)[1]	Wetlands (acres)[2]	Waters of the U.S. (acres)	Floodplains (acres)[3]	Forest (acres)	Farmland (acres)[4]
No-Build	0	0	Unacceptable	None	0	0	0	0	0
Alternative I-1: Conventional Diamond	0.7	$15.6	Acceptable	1,311	<0.1	0	0	<0.1	0.9
Alternative I-2: Conventional Diamond w/ Roundabouts	0	$15.4	Acceptable	631	<0.5	0	0	<0.1	<0.1
Alternative I-3: Diverging Diamond	7.2	$23.6	Acceptable	0*	0.9	<0.1	0	0.9	5.2
Alternative I-4: Partial Cloverleaf-NE Quadrant	0.7	$19.8	Acceptable	0	<0.1	0	<0.1	0.1	0.7

1. Additional square feet of bridge surface area required. See **Appendix D** for more details.
2. Wetlands and Waters of the U.S. were determined based on the INHS 2016 survey.
3. Floodplains were based on Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM)
4. Farmland was based on current land use.

* 14,640 square feet of new structure is required for the I-3: Diverging Diamond.

6. Summary of Environmental Resources Impact Analysis by Criterion

Displaced businesses, and cultural resources are not included in the summary tables since the build alternatives will have no impacts to these resources. The INHS conducted fish surveys within Blackberry Creek at IL 47, as well as benthic macroinvertebrate and water quality characterizations in the project area. Species specific surveys, within appropriate habitat, in the study area were conducted for the Eastern prairie fringed orchid (*Platanthera leucophaea*) and Blanding's turtle (*Emydoidea blandingii*). An avian survey is currently being conducted over the course of three seasons by the INHS. A mussel survey will be conducted in the summer of 2017 for Blackberry Creek. To date, no threatened or endangered species have been found within the study area.

Currently there are no businesses located along the corridor; therefore there are no commercial displacements. Finally, the State Historic Preservation Officer (SHPO) has concurred with a "no historic properties affected" finding for the study area.

6.1. IL 47 Mainline Environmental Impacts

Differentiating environmental resources for the three build alternatives for each criterion are described below:

Agricultural Lands

The current Village of Sugar Grove Land Use Plan shows 58% of the project study area zoned for agricultural use. Agricultural properties are located directly south of I-88 on both sides of IL 47, north of I-88 on both sides of IL 47 to Seavey Road, and on the east side of IL 47 from Seavey Road to Green Road. Farmland was classified by the Natural Resource Conservation Service (NRCS) as either Prime Farmland of Statewide Importance, Prime Farmland, or Prime Farmland if Drained.

All three IL 47 Mainline build alternatives will impact farmland due to the addition of a through lane in each direction. The M-2C alternative will impact the most agricultural land due to the shift of the centerline to the east.

Construction Costs

Preliminary construction estimates were developed for each alternative. Cost estimates for M-1A and M-1C were approximately $16.7 Million, while the cost estimate for M-2C was $18.5 Million. The reason for the cost difference is that additional grading, subgrade development, and drainage improvements will be necessary for the asymmetric widening in M-2C.

Floodplains

Floodplains were identified using FEMA Flood Insurance Rate Maps. Floodplains are associated with both Blackberry Creek and Tributary C (Seavey Road Run).

The Blackberry Creek Bridge will be centered on the existing alignment. The bridge will either be widened or completely replaced. Since this structure is situated between forest preserve property, efforts are being made to minimize any impact to the adjacent property as well the associated floodplain. Any fill in the floodplain will be compensated per regulatory requirements.

Tributary C (Seavey Road Run) is conveyed in a triple box cell culvert under IL 47 within the project limits. The culvert will either be extended to the east or completely replaced. Efforts will be made to minimize

impacts to the adjacent floodplain and any fill in the floodplain will be compensated per regulatory requirements.

Right-of-Way

In order to construct the additional through lane in each direction of the IL 47 build alternatives, right-of-way will be required. Alternative M-1C has the lowest estimated amount of right-of-way required at 10.9 acres. Alternative M-1A and M-2C require 11.4 acres and 12.0 acres of right-of-way respectively.

Residential Displacements

Residential displacements were determined if a home occurred within 10 feet of the proposed right-of-way limits. The majority of residences occur along the west side of IL 47; therefore, both M-1A and M-1C would impact six residences. The M-2C alternative is able to avoid residences by shifting the alignment to the east.

Section 4(f) Lands

The Hannaford Woods/Nickels Farm Forest Preserve is part of the Bliss Woods-Waubonsee College Forest Preserve. It is owned by the Forest Preserve District of Kane County. It is located within the project study area on both sides of IL 47 south of Merrill Road and north of Waubonsee Community College. The preserve offers bike and nature trails, hiking, and picnic areas; however, none of the trails or picnic areas are located within the project study area.

The Kane County Forest Preserve purchased the portion of the forest preserve on the east side of IL 47 from Waubonsee Community College on August 9, 2012. As a part of the deed, a 60 foot strip was set aside along IL 47 to be purchased by IDOT at a fair market value, if IL 47 is widened. The portion of forest preserve west of IL 47 does not have land set aside, but the Kane County Forest Preserve has stated that the land has no restrictions preventing it from being purchased by IDOT.

Alternative M-1C and M-2C have the lowest estimated impacts to the Hannaford Woods/Nickels Farm Forest Preserve at 0.6 acres. Alternative M-1A has an estimated 0.9 acres of impacts.

Waters of the U.S./Wetlands

INHS examined all potential wetlands and Waters of the U.S. (WOUS) within the project study area. The results were eighteen sites meeting the criteria of wetlands; of those, eight were identified as Advanced Identification High Habitat Value Wetlands and of those, seven were also deemed high quality aquatic resources (HQAR). One wetland (Wetland Site 8) has a mean C of 4.6. There were eight sites that met the criteria of a WOUS. Blackberry Creek met the criteria of a HQAR.

Alternative M-2C has the lowest estimated impacts to wetlands at 1.3 acres. Alternatives M-1A and M-1C are estimated to impact 1.6 and 1.4 acres of wetlands respectively. Alternatives M-1C and M-2C were estimated to impact 0.6 acres of WOUS. M-1A was estimated to impact 0.7 acres of WOUS.

6.2. IL 47/ I-88 Interchange Environmental Impacts

Differentiating environmental resources for the four build alternatives for each criterion are described below:

Agricultural Lands

The current Village of Sugar Grove Land Use Plan shows 58% of the project study area zoned for agricultural use. Agricultural properties are located directly south of I-88 on both sides of IL 47, north of I-88 on both sides of IL 47 to Seavey Road, and on the east side of IL 47 from Seavey Road to Green Road. Farmland was classified by the NRCS as either Prime Farmland of Statewide Importance, Prime Farmland, or Prime Farmland if Drained.

The I-1 and I-4 alternatives impact agricultural lands by extending the west bound exit ramp north into the adjacent field in order to incorporate the loop ramp in the northeast quadrant.

Construction Costs

Preliminary construction estimates were developed for each alternative. Cost estimates for I-2 was the lowest at $15.9 million, and I-3 was estimated the highest at $23.6 million. The I-1 and I-4 alternatives were estimated at $16.2 million and $19.8 million respectively.

Floodplains

Floodplains were identified using FEMA Flood Insurance Rate Maps. Floodplains are associated with both Blackberry Creek and Tributary C (Seavey Road Run). The only floodplain impacts associated with the Interchange was estimated to be <0.1 acres with Alternative I-4. This impact is caused by the need to extend the roadway to incorporate the merge lanes onto westbound I-88.

Right of Way

The majority of the interchange area is already either Illinois Department of Transportation or Illinois State Toll Highway Authority right-of-way. Alternative I-3 would require an additional 7.2 acres of right-of-way to accommodate the new structure required. Right-of-way may need to be purchased for alternatives I-1 and I-4 in order to incorporate the loop ramp in the northeast quadrant. This is estimated to be 0.7 acres of right-of-way required. Alternative I-2 is not anticipated to require any additional right-of-way.

Waters of the U.S./Wetlands

INHS examined all potential wetlands and Waters of the U.S. (WOUS) within the project study area. The results were eighteen sites meeting the criteria of wetlands; of those, eight were identified as Advanced Identification High Habitat Value Wetlands and of those, seven were also deemed HQAR. One wetland (Wetland Site 8) has a mean C of 4.6. There were eight sites that met the criteria of a WOUS. Blackberry Creek met the criteria of a HQAR.

Alternatives I-1 and I-4 were estimated to have wetland impacts of less than 0.1 acres. Alternative I-2 has an estimated impact of less than 0.5 acres. Alternative I-3 has the highest estimated wetland impact at 0.9 acres. Interchange alternatives I-1, I-2 and I-4 are not estimated to impact a WOUS. Alternative I-3 is estimated to impact less than 0.1 acres of WOUS.

6.3. Public and Local Agency Input

The public involvement program for this project has followed the principles of Context Sensitive Solutions (CSS). Local agencies and the public have provided input throughout the study process including reviewing and providing comment on the alternatives carried forward and the preferred alternative. A brief summary of the public and local agency input is provided below.

What is CSS?

CSS is an interdisciplinary approach that seeks effective, multi-modal transportation solutions by working with stakeholders to develop, build, and maintain cost-effective transportation facilities that fit into and reflect the project's surroundings - its "context." Through early, frequent, and meaningful communication with stakeholders, and a flexible and creative approach to design, the resulting projects should improve safety and mobility for the traveling public, while seeking to preserve and enhance the scenic, economic, historic, and natural qualities of the settings through which they pass.

6.3.1 Village of Sugar Grove and Kane County

Two of the four PSG members for this project are local agencies including the Village of Sugar Grove and Kane County. As PSG members, these local agencies have provided input throughout the study process including the selection of the preferred alternative. These local agencies review, contribute information, and help make decisions throughout the detailed planning and engineering studies at major and minor milestones.

6.3.2 Community Advisory Group

As part of the CSS process, a Community Advisory Group (CAG) was formed for this project. The fourth CAG meeting was held on Tuesday, November 15, 2016. The purpose of this meeting was to present the full range of alternatives considered, explain the alternatives screening process, and describe and seek input on the range of alternatives to be carried forward. The CAG expressed agreement with the process and did not propose other means to select Alternatives to be Carried Forward. The CAG made further suggestions and comments on the alternatives carried forward. A summary of all meeting minutes can be found in **Appendix G**.

CAG Membership
Residents
Property Owners
Sugar Grove Fire Protection District
Kane DuPage Soil & Water Conservation District
Township of Sugar Grove
Forest Preserve District of Kane County
Waubonsee Community College
Kane/Kendall Council of Mayors
Blackberry Township
Crown Community Development

The fifth CAG meeting will be held in Spring of 2017 where the preferred alternative will be presented.

6.3.3 General Public

The third public information meeting was held on March 28, 2017. The purpose of this meeting was to present the alternatives screening results, present alternatives to be carried forward, and to solicit input. For the IL 47 Mainline alternatives, preferences were shown for the No-Build Alternative, Alternative M-2C and Alternative M-3 (which was shown as eliminated). For the IL 47/I-88 Interchange alternatives, there were preferences for the No-Build Alternative, Alternative I-1 Conventional Diamond Interchange and Alternative I-4 Partial Cloverleaf with Loop Ramp in Northeast Quadrant Interchange. There were also preferences for and against Alternative I-2 Conventional Diamond Interchange with Roundabouts and Alternative I-3 Diverging Diamond Interchange.

6.3.4 Forest Preserve District of Kane County

A separate stakeholder meeting was held with the Forest Preserve District of Kane County, also a CAG member, on September 13, 2016 to discuss the potential improvement and widening of Illinois Route 47 and any associated impact to the Hannaford Woods – Nickels Farm Forest Preserve. An exhibit provided by the Forest Preserve indicated that no Land and Water Conservation Fund (LAWCON) or Open Space Lands and Acquisition (OSLAD) funds were used for the land that is adjacent to Illinois Route 47. A 60-foot strip of land adjacent and east of Illinois Route 47 was reserved for subsequent purchase by IDOT if Illinois Route 47 is widened. The Forest Preserve noted a desire for a shared use path on Illinois Route 47 to help link existing paths that are north and south of I-88.

7. Preferred Alternative Recommendation

A preferred alternative was selected for both IL 47 Mainline and the IL 47/I-88 Interchange. The preferred alternative was based on operational reviews, capacity studies, environmental impacts, and project constraints.

7.1. IL 47 Mainline Preferred Alternative Recommendation

It is recommended that the Preferred Alternative for the IL 47 Mainline be Alternative M-2C; which consists of two 12 foot lanes in each direction, a 30 foot raised median through the majority of the corridor but reduced through the Hannaford Woods/Nickels Farm Forest Preserve, and shifts the alignment to the east, north of Thornapple Tree Road. Sufficient right-of-way will be secured to accommodate a 10-foot wide multi-use path on the east side and a 5-foot wide sidewalk on the west side of IL 47.

All three IL 47 build alternatives provide adequate capacity for 2040 traffic volumes with the provision of two through lanes in each direction for the entirety of the study corridor. M-1A does not minimize impacts to the Hannaford Woods/Nickels Farm Forest Preserve and therefore impacts more forest, wetlands, and waters of the U.S. M-1C and M-2C have minimized their footprints through the forest preserve and therefore have similar impacts in that area. The differences in M-1C and M-2C include the cost, residential impacts, wetland impacts and agricultural land impacts. M-2C has an increase in cost and agricultural impacts due to the shift of the centerline to the east, but by doing so, has eliminated potential residential displacements. Considering the elimination of residential displacements M-2C is the recommended preferred alternative for the IL 47 Mainline.

7.2. IL 47/I-88 Interchange Preferred Alternative Recommendation

It is recommended that the Preferred Alternative for the IL 47/I-88 Interchange be Alternative I-4, the Partial Cloverleaf with Loop Ramp in Northeast Quadrant of the interchange. This alternative creates a full service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. It also includes a loop ramp in the northeast quadrant for northbound IL 47 traffic to enter I-88 westbound. The loop ramp improves the operations of travelers utilizing the entrance ramps of the interchange.

The IL 47/I-88 Interchange build alternatives all provide adequate capacity for 2040 traffic volumes. Also, since the majority of the land is already either IDOT or Illinois Tollway right-of-way, the difference in environmental impacts is small. The concerns of the IL 47/I-88 Interchange are then based on cost and functionality. Specifically, the concerns include back to back left turn lanes, backups onto I-88 Mainline, and the existing IL 47 bridge of I-88, which had the superstructure fully reconstructed in 2007.

The I-1 Conventional Diamond Interchange was eliminated due to back to back left turn lanes needed to access the on-ramps. There is a limited distance between these on-ramps within which the left turn lanes and taper lengths need to be placed. The projected traffic for this project is assumed to develop in a straight line fashion from current traffic numbers. If development occurs at a more accelerated pace, the back to back left turn lanes may very well prove inadequate to accommodate the IL 47 traffic accessing I-88. This could then necessitate a significant modification of the interchange not long after its construction. The addition of a loop ramp in the I-4 alternative eliminates the concern of back to back left turn lanes.

The I-2 Conventional Diamond Interchange with Roundabouts was eliminated due to its inability to manage ramp queues, particularly for the I-88 westbound exit ramp. In the event of excessive queues, roundabouts would not provide the option to flush traffic from the ramps (as could be done under signalized control) in order to prevent backups onto the I-88 Mainline. The I-4 Alternative would provide signalized interchanges which would eliminate the concern of backups to I-88 Mainline.

The I-3 Diverging Diamond Interchange has crossover angles of 45 degrees and a curve radius in excess of 1,000 feet. This will lead to the construction of a new bridge to accommodate one direction of travel. Due to the construction cost, new right of way, and additional environmental impacts, this alternative was eliminated. Therefore the I-4 Partial Cloverleaf with Loop Ramp in Northeast Quadrant of the interchange is the recommended alternative.

Table 3 on the following page summarizes the impacts for the recommended Preferred Alternatives, M-2C and I-4, as well as the total combined impacts.

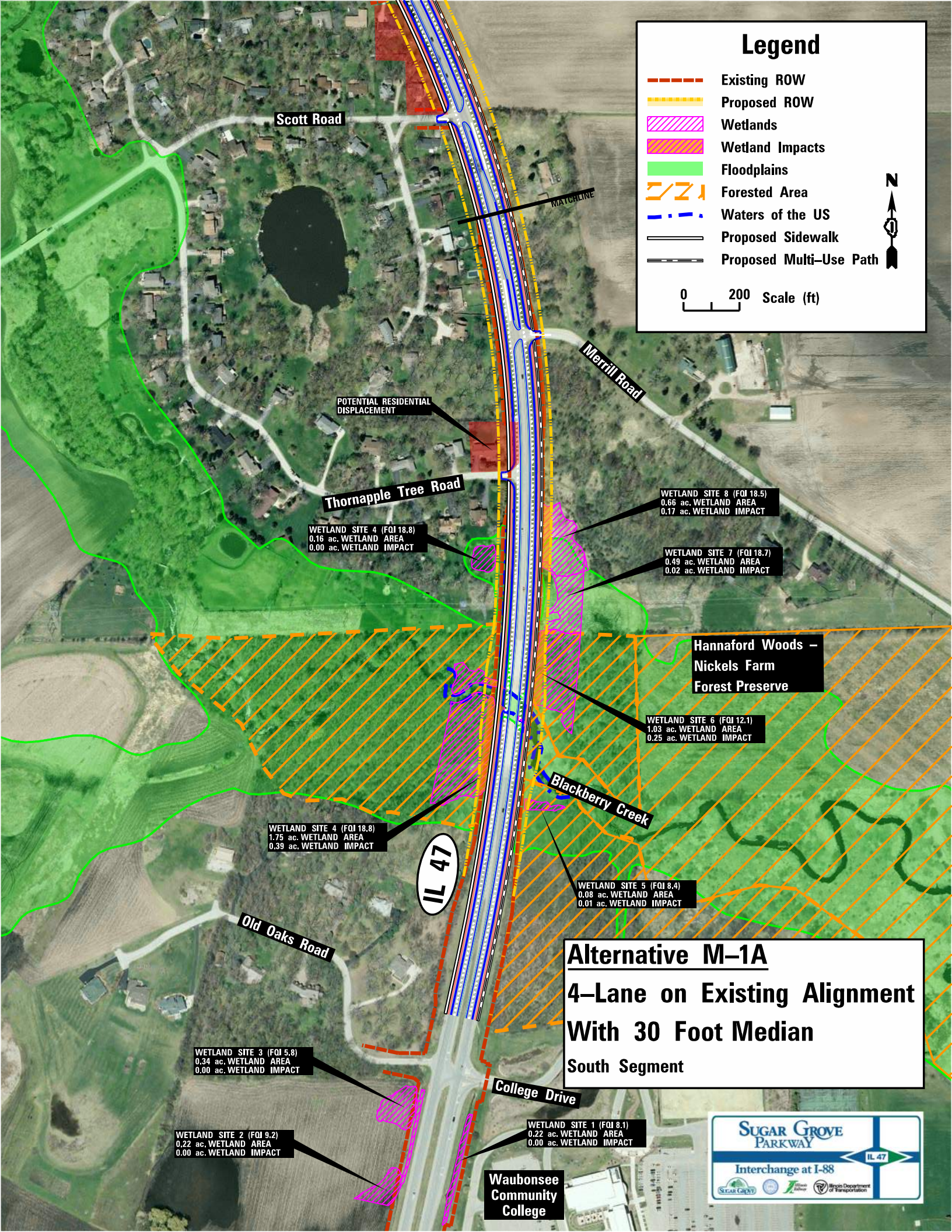
Table 3: Preferred Alternative Impact Matrix

	Residential Displacements	Right of Way Required (acres)	Estimated Cost in Millions (2016 Dollars)	Operational Review	Existing IL 47 over I-88 Bridge Widening(square feet)[1]	Wetlands (acres)[2]	Floodplains (acres)[3]	Farmland (acres)[4]	Waters of the U.S. (acres)[2]	Forest (acres)	Forest Preserve – 4(f) (acres)
M-2C Modified 30 Foot Median	0	12	$18.5	Acceptable	N/A	1.3	3	6.2	0.6	0	0.6
I-4: Partial Cloverleaf-NE Quadrant	0	0.7	$19.8	Acceptable	0	< 0.1	< 0.1	0.7	0	0.1	0
TOTAL	0	12.7	$38.3	Acceptable	0	1.4	3.1	6.9	0.6	0.1	0.6

1. Additional square feet of bridge surface area required. See **Appendix D** for more details.
2. Wetlands and Waters of the U.S. were determined based on the INHS 2016 survey.
3. Floodplains were based on Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM)
4. Farmland was based on current land use.

Appendix A

IL 47 Alternatives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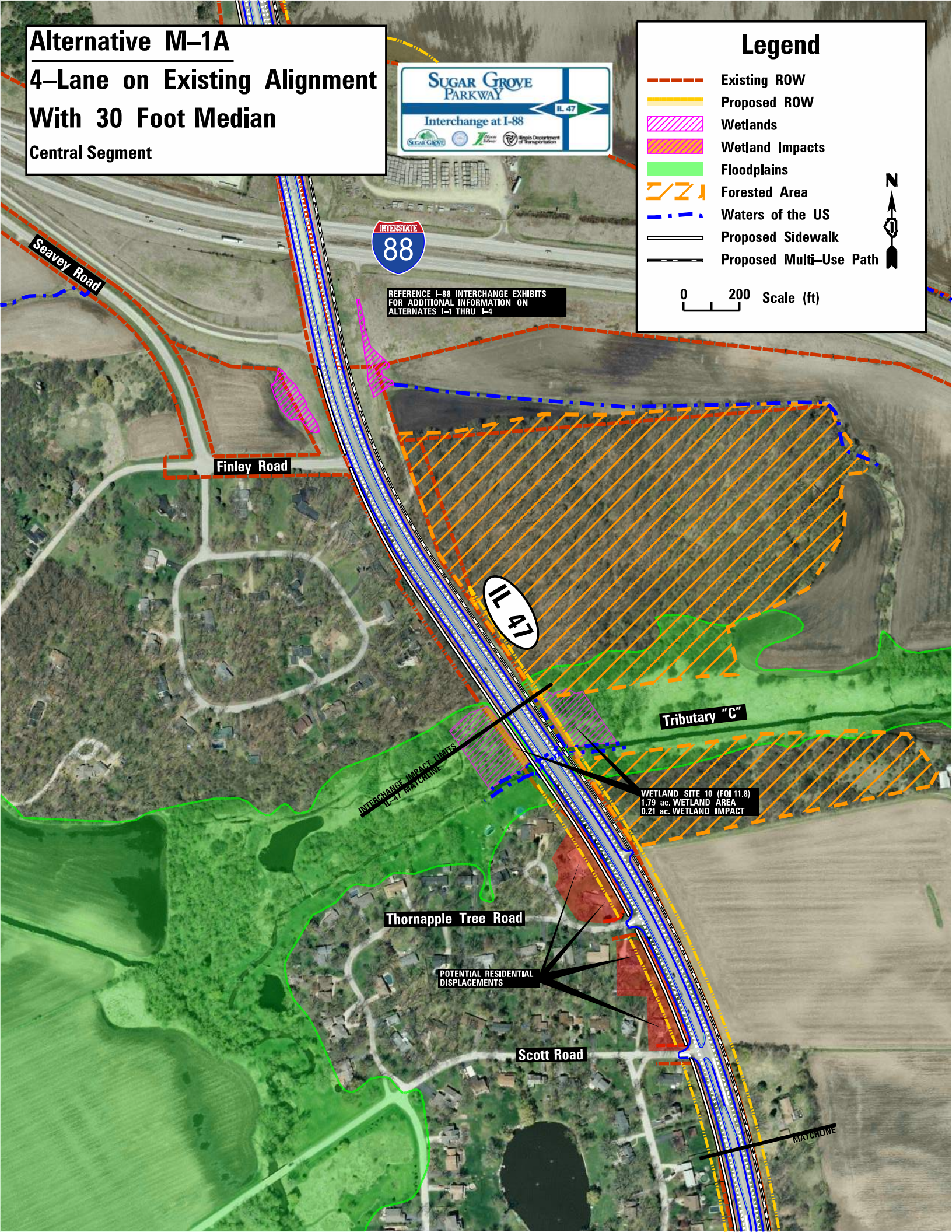
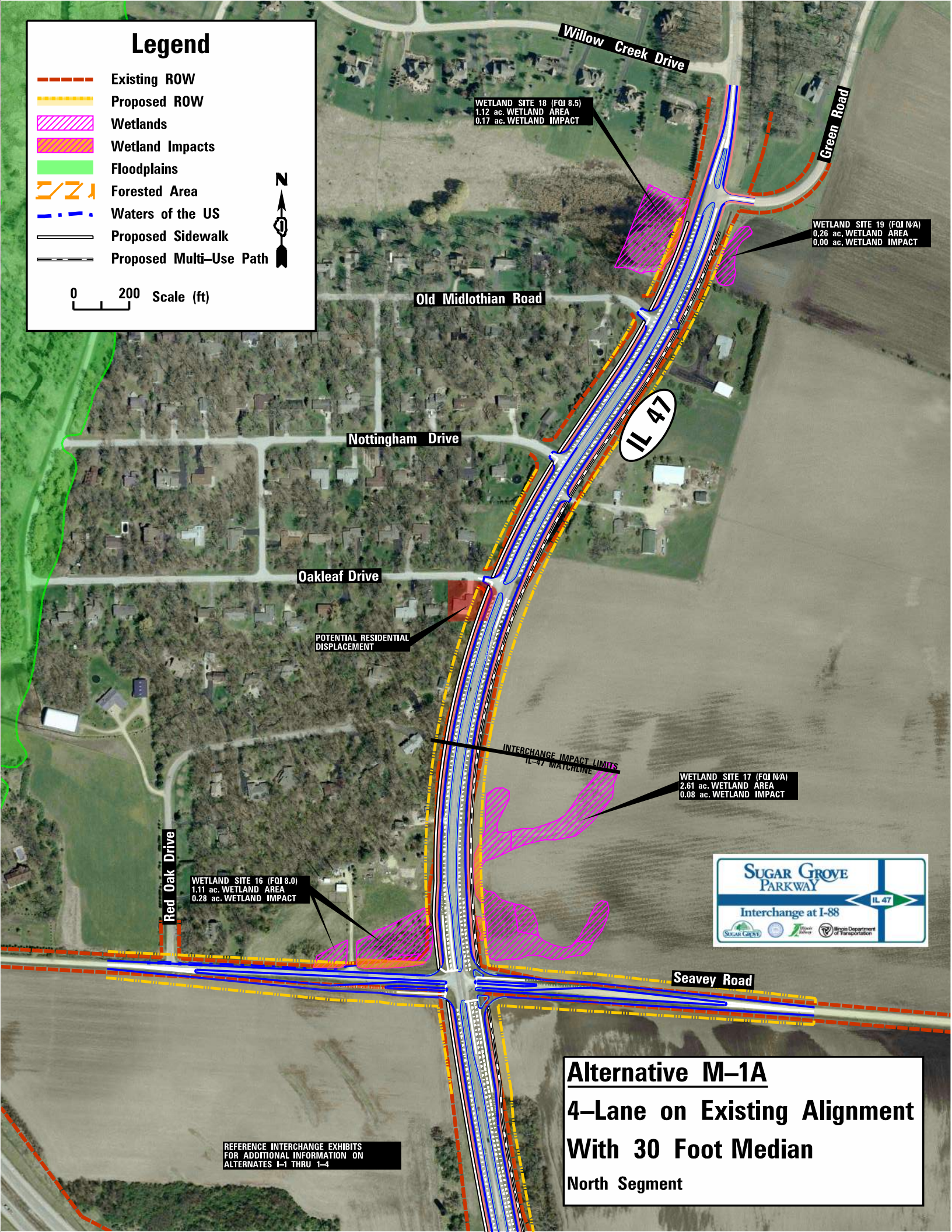
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Proposed Sidewalk
Proposed Multi–Use Path
N
0
200
Scale (ft)
Scott Road
MATCHLINE
Merrill Road
POTENTIAL RESIDENTIAL DISPLACEMENT
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.17 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.02 ac. WETLAND IMPACT
Hannaford Woods – Nickels Farm Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
0.25 ac. WETLAND IMPACT
Blackberry Creek
WETLAND SITE 4 (FQI 18.8)
1.75 ac. WETLAND AREA
0.39 ac. WETLAND IMPACT
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
Old Oaks Road
Alternative M–1A
4–Lane on Existing Alignment
With 30 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee Community College
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

Alternative M–1A

4–Lane on Existing Alignment With 30 Foot Median

Central Segment

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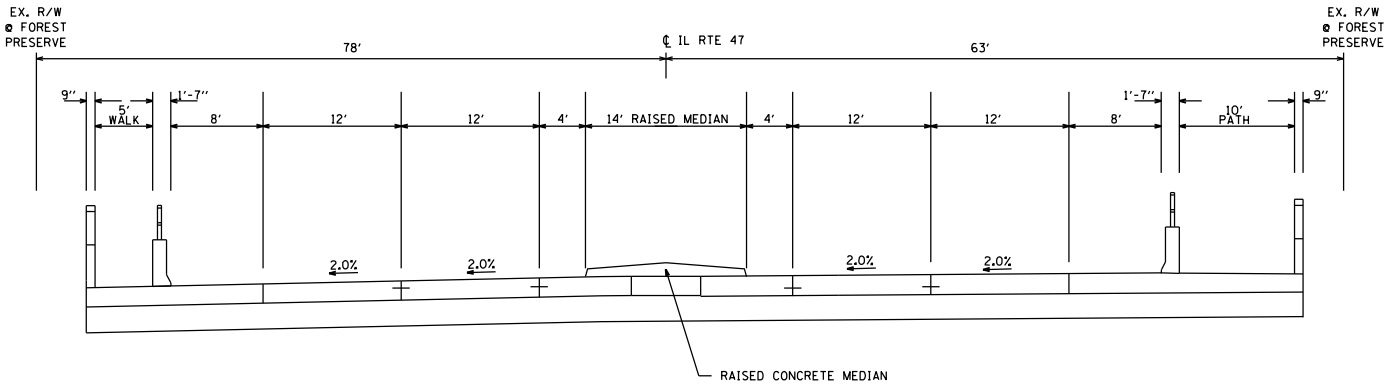
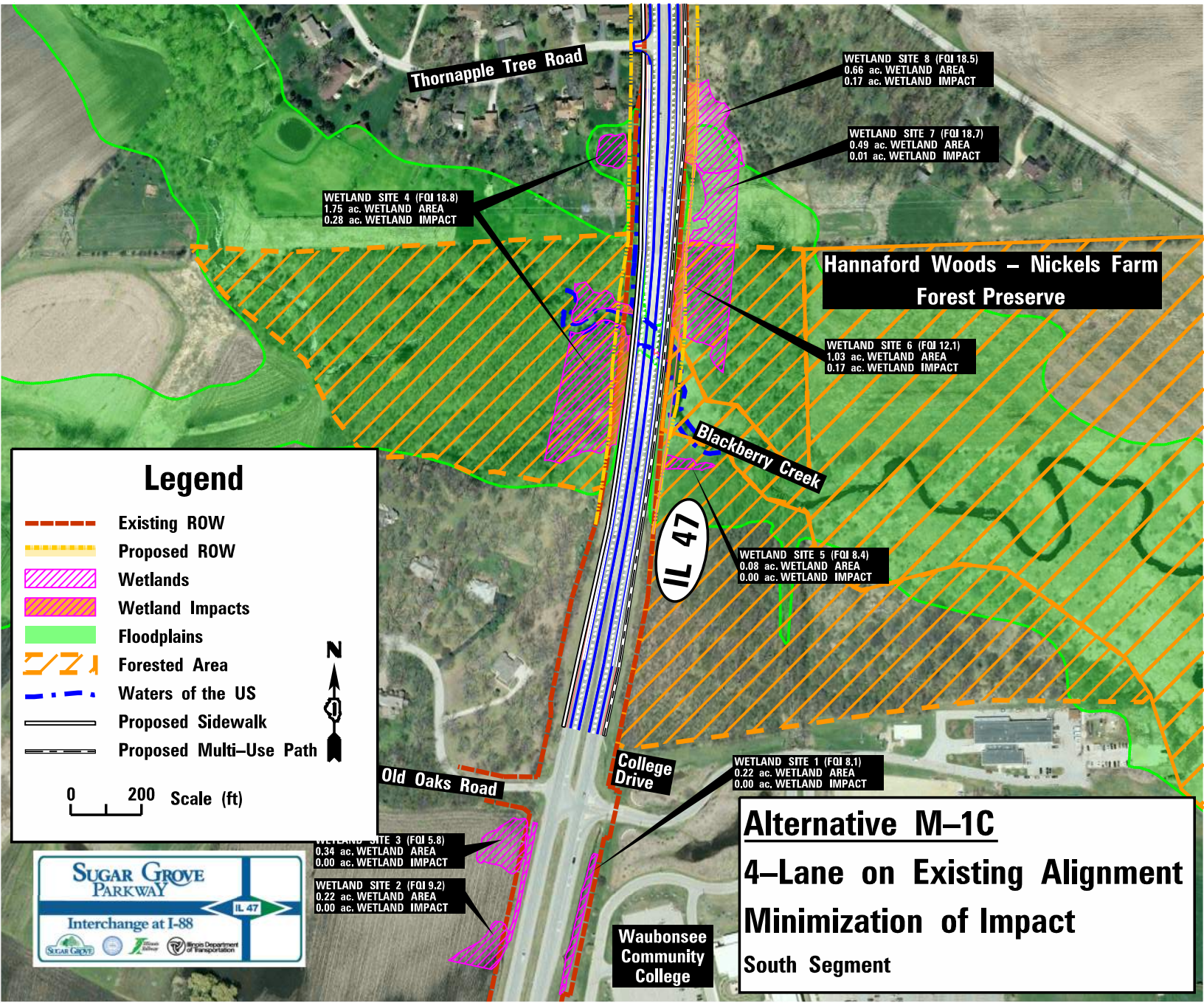
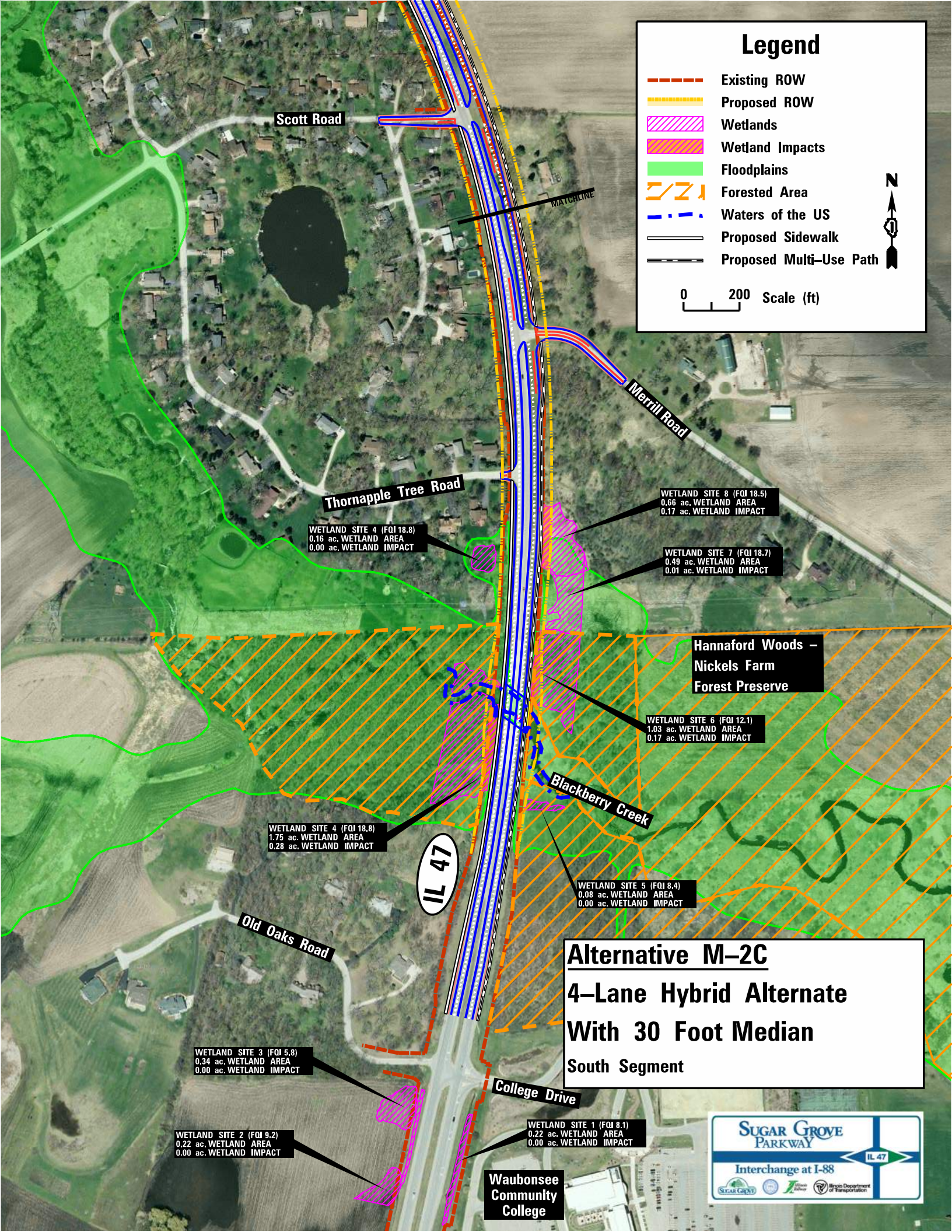
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Proposed Sidewalk
Proposed Multi–Use Path
0 200 Scale (ft)
N
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.17 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
POTENTIAL RESIDENTIAL DISPLACEMENT
INTERCHANGE IMPACT LIMITS
IL–47 MATCHLINE
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.08 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.28 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
Interchange at I-88
IL 47
Seavey Road
REFERENCE INTERCHANGE EXHIBITS FOR ADDITIONAL INFORMATION ON ALTERNATES I–1 THRU 1–4
Alternative M–1A
4–Lane on Existing Alignment
With 30 Foot Median
North Segment



PROPOSED TYPICAL SECTION
IL RTE 47 - THROUGH HANNAFORD WOODS - NICKELS FARM FOREST PRESERVE

REDUCED MEDIAN WIDTH W/ CONCRETE BARRIER SEPARATION

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Proposed ROW
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Wetland Impacts
Floodplains
Forested Area
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Proposed Sidewalk
Proposed Multi–Use Path
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0
200
Scale (ft)
Scott Road
MATCHLINE
Merrill Road
Thornapple Tree Road
WETLAND SITE 8 (FQI 18.5)
0.66 ac. WETLAND AREA
0.17 ac. WETLAND IMPACT
WETLAND SITE 4 (FQI 18.8)
0.16 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 7 (FQI 18.7)
0.49 ac. WETLAND AREA
0.01 ac. WETLAND IMPACT
Hannaford Woods –
Nickels Farm
Forest Preserve
WETLAND SITE 6 (FQI 12.1)
1.03 ac. WETLAND AREA
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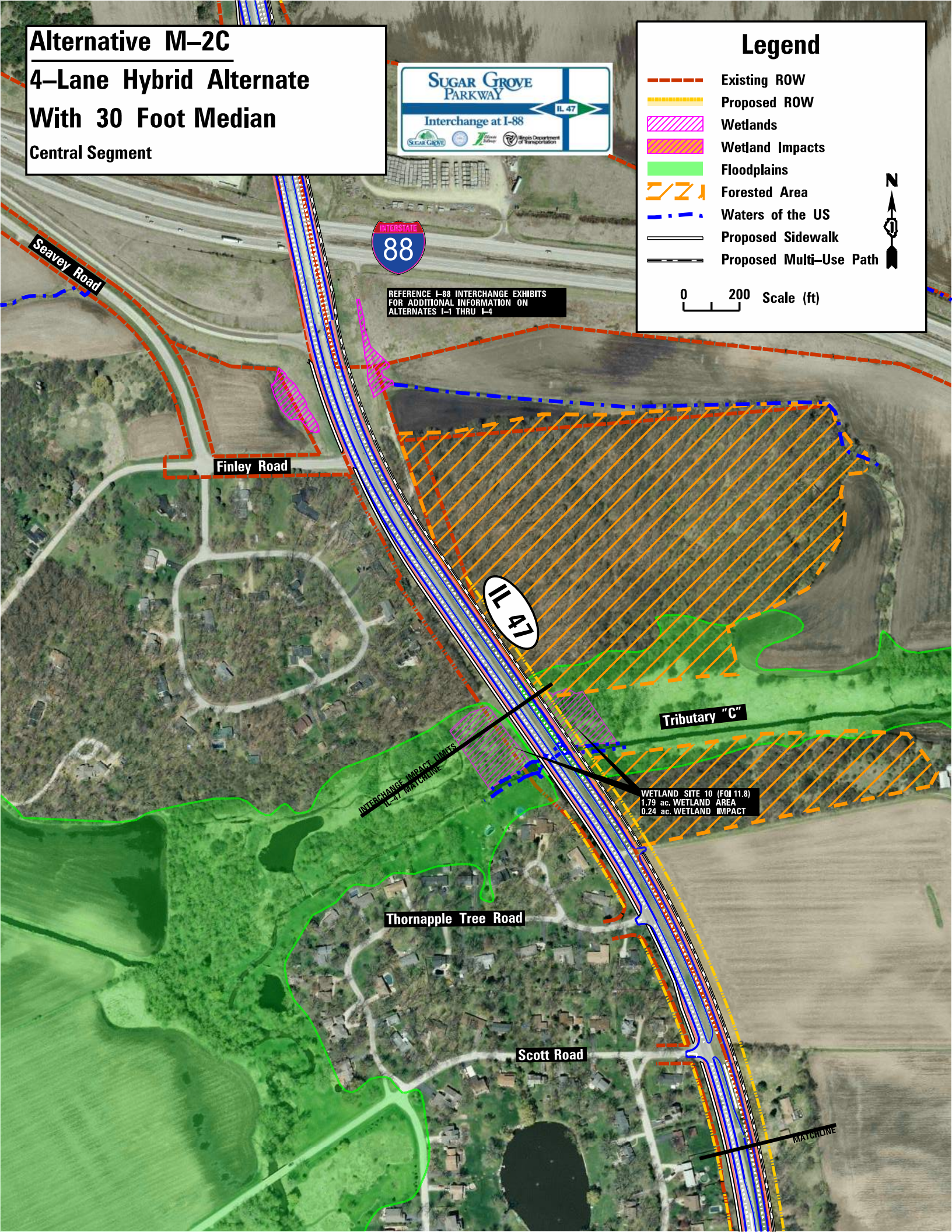
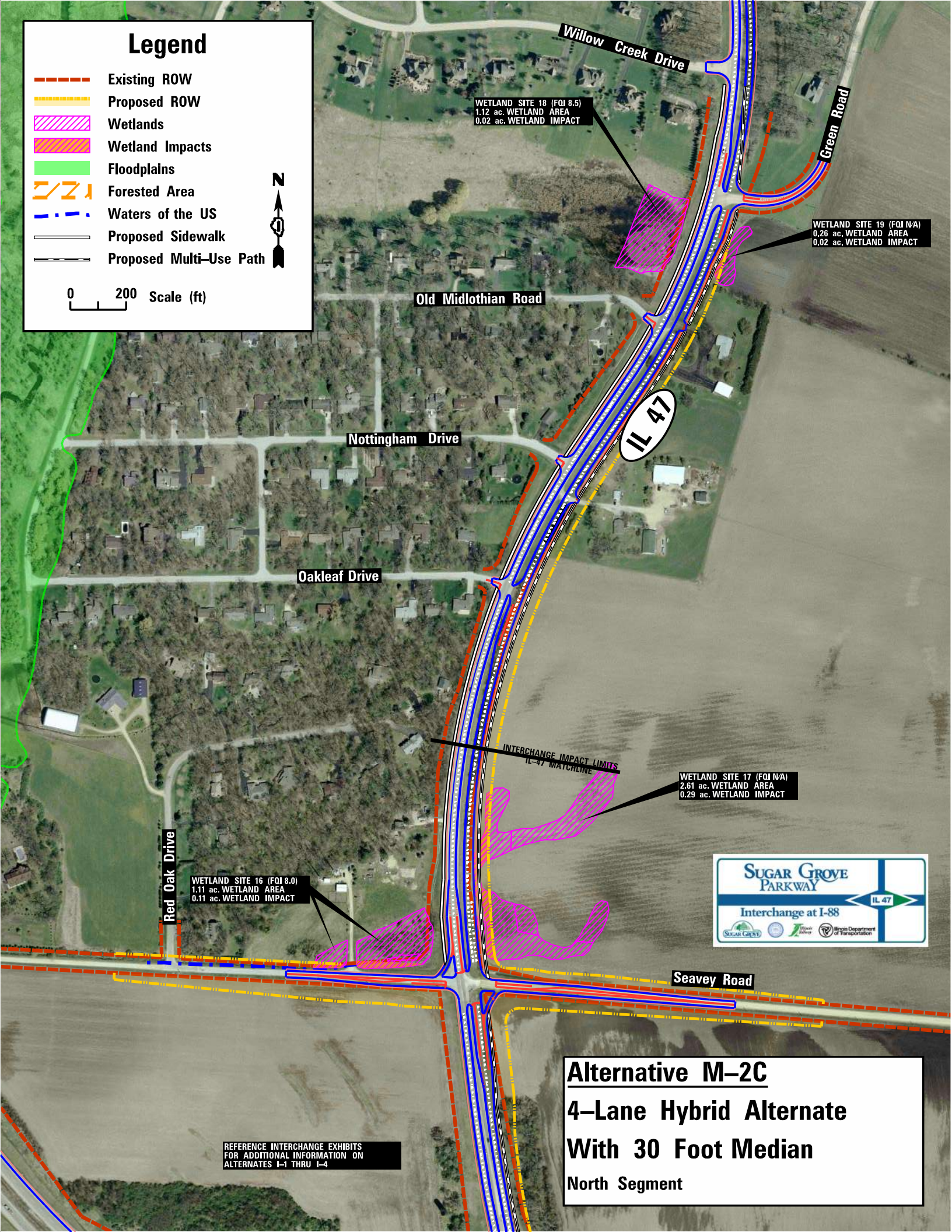
IL 47
WETLAND SITE 5 (FQI 8.4)
0.08 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Old Oaks Road
Alternative M–2C
4–Lane Hybrid Alternate
With 30 Foot Median
South Segment
WETLAND SITE 3 (FQI 5.8)
0.34 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
College Drive
WETLAND SITE 1 (FQI 8.1)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
WETLAND SITE 2 (FQI 9.2)
0.22 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
Waubonsee
Community
College
SUGAR GROVE
PARKWAY
IL 47
Interchange at I-88

Alternative M–2C

4–Lane Hybrid Alternate With 30 Foot Median

Central Segment




Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Proposed Sidewalk
Proposed Multi–Use Path
0 200 Scale (ft)
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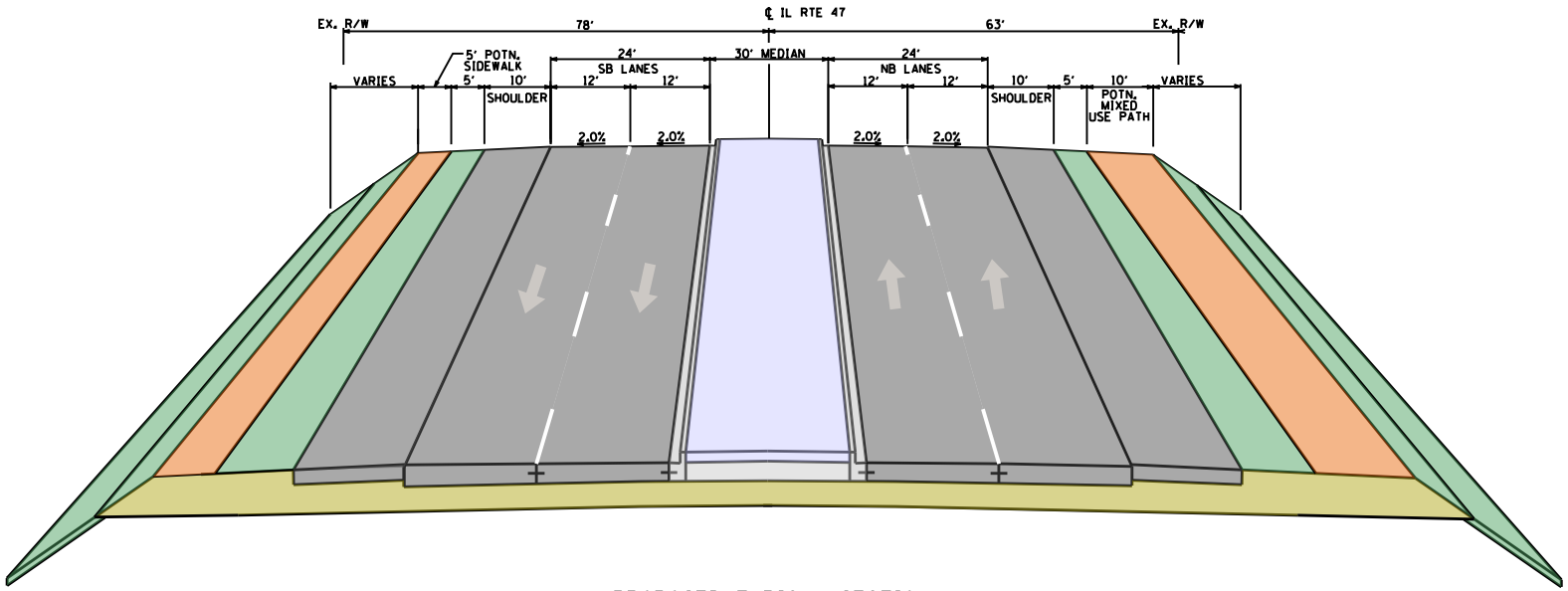
Willow Creek Drive
Green Road
WETLAND SITE 18 (FQI 8.5)
1.12 ac. WETLAND AREA
0.02 ac. WETLAND IMPACT
WETLAND SITE 19 (FQI N/A)
0.26 ac. WETLAND AREA
0.02 ac. WETLAND IMPACT
Old Midlothian Road
IL 47
Nottingham Drive
Oakleaf Drive
INTERCHANGE IMPACT LIMITS
IL–47 MATCHLINE
WETLAND SITE 17 (FQI N/A)
2.61 ac. WETLAND AREA
0.29 ac. WETLAND IMPACT
Red Oak Drive
WETLAND SITE 16 (FQI 8.0)
1.11 ac. WETLAND AREA
0.11 ac. WETLAND IMPACT
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88
Seavey Road
REFERENCE INTERCHANGE EXHIBITS
FOR ADDITIONAL INFORMATION ON
ALTERNATES I–1 THRU I–4
Alternative M–2C
4–Lane Hybrid Alternate
With 30 Foot Median
North Segment

Appendix B

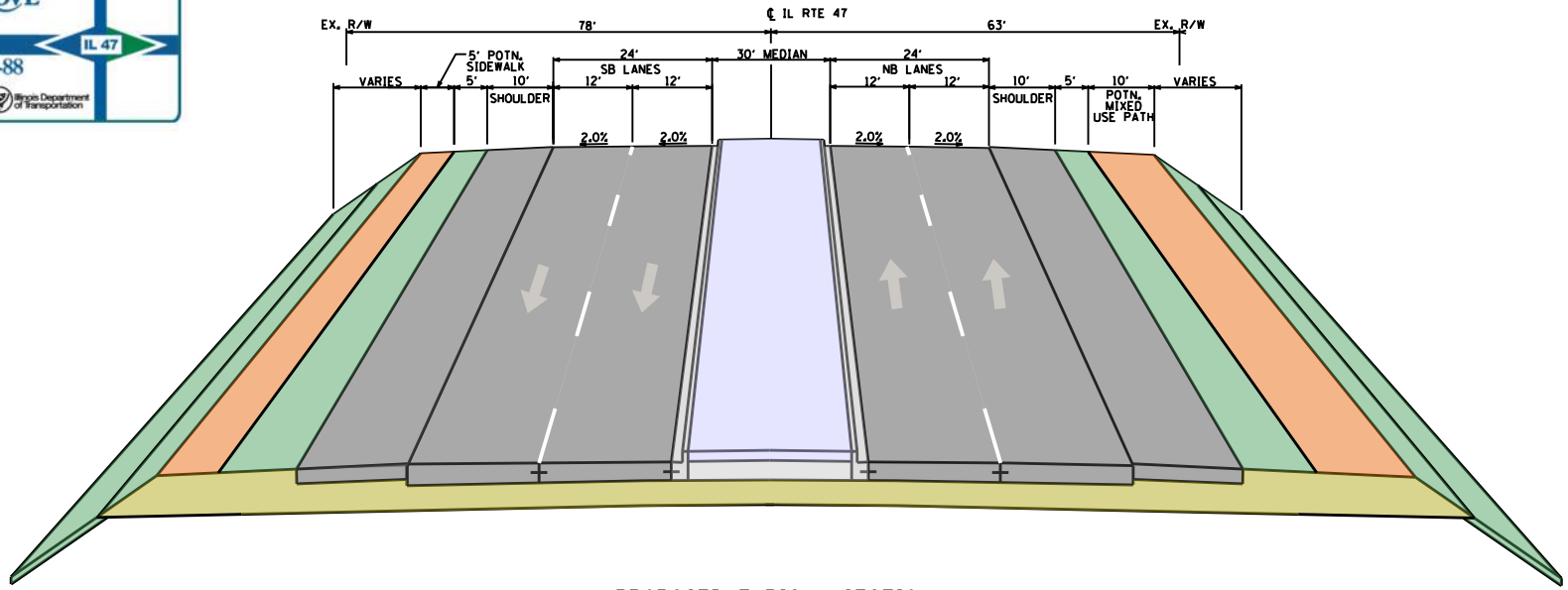
IL 47 Typical Sections

SUGAR GROVE PARKWAY
IL 47
Interchange at I-88



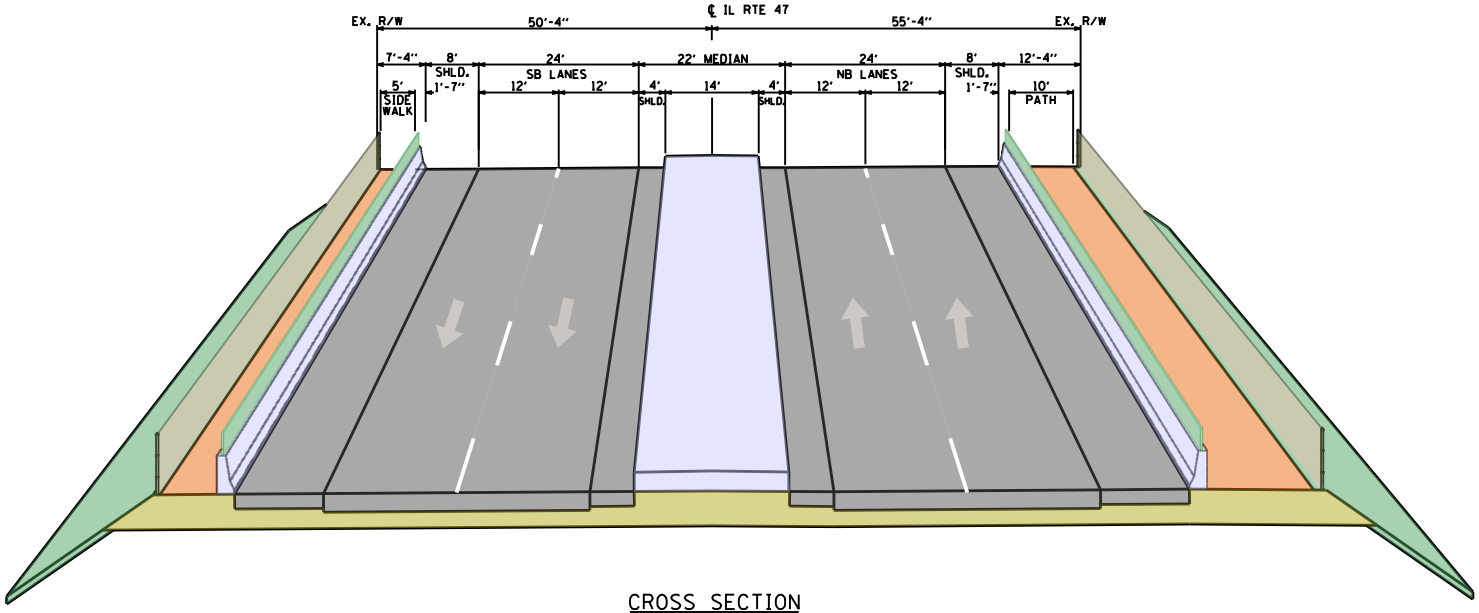
PROPOSED TYPICAL SECTION
IL RTE 47

M-1A - 30' RAISED MEDIAN



PROPOSED TYPICAL SECTION
IL RTE 47

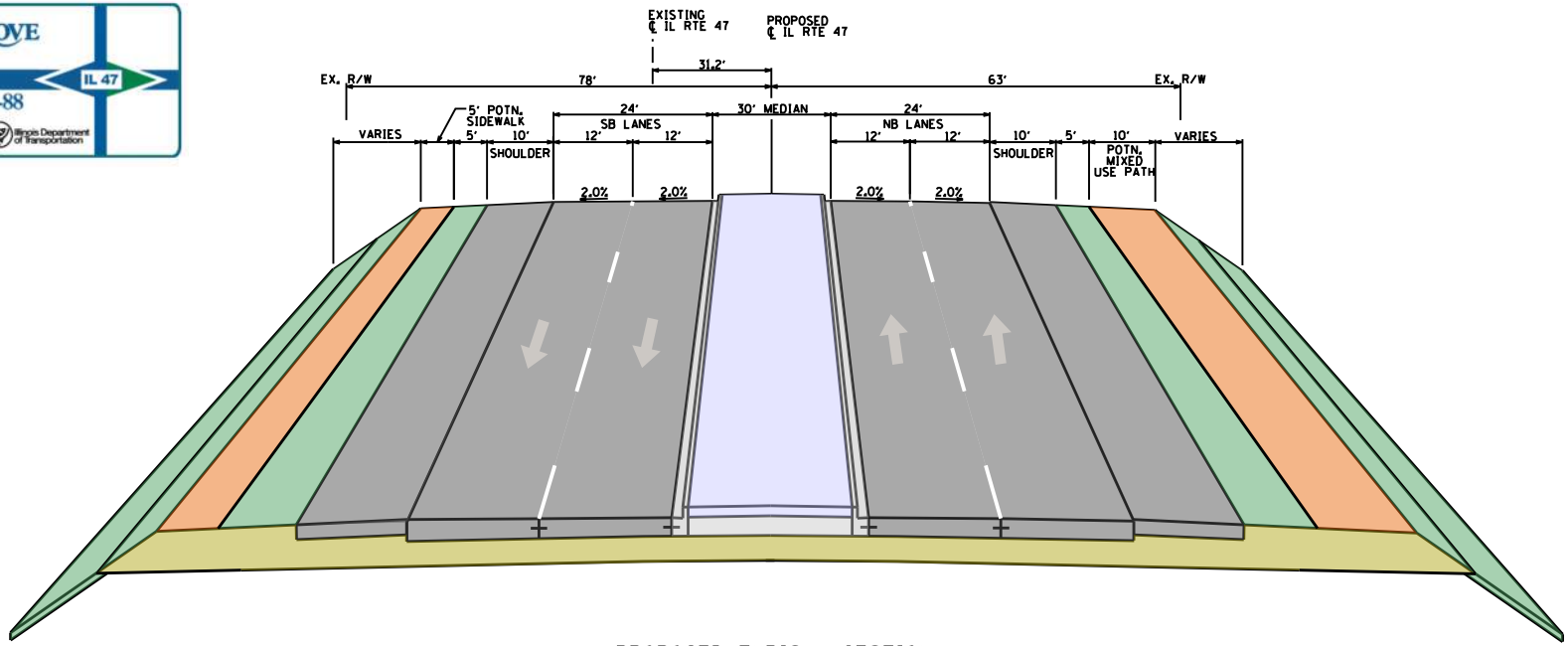
M-1C - 30' RAISED MEDIAN



CROSS SECTION
IL 47 OVER BLACKBERRY CREEK

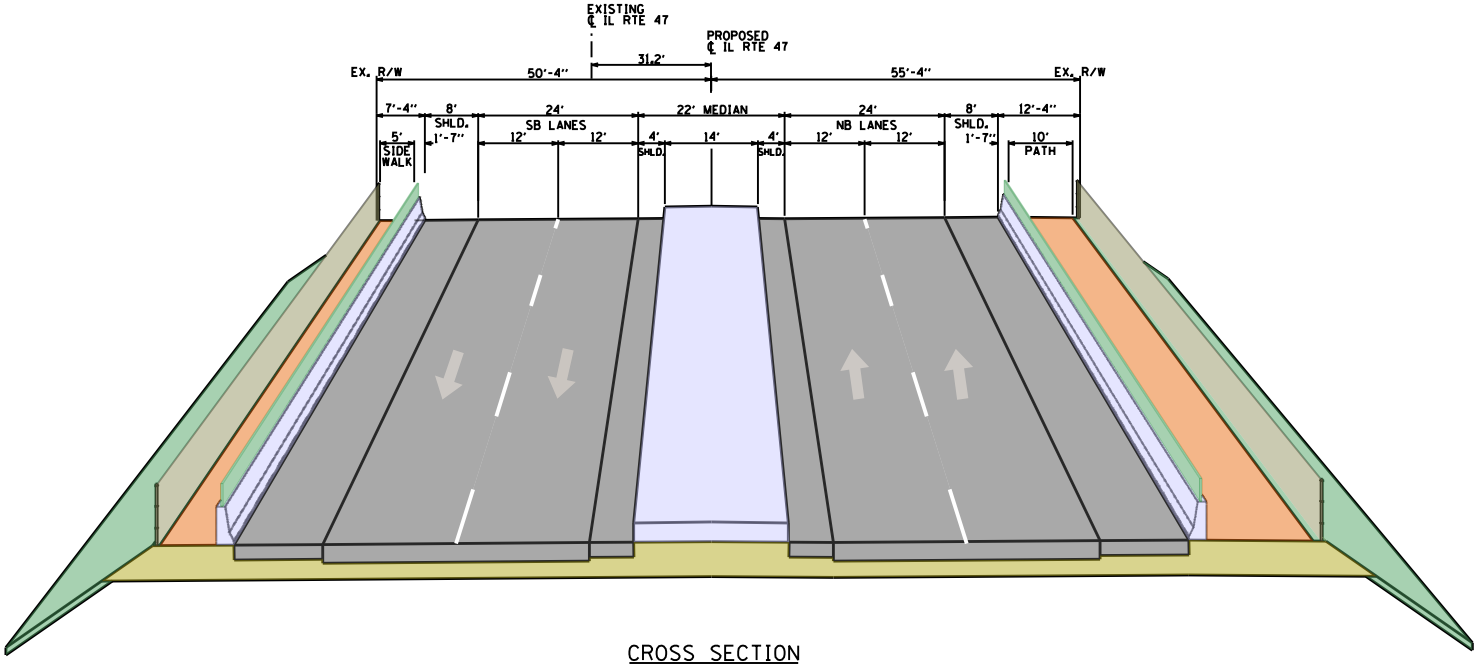
M-1C - 22' RAISED MEDIAN

SUGAR GROVE PARKWAY
IL 47
Interchange at I-88



PROPOSED TYPICAL SECTION
IL RTE 47

M-2C - 30' RAISED MEDIAN

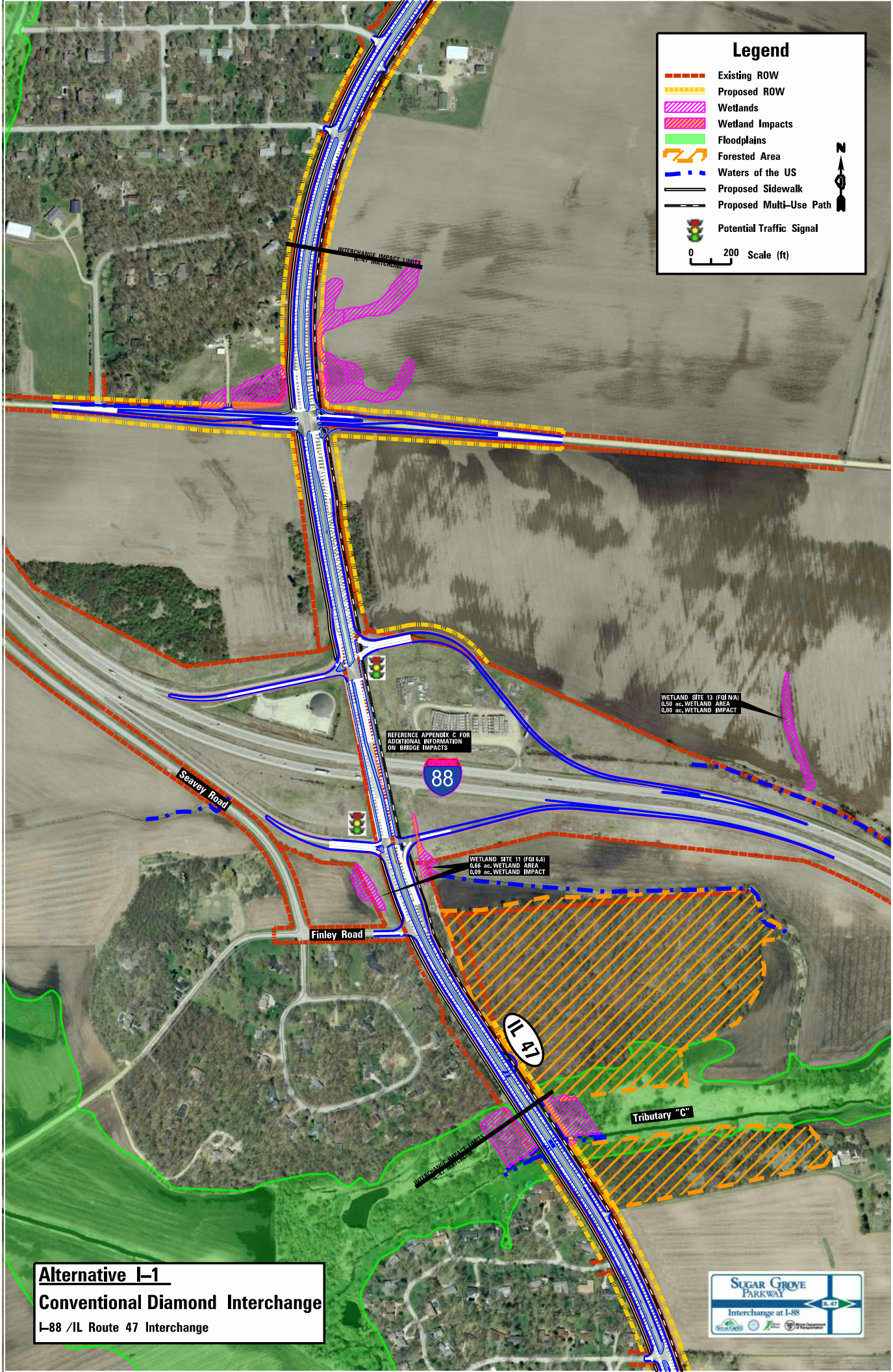


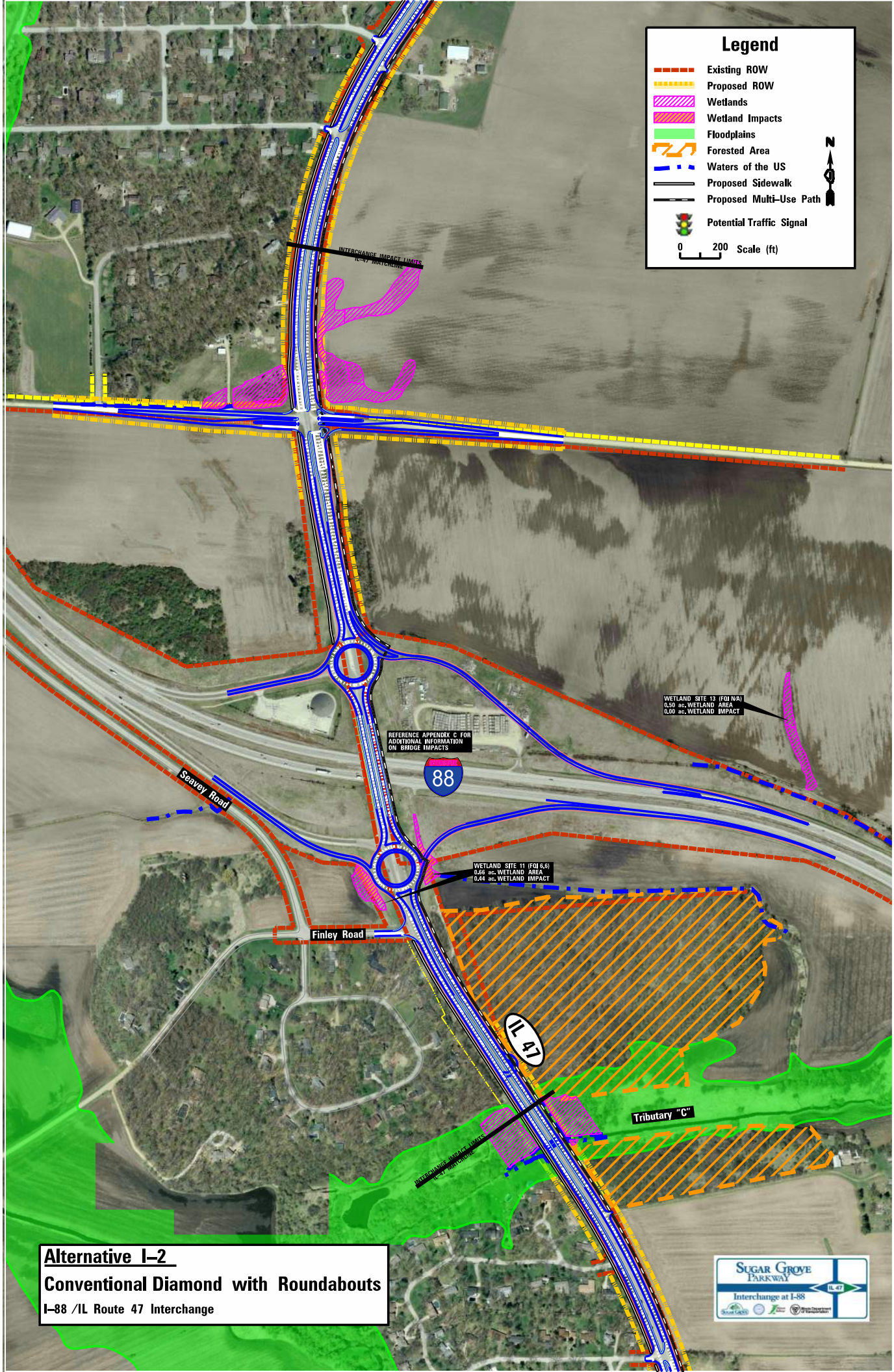
CROSS SECTION
IL 47 OVER BLACKBERRY CREEK

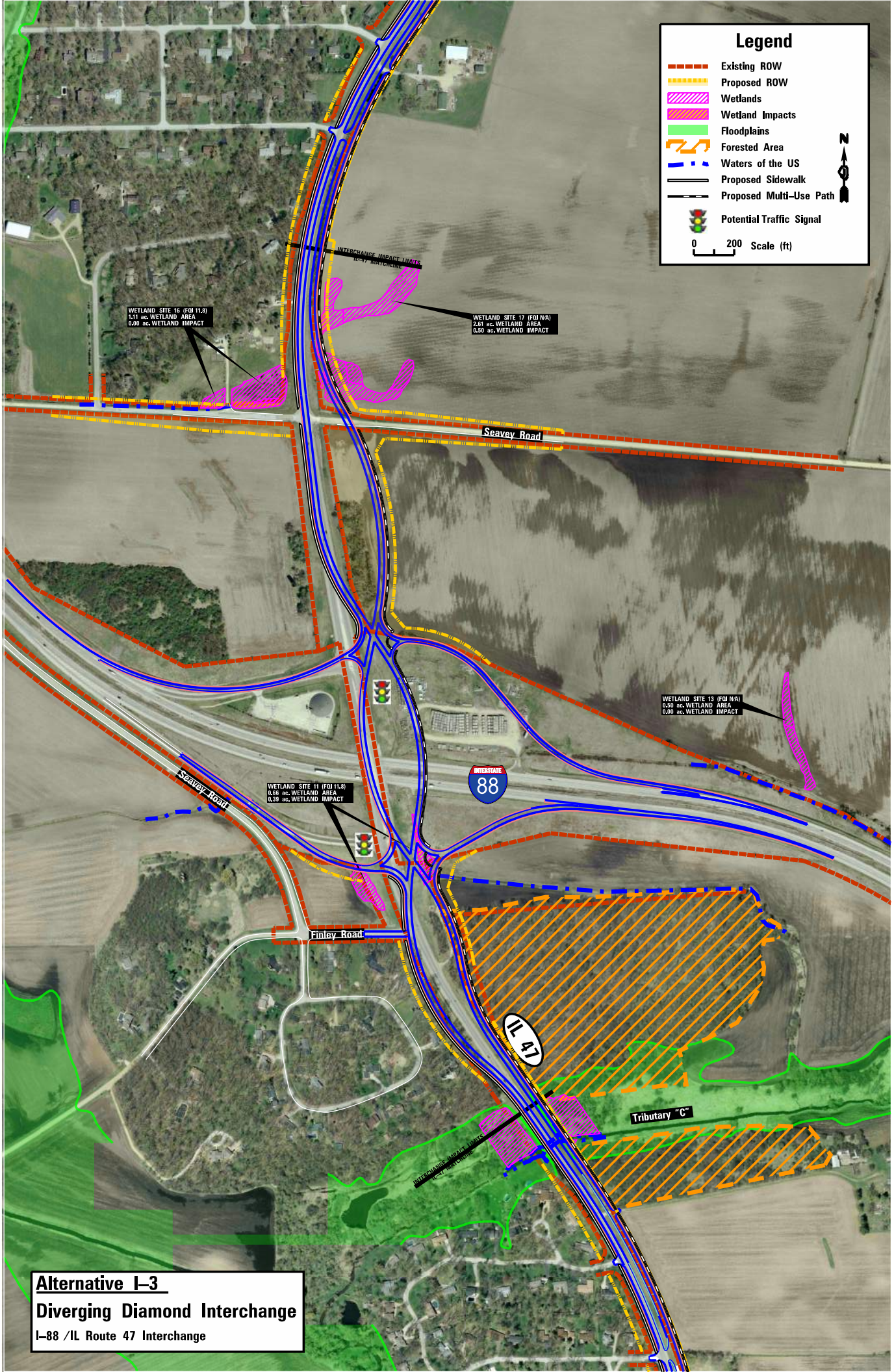
M2-C - 22' RAISED MEDIAN

Appendix C

IL 47 / I-88 Interchange Alternatives


Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Proposed Sidewalk
Proposed Multi-Use Path
Potential Traffic Signal
0 200 Scale (ft)
N
INTERCHANGE IMPACT LIMITS
(E-W MATCHLINE)
WETLAND SITE 13 (FQI N/A)
0.50 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
REFERENCE APPENDIX C FOR
ADDITIONAL INFORMATION
ON BRIDGE IMPACTS
88
Seavey Road
WETLAND SITE 11 (FQI 6.6)
0.66 ac. WETLAND AREA
0.09 ac. WETLAND IMPACT
Finley Road
IL 47
Tributary "C"
INTERCHANGE IMPACT LIMITS
(E-W MATCHLINE)
Alternative I-1
Conventional Diamond Interchange
I-88 /IL Route 47 Interchange
Sugar Grove Parkway
Interchange at I-88
IL 47

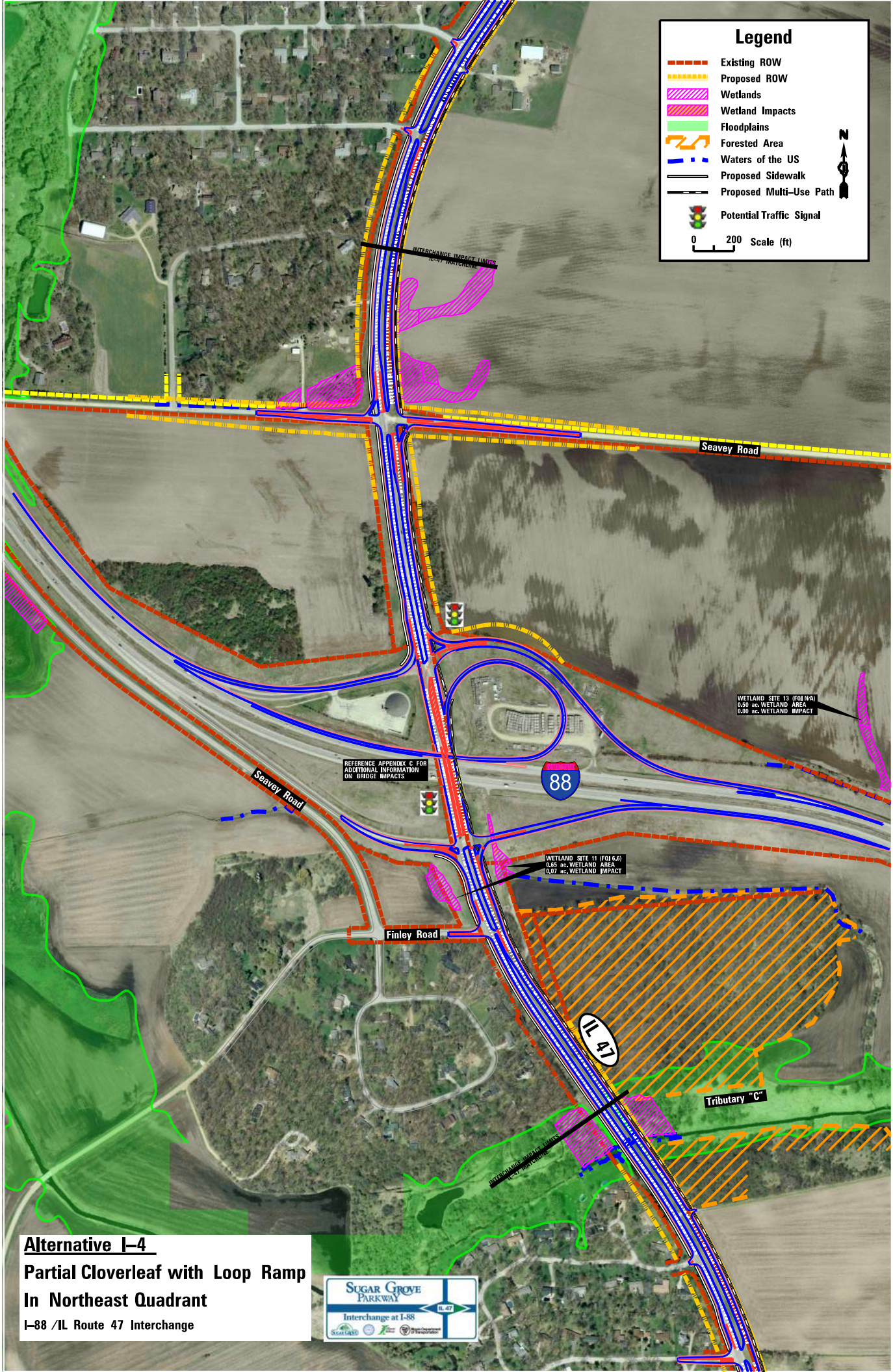

Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Proposed Sidewalk
Proposed Multi-Use Path
Potential Traffic Signal
0 200 Scale (ft)
N
INTERCHANGE IMPACT LIMITS
(IL-47 NORTHBOUND)
WETLAND SITE 13 (FOI N/A)
0.50 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
REFERENCE APPENDIX C FOR
ADDITIONAL INFORMATION
ON BRIDGE IMPACTS
88
Seavey Road
WETLAND SITE 11 (FOI 6,6)
0.66 ac. WETLAND AREA
0.44 ac. WETLAND IMPACT
Finley Road
IL 47
Tributary "C"
INTERCHANGE IMPACT LIMITS
(IL-47 NORTHBOUND)
Alternative I–2
Conventional Diamond with Roundabouts
I–88 /IL Route 47 Interchange
Sugar Grove Parkway
Interchange at I-88
IL 47



Alternative I–3

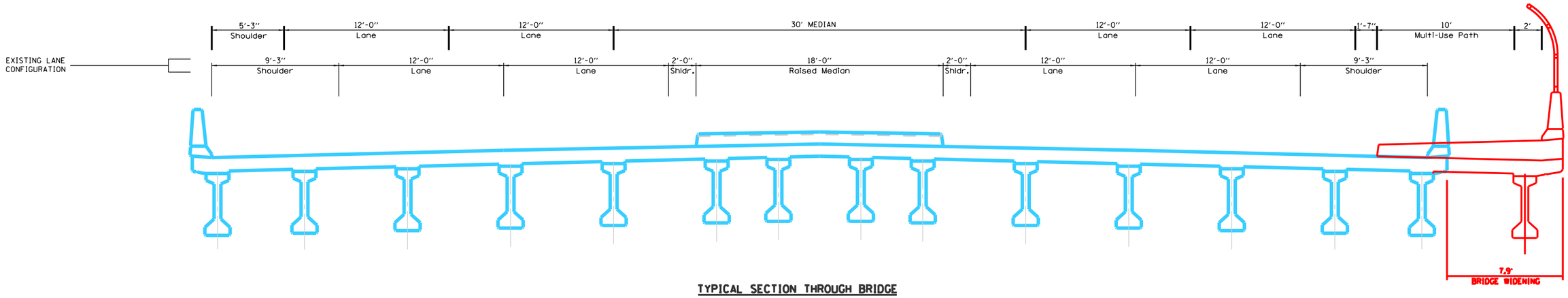
Diverging Diamond Interchange

I–88 /IL Route 47 Interchange

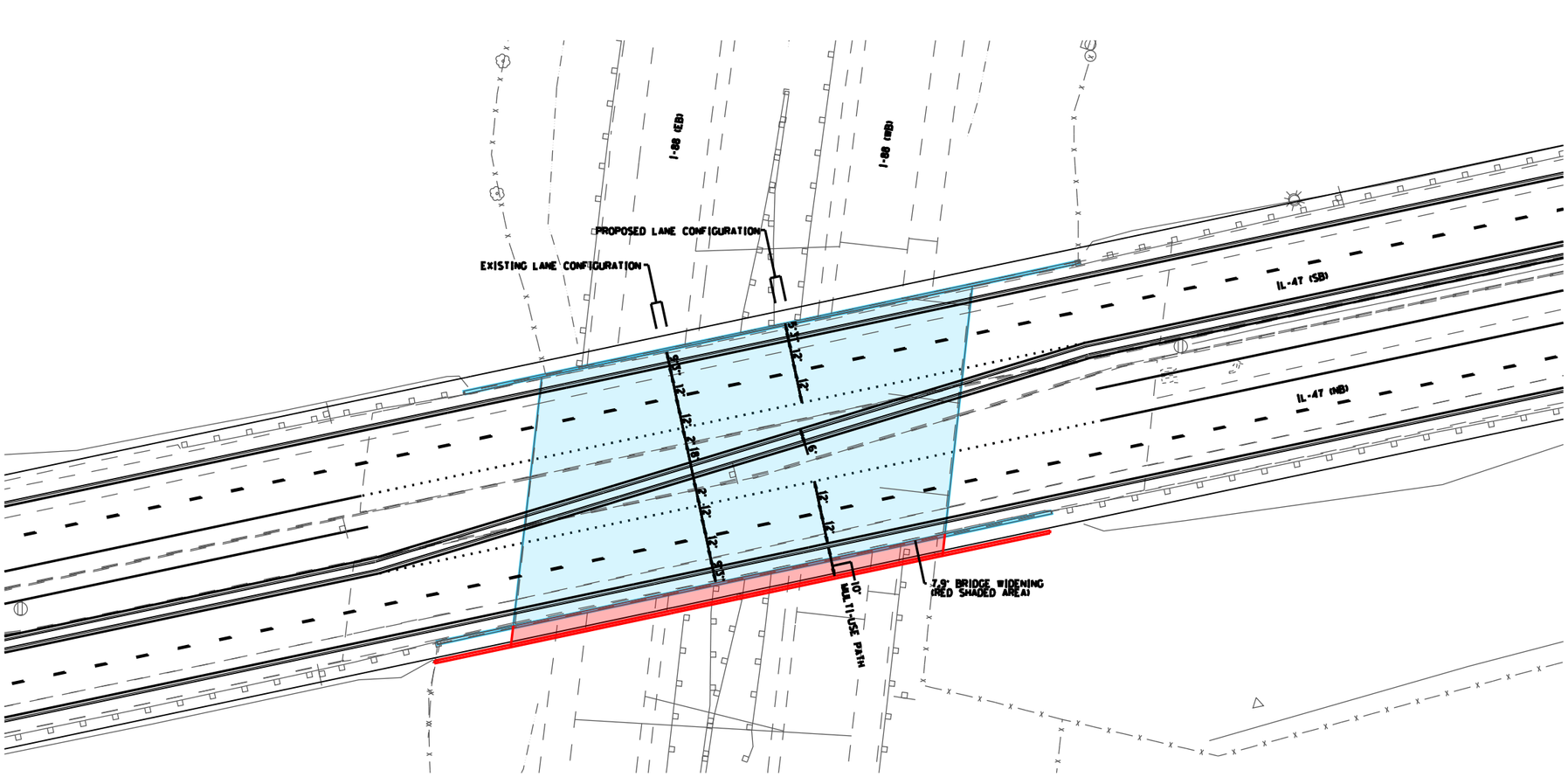

Legend
Existing ROW
Proposed ROW
Wetlands
Wetland Impacts
Floodplains
Forested Area
Waters of the US
Proposed Sidewalk
Proposed Multi-Use Path
Potential Traffic Signal
0
200
Scale (ft)
N
INTERCHANGE IMPACT LIMITS
(I-47 INTERCHANGE)
Seavey Road
WETLAND SITE 13 (FQI N/A)
0.50 ac. WETLAND AREA
0.00 ac. WETLAND IMPACT
REFERENCE APPENDIX C FOR
ADDITIONAL INFORMATION
ON BRIDGE IMPACTS
88
Seavey Road
WETLAND SITE 11 (FQI 6.6)
0.65 ac. WETLAND AREA
0.07 ac. WETLAND IMPACT
Finley Road
IL 47
Tributary "C"
INTERCHANGE IMPACT LIMITS
(I-47 INTERCHANGE)
Alternative I-4
Partial Cloverleaf with Loop Ramp
In Northeast Quadrant
I-88 /IL Route 47 Interchange
SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

Appendix D

IL 47 Bridge Typical Sections for Interchange Alternatives



TYPICAL SECTION THROUGH BRIDGE
(Looking North)



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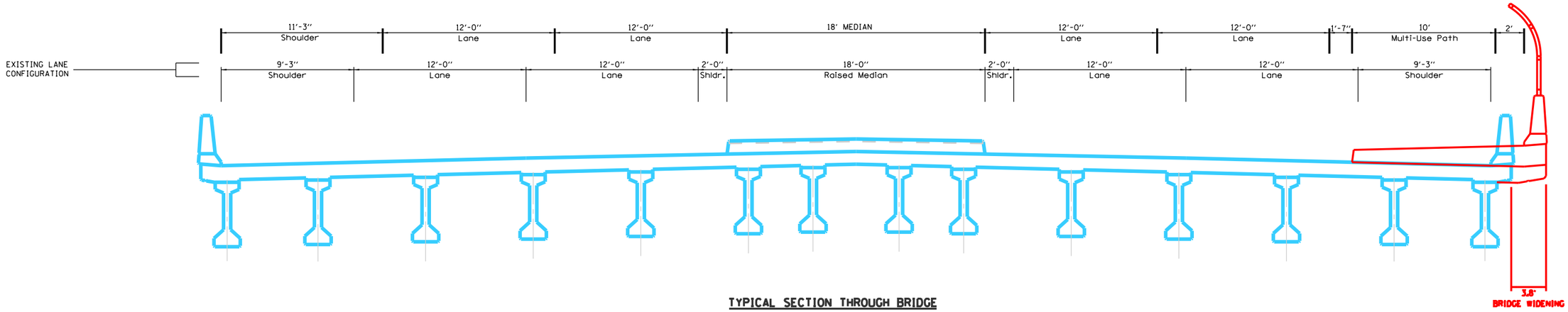
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

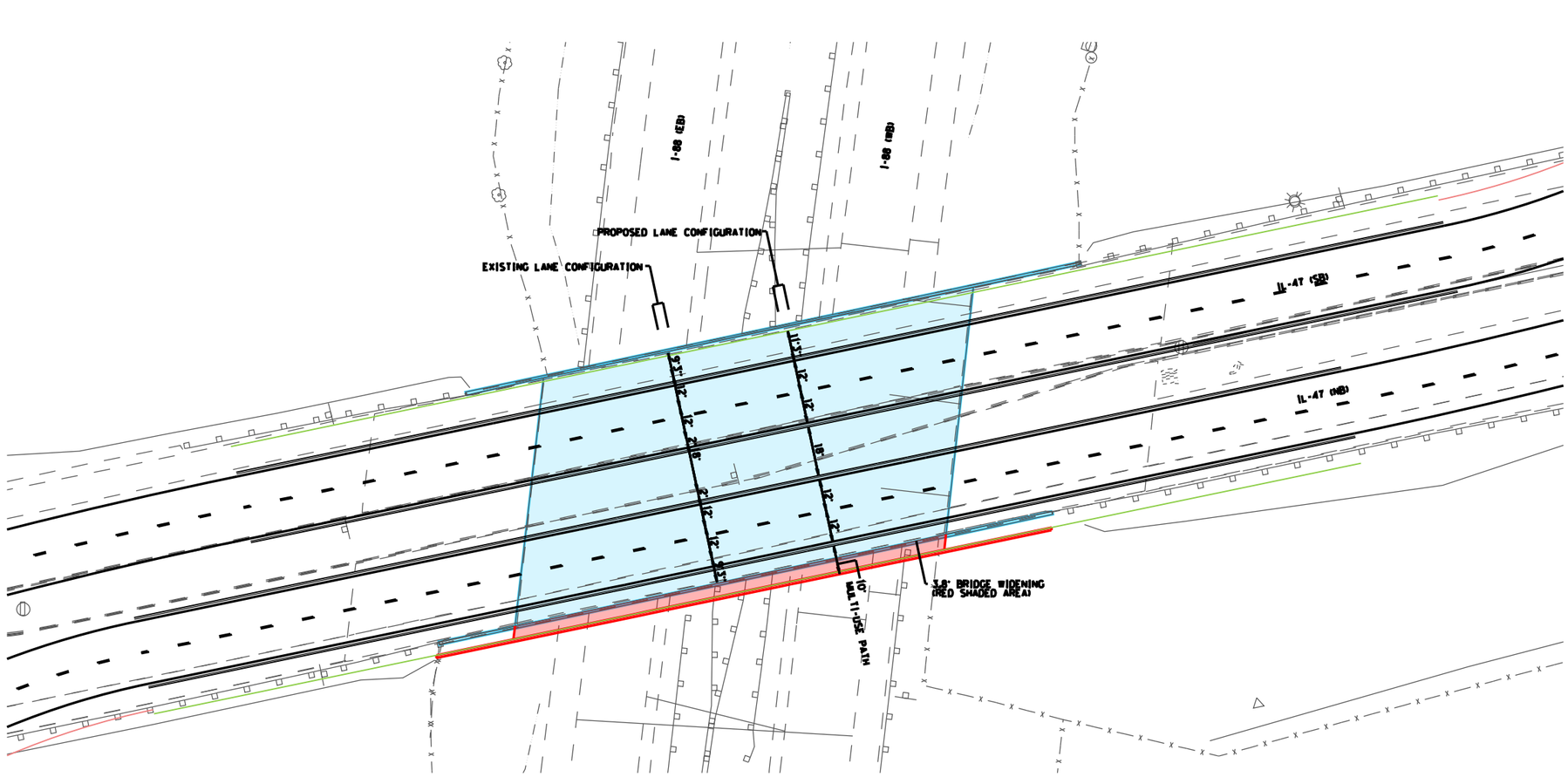
ILLINOIS ROUTE 47 – STRUCTURE NO. 045–0082
TYPICAL SECTION – DIAMOND INTERCHANGE ALT I–1

SCALE: | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



TYPICAL SECTION THROUGH BRIDGE
(Looking North)



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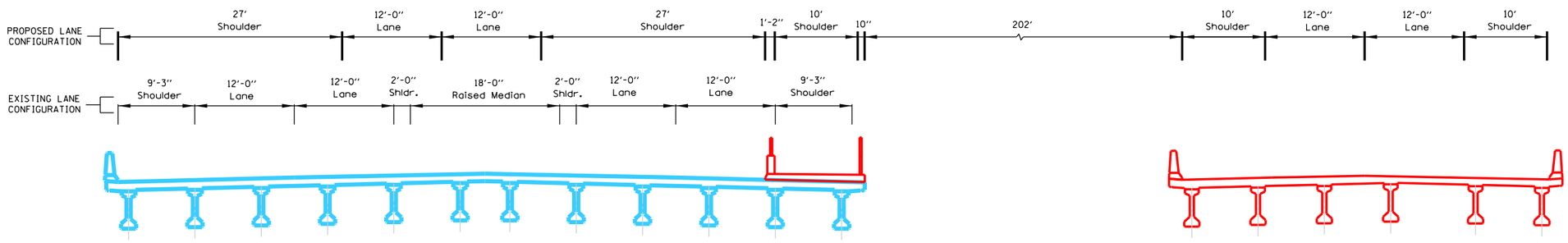
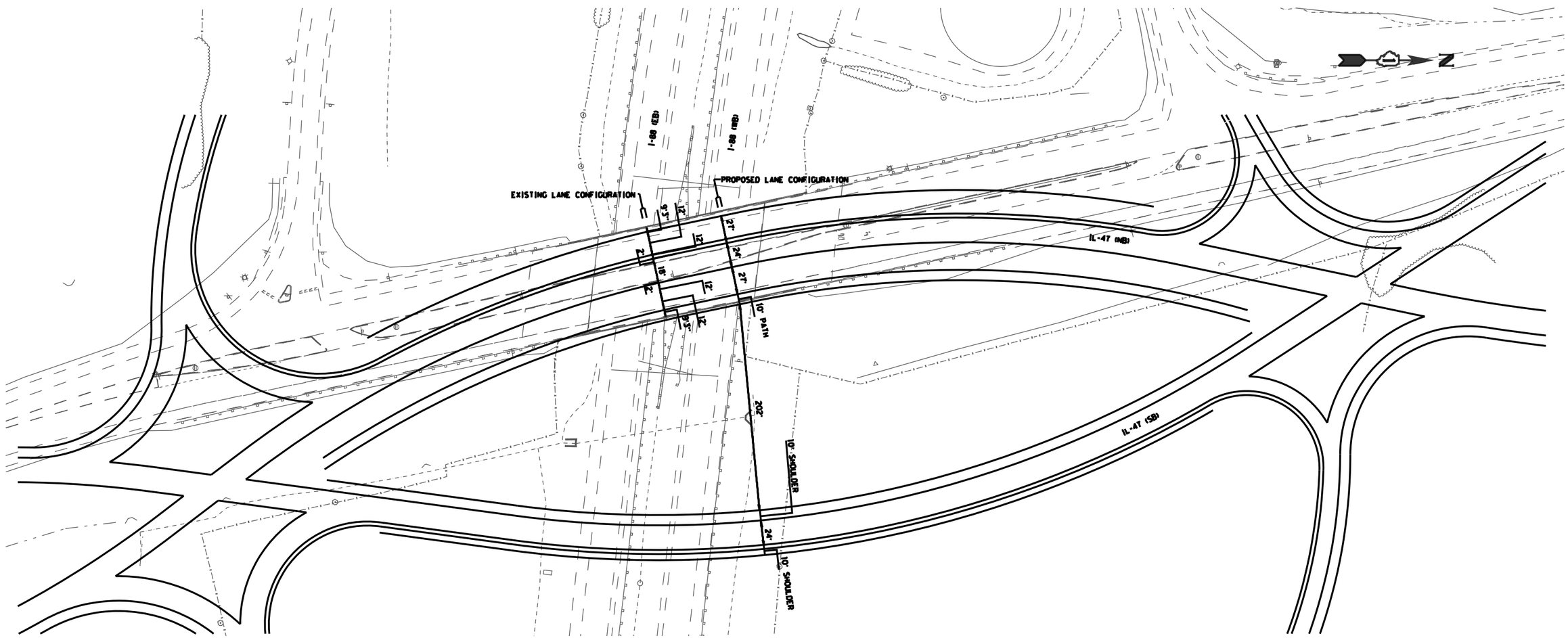


TYPICAL SECTION THROUGH BRIDGE
(Looking North)



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GRAEF
850 N. Higgins Road, Suite 200
Chicago, Illinois 60631
(773) 399-0112

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ILLINOIS ROUTE 47 – STRUCTURE NO. 045-0082
TYPICAL SECTION – DDI – ALT I-3

SCALE: ____ SHEET ___ OF ___ SHEETS STA. ____ TO STA. ____

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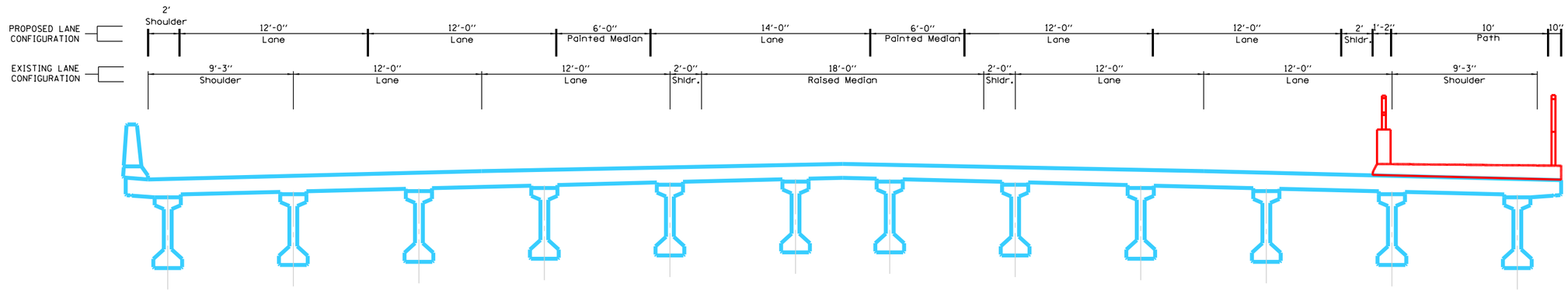
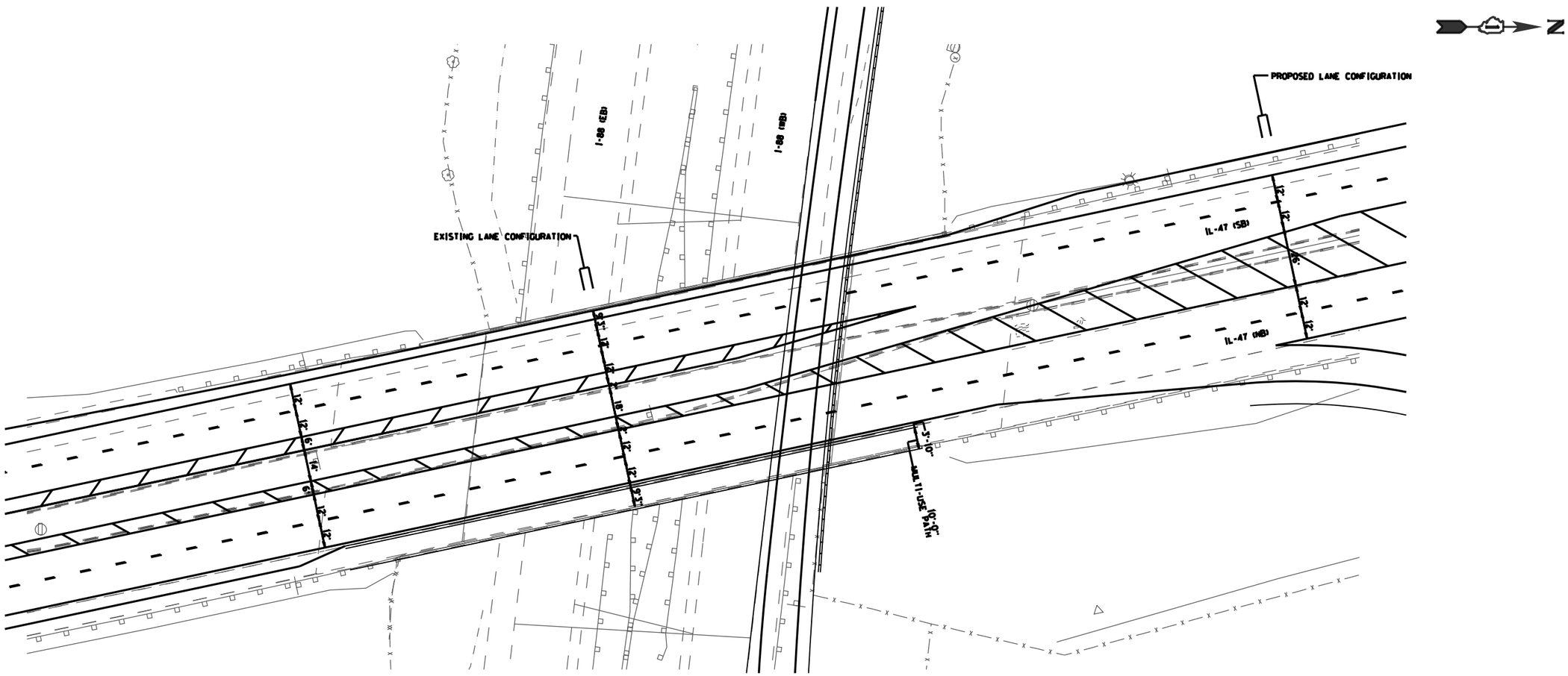


TYPICAL SECTION THROUGH BRIDGE

(Looking North)



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Appendix E

IL 47 Operational Reviews

IL 47 Operational Review-2040 No-Build Conditions

Roadway Segment	Number of Lanes[1]		Operational Review – 2040 No-Build Conditions			
			Weekday AM Peak Hour		Weekday PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Green Road to Seavey Road	1	1	LOS E	LOS E	LOS E	LOS D
Seavey Road to I-88 W On-Ramp	1	1	LOS E	LOS E	LOS E	LOS D
I-88 W On-Ramp to I-88 E Off-Ramp	2	2	LOS B	LOS A	LOS B	LOS A
I-88 E Off-Ramp to Finley Road	2	1	LOS B	LOS E	LOS B	LOS E
Finley Road to Scott Road	1	1	LOS E	LOS E	LOS E	LOS E
Scott Road to Merrill Road	1	1	LOS E	LOS E	LOS E	LOS E
Merrill Road to Old Oaks Road/ College Drive	1	1	LOS D	LOS E	LOS D	LOS D

[1]On segments where the number of directional lanes varies, the narrower cross-section was used in analysis for a conservative result.

IL 47 Operational Review-2040 Build Conditions

Roadway Segment	Number of Lanes		Operational Review – 2040 Build Conditions			
			Weekday AM Peak Hour		Weekday PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Green Road to Seavey Road	2	2	LOS A	LOS A	LOS A	LOS A
Seavey Road to I-88 W On-Ramp	2	2	LOS A	LOS A	LOS B	LOS A
I-88 W On-Ramp to I-88 E Off-Ramp	2	2	LOS B	LOS B	LOS B	LOS A
I-88 E Off-Ramp to Finley Road	2	2	LOS B	LOS B	LOS B	LOS B
Finley Road to Scott Road	2	2	LOS B	LOS B	LOS B	LOS B
Scott Road to Merrill Road	2	2	LOS A	LOS B	LOS A	LOS A
Merrill Road to Old Oaks Road/ College Drive	2	2	LOS A	LOS A	LOS A	LOS A

IL 47 Intersection Operational Review-2025 Build Conditions

Intersection	Type of Intersection Control	Operational Review – 2025 Build Conditions	
		Weekday AM Peak Hour	Weekday PM Peak Hour
IL 47 at Green Road	Minor-Leg Stop Control	LOS C (WB Approach)	LOS C (WB Approach)
IL 47 at Scott Road	Minor-Leg Stop Control	LOS C (EB Approach)	LOS C (EB Approach)
IL 47 at Merrill Road	Minor-Leg Stop Control	LOS B (WB Approach)	LOS B (WB Approach)
IL 47 at Old Oaks Road/College Drive	Signalized	LOS A	LOS B

IL 47 Intersection Operational Review-2040 Build Conditions

Intersection	Type of Intersection Control	Operational Review – 2040 Build Conditions	
		Weekday AM Peak Hour	Weekday PM Peak Hour
IL 47 at Green Road	Minor-Leg Stop Control	LOS D (WB Approach)	LOS E (WB Approach)
IL 47 at Scott Road	Signalized	LOS B	LOS A
IL 47 at Merrill Road	Signalized	LOS B	LOS B
IL 47 at Old Oaks Road/College Drive	Signalized	LOS A	LOS A

IL 47/I-88 Interchange Operational Review-2025 Build Conditions

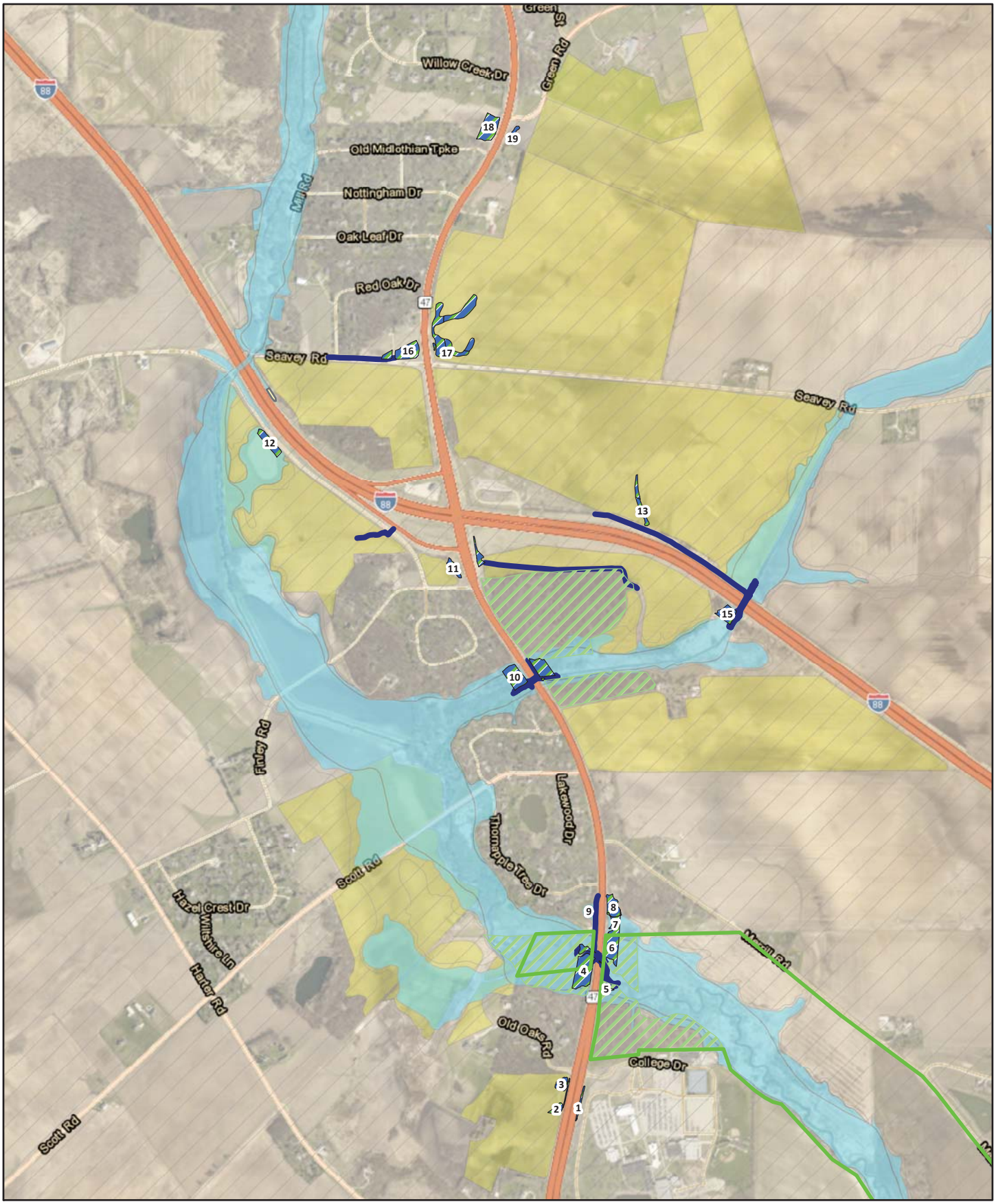
Intersection	Type of Intersection Control	Operational Review – 2025 Build Conditions	
		Weekday AM Peak Hour	Weekday PM Peak Hour
IL 47 at Seavey Road	Minor-Leg Stop Control	LOS B (EB Approach) LOS C (WB Approach)	LOS B (EB Approach) LOS C (WB Approach)
IL 47 at I-88 W Ramps	Minor-Leg Stop Control	LOS C (WB Approach)	LOS C (WB Approach)
IL 47 at I-88 E Ramps	Minor-Leg Stop Control	LOS C (EB Approach)	LOS B (EB Approach)
IL 47 at Finley Road	Minor-Leg Stop Control (Three-Quarters Access)	LOS B (EB Approach)	LOS B (EB Approach)

IL 47/I-88 Interchange Operational Review-2040 Build Conditions

Intersection	Type of Intersection Control	Operational Review – 2040 Build Conditions	
		Weekday AM Peak Hour	Weekday PM Peak Hour
IL 47 at Seavey Road	Signalized	LOS B	LOS B
IL 47 at I-88 W Ramps	Signalized	LOS B	LOS B
IL 47 at I-88 E Ramps	Signalized	LOS B	LOS B
IL 47 at Finley Road	Minor-Leg Stop Control (Three-Quarters Access)	LOS A (EB Approach)	LOS A (EB Approach)

Appendix F

Natural Resources Map



Forest Preserve
Forested Area
Wetland Sites
Farmland
Waters of the U.S.
Flood Hazard AE
Flood Hazard X

0 500 1,000
Feet

Natural Resource Map

Sugar Grove Parkway
Interchange at I-88 and IL 47
FAP Route 326 Illinois Route 47
at Reagan Memorial Tollway (I-88)
P-91-015-13

09/22/2015

Data Provided by: http://http://www.fema.gov/national-flood-hazard-layer-nfhl
Service Layer Credits:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors

Appendix G

Public Involvement Meeting Minutes

CAG Meeting #4

Summary

General Information, Overview, Purpose, and Goals

The fourth Community Advisory Group (CAG) meeting for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) Improvement Study was held on Tuesday, November 15, 2016 from 9:30 A.M. to 11:30 A.M. at the Academic and Professional Center, Event Room, Waubonsee Community College, Route 47 at Waubonsee Drive, Sugar Grove, IL 60554.

The meeting included a power point presentation that reviewed the previous CAG #3 meeting, Public Information #2 meeting, range of IL 47 alignment alternatives and IL 47 and I-88 interchange alternatives, and the screening process for the range of alternatives. The goal of this meeting was to present a range of alternatives considered, explain the Alternative Screening Process, and describe and seek input on the range of alternatives to be carried forward for the project.

Project Team Attendance

- Tony Speciale – Village of Sugar Grove
- Steve Schilke – IDOT
- Kyle Bochte – IDOT
- Niki Nutter – Illinois Tollway
- Peter Johnston – GRAEF
- Peter Ross – CMT
- Kris Salvatera – CMT
- Jennifer Becker – Kane County Division of Transportation

CAG Member Attendance

The meeting was attended by 10 of the 32 CAG members.

1. Walter Magdziarz – Village of Sugar Grove
2. Patrick Knapp – Kane Kendall Council of Mayors
3. Tom Rowe – Sugar Grove Township
4. Pete Adams – Waubonsee Community College
5. Marv Bailey – Crown Community Development
6. Dan Olsem – Crown Community Development
7. David Livengood – Resident
8. Tyrone Tipitino – Resident
9. Leroy Karp - Resident
10. Christopher Kruse – Resident

Other Attendees

None

Range of Alternatives

An overview of the range of IL 47 Alignment Alternatives and IL 47 Interchange Alternatives was provided. It included a visual map of the alignment alternatives, typical section exhibits of alignment combinations, the proposed access management along IL 47, and maps of the various service interchange types. Further description of the range of alternatives follows:

IL 47 Alternatives

Eight total IL 47 alternatives were presented to the CAG. Each alternative has two parts: its alignment and its typical section. The reviewed IL 47 alignments included the following:

M-1. Existing Alignment with Symmetrical Widening

M-2. Existing Alignment with Asymmetrical Widening to the East

M-3. New Alignment to the East

M-4. New Alignment to the West

The M-4 alignment was recently created to avoid Section 4(f) impacts, per NEPA guidance. Its presentation at this meeting introduced the CAG to this alternative.

Typical sections varied based on the width of the median, as follows:

A. Rural Typical SRA Section with 50-foot Ditch Median

B. Suburban Typical SRA Section with 30-foot Raised Median

C. Modified Typical SRA Section with 6-foot Raised Median

This resulted in the following IL 47 alternatives presented to the CAG:

Alt.	Alignment	Typical Section
M-1A	Existing Alignment with Symmetrical Widening	30-foot median
M-1B	Existing Alignment with Symmetrical Widening	50-foot median
M-1C	Existing Alignment with Symmetrical Widening	30-foot median/6-foot in FP
M-2A	Existing Alignment with Asymmetrical Widening to East	30-foot median
M-2B	Existing Alignment with Asymmetrical Widening to East	50-foot median
M-2C	Existing Alignment with Asymmetrical Widening to East	30-foot median/6-foot in FP
M-3	New Alignment East	50-foot median
M-4	New Alignment West	30-foot median

FP = Section 4(f) Forest Preserve Areas

Interchange Alternatives

The I-88 service type interchanges reviewed included the following:

Alternative	Description
I-1	Conventional Diamond
I-2	Conventional Diamond with Roundabouts
I-3	Diverging Diamond
I-4	Partial Cloverleaf NE Quadrant
I-5	Partial Cloverleaf NE and SW Quadrant
I-6	Partial Cloverleaf SW Quadrant
I-7	Partial Cloverleaf – Loop Ramp terminating at Finley Road

Alternative Evaluation and Screening Process

An overview of the evaluation and screening process was given. Evaluation criteria is the yardstick against which an alternate is measured to determine pros and cons and to compare with other alternatives. The facilitator explained how the Alternatives Evaluation and Screening Process will be used to narrow the range of alternatives down to the eventual recommended preferred alternative. The facilitator pointed out that stakeholder input would continue to be used at the various levels of screening, and that the preferred alternative may ultimately reflect either one of the alternatives carried forward, or more likely, a blend from multiple alternatives carried forward.

IL 47 Alignment Screening Process

The Alternative Evaluation of the IL 47 alignments was presented showing the impacts to different criteria in the screening process. The alternatives with the most significant impact to each evaluation criteria were eliminated. The screening of IL 47 alternatives was broken into Round 1 and Round 2.

Round 1

In Round 1 screening, the criteria that were evaluated by impacts for each alignment alternative included the following:

1. Residential Displacements
2. ROW (acres)
3. NWI Wetlands (acres)
4. Floodplains (acres)
5. Forest (acres)
6. Farmland (acres)
7. Forest Preserve 4(f) (acres)

Two alternatives stood out for having more pronounced impacts than the others. Alternatives M-3 (new alignment to the east) and M-4 (new alignment to the west) resulted in the greatest right-of-way, farmland, forest, and floodplain impacts. This led to a conclusion that these two alternatives should not be carried forward into Round 2. All other alternatives were moved forward for Round 2 consideration.

Round 2

In Round 2 screening, the criteria that were evaluated by impacts for each alignment alternative carried forward from the Round 1 screening included the following:

1. Potential Residential Displacements
2. Conceptual Cost ($millions)
3. ROW (acres)
4. INHS Wetlands (acres)
5. Floodplains (acres)
6. Farm-land(acres)
7. Forest Preserve (acres)

Round 2 screening revealed that the symmetrical and asymmetrical widening alternatives with a 50-foot wide median (M-1B and M-2B) resulted in greatest impacts in terms of right-of-way, wetland, and floodplain impact. Alternative M-2A, asymmetrical widening with a 30-foot median, resulted in greater right-of-way, wetland, floodplain, farmland and forest preserve impacts than the remaining alternatives. Therefore, Alternatives M-1B, M-2A and M-2B were all dropped from further consideration. This resulted in the following three alternatives to be carried forward:

Alt.	Alignment	Typical Section
M-1A	Existing Alignment with Symmetrical Widening	30-foot median
M-1C	Existing Alignment with Symmetrical Widening	30-foot median/6-foot in FP
M-2C	Existing Alignment with Asymmetrical Widening to East	30-foot median/6-foot in FP

FP = Section 4(f) Forest Preserve Areas

During the meeting, the facilitator emphasized that the preferred alternative may be one of these remaining alternatives or a blend of multiple alternatives, all based on further study.

I-88 Interchange Screening Process

The Alternative Evaluation of the I-88 Interchange was presented showing the impacts to the different criteria in the Interchange Screening Process. The alternatives with the most significant impact to each evaluation criteria were eliminated. In the Interchange Screening process, the criteria that were evaluated for each interchange alternative included:

1. ROW (acres)
2. Conceptual Cost ($millions)
3. Bridge Impacts (square feet)
4. Wetlands (acres)
5. Waters of the US (lineal feet)
6. Floodplains (acres)
7. Forest (acres)
8. Farmland (acres)

After consideration of the evaluation criteria, Alternatives I-5 (partial cloverleaf in NE and SW quadrants), I-6 (partial cloverleaf in the SW quadrant), and I-7 (partial cloverleaf to Finley Road) all resulted in greater overall impact than the other alternatives. Alternatives I-5 and I-6 resulted in the highest impacts in terms of conceptual costs, bridge impacts and wetland impacts. Alternative I-7 also scored among the highest impacts in conceptual cost and bridge impacts, as well as in waters of the U.S., forest and farmland impacts. Therefore, Alternatives I-5, I-6, and I-7 were not carried forward. The remaining alternatives that were carried forward include the following:

Alternative	Description
I-1	Conventional Diamond
I-2	Conventional Diamond with Roundabouts
I-3	Diverging Diamond
I-4	Partial Cloverleaf NE Quadrant

The facilitator noted that any of the IL 47 alternatives could be paired with any of the interchange alternatives. Thus, selection of the preferred alternatives for each can be an independent process.

Access Management

The presentation included a description of potential access management along IL 47. The desired signal/full access spacing would be ¼-mile. Right-in/right-out (RIRO) and ¾-accesses (RIRO plus left-in) would supplement full access points.

For this IL 47 project corridor, the full access points would be located at College Drive, Merrill Road, Scott Road, Seavy Road and Green Road. Merrill Road and Scott Road are located within ¼-mile of one another, but are T-intersections that serve regional roadways. All other intersections would be served by partial accesses (RIRO or ¾-access). A special U-turn area would be provided south of Finley Road to increase mobility, unless a roundabout is provided as part of the interchange preferred alternative.

Discussion

This meeting sought feedback from the CAG on the IL 47 and interchange Alternatives to be Carried Forward, and the screening process used to determine those alternatives. The CAG expressed agreement with the process and did not propose other means to select Alternatives to be Carried Forward. Following the presentation of the screening process and results, the CAG group discussed the alternatives and results individually at their tables and with the project study group. Following the table discussions, CAG members were given an opportunity to express any opinions or ask questions to the CAG. The following comments made by CAG members include the following:

- A request for a ¾ turn at the Finley Rd. intersection was made, particularly if the roundabout alternative is not selected.
- Suggestion was made to re-align Merrill Rd. such that it would intersect with Scott Rd. at Route 47. A signal at this new intersection was also recommended.
- Request was made for channelization (right turn lanes) at local roads to permit traffic to slow before turning.
- Request was made for traffic signal at the Green Rd. intersection. The WB to SB movement was said to be problematic.
- A concern was expressed that only one of the interchange alternatives aligned opposite of Finley Road (Alternative I-7).
- Suggestion was made that PSG also consider residential development that may occur on the east side of Route 47 when considering the shared use path location.
- The representative from Waubonsee Community College flagged localized flooding adjacent to IL 47 just south of Tributary C.
- Comments expressed in regards to sidewalk and shared-use path placement: The location of Waubonsee Community College and the existing terminus of the Gilman Trail makes a case for placing the shared-use path on the east side of IL 47. The residential land uses and proposed extension of the Gilman Trail on the west side makes a case for locating the shared-use path there.

These comments will be considered by the project study team as alternatives are further refined.

Next Steps

Upon completion of the design alternatives exercise, the next steps were highlighted. The third public meeting is tentatively scheduled for spring of 2017. The alternatives screening results, the alternatives carried forward and the alternative evaluation will be presented.

The next CAG meeting is tentatively scheduled for the spring of 2017; at this meeting the CAG will evaluate the Alternatives Carried Forward (which may include refinements), along with any hybrid alternatives developed before that time, to identify their preferred alternative.

The meeting was adjourned at 11:00 am.

Sugar Grove Parkway (IL 47) Interchange
at the Reagan Memorial Tollway (I-88)
Improvement Study

Public Information Meeting #3
Short Summary

Final

General Information

The third public meeting for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) was held on Tuesday, March 28, 2017 at the Academic and Professional Center (APC) Event Room at Waubonsee Community College, IL Route 47 at Waubonsee Drive, Sugar Grove, IL 60554, from 4:00 PM to 7:00 PM. The meeting was conducted in an open house format.

Attendees signed in and a brochure unique to public meeting 3 was provided. There were two rooms for attendees to learn more about the project. One room contained a continuous audio-visual presentation that described the project summary, provided the study process and schedule, outlined the alternative screening process, and described the alternatives carried forward. The second room contained more detailed information, comment forms, and project study team representatives. Information in the second room included exhibit boards and roll plot maps.

The exhibit boards generally included: the limits of the project study; the purpose and need for the project; the public involvement process and schedule; an environmental study overview; traffic volumes and projections; capacity analysis results, crash locations and statistics; the alternatives evaluation, screening process and results; and the alternatives to be carried forward.

Roll plot maps included plan layouts of the IL 47 and I-88 alternatives carried forward with identified impacts.

Attendees were provided an opportunity to speak with representatives from the Village of Sugar Grove, The Illinois Department of Transportation (IDOT), Kane County, and the Illinois Tollway. The meeting was attended by ninety-nine (99) people. Sixteen (16) comment forms were received at the meeting.

Attendees

Public Officials:

- Drew Frasz, Kane County Board District-18
- Fred Dornback, Blackberry Township Supervisor
- Tom Rowe, Sugar Grove Township Supervisor
- Rod Feece, Blackberry Township Highway Commissioner

Other Agencies/Organizations:

- Jim Michels, Blackberry Township
- Assistant Chief Wayne Parson, Sugar Grove Fire Protection District
- Sergeant Korey Wallace, Kane County Sheriff's Office
- Craig Hanson, Elburn Fire Department
- Tom Reynolds, Elburn Fire Department
- Mike Anderson, Elburn Fire Department
- Lisa Engberg, Elburn Fire Department
- Leroy Herra, Elburn Fire Department
- David Burroughs, EEI (EEI is Village Engineer)

- Matthew Stegeman, Pace Suburban Bus
- Marvin Bailey, Crown Community Development
- Randy Mapes, Waubonsee Community College

Businesses:

No businesses were represented. The area is generally agriculture and residential.

Media:

No media were represented.

CAG Members:

- Walter Magdziarz, Village of Sugar Grove
- Wayne Parson, Sugar Grove Fire Protection District
- Patrick Knapp, Kane Kendall Council of Mayors
- Tom Rowe, Sugar Grove Township
- Fred Dornback, Blackberry Township
- Rod Feece, Blackberry Township
- Jennifer Becker, Kane County DOT/Kane Kendall Council of Mayors
- Marvin Bailey, Crown Community Development
- Leroy Karp, Resident
- Kathryn Kruse representing Christopher Kruse, Resident
- Brenda Ross, Resident
- Christopher Stepnoski, Resident
- John Stepnoski, Resident

Comments

Sixteen (16) comment forms were received at the meeting. Comments can continue to be submitted and included in the public meeting record until April 11, 2017. The topics include the following:

General

- Want a decision quickly and to build ASAP
- Concerns regarding a decrease in home value and to accommodate existing residents
- Prefer to do all the improvements at one time and not come back for future improvements
- Would like to have seen a timeline for each build alternative.

Interchange

- Preferences for the No-Build Alternative, Alternative I-1 Conventional Diamond Interchange and Alternative I-4 Partial Cloverleaf Interchange
- Preferences for and against Alternative I-2 Conventional Diamond Interchange with Roundabout Intersections and Alternative I-3 Diverging Diamond Interchange

Illinois Route 47

- Preference for No-Build Alternative
- Preferences for Alternative M-2C
- Preferences for Alternative M-3 which was eliminated during screening and not carried forward
- Concerns regarding Finley Road restricted access and the conceptual U-turn mitigation proposed
- Concerns regarding traffic volumes, noise pollution, and impacts to residents and property
- Concerns regarding access consolidation impacts and safely accessing IL 47 from side street
- Concerns regarding septic field proximity to the ROW

Meeting Minutes
Status: Final

Illinois Route 47 @ I-88 Interchange
Potential Impacts to Hannaford Woods – Nickels Farm Forest Preserve
September 13, 2016, 11:00 am
Meeting Location: Forest Preserve District of Kane County
Geneva, IL
(Attendance Roster is included as a separate file)

The purpose of the meeting was to discuss the potential improvement and widening of Illinois Route 47 and any associated impact to the Hannaford Woods – Nickels Farm Forest Preserve. A potential location of a shared use path was also discussed.

Introductions

The attendees introduced themselves.

Project Scope

The project scope was discussed. The project team is approximately 50% complete with the Phase I report. Final approval of the Phase I report is anticipated in December 2017. A project Location Map was distributed.

Input from Forest Preserve:

J. Culp indicated that the Forest Preserve is interested in a shared use path along Route 47 extending to the north over I-88. This would help in linking paths both north and south of I-88. There was discussion regarding which side of the road the path would be preferred. IDOT and the Forest Preserve were both favoring the east side of IL 47 with crossings at Main Street (north of project limit) and Old Oaks Drive/College Drive.

There was discussion on whether any LAWCON or OSLAD funds have been used for the development of the Hannaford Woods – Nickel Farms Forest Preserve. A related exhibit was produced and provided to IDOT. The exhibit indicates that these funds were not used for the land that is adjacent to Route 47. Therefore, any widening of Route 47 would not be restricted by any requirements of these funding mechanisms. **Action Item: J. Culp to provide Grant language for transfer of land from Waubonsee Community College to the Forest Preserve.**

J. Culp indicated that the Forest Preserve property on the west side of Route 47 is a low area which is frequently saturated. There is currently no access to this portion of the preserve. If access is installed later, it will not be off of IL 47.

J. Culp asked that the project team contact Ken Anderson of Kane Co. with regard to prior hydraulic studies along Blackberry Creek. A concern was raised whether any modifications to the Route 47 bridge over Blackberry Creek would exacerbate flooding that has occurred downstream of the bridge in the past. An Existing Drainage Plan is being developed which will highlight any sensitive outlets on the project.

The existing trail that was identified by the project team on the east side of Route 47 is likely for maintenance purposes and not a designated trail per the Forest Preserve.

J. Culp will investigate Forest Preserve records for the presence of any threatened or endangered species. **Action Item: J. Culp to provide any record of threatened or endangered species.**

A 60’ strip of land adjacent and east of Route 47 is reserved for subsequent purchase by IDOT if Route 47 is widened. The Forest Preserve did not indicate a preference of fee simple vs. permanent easement. The form of purchase would be worked out in negotiations. There are no restrictions on the Forest Preserve property to the west of Route 47, so any subsequent purchase for widening should not be an issue. The project team is reviewing options for minimizing impact to Forest Preserve land when widening thru this area.

The Forest Preserve is unlikely to request access to their property directly from Route 47.

Input from IDOT:

IDOT indicated that local meetings would be held to discuss any flooding and drainage issues associated with the project.

IDOT asked J. Culp to send Grant language for transfer of land from Waubonsee Community College to the Forest Preserve.

IDOT indicated that best management practices (BMPs) will be used to protect the water quality of Blackberry Creek; however, right of way may be required on forest preserve property in order to implement these BMPs.

Adjourn

Prepared by: Peter Johnston. I may be contacted by telephone at (773) 399-5443, facsimile at (773) 399-0170 or by e-mail at peter.johnston@graef-usa.com. Please notify the author of the minutes of any corrections and/or clarifications within three (3) business days. If no comments are made within this time frame, these minutes are assumed accurate.

QUIGG ENGINEERING INC

Looking north at Illinois 47 south of the I-88.

Illinois Route 47/I-88 Interchange Improvements

Tree Survey

Kane County, Illinois

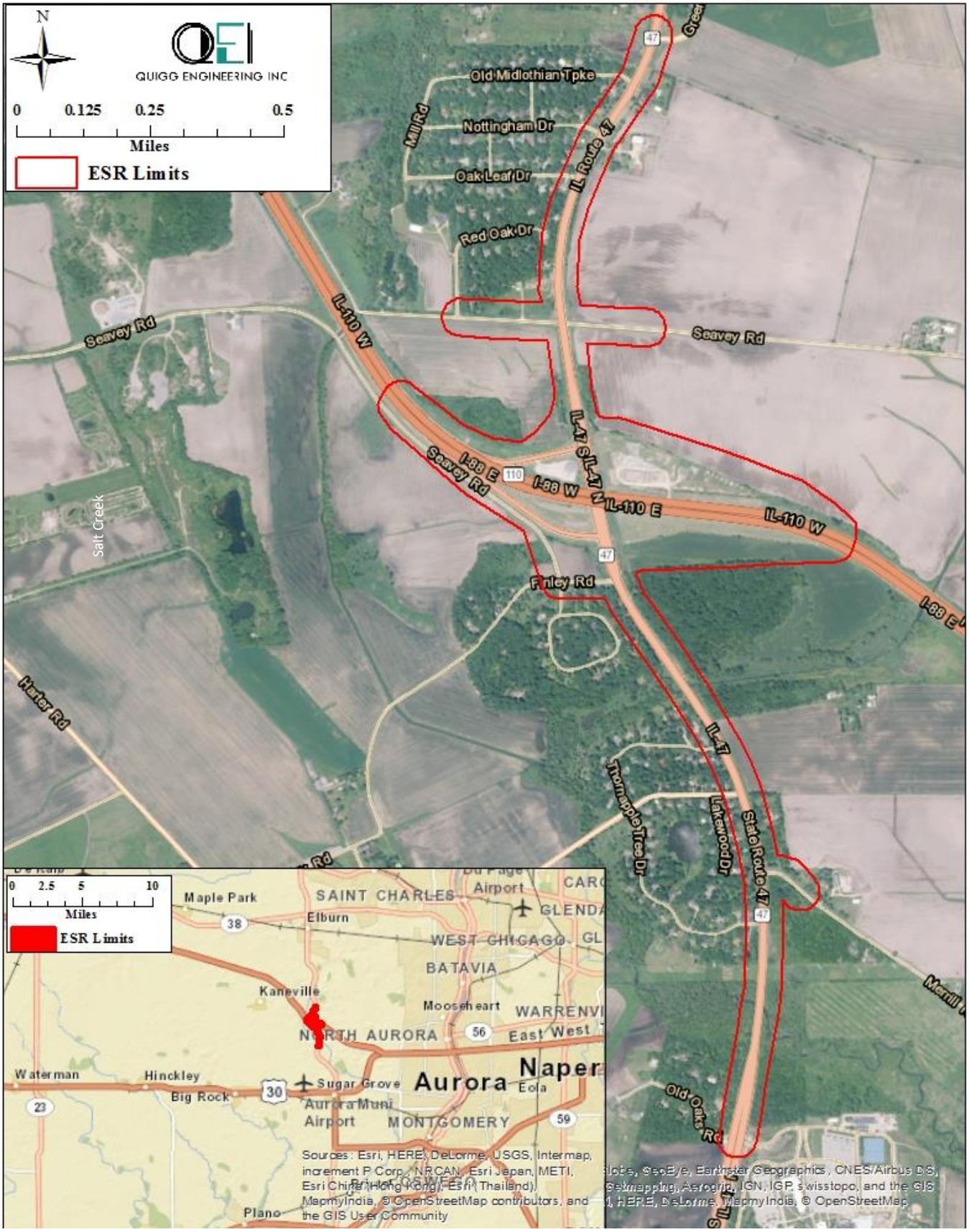
Prepared by Quigg Engineering Inc. (QEI)

October 2, 2015

Table of Contents

Location Map 1
Project Description 2
Methodology 2
Limitations of Survey 2
Tree Evaluation 3
References 3

Illinois Route 47/I-88 Interchange Improvements



Project Description

A tree survey to identify species, size, health and structure was conducted by Quigg Engineering Inc. (QEI) personnel on September 2 and 3 of 2015, in Sugar Grove, Illinois along Illinois 47 and I-88 from Green Road to the north entrance of Waubonsee College; and 3000 feet east and west of Illinois 47 along I-88. This survey was conducted for Illinois Department of Transportation (IDOT) and Illinois State Toll Highway Authority (ISTHA).

Methodology

Trees were surveyed using a transect method, with information collected on the species, size (Diameter Breast Height (DBH)), health, structure and origin (landscape or volunteer). QEI chose ten locations based on aerial imagery that provided a representation of the trees and plant community of the project area. These locations were pre-approved by IDOT District 1. Each transect was 100 feet long and approximately 20 feet wide.

A tree is defined by the Illinois Department of Transportation Bureau of Design and Environment (BDE) Manual Chapter 26-17 as a woody perennial plant having a single main stem (trunk), the diameter of which is 6 in (150 mm) or more at a point 4.5 ft (1.35 m) above the highest ground level at the base of the tree. The term "tree" also includes woody perennial plants having a single trunk of less than 6 in (150 mm) in diameter where such plants have been intentionally planted for landscaping, environmental mitigation, or habitat preservation/enhancement. A "landscape tree" is defined as any tree planted as a seed or sapling in a managed area and maintained by human actions. A "specimen tree" is defined as those on the inventory of state record trees; those that are outstanding examples possessing exceptional size, form, etc.; or those having a recognized historical significance.

The health and structure of the surveyed trees were categorized and each category was given a corresponding number: good (4), fair (3), poor (2), or dead (1). Ratings for health are based on the extent to which a tree is reasonably free of signs and symptoms of disease. Ratings for structure are based on the extent to which a tree has a structure and form typical of the species as defined in (BDE) Manual Chapter 26-17.

Two QEI employees were tasked with performing the tree survey. The survey began on September 2, 2015 on the southeast end of the project corridor, north of Old Oak Road and continued along the east side of Illinois 47 north to Green Street. The following day, September 3, 2015 the survey continued, starting on the northwest end of the project corridor and continued south along the west side of Illinois 47 south to Old Oak Road (See Figure 1).

Limitations of Survey

Each tree was inspected visually by a QEI biologist during the tree survey. However, tree health is not always visible on the surface. It is believed that the health is accurate based on the outward appearance of the tree, but there may be health problems that were not visible on the surface of the tree. Therefore, this survey does not guarantee the health of any trees in the survey.

Tree Evaluation

Ten locations within the project corridor were surveyed in order to obtain cover type characteristics for trees. Cover types sampled included upland forest, floodplain forest, shrubland, and urban/built-up land. The upland forest consisted of Mockernut Hickory (*Carya tomentosa*), Black Cherry (*Prunus serotina*), and Oak species *(Quercus* sp.). The floodplain forests consisted of primarily Box Elder (*Acer negundo*). Shrubland consisted of Green Ash (*Fraxinus pennsylvanica*), Siberian Elm *(Ulmus pumila*), and Black Walnut (*Juglans nigra*). Urban/built-up land consisted of White Oaks (*Quercus alba*), Blue Spruce (*Picea pungens*), and Mockernut Hickory (*Carya tomentosa*). Figure 2 indicate the trees surveyed within each transect.

Ash trees observed along the corridor were generally in poor health. Emerald Ash Borer holes were present in several of the trees.

References

Illinois Department of Transportation.2010. *Bureau of Design and Environment Manual-Chapter 26.*

Illinois State Toll Highway Authority (ISTHA). 2014. *Erosion and Sediment Control Manual.* "Appendix 10: Preservation, Removal and Replacement of Trees."

Figure 1

Illinois Route 47/I-88 Interchange Improvements

Transect Location Map

N
Old Midlothian Tpke
Nottingham Woods
Nottingham Dr
Oak Leaf Dr
Red Oak Dr
Mill Rd
IL-110 E/I-88 E
IL-110 W
IL Route 47
Green R
Seavey Rd
IL-47 S/IL-47 N
I-88 E
I-88 W
IL-110 E
IL-110 W
Finley Rd
I-88 E I-88 W IL-110 E
IL-47
Thornapple Tree Dr
Lakewood Dr
State Route 47
Scott Rd
Hazel Crest Dr
Merrill Rd
Old Oaks Rd
1
2
3
4
5
6
7
8
9
10
Tree Transect Locations
IL Route 47/I-88 Interchange Improvement
0
0.15
0.3
0.6
Miles
Transect (100'X20')
ESR Limits
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Figure 2

Illinois Route 47/I-88 Interchange Improvements

Tree Survey Tables

Transect 1

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
6.4	Mockernut Hickory	*Carya tomentosa*	4	4	Volunteer	Transect 1 is located 400 feet north of the Waubonsee College entrance on the east side of IL 47. The trees were located within the Hannaford Woods/Nickels Farm Forest Preserve.
13.4	Black Cherry	*Prunus serotina*	4	4	Volunteer	
7.6	Mockernut Hickory	*Carya tomentosa*	4	4	Volunteer	
8.5	Black Cherry	*Prunus serotina*	4	4	Volunteer	
21.8	White Ash	*Fraxinus americana*	4	4	Volunteer	
9.5	Black Cherry	*Prunus serotina*	4	4	Volunteer	
6.5	Mockernut Hickory	*Carya tomentosa*	4	4	Volunteer	
8.6	Black Cherry	*Prunus serotina*	4	4	Volunteer	

Transect 2

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
14.5, 16.3	Box Elder	*Acer negundo*	4	4	Volunteer	Transect 2 is located 1000 feet north of the Waubonsee College entrance on the east side of IL 47. The trees were located in the floodplain of Blackberry Creek.
8.6	Box Elder	*Acer negundo*	4	2	Volunteer	
9.9	Box Elder	*Acer negundo*	4	3	Volunteer	
9.6, 8.7	Box Elder	*Acer negundo*	4	2	Volunteer	
6.7, 7.2	Snag		1	1	Volunteer	

Transect 3

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
9.4	Bur Oak	*Quercus macrocarpa*	4	4	Volunteer	Transect 3 is located 100 feet north of Merrill Road on the east side of IL 47.
8	Bur Oak	*Quercus macrocarpa*	4	4	Volunteer	
22.4	Mockernut Hickory	*Carya tomentosa*	4	4	Volunteer	
16.2	Black Walnut	*Juglans nigra*	4	4	Volunteer	

Transect 4

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
7	Common Buckthorn	*Rhamnus cathartica*	3	3	Volunteer	Transect 4 is located 50 feet south of Tributary C of Blackberry Creek on the east side of IL 47. The trees were located within the floodplain.
17.3	Box Elder	*Acer negundo*	4	3	Volunteer	
6	Common Buckthorn	*Rhamnus cathartica*	3	3	Volunteer	

Transect 5

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
9.9	Red Oak	*Quercus rubra*	4	4	Volunteer	Transect 5 is located 1000 feet south of I-88 on the east side of IL 47.
6.6	Black Cherry	*Prunus serotina*	4	4	Volunteer	
16.9, 11.0	White Oak	*Quercus alba*	4	3	Volunteer	
17.3	White Oak	*Quercus alba*	2	4	Volunteer	
12	Black Cherry	*Prunus serotina*	4	4	Volunteer	

Transect 6

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
29.3	Siberian Elm	*Ulmus pumila*	2	3	Volunteer	Transect 6 is located 1000 feet north of I-88 on the east side of IL 47. The location was the site of a demolished home with a regrowth of volunteer vegetation.
17.6	Sugar Maple	*Acer saccharum*	4	4	Volunteer	
16.3	Black Walnut	*Juglans nigra*	4	4	Volunteer	
45.8	Siberian Elm	*Ulmus pumila*	2	3	Volunteer	
9.7, 8.7	American Elm	*Ulmus americana*	2	2	Volunteer	
23.8	Siberian Elm	*Ulmus pumila*	3	3	Volunteer	
7.4	Siberian Elm	*Ulmus pumila*	3	3	Volunteer	
14.3, 14.9	Siberian Elm	*Ulmus pumila*	3	3	Volunteer	
36.2	Siberian Elm	*Ulmus pumila*	3	3	Volunteer	

Transect 7

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
6.7	Eastern Cottonwood	*Populus deltoides*	2	2	Volunteer	Transect 7 is located 500 feet south of Oak Leaf Drive on the west side of IL 47. The location was a hedge row along IL 47 along residential areas. The Ash trees in this location were infected with Emerald Ash Borer.
6	Green Ash	*Fraxinus pennsylvanica*	2	3	Volunteer	
6.4	Snag-Ash	*Fraxinus pennsylvanica*	1	1	Volunteer	
14	Black Walnut	*Juglans nigra*	3	3	Volunteer	
6.8	Snag-Ash	*Fraxinus pennsylvanica*	1	1	Volunteer	
9.6	Black Walnut	*Juglans nigra*	3	3	Volunteer	
6.5	Green Ash	*Fraxinus pennsylvanica*	1	1	Volunteer	
6.2	Green Ash	*Fraxinus pennsylvanica*	1	1	Volunteer	
10.8	Black Walnut	*Juglans nigra*	2	3	Volunteer	

Transect 8

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
29.1	White Oak	*Quercus alba*	4	4	Landscape	Transect 8 is located 400 feet south of Finley Road on the west side of IL 47, in a residential location.
18.3	White Oak	*Quercus alba*	4	4	Landscape	
2	Austrian Pine	*Pinus nigra*	3	3	Landscape	
33.9	White Oak	*Quercus alba*	4	4	Landscape	
18.1	White Oak	*Quercus alba*	4	4	Landscape	
2.3	Blue Spruce	*Picea pungens*	4	3	Landscape	
3.6	Blue Spruce	*Picea pungens*	4	4	Landscape	
3.5	Blue Spruce	*Picea pungens*	4	4	Landscape	

Transect 9

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
21	Box Elder	*Acer negundo*	1	1	Volunteer	Transect 9 is located 700 feet south of Thornapple Tree Drive on the west side of IL 47. It is located just north of Blackberry Creek.
10.3	Box Elder	*Acer negundo*	2	2	Volunteer	
6.1	Red Mulberry	*Morus rubra*	3	2	Volunteer	
16.4	Box Elder	*Acer negundo*	2	2	Volunteer	
13.7	Box Elder	*Acer negundo*	1	1	Volunteer	
11.3	Box Elder	*Acer negundo*	1	1	Volunteer	
9.2	Box Elder	*Acer negundo*	1	1	Volunteer	
13.1	Box Elder	*Acer negundo*	3	2	Volunteer	
19.6	Green Ash	*Fraxinus pennsylvanica*	2	3	Volunteer	
8.9	Box Elder	*Acer negundo*	2	2	Volunteer	
9.3	Snag		1	1	Volunteer	

Transect 10

Size (in.)	Common Name	Scientific Name	Health	Form	Type	Description
19.7	American Elm	*Ulmus americana*	4	4	Volunteer	Transect 10 is located 400 feet north of Old Oaks Road on the west side of IL 47. The location was a hedge row along IL 47 near a residential area.
28.7	Black Cherry	*Prunus serotina*	4	4	Volunteer	
8	Blue Spruce	*Picea pungens*	2	2	Volunteer	
6.6	Mockernut Hickory	*Carya tomentosa*	4	4	Volunteer	
6.6	Mockernut Hickory	*Carya tomentosa*	4	4	Volunteer	
10.4	Siberian Elm	*Ulmus pumila*	3	3	Volunteer	
13.5	Blue Spruce	*Picea pungens*	2	2	Volunteer	
13.5	Blue Spruce	*Picea pungens*	2	2	Volunteer	

Figure 3

Illinois Route 47/I-88 Interchange Improvements

Photolog

Looking north at Transect 1

Looking north at Transect 2

Looking south at Transect 5

Looking north at Transect 7

Looking south at Transect 8

Looking southwest at Transect 9

BRIDGE CONDITION REPORT

REGION: 1
DISTRICT: 1
ROUTE: FAP Route 326 (IL Route 47)
COUNTY: Kane County
JOB NUMBER: P-91-015-14
SECTION: 14-00028-00-CH
STRUCTURE NUMBER: 045-0082
LOCATION: FAP Route 326 (IL Route 47) over I-88 East/West Tollway

Prepared by: GRAEF
Date Inspected: April 2016
Proposed Letting date: TBD

Illinois Department of Transportation
Division of Public Transportation

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III.	Field Inspection & Physical Evaluation	Pg. 3
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V.	Discussion and Recommended Scope	Pg. 9

Attachments:

A. Location Map

B. IDOT Master Structure Report

C. Bridge Inspection Report

D. Top and Bottom of Deck Condition Surveys

E. Substructure Condition Surveys

F. Cost Estimate

G. Proposed Structure

H. Structure Photos

I. Hydraulic Analysis Summary *(if required / available)*

J. Proposed Plan & Profile *(if available)*

K. Existing and Proposed Roadway Cross Sections *(if available)*

L. Abbreviated Existing Plans

M. Additional Testing Results *(if applicable – i.e. borings, cores, salinity, ASR etc)*

I. Geographical and Administrative Data:

The following report documents the condition of Structure Number 045-0082, Illinois Route 47 over Interstate 88 East/West Toll road located in the Village of Sugar Grove, within Kane County, Illinois. Maintenance of the structure falls under the combined jurisdiction of IDOT District 1 and the Illinois Tollway. See Attachment A for a location map and TABLE I-A for pertinent data regarding this structure.

TABLE I-A

Structure Number:	045-0082
County:	Kane
Route Carried:	FAP Route 326 (IL Route 47)
Feature Crossed:	I-88 EW Toll Road
Section:	14-00028-00-CH
Station:	165+40.00
Roadway Classification:	Other Principal Arterial
Design / Posted Speed:	60 / 55 MPH
ADT (Current / Design):	10,900 (2014) / 24,100 (2040)
ADTT (Current / Design):	25%
DHV:	2,474
Inventory Rating:	*1.050 (HS-20-44)
Operating Rating:	*1.750 (HS-20-44)
Sufficiency Rating:	*100.0

*Information obtained from IDOT Master Structure Report last updated on September 1, 2016, see Attachment B.

Construction / Reconstruction / Repair History:

Structure Number 045-0082 was originally constructed in 1972 under Contract E-8B as part of FAP 326. In 2007, under Section 0910-IBR-84, the bridge was reconstructed with the following major scope items:

- The existing bridge deck and concrete deck panels were removed and replaced with a conventionally reinforced concrete deck (7.5” Thickness).
- The existing 54” Precast, pre-stressed concrete (PPC) I-Beams in Spans 2 and 3 were removed and replaced with 48” PPC I-Beams.
- The abutment and pier beams seats were reconstructed and new bearings were placed for the Spans 2 and 3 bearing lines.
- A deck drainage system was placed near the South Abutment wall stem in Span 3 each side of the deck, that outlets onto the existing slope wall.
- The bridge deck expansion joints were removed and replaced with a neoprene expansion seals.
- Formed concrete repairs were executed at the abutments, pier and wing walls.

II. Physical Description of Structure:

The existing structure is a four span bridge that carries Illinois Route 47 over the Interstate 88 East/West Toll road. Spans 1 and 4 are vaulted spans, with the slab terminating over approach bents with an

approach pavement. The bridge is aligned with a skew of 18° - 30' - 0'' left ahead station. The structure is located near the Village of Sugar Grove, Illinois, in Kane County. See Attachment A for location map.

The structure is comprised of four spans arranged in simple and continuous framing in multiple framing units. The back to back measure from the approach bents is recorded as 239'-0" and the out-to-out bridge width is recorded as 91'-8". There are neoprene expansion joints located at each abutment between the vaulted span and the main spans. The superstructure supports a 7.5" thick deck with no indication of an overlay. The beam spacing varies from unit to unit, with the vaulted spans having a differing spacing than the main spans. The parapet overhang measures 2'-10" from edge of deck to centerline of the fascia beam. For beam type and span information see TABLE II-A.

TABLE II-A

Framing Unit	Span No.	Span Length	Beam Type
UNIT 1	1	41' - 8 3/8"	36" PPC I-Beam
UNIT 2	2	82' - 3"	48" PPC I-Beam
	3	82' - 3"	48" PPC I-Beam
UNIT 3	4	30' - 2 3/8"	36" PPC I-Beam

The minimum clear roadway width for each approach direction is recorded as 32'-0" in the Structure Summary Report. The Bridge accommodates two 12'-0" width through lanes in each direction, a 9'-3" outside shoulder and a 2'-0" inside gutter flag, for a minimum clear width of 35'-3" in each direction. The opposing lanes of traffic are divided by a raised median that is 9" in height and 18'-0" wide at its maximum width. The median varies in width across the structure to accommodate a left turn lane onto Westbound I-88. The exterior barrier is a standard F-shape barrier that measures 2'-10" in height.

There are neoprene expansion joints located at each of the abutments. The joints size is believed to be 2" per design, with the parapet separation listed as 2 1/8" at 50 degrees.

The superstructure also supports a deck drainage system. The piping is suspended from the deck soffits at the interior bay of each fascia at the south end of Span 3. The systems transfer water collected by the drainage scuppers, carries it to the abutment wall stem, and then outlets the water onto the slope wall.

The substructure consists of vaulted abutments and a center pier. The vaulted abutments have an approach bent that is a stub type abutment supported on concrete filled steel shell piles and a wall type abutment also supported on shell piles. The lead row of piles is battered toward the center pier at each wall stem. The center pier is composed of a pier cap that is supported by columns, with each column supported by an isolated footing. The pier footings are also supported by concrete filled, steel shell piles.

There were no additional appurtenances observed that were attached to the substructure.

The theoretical minimum vertical clearance as reported on the 2008 reconstruction plans is 17'-4" which occurs over the right shoulder of the westbound lanes. The minimum horizontal clearances are not recorded on the existing plans, but the roadway section through the structure is 41'-0" in width each direction. See Attachment B for more information.

The existing bridge is constructed on a crest vertical curve with an entrant grade of 2.40%. The high point of the bridge based on the vertical alignment is located at the North Approach Bent as the roadway tangent at the departure is 0.91%. The structure is on a horizontally tangent alignment. The transverse crown of the bridge deck is located at the Centerline of IL-47. The deck drains from north to south, with cross slopes pitching to each shoulder drain near the South Abutment. The median drains to inlet structures located off the bridge, within the median section.

A set of abbreviated existing plans for this structure can be found in Attachment L, including the original construction drawings and relevant rehabilitation contracts as applicable.

III. Field Inspection and Physical Evaluation:

The structure was inspected between the dates of March 31st through April 22nd, 2016 by GRAEF. A follow up inspection focusing on the vaulted abutments and the deck longitudinal cracking was completed on March 6th, 2017 to assess if the condition worsened after the winter weather cycle. The inspector of record is Nathan D. Rick, PE, SE. All accessible areas of the superstructure and substructure were assessed at arm's length and inspected both visually and through sounding with masonry hammers. The bearings were investigated for proper alignment and displacement properties with respect to the ambient temperature at the time of inspection. The underside of the bridge deck was inspected through the use of lift vehicles and lane closures as required. The top side of the bridge deck was inspected visually by walking the surface and through chain dragging.

Field inspection documentation was prepared following the Illinois Department of Transportation's *Bridge Condition Report Procedures and Practices* (December 2011 edition) manual with consideration given to the National Bridge Inspection Standards (NBIS) published through the Federal Highway Authority. Exhibits were created from the documented findings and can be seen in Attachments D and E for the superstructure and substructure respectively. Photo documentation of observed deficiencies was recorded and reported in Attachment H with applicable descriptions for each photograph. The observations noted within this report will be used to verify the current bridge appraisals and if required will be used to adjust the ratings based on the in-service conditions. Detailed information is provided to identify and locate areas of concern when present regarding the in-service condition of the bridge. A summary of the findings is reported as follows:

Superstructure:

Deck: The deck superstructure is in FAIR CONDITION which corresponds to and NBIS and IDOT condition rating of 5. This value is less than the value reported in the current structure summary report, which is a 7. See Attachment B for the current IDOT Master Structure Report and Attachment C for the most recent NBIS and PONTIS Bridge Inspection Report.

Elements that factored into the evaluation of the deck included the frequency of hairline cracking, the presence of map cracking, the discovery of longitudinal cracking in the deck and minor areas of suspected delaminated concrete. A chain drag over the deck was used to identify suspected areas of delamination, as a deck thermograph was not ordered for this bridge since it has only been in service for just over 10 years. While the discovered cracking was frequent, significant concrete deterioration was not observed during the inspection, thus additional testing is not believed to be required.

Examples of the types and frequency of deterioration that were factored in to the assignment of this rating can be seen in Photos in Attachment H.

For the Deck Soffit evaluations, elements that factored into the condition rating of the deck include the presence of frequent hairline cracks at spacing near 5' on centers, significant presence of localized map cracking near the Pier, and the presence of distinct longitudinal cracks in the vaulted spans and in Span 3. The longitudinal cracks intersect several of the transverse hairline cracks in this area, and appear to be located near where the wheel load of truck traffic should be expected to be applied. All cracks appear to be less than 0.06" in width, with only minor efflorescence present. Examples of the observed conditions can be seen in the photos provided in Attachment H.

The inside face-to-inside face of parapet dimension was taken from the existing drawings and is recorded as 88'-6". The approximate length of the existing bridge deck based on the existing drawings is estimated at 237'-10". These values are used to calculate a bridge deck riding surface area of 21,048 square feet. Areas estimated at 32 square feet on the top side of the deck were recorded as spalled concrete and delaminated concrete, with no delamination or spalling observed on the deck soffit.

The top and bottom of deck survey can be found in Attachment D which show the approximate locations of the observed deficiencies. These surveys in combination with IDOT's Structural Service Manual will be used to identify any type of deck repair, if required, at these locations. This evaluation can be found in Section IV of the report.

The bridge parapet was observed to be a standard barrier (TYPE F) with a height of 2'-10" above the top of the deck. There were infrequent hairline cracks that passed vertically through the parapet full height and observed pop-outs throughout. The approach guardrail transitions, guardrail typical section and the end impact attenuator no longer meet currently acceptable IDOT standards. Small areas of map cracking were observed near the connections for the guardrail transition section on the outside face of the parapet.

Documentation of the condition of these elements can be seen in the photos provided in Attachment H.

Beams: The beam superstructure is in GOOD CONDITION which corresponds to an NBIS and IDOT condition rating of 7. This value is lower with the value reported (8, VERY GOOD CONDITION) in the current structure summary report.

Observations that were factored into the provided rating include the presence of scaling in the beam webs in the vaulted spans underneath the deck stage construction joint and the presence of multiple cracks at the beam ends. It is noted these cracks do not appear to be structural cracks and that the majority of them have had a sealant applied to them. There are however several instances where the cracks were either not sealed with the initial discovery of these cracks, or they are new cracks in the beam ends. Two locations at the ends of the beams were discovered with vertical cracking approximately 4" from the end of beam. All concrete was sound at the time of inspection.

Representations of these finding can be seen in the Photos in Attachment H.

Joints: The deck joints are in GOOD CONDITION. There is not an applicable coding item in the NBIS or IDOT Highway Information System for this item as it is considered a Bridge Management Element, but a general representation and evaluation of the items is presented below.

Elements that factored into the evaluation of the deck joints included the measurement of the observed gaps, the ambient temperatures during inspection, and the observed condition of the element. The gap at the parapet joint was measured at approximately 2.5" with an ambient temperature of approximately 55 degrees. This measure was slightly greater than what was anticipated based on the as-built

drawings. The sealing elements appeared to be intact even as evidence of water leakage existed at the abutments. The southbound neoprene seal at the south abutment appears to have been damaged by plowing. For images of the typical condition of the joint sealing elements, see the Photos in Attachment H.

Bearings: The beam bearings are in GOOD CONDITION. There is not an applicable coding item in the NBIS or IDOT Highway Information System for this item as it is considered a National Bridge Element, but a general representation and evaluation of the items is presented below. Elements that factored into the evaluation of the bearings include the observed deflection and its corresponding translation relative to the ambient temperatures during inspection, the condition of the steel protective coatings on the bearing, the alignment of the anchor bolts, side retainers, and the contact of the elastomeric bearing with the beam seat.

Surface corrosion and paint loss was present on many side retainers and the bottom of the bearing plates. It was estimated that 5% of the paintable surface was missing its protective coating. Anchor bolts appeared sound after striking with a hammer, with all bolts appearing anchored into the beam seats. Several anchor bolts were observed to have a grout placed between the top of the side retainer and bottom of the anchoring nut.

The elastomeric bearing was translated just slightly towards the pier in all spans, the translation was typically too small to consistently measure. This was the expected finding given the recorded ambient temperatures during inspection. The bearing at Beam 8 at the South Abutment was not fully in contact with the beam seat however. The elastomer appeared slightly deformed, yet it was not clear if this was a construction defect with the beam seat, a material issue with the bearing or an otherwise undiscovered defect that is leading to this condition. It is recommended that this bearing be monitored during future inspections.

Representations of these finding can be seen in the Photos in Attachment H.

Substructure:

Abutments: The abutments are in SATISFACTORY CONDITION which corresponds to and NBIS and IDOT condition rating of 6. This rating is lower than the reported value of 7 in the current structure summary report. Areas of concrete delamination were found in both new and previously repaired locations. Measurements of these areas as well as the presence of Narrow cracking was documented in Attachment E. The bearing areas were sound and appeared to be intact with staining, likely resulting from the previous rehabilitation work.

The wing walls showed minor defects with hairline cracks measured as indicated, previous repairs and some delamination near the abutment seats. The delamination at the North Wing Wall was most significant as rust staining was present, indicating water from the deck joint was likely passing onto the wall. Minor spalling was present but generally the walls were in GOOD CONDITION. The access doors to the vaults were secure, though several bolts were missing from the frame.

The approach bent was inspected and no significant defects were observed at the North and South Abutments. It was noted that water was passing through the joint between the end diaphragm and the tops of the bent caps. Staining from rust and efflorescence was present along the seats but no cracking or spalling was observed.

Representations of these finding can be seen in the Photos in Attachment H. Detailed mapping of the observed defects can be seen in Attachment E.

Pier: The pier is in GOOD CONDITION which corresponds to and NBIS and IDOT condition rating of 7. This value agrees with the value reported 7 in the current structure summary report. The Pier had several measureable areas with defects. There were both new and recurring problems at the pier caps and columns.

Areas of previous repairs for spalled or delaminated concrete were measured in the field. The repairs appeared sound at the time of inspection. Minor spalls, some with exposed tie bar steel were observed as was minor hairline cracking. An area of heavy efflorescence was observed on the beam seat on the Span 2 side of the west pier. This area is in the same location where significant areas of map cracking were observed in the concrete bridge deck.

Representations of these finding can be seen in the Photos in Attachment H. Detail mapping of the observed defects can be seen in Attachment E.

Slope Protection: The slope protection is in SATISFACTORY condition which corresponds to and NBIS and IDOT condition rating of 6. Several panels of the slope wall have displaced spalling or heaved segments. Hairline cracking was consistently present across the majority of the panels at each abutment, as well as several areas of void were identified. There is fill material accumulation at the base of several panels were the voids were discovered.

Representations of these finding can be seen in the Photos in Attachment H.

Inspection History (NBIS Ratings):

The four most current historical NBIS ratings for this structure are reported in TABLE III-A. See Attachment B for more information.

TABLE III-A

Year	Deck	Superstructure	Substructure
2016	7	8	7
2014	7	8	7
2012	7	8	7
2010	7	8	8

IV. Potential Scope of Work Determination and Analysis:

A detailed inspection was performed to evaluate the in-service condition of this structure. Areas of concern were documented in the narrative in Section III of this report and in the exhibits located in Attachments D and E. Photographs have been used to identify typical features of this bridge as well as areas that appear to be in distress or functionally deficient. These photos are presented in Attachment H.

The bridge deck elements are rated in FAIR condition and will require rehabilitation. The superstructure is considered to be in GOOD condition and is structurally rated for an HS 21.0 loading (Inventory) which is considered acceptable to remain in service along this route. The substructure is in SATISFACTORY

condition and will require rehabilitation. The approach roadway alignment is considered to be BETTER THAN PRESENT MINIMUM CRITERIA; the approach guardrail is rated NOT ACCEPTABLE; and the under clearance vertically and horizontally is reported as EQUAL TO PRESENT MINIMUM CRITERIA).

The bridge structure was originally constructed in 1972, the deck was replaced in 2003 and the beams for Spans 2 and 3 were also replaced in 2003. At the time of inspection, the original bridge elements had been in service for approximately 45 years. The estimated remaining service lives of the structural elements are listed in TABLE IV-A. These values are presented for discussion purposes only to aid in the evaluation of alternatives for the rehabilitation or replacement of the in-service structure.

TABLE IV-A

Element	Estimated Service Life	Element In-Service Age	Service Life Remaining
Deck	50	10	40
Beams (Spans 1 & 4)	80	45	35
Beams (Spans 2 & 3)	80	10	70
Substructure	100	45	55

A Phase I Project Report is currently being prepared for an approximate 2.1-mile-long segment of IL 47 and the associated interchange with I-88. The current interchange provides access to and from the west only. The proposed configuration will provide eastern access by adding an I-88 eastbound entrance ramp from IL 47 and adding an I-88 westbound exit ramp to IL 47. The report indicates a southbound IL 47 left turn lane is needed on the bridge. The left turn lane will provide access to the new I-88 eastbound entrance ramp. In addition, a 10' wide future multi-use path is anticipated on the east side of IL 47. The proposed bridge cross section will accommodate the new left turn lane and the multi-use path and is shown in Attachment G.

Description and Analysis of Alternatives

Presented below are two alternatives for Structure Number 045-0082. One is for rehabilitation of the existing bridge and the second is for complete removal and replacement of the bridge. Both alternatives have been developed with consideration given to the interchange improvement, initial construction cost, service life remaining, staged construction constraints, established design criteria and department policies governing similar structures.

Alternative 1 – Bridge Rehabilitation

The scope of work proposed for Alternative 1 is focused on the rehabilitation and reuse of the existing superstructure and substructure. Repairs will be made to the existing abutments, piers, deck, wingwalls, expansion joints and slopewalls. The removal of the existing raised concrete median will be required to allow for the proposed added left turn lane as part of the work for the proposed IL 47 / I-88 eastern access interchange. The Alternative 1 scope of work would also include adding a raised sidewalk on the east side for the multi-use path. A parapet and railings along each side of the path are included.

The substructure will be repaired by using structural repair of concrete and epoxy crack injection in the areas identified in the damage surveys. Slopewall repairs will consist of removing and replacing the slopewall in the deteriorated areas noted in the damage surveys. Wide cracks in the slopewalls will be repaired using low pressure epoxy injection.

The deck has significant areas of distress including numerous occurrences of longitudinal and transverse cracking with efflorescence, as well as minor suspected delamination and map cracking near the pier. We recommend scarifying the deck and adding a latex concrete overlay. Execution of this scope of repairs is intended reduce the water entering the deck and reaching the reinforcing steel. The overlay should also stiffen the deck and reduce future cracking. Scarification should also remove any delaminated concrete. The overlay will be placed between the parapets over the full width of the deck and over the approach pavement.

The existing PPC I-Beams are in good condition (Condition Rating 7). Hairline cracks in the webs near the beam ends were noted, but the beams were otherwise in good condition. We do not recommend covering the cracks with a product such as fiberwrap or other proprietary beam end repairs at this time as they would impede future inspection. The presence of the repaired cracks and potentially newly formed cracks has been documented and is included in Attachment D. These conditions should be monitored during future inspections.

The existing neoprene expansion joints were in satisfactory condition with no apparent defects. Adding the latex concrete overlay will raise the top of deck elevation. The expansion joint elevation will need to be raised to match the top of overlay elevation. In addition, the expansion joint will need to be replaced in the area of the existing median and the proposed multi-use path. Therefore, we recommend removing and replacing the expansion joint per Figure 1.5.10-1 of the Structural Services Manual.

A few abutment bearings and their side retainers were rust coated, but most were in good condition. Since most bearings were in good condition and no other painting is required at this bridge, we recommend no action at this time.

The estimated construction cost for **Alternative 1** is **$1,168,000**. A detailed breakdown of the estimated cost is included in Attachment F. This cost does not include roadway items or guardrail costs.

We believe the existing bridge could be widened in two construction stages. Currently the bridge carries two traffic lanes in each direction. During construction only one lane in each direction would be provided. We believe one lane in each direction is sufficient since IL 47 narrows to only one lane about 1000' north and south of the bridge. The existing bridge has a clear width between the parapets of 88'-6". In Stage I the traffic could be moved to one side while the other side is scarified and overlaid. In Stage II the other side would be scarified and overlaid.

Alternative 2 – Complete Bridge Replacement

The scope of work of Alternative 2 consists of complete removal and replacement of the existing bridge. As with Alternative 1, the out-to-out width of the deck is assumed to be 91'-8" and the length from back-to-back of abutments is assumed to be 239'.

The approximate construction cost for **Alternative 2** is **$4,163,000**. This cost is a rough estimate based on an assumed cost of $190 per square foot of bridge deck. This cost does not include roadway items or guardrail.

As with Alternative 1, we believe Alternative 2 could be constructed in two stages while maintaining one lane of traffic in each direction throughout construction.

V. Discussion and Recommended Scope of Work:

Alternatives were developed and analyzed in Section IV to address the observed and recorded deficiencies for Structure Number 045-0082, Illinois Route 47 over I-88 EW Tollway. In this section, the positive and negative merits of the potential scopes of work are evaluated and summarized. The reasoning for the selection of the proposed scope of work will be documented as well as any known external constraints that would affect the selection of a desired course of action.

Cost: The estimated construction cost for **Alternative 1 is $1,168,000** and the estimated construction cost for **Alternative 2 is $4,163,000**. Alternative 1 is $2,995,000 less expensive and the cost is only 28% of the Alternative 2 cost.

Staging: Both alternatives can be constructed in two stages. Alternative 2 would have a substantially longer construction duration since it requires complete bridge reconstruction.

Service Life: The remaining life for the Alternative 1 deck is estimated be 40 years as the existing deck is only 10 years old. However, it already is showing signs of significant deterioration and the proposed overlay would have a service life that should be considered less than 25 years. The remaining life for the Alternative 2 deck is estimated to be 50 years. The remaining service life of the Alternative 1 substructure is estimated to be 55 years while the remaining life for the Alternative 2 substructure is estimated to be 100 years.

Other: A greater deck width may be desired in order to accommodate wider shoulders or other future considerations, as the proposed modifications will come with substandard shoulder widths. In order to provide a fair comparison between Alternatives 1 and 2, both alternatives are based on an out-to-out deck width of 91'-8". Increasing the Alternative 1 deck width would be relatively expensive due to the existing vaulted abutments. Alternative 2 provides a flexibility advantage because the deck width could be increased as the substructure would be rebuilt with this option.

Recommended Scope of Work

The initial construction cost for Alternative 1 (rehabilitation) is only 28% of the cost for Alternative 2 (complete replacement) and there would be a cost savings of approximately $3,000,000 with Alternative 1. The primary advantage of Alternative 2 would be a longer service life. Based on the large cost savings, we recommend Alternative 1, rehabilitation of the existing bridge including a latex concrete overlay.

Following is the recommended scope of work for Alternative 1. All work would occur in two construction stages and considers planned future work at the I-88 interchange:

1. Remove the existing raised concrete median.

2. Scarify the entire width of the bridge deck and place a latex concrete overlay.

3. Reset the existing neoprene expansion joints to accommodate the proposed overlay.

4. Remove the existing east concrete parapet.

5. Construct the new raised concrete sidewalk, parapet and railings on the east side of the bridge deck.

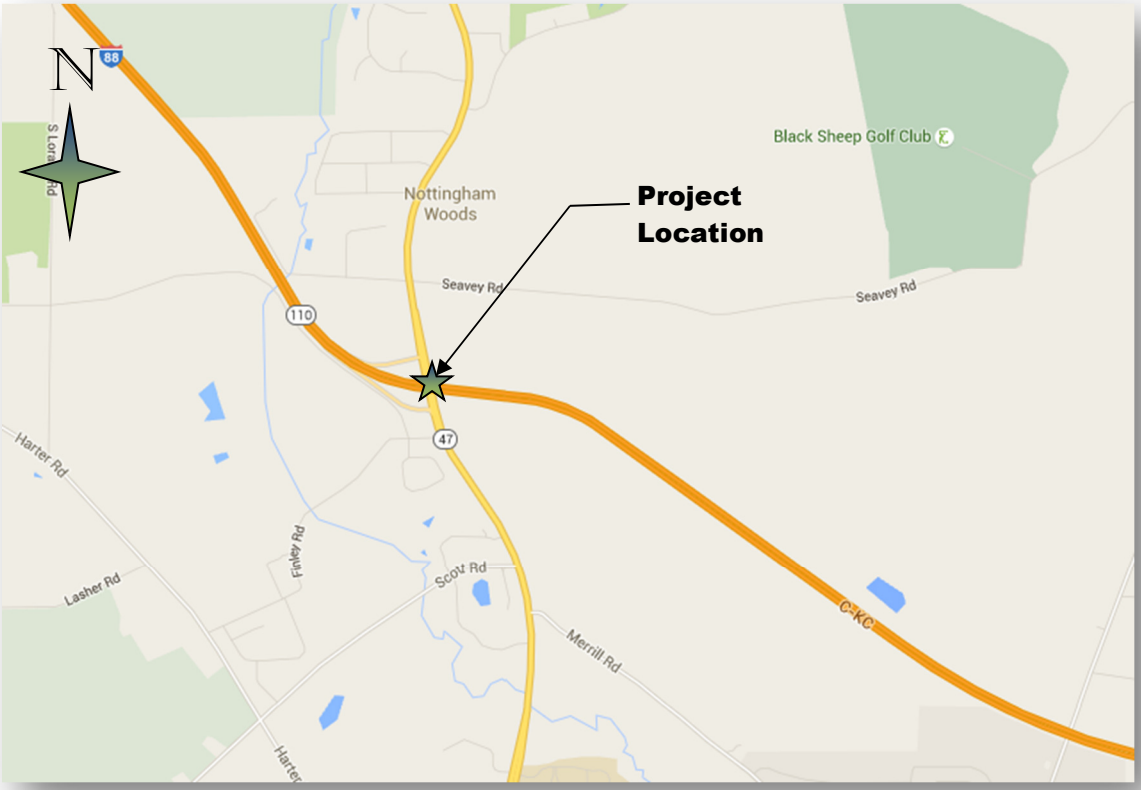
6. Repair the existing piers and abutments with structural repair of concrete and epoxy crack injection as required.

7. Remove and replaced isolated sections of the existing slopewall that are heavily damaged and have heaved. Use slurry pumping to repair washed out bedding material and inject cracks with low pressure epoxy.

The proposed bridge cross section is shown in Attachment G. The estimated construction cost for **Alterative 1** is **$1,168,000**. A detailed breakdown of the cost estimate, including preliminary quantities and contingency can be found in Attachment F. The cost is in 2017 dollars and should be escalated when the construction year is determined.

ATTACHMENT A

Location Map



ATTACHMENT B

IDOT Master Structure Report

Included in this attachment is the current IDOT Structure Summary Report, last updated on September 1, 2016, for Structure Number 045-0082, IL Route 47 over I-88 E/W Tollway.

Illinois Department of Transportation
Structures Information Management System
Structure Summary Report

Structure Number: 045-0082 **District:** 1

Inventory Data

Facility Carried: IL 47
Feature Crossed: I- 88 EW TOLL
Bridge Remarks: MAX.= 34.0(45/6) Spans 1 & 4 are Vaulted, same material type as Spans 2 & 3.
Bridge Status: 1 OPEN - NO RESTRICT
Status Remarks: ALL LANES OPEN. SMW
Maint County: 045 KANE
Maint Responsibility: 21 ILL. TOLLWAY COMMISSION I.D.O.T.
Service On/Under: 5 SECOND LEVEL INTERCHANGE 1 / HIGHWAY
Reporting Agency: 8 ILLINOIS TOLLWAY AUTHORITY
Main Span Matl/Type: 6 PRESTRESS CONCRETE CONTINUOUS / 02 STRINGER/MULTI-BEAM/GIRDER
Nbr Of Main Spans: 4 **Nbr Of Approach Spans:** 0
*****Approaches*****
Near #1 Matl/Type: /
Near #2 Matl/Type: /
Far #1 Matl/Type: /
Far #2 Matl/Type: /
Median Width/Type: 12 Ft. / 3 Curb

Bridge Name:
Location: 5 M N OF IL 56
Status Date: 08/2008
Maint Township: 04 BLACKBERRY

Sufficiency Rating: 100.0
HBP Eligible: No
Replaced By: -
Replaces: -
Last Update Date: 09/13/2015
Parallel Structure: None
Multi-Level Structure Nbr:
Skew Direction: L Left
Skew Angle: 18 D
Structure Flared: No
Historical Significance: No
Border Bridge State:
Bdr State SN:
Bdr State % Responsibility: 0
Structural Steel Wt 0
Substructure Material:

Structure Length: 239.0
AASHTO Bridge Length: 99.9
Length of Long Span: 82.3
Bridge Roadway Width: 77.0
Appr Roadway Width: 32.0
Deck Width: 91.7
Sidewalk Width Right: 0.0
Sidewalk Width Left: 0.0
Navigation Control: N N/A
Navigation Horiz Clear: 0
Navigation Vert Clear: 0
Culvert Fill Depth: 0.0
Number Culvert Cells: 0
Culvert Opening Area: 0.0
Culvert Cell Height: 0.00
Culvert Cell Width: 0.00

Rated By: 3 Consultant **Rate Method:** 6 LOAD FACTOR (LF) REPORTED BY RATING FACTOR (RF)

Guardrail Type L/R: 0None / 0 None
Toll Facility Indicator: 0 No Toll
Latitude: 41.81822000 **S** **Longitude:** 88.46635000 **S**
Deck Structure Type: A CIP CON NRMLLY FORM
Sidewalks Under Structure: 0 None

Inventory Rating: 1.050(37)
Operating Rating: 1.750(63)
Design Load: 99 UNKNOWN
Deck Structure Thickness: 7.5 **SD:** N **FO:** N

Load Rating Date: 03/10/2014

Railroad Crossing Info
Crossing 1 Nbr:
Crossing 1 Nbr:
RR Lateral Underclear: 0.0
RR Vertical Underclear: 0 **Ft** 0 **In**

Key Route On Data

Key Route Nbr: FEDERAL-AID PRIMARY 0326 **Station:** 24.5300
Appurtenances Main Route 00000 **Segment:**
Inventory County: 045 KANE **Linked:** Y
Township/Road Dist 04 BLACKBERRY **Natl. Hwy System:** On NHS
Municipality 0000 **Inventory Direction:**
Urban Area: 1051 1051 **Curr AADT Yr/Count:** 2016 / 12000
Functional Class: 3 OTHER PRINCIPAL ARTERIAL **Est Truck Percentage:** 22
**** CLEARANCES **** **South/East** **North/West** **Number Of Lanes:** 4
Max Rdwy Width: 35.0 **One Or Two Way:** 2 Two-Way
Horizontal: 70.0 0.0 **Bypass Length:** 0
Future AADT Yr/Cnt: 2032 / 12569
Designated Truck Rte: CLASS II
Lateral: **Special Systems:** Yes

Key Route Under Data

FEDERAL-AID INTERSTATE 0088 **Station:** 8.2100
Main Route 00000 **Segment:**
045 **Linked:** Y
04 BLACKBERRY **Natl. Hwy System:** On NHS
0000 **Inventory Direction:**
1051 1051 **Curr AADT Yr/Count:** 2015 / 29900
1 INTERSTATE **Est Truck Percentage:** 9
South/East **North/West** **Number Of Lanes:** 4
0.0 **One Or Two Way:** 2 Two-Way
62.0 62.0 **Bypass Length:** 0
Future AADT Yr/Cnt: 2032 / 31900
Designated Truck Rte: CLASS I
Special Systems: Yes

*** Marked Route On Data ***

	Designation	Kind	Number
Route #1:	1 Mainline	3 State Highway	047
Route #2:	1 Mainline		
Route #3:	1 Mainline		

*** Marked Route Under Data ***

Designation	Kind	Number
1 Mainline	1 Interstate Highway	088
1 Mainline	3 State Highway	110
1 Mainline		

Attachment B

Illinois Department of Transportation
Structures Information Management System
Structure Summary Report

Structure Number: 045-0082 **District:** 1

Data Related to Inspection Information

*** Inspection Intervals ***				*** Maximum Allowable Posting Limits ***				Bridge Posting Level:	
Routine NBIS:	24 MOS	**Underwater:**	0 MOS	**One Truck At A Time:**	0	**Combination Type 3S-1:**	Tons	5	No Posting Required
		Special:	N	**Single Unit Vehicles:**	Tons	**Combination Type 3S-2**	Tons		

Inspection/Appraisal Information

Inspection Date: 09/01/2016 **Inspection Temperature:** 79Deg. F

Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS				**Single Unit Vehicles:**	Tons
Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED				**Combination Type 3S-1:**	Tons
Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS				**Combination Type 3S-2:**	Tons
Culvert:	N	NOT APPLICABLE				**One Truck At A Time:**	0
Channel and Protection:	N	NOT APPLICABLE	**Deck Wearing Surf:**	A	BARE DECK NO OVRLAY	**Last Paint Type:**	
Structural Evaluation:	7	BETTER THAN PRESENT MINIMUM CRITERIA	**Deck Membrane:**	F	NONE		
Deck Geometry:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA	**Deck Protection:**	A	EPOXY COATED REINF		
Underclearance-Vert/Lat.:	6	EQUAL TO PRESENT MINIMUM CRITERIA	**Total Deck Thick:**	7.5			
Waterway Adequacy:	N	NOT APPLICABLE	**Last Paint Date:**				
Approach Roadway Align:	7	BETTER THAN PRESENT MINIMUM CRITERIA					
Bridge Railing Appraisal:	3	Meets Standards					
Approach Guardrail:	32N	Acceptable Not Acceptable N/A					
Pier Navig Protection:	N	N/A					

** Actual Posted Limits **

Underwater Inspection/Appraisal Information

Inspection Date:

Temperature: **Inspection Method:**

Appraisal Rating:

Scour Critical Information

Rating: **Evaluation Method:**

Analysis Date:

Miscellaneous

Microfilm Data Recorded: Yes

Construction Information

Year:	1972	Original	2008	Reconstructed
Route:		**Sta:** 5782+90.00 FAP 326		**Sta:** 56+95
Section Nbr:		E8-4	E-8-4-B	
Contract Nbr:		E8-B	62531	
Fed Aid Pr#:		00000000000000		
Built By:	2	OTHER STATE AGENCY	1	I.D.O.T.

Attachment B

ATTACHMENT C

Bridge Inspection Report

Included in this attachment is the three most current available NBIS Bridge Inspection Report (BIR) data files and the provided PONTIS information for Structure Number 045-0082, IL Route 47 over I-88 E/W Tollway.

ILLINOIS STATE TOLL HIGHWAY AUTHORITY
STRUCTURE INSPECTION FIELD REPORT

INSPECTOR: E. Ajami

INSP. DATE: 9/5/2014

INSP. TYPE: Detailed

TEMP: 90.00 °F

BRIDGE NUMBER	LOCATION	MILE POST	INVENTORY NO. (FHWA ID)
1101	EW U IL 47	109.30 mi	0450082

STRUCTURE TYPE	MAINT. AREA	NO. OF SPANS	MAINT. AGENCY	AGREEMENT TYPE
PPCB	11.00	2.00	IDOT	C

DECK *	P.	C.
Deck Wearing Surface	8	8
Deck Condition	7	7
Deck Joints	6	6
CULVERTS *		
Top Slab		
Base Slab		
Walls		
GENERAL *		
Median	8	8
Parapet	8	8
Railing	N	N
Drains	8	8
Approach Slab.	7	6

SUPERSTRUCTURE *	P.	C.
Stringers	N	N
Diaphragms	8	8
Girders or Beams	8	8
Floor Beams	N	N
Trusses - General	N	N
- Portals	N	N
- Bracing	N	N
Rivets or Bolts	N	N
Welds - Cracks	N	N
Collision Damage	N	N
Load Deflection	8	8
Member Alignment	8	8
Load Vibration	8	8
GENERAL *		
Paint	N	N
Year Painted:		

SUBSTRUCTURE *	P.	C.
Abutments :		
- Wings	8	8
- Backwall	8	8
- Breastwall	7	7
- Pedestal	8	8
- Slope Protection	5	5
- Settlement	8	8
Piers or Bents		
- Caps	7	7
- Column	8	8
- Web	N	N
- Settlement	8	8
Bridge Protection	8	8
Bearing Devices	7	7
Arch	N	N

Deck * Item 58	7	7	SUPERSTR. * Item 59	8	8	SUBSTR. * Item 60	7 7
Culverts * Item 62			FCR * Item 93A1			SCOUR * Item 113	

R. Ap. Item 36A B C D	3 2 2 N	**Cha. Prot. Item 61**	N
		W/W. Adq. Item 71	N
		P/A. Prot. Item 111	N

OPERATING RATING (64B1): TRUCK TYPE: HS 20 INVENTORY RATING (66B1):

* Use rating schedule for Deck, Superstructure, Substructure & Scour items (9 to 0)

NOTE: See reverse for description of condition rating

Illinois Department of Transportation

Routine Inspection Report

SN:	045-0082	**District:**	1	**Spans:**	4	**Appr. Spans:**	0	**Skew:**	18	**ADT:**	9650	**Truck Pct:**	25
ADT Un:	30100	**Maint. Co:**	KANE	**Twsp:**	BLACKBERRY			**Status:**	OPEN - NO RESTRICT				
Facility Carried:	IL 47					**Feature Crossed:**	I- 88 EW TOLL						
Location	5 M N OF IL 56			**Municipality:**				**Team/Sub:**	129/475	**Insp/Rte:**	029		
Bridge Name:						**Material & Type:**	PRESTRESS CONCRETE CONTINUOUS/STRINGER/MUL						
Insp. Intervals Routine:	24	**Fracture Critical:**	0	**Underwater:**	0	**Special:**	N/A	**Element Level:**	24				

90 – Inspection Date:	/ /	90C – Temp. (ºF)		90B1 – In-Depth	☐
Is Delinquent:	☑	Reason:	None		
90A – Agency Program Manager:		90A3 – Consultant Program Manager:			
90A1 – Team Leader:		90A2 – Inspector:			

90B – Inspection Remarks:

Previous Inspection

Resources

Time to Inspect (H:M):	0:0	:	Traffic Control:			Boat:			Waders:			Snooper:			
Ladder:			Manlift:			Bucket Truck:			Other:						

Inspector's Appraisals

	Prev	New	Comments
58 – Deck Condition:	7		
59 – Superstructure Cond:	8		
60 – Substructure Cond:	7		
62 – Culvert Condition:	N		
61 – Channel Condition:	N		
71 – Waterway Adequacy:	N		
72 – Approach Rdw Align:	7		
111 – Pier Navig Protection:	N		

90B – Inspector Remarks:

BBS-BIR (Rev. 03/04/14) Sheet 1 of 2

Attachment C

Routine Inspection Report

Structure Number: 0450082

Additional Inspection Data

	Prev	New
36A – Bridge Railing Adequacy:	3	

Rail Types:

	Prev	New		New		New
Approach Guardrail Adequacy: 36B – Transitions:	2		36C – Guardrail:	2	36D – Ends:	N

	Prev	New	
108A – Wearing Surface Type:	A		If "L-Other" Describe:
108B – Type of Membrane:	F		If "E-Other" Describe:
108C – Deck Protection:	A		If "I-Other" Describe:
108D – Total Deck Thickness (in):	7.5		

	Prev	New
59A – Paint Date (Mo/Yr):		/
59B – Paint Type:		__ __ __ __ __ __ __ __

Color: Fascia - ____: Inter. - ____: Railing - ____.

59C – Utilities Attached:		__ __ __

If "B-Other" Describe: _____

		Prev	New
Weight Limit Posting:	70A2 – Single Unit Vehicles:		Tons
	70B2 – Combination Type 3S-1 (3 or 4 axles):		Tons
	70C2 – Combination Type 3S-2 (5 or more axles):		Tons
	70D2 – One Truck at a Time:	0	

Joint Openings (In.) _____

90B – Inspector Remarks Continued:

	Signature	Date
Inspection Team Leader:		/ /
Consultant Program Manager:		/ /
Agency Program Manager:		/ /

Attachment C

Inspection Appraisal Data 1

Today's Date: 03/10/2016

Structure Number:	045-0082 **(2) District:** 1	**(41) Bridge Status:**	1 OPEN - NO RESTRICT
(6) Feature Crossed:	I- 88 EW TOLL	**(7) Facility Carried:**	IL 47
(9) Location:	5 M N OF IL 56	**(7A) Bridge Name:**	
(90) Inspection Date:	09/05/2014	**Interval Date:**	04/30/2014
Delinquent Inspection:	Y	**(90B1) In-Depth:**	☐
Delinquent Reason:	None		

(58) Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Deck Comments:				
(36A) Bridge Railing Appraisal:	3	Meets Standards		
(36B,C,D) Approach Guardrail:	22N	Not Acceptable	Not Acceptable	N/A
(59) Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED		
Superstructure Comments:				
(60) Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Substructure Comments:				
(61) Channel - Protection:	N	NOT APPLICABLE		
Channel Comments:				
(111)Pier/Abut. Prot:	N	N/A		
Pier Nav. Prot. Comments:				
(62) Culvert & Retaining Wall:	N	NOT APPLICABLE		
Culvert Comments:				
(70) Bridge Posting Level:	5	No Posting Required		
(71) Waterway Adequacy:	N	NOT APPLICABLE		
Waterway Comments:				
(67) Structure Condition:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
(68) Deck Geometry:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA		
(69) Underclear- Vert/Lat.:	6	EQUAL TO PRESENT MINIMUM CRITERIA		
(72) Approach Roadway Align:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
Approach Rdwy Comments:				

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 2

Today's Date: 03/10/2016

Structure Number: 045-0082 **(2) District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: I- 88 EW TOLL **(7) Facility Carried:** IL 47

(9) Location: 5 M N OF IL 56 **(7A) Bridge Name:**

(90) Inspection Date: 09/05/2014 **Interval Date:** 04/30/2014

(90C) Temperature: 90

(70D2) OTAT: 0 No **Posting 70A:** **70B:** **70C:**

(108) Wearing Surf On: A BARE DECK NO OVRLAY F NONE A EPOXY COATED REINF

Other Wearing Surf Type:

(108D) Total DeckThick: 7.5

(59A) Last Paint Date:

(59C) Utilities Attached:

Other Utility:

(90A) Agency Program Manager: AjamiE

(90A3) Consultant Program Manager:

(90A1) Team Leader: AjamiE **(90A2) Inspector:**

(90B) Inspection Remarks:

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 1

Today's Date: 03/10/2016

Structure Number:	045-0082 **(2) District:** 1	**(41) Bridge Status:**	1 OPEN - NO RESTRICT
(6) Feature Crossed:	I- 88 EW TOLL	**(7) Facility Carried:**	IL 47
(9) Location:	5 M N OF IL 56	**(7A) Bridge Name:**	
(90) Inspection Date:	04/30/2012	**Interval Date:**	09/30/2012
Delinquent Inspection:	N	**(90B1) In-Depth:**	☐
Delinquent Reason:			

(58) Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Deck Comments:				
(36A) Bridge Railing Appraisal:	3	Meets Standards		
(36B,C,D) Approach Guardrail:	22N	Not Acceptable	Not Acceptable	N/A
(59) Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED		
Superstructure Comments:				
(60) Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Substructure Comments:				
(61) Channel - Protection:	N	NOT APPLICABLE		
Channel Comments:				
(111)Pier/Abut. Prot:	N	N/A		
Pier Nav. Prot. Comments:				
(62) Culvert & Retaining Wall:	N	NOT APPLICABLE		
Culvert Comments:				
(70) Bridge Posting Level:	5	No Posting Required		
(71) Waterway Adequacy:	N	NOT APPLICABLE		
Waterway Comments:				
(67) Structure Condition:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
(68) Deck Geometry:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA		
(69) Underclear- Vert/Lat.:	6	EQUAL TO PRESENT MINIMUM CRITERIA		
(72) Approach Roadway Align:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
Approach Rdwy Comments:				

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 2

Today's Date: 03/10/2016

Structure Number: 045-0082 **(2) District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: I- 88 EW TOLL **(7) Facility Carried:** IL 47

(9) Location: 5 M N OF IL 56 **(7A) Bridge Name:**

(90) Inspection Date: 04/30/2012 **Interval Date:** 09/30/2012

(90C) Temperature: 60

(70D2) OTAT: 0 No **Posting 70A:** **70B:** **70C:**

(108) Wearing Surf On: A BARE DECK NO OVRLAY F NONE A EPOXY COATED REINF

Other Wearing Surf Type:

(108D) Total DeckThick: 7.5

(59A) Last Paint Date:

(59C) Utilities Attached:

Other Utility:

(90A) Agency Program Manager: AjamiE

(90A3) Consultant Program Manager:

(90A1) Team Leader: ChildressDG **(90A2) Inspector:**

(90B) Inspection Remarks:

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 1

Today's Date: 03/10/2016

Structure Number:	045-0082 **(2) District:** 1	**(41) Bridge Status:**	1 OPEN - NO RESTRICT
(6) Feature Crossed:	I- 88 EW TOLL	**(7) Facility Carried:**	IL 47
(9) Location:	5 M N OF IL 56	**(7A) Bridge Name:**	
(90) Inspection Date:	09/27/2010	**Interval Date:**	
Delinquent Inspection:	N	**(90B1) In-Depth:**	☐
Delinquent Reason:			

(58) Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Deck Comments:				
(36A) Bridge Railing Appraisal:	3	Meets Standards		
(36B,C,D) Approach Guardrail:	323	Acceptable	Not Acceptable	Acceptable
(59) Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED		
Superstructure Comments:				
(60) Substructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED		
Substructure Comments:				
(61) Channel - Protection:	N	NOT APPLICABLE		
Channel Comments:				
(111)Pier/Abut. Prot:	N	N/A		
Pier Nav. Prot. Comments:				
(62) Culvert & Retaining Wall:	N	NOT APPLICABLE		
Culvert Comments:				
(70) Bridge Posting Level:	5	No Posting Required		
(71) Waterway Adequacy:	N	NOT APPLICABLE		
Waterway Comments:				
(67) Structure Condition:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
(68) Deck Geometry:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA		
(69) Underclear- Vert/Lat.:	6	EQUAL TO PRESENT MINIMUM CRITERIA		
(72) Approach Roadway Align:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
Approach Rdwy Comments:				

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 2

Today's Date: 03/10/2016

Structure Number: 045-0082 **(2) District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: I- 88 EW TOLL **(7) Facility Carried:** IL 47

(9) Location: 5 M N OF IL 56 **(7A) Bridge Name:**

(90) Inspection Date: 09/27/2010 **Interval Date:**

(90C) Temperature: 65

(70D2) OTAT: 0 No **Posting 70A:** **70B:** **70C:**

(108) Wearing Surf On: A BARE DECK NO OVRLAY F NONE A EPOXY COATED REINF

Other Wearing Surf Type:

(108D) Total DeckThick: 7.5

(59A) Last Paint Date: **(59C) Utilities Attached:** N N/A

N N/A

N N/A

Other Utility:

(90A) Agency Program Manager: ELIAS AJAMI - ISTHA

(90A3) Consultant Program Manager:

(90A1) Team Leader: ELIAS AJAMI - ISTHA **(90A2) Inspector:**

(90B) Inspection Remarks: INSPECTION BY THE TOLLWAY, ENTERED BY IDOT 03/16/2011 S WILSON.

Download Date: 03/10/2016

Attachment C

Pontis

Today's Date: 03/09/2016

Structure Number: 045-0082 **District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: I- 88 EW TOLL **(7) Facility Carried:** IL 47

(9) Location: 5 M N OF IL 56 **(7A) Bridge Name:**

Element Inspection Date: 02/25/2014

(90E) Agency Program Manager: MastnySC **(90E3) Consultant Program Manager:**

(90E1) Team Leader: ValentineMA **(90E2) Inspector:**

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Concrete Bridge Railing										
331	4	0	0	100	334	0	0	0	0	334
		No deterioration	Minor cracks/spalls		Analysis warranted					

Remarks:

Concrete Deck Protected w/ Coated Bars										
8026	4	100	21,780	0	0	0	0	0	0	21,780

Remarks: Top:Tines scaling, HL transv cracks worst over pier; hl longit& diag sp's 1 & 4 Soffit:Typ HL transv w/scatt fine HL shrinkage type cracks, hl longit & diag in sp's 1 & 4

Continuous Seal Neoprene Expansion Joint										
8308	4	84	160	16	30	0	0	0	0	190

Remarks: Lt-mod plow damage N&S

Approach Pavement										
8323	4	100	4	0	0	0	0	0	0	4

Remarks: HL-narrow random cracking both NB and SB

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
P/S Concrete Approach Slab										
320	4	100	6,494	0	0	0	0	0	0	6,494
		No deterioration	Minor cracks/spalls		Major cracks/spalls		Broken/Unstable			

Remarks: Top: HL random & longit cracking worst @ N SB lanes. Soffit: HL diag & longit cracks w/areas of fine HL map cracks N&S

Concrete Bridge Railing										
331	4	0	0	100	334	0	0	0	0	334
		No deterioration	Minor cracks/spalls		Analysis warranted					

Remarks:

Attachment C

Concrete Deck Protected w/ Coated Bars

8026	4	100	15,286	0	0	0	0	0	0	15,286

Remarks: Main:Top:Tines scaling, HL transv cracks worst over pier; Soffit:Typ HL transv w/scatt fine HL shrinkage type cracks.

Continuous Seal Neoprene Expansion Joint

8308	4	84	160	16	30	0	0	0	0	190

Remarks: Lt-mod plow damage N&S

Approach Pavement

8323	4	100	4	0	0	0	0	0	0	4

Remarks: HL-narrow random cracking both NB and SB

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
P/S Concrete Approach Slab										
320	4	100	6,494	0	0	0	0	0	0	6,494
		No deterioration	Minor cracks/spalls		Major cracks/spalls		Broken/Unstable			
Remarks: Top: HL random & longit cracking worst @ N SB lanes. Soffit: HL diag & longit cracks w/areas of fine HL map cracks N&S										
Concrete Bridge Railing										
331	4	0	0	100	334	0	0	0	0	334
		No deterioration	Minor cracks/spalls		Analysis warranted					
Remarks:										
Concrete Deck Protected w/ Coated Bars										
8026	4	100	15,286	0	0	0	0	0	0	15,286
Remarks: Main:Top:Tines scaling, HL transv cracks worst over pier; Soffit:Typ HL transv w/scatt fine HL shrinkage type cracks.										
Continuous Seal Neoprene Expansion Joint										
8308	4	84	160	16	30	0	0	0	0	190
Remarks: Lt-mod plow damage N&S										
Approach Pavement										
8323	4	100	4	0	0	0	0	0	0	4
Remarks: HL-narrow random cracking both NB and SB										

Attachment C

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Concrete Bridge Railing										
331	4	0	0	100	334	0	0	0	0	334
		No deterioration		Minor cracks/spalls	Analysis warranted					
Remarks:										
Concrete Deck Protected w/ Coated Bars										
8026	4	100	21,780	0	0	0	0	0	0	21,780
Remarks:	Main:Top:Tines scaling, HL transv cracks worst over pier; Soffit:Typ HL transv w/scatt fine HL shrinkage type cracks.Vaults:Top:HL longit,random & transv cracks,Soffit: Typical as top w/leaching									
Continuous Seal Neoprene Expansion Joint										
8308	4	87	166	13	24	0	0	0	0	190
Remarks:	Lt-mod plow damage N&S									
Approach Pavement										
8323	4	100	4	0	0	0	0	0	0	4
Remarks:	HL random cracking both NB and SB									

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Concrete Bridge Railing										
331	4	0	0	100	334	0	0	0	0	334
		No deterioration		Minor cracks/spalls	Analysis warranted					
Remarks:										
Concrete Deck Protected w/ Coated Bars										
8026	4	100	21,780	0	0	0	0	0	0	21,780
Remarks:	Diag cracks in bay 5 of span 1 and in bay 1,2 of span 4									
Continuous Seal Neoprene Expansion Joint										
8308	4	100	190	0	0	0	0	0	0	190
Remarks:										
Approach Pavement										
8323	4	100	4	0	0	0	0	0	0	4
Remarks:										

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Concrete Deck Bare										
12	3	14	3,060	65	14,135	18	4,002	3	710	21,907
		No deficiencies.	Repaired areas.		Map cracks.		Spalls/delam exist.		Full depth failures.	

Remarks: Top:Very lg unsound areas thru-out;HL-wide transv,mapped & random cracking thru-out;Numer bit filled & devel. potholes thruout. Soffit:Several lg spalls w/exp. rusted strands & rebar most NB;Areas of

Open Expansion Joint										
304	3	0	0	95	227	5	12	0	0	239
		No deterioration	Minor deterioration		Advanced corrosion					

Remarks: Several small spalls along joint on soffit.

Concrete Bridge Railing										
331	3	0	0	40	189	59	281	2	8	478
		No deterioration	Minor cracks/spalls		Analysis warranted					

Remarks: Numerous areas of Lg HP's, spalling(most @ east) & HL-narrow horizontal & vert. cracking with rust stains. Large impact damage to west span 1.

Neoprene Expansion Joint										
8307	3	0	0	60	116	31	60	9	17	193

Remarks: Numerous areas of polymer concrete nosing breaking up. Majority of seals are torn, missing & leaking

Approach Pavement										
8323	3	0	0	100	4	0	0	0	0	4

Remarks: Typical random cracking

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Open Expansion Joint										
304	3	0	0	95	227	5	12	0	0	239
		No deterioration	Minor deterioration		Advanced corrosion					

Remarks: Several small spalls along joint on soffit.

Concrete Bridge Railing										
331	3	0	0	40	189	59	281	2	8	478
		No deterioration	Minor cracks/spalls		Analysis warranted					

Remarks: Numerous areas of Lg HP's, spalling(most @ east) & HL-narrow horizontal & vert. cracking with rust stains. Large impact damage to west span 1.

Neoprene Expansion Joint										
8307	3	0	0	60	116	31	60	9	17	193

Remarks: Numerous areas of polymer concrete nosing breaking up. Majority of seals are torn, missing & leaking

Approach Pavement

8323	3	50	2	50	2	0	0	0	0	4

Remarks: Typical random cracking

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Concrete Deck Bare										
12	3	82	17,963	9	1,972	9	1,972	0	0	21,907
		No deficiencies.	Repaired areas.		Map cracks.		Spalls/delam exist.		Full depth failures.	
Remarks:										
Open Expansion Joint										
304	3	0	0	100	239	0	0	0	0	239
		No deterioration	Minor deterioration		Advanced corrosion					
Remarks:										
Concrete Bridge Railing										
331	3	0	0	50	239	50	239	0	0	478
		No deterioration	Minor cracks/spalls		Analysis warranted					
Remarks:										
Neoprene Expansion Joint										
8307	3	60	116	0	0	31	60	9	17	193
Remarks:										
Approach Pavement										
8323	3	100	4	0	0	0	0	0	0	4
Remarks:										

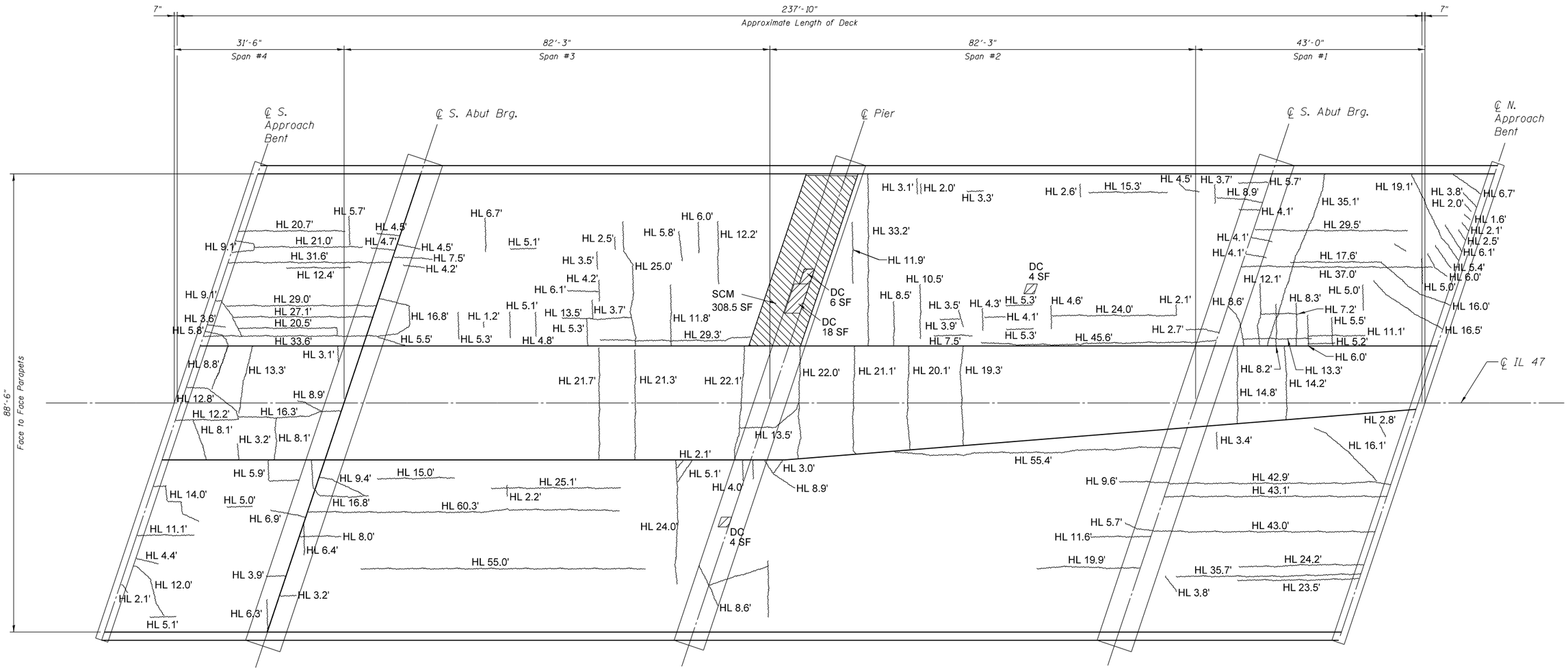
Download Date: 03/08/2016

Attachment C

ATTACHMENT D

Top and Bottom of Deck Condition Surveys

Note:Surveys of the beam ends are also included in this Attachment.



TOP OF DECK PLAN

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)
HL
EFF
CRACK LENGTH

OBSERVED DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	32
SC	SQ. FT.	0
SCEB	SQ. FT.	0
SCM	SQ. FT.	309
PR	SQ. FT.	0
HA	SQ. FT.	0
CRACK	FOOT	2223'

Estimated Deck Surface Area = 21,048 SF

NOTE:

Longitudinal cracks were discovered in each span, as well as map cracking near the pier in the south bound lanes. Additional transverse hairline cracking was present, but only cracks deemed significant were mapped for this exhibit.

3/30/2017
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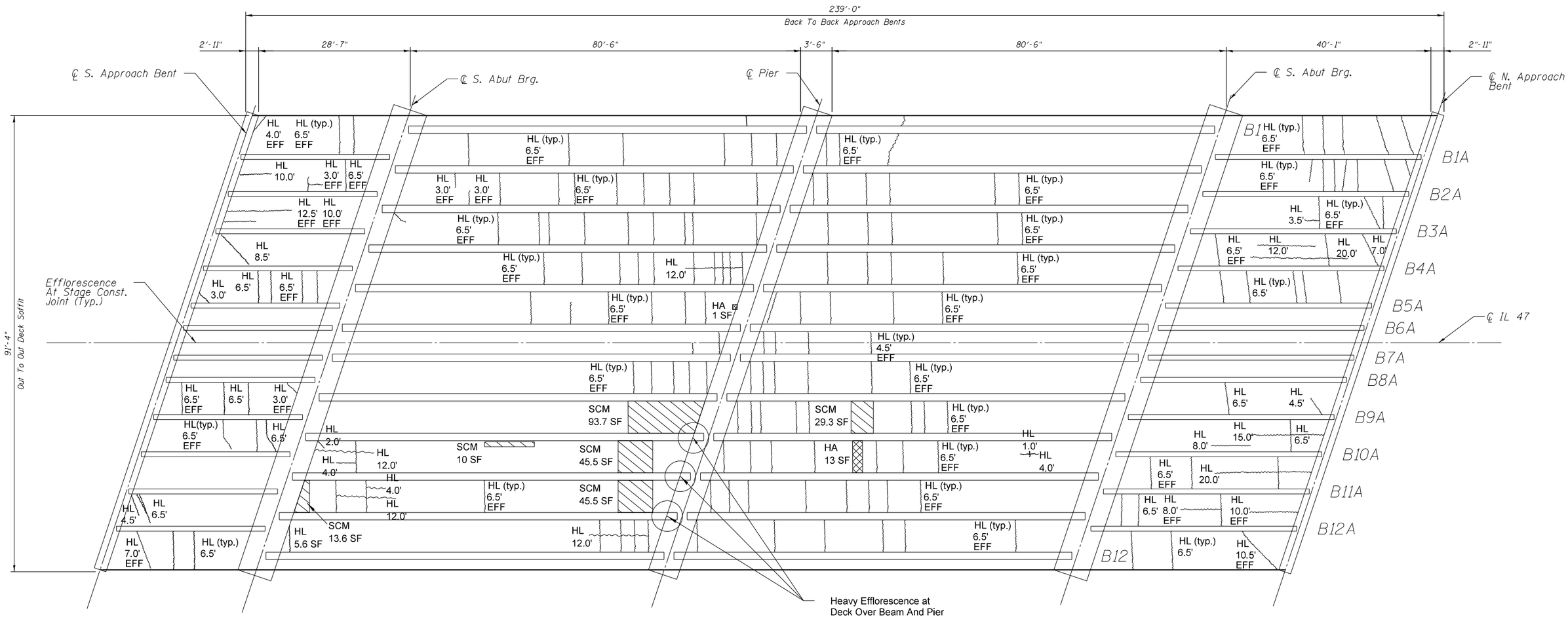
GREEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME = 1908	DESIGNED -	REVISED -	
	CHECKED - NDR	REVISED -	
PLOT SCALE = 20:0 9/32 ':' / In.	DRAWN - TCK	REVISED -	
PLOT DATE = 3:11:14 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
TOP OF DECK PLAN
ATTACHMENT D

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



BOTTOM OF DECK PLAN

Estimated Deck Soffit Area = 16,840 SF

N

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)
HL

CRACK LENGTH

OBSERVED DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	0
SC	SQ. FT.	0
SCEB	SQ. FT.	0
SCM	SQ. FT.	228
PR	SQ. FT.	0
HA	SQ. FT.	14
CRACK	FOOT	1410

NOTE:

Deck soffit is heavily cracked with significant Portion of the deck having transverse, efflorescent cracks spaced at less than 5 foot centers. Longitudinal cracks are also present as indicated.

GREAD EF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631: (773) 399-0112

USER NAME = 1908	DESIGNED -	REVISED -	
	CHECKED - NDR	REVISED -	
PLOT SCALE = 20:0 9/32 ':' / In.	DRAWN - TCK	REVISED -	
PLOT DATE = 3:11:09 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
BOTTOM OF DECK PLAN
ATTACHMENT D

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

3/30/2017
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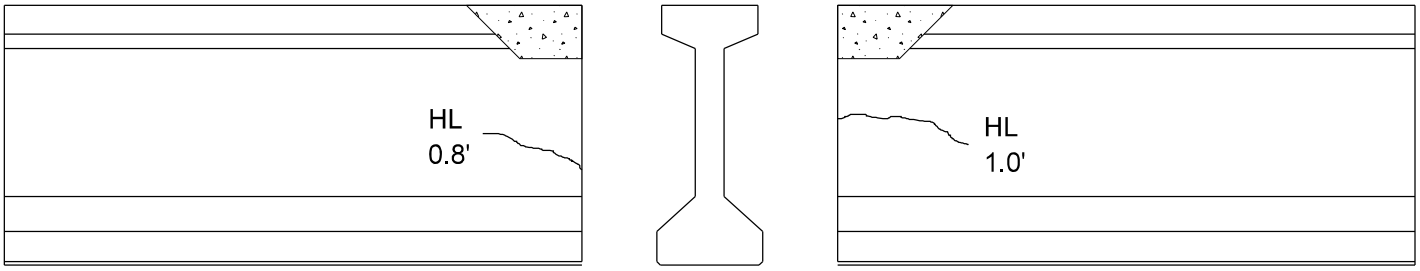
WEST FACE

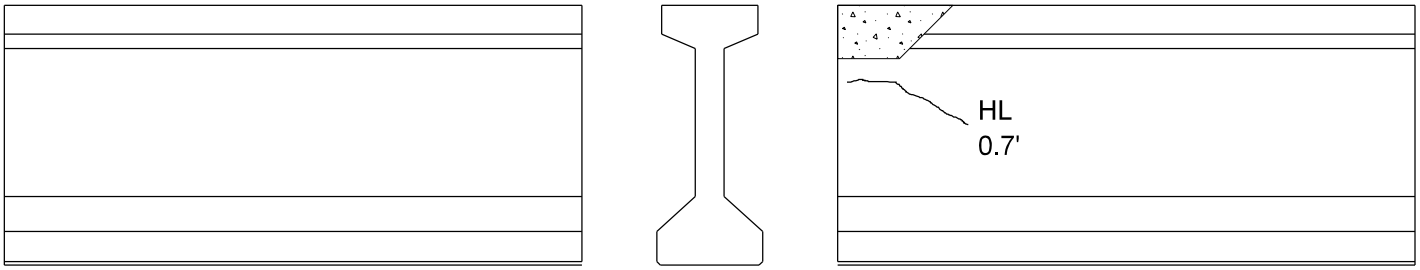
EAST FACE



BEAM: 2

WEST FACE

EAST FACE



BEAM: 1

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	<1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

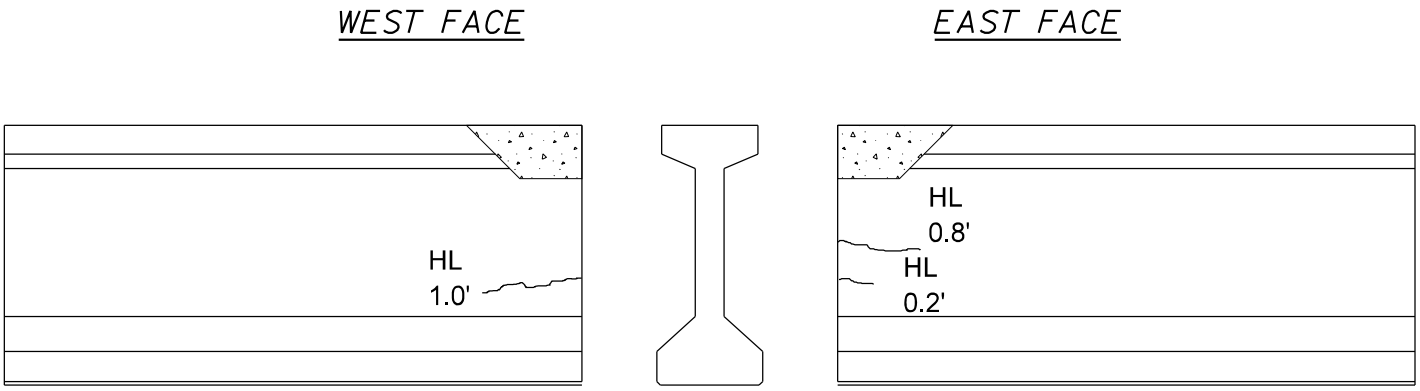
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

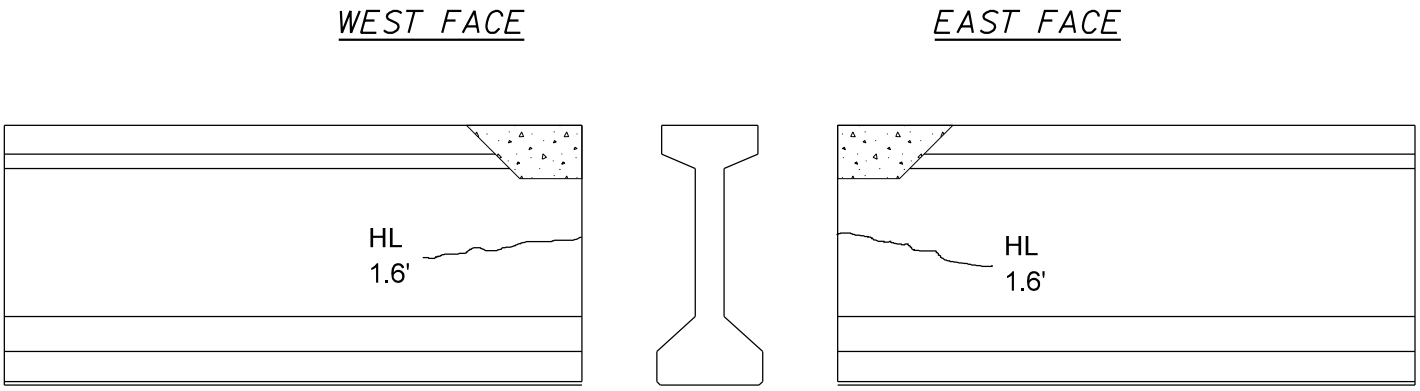
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT N. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



BEAM: 4



BEAM: 3

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	<1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
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DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

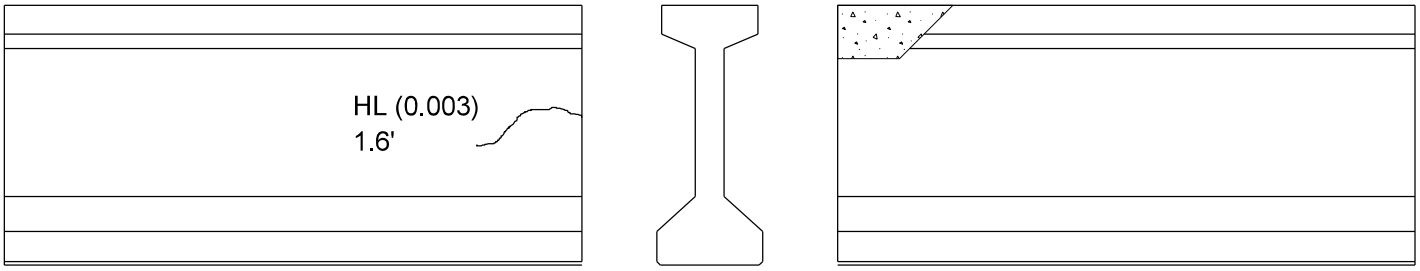
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT N. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE

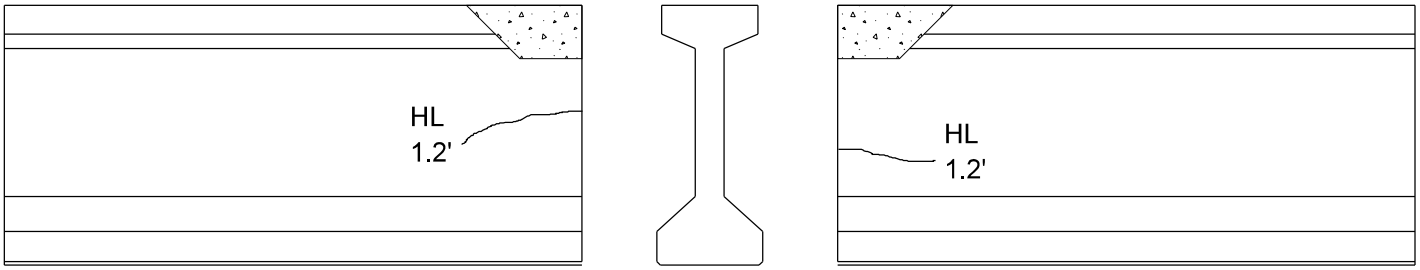
EAST FACE



BEAM: 6

WEST FACE

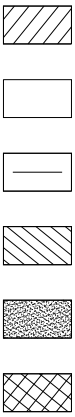
EAST FACE



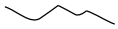
BEAM: 5

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	≤1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")



CRACK TYPE (WIDTH)

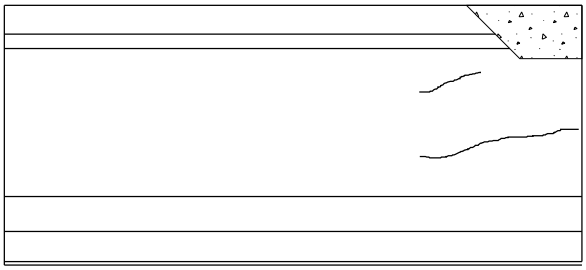


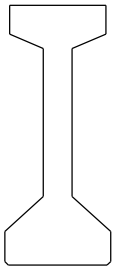
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT N. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE





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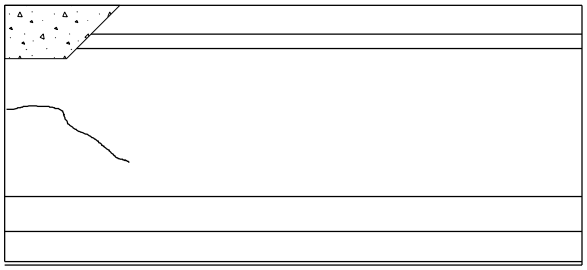

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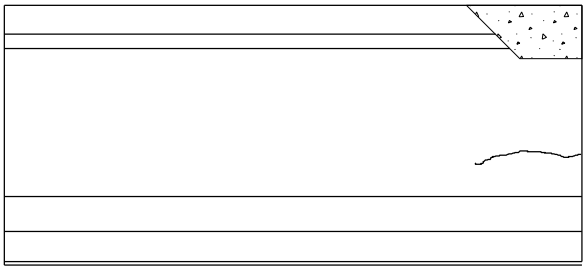

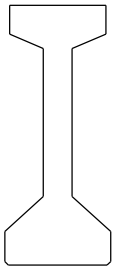

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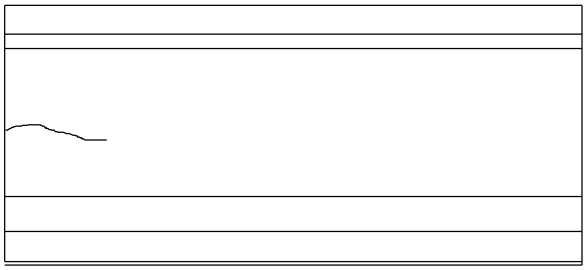


BEAM: 7

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	<1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

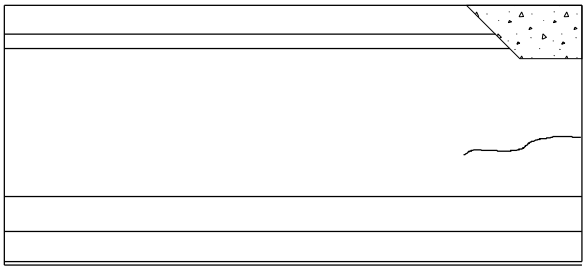
NTS

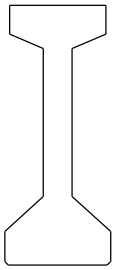
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
BEAMS AT N. ABUTMENT
ATTACHMENT D

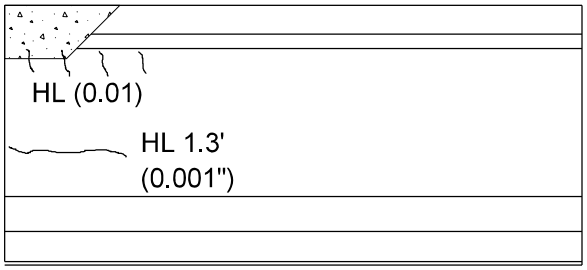
GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

WEST FACE



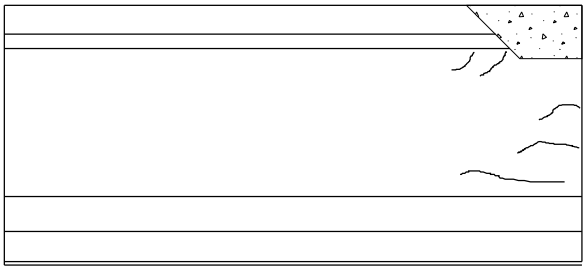


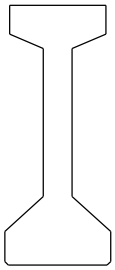
EAST FACE



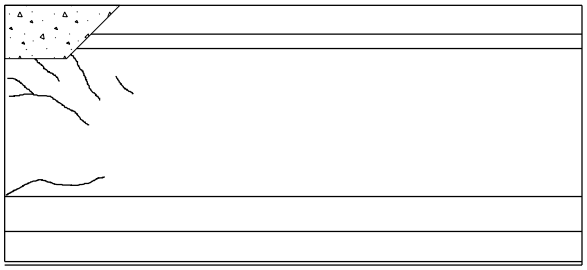
BEAM: 10

WEST FACE





EAST FACE



BEAM: 9

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	<1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

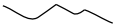
SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

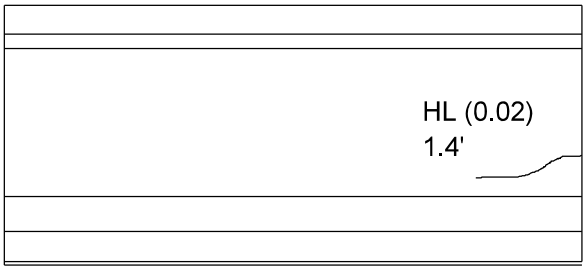


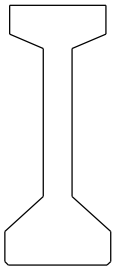
CRACK LENGTH

NTS

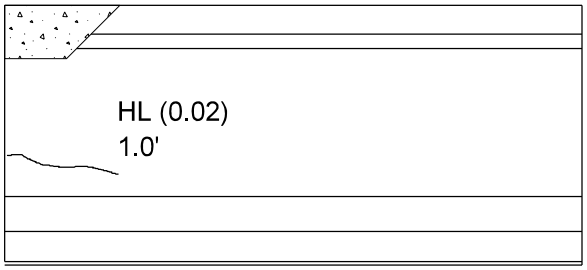
STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT N. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE



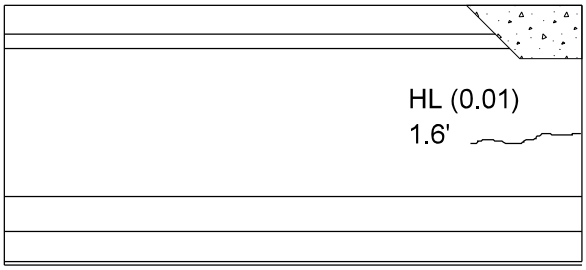


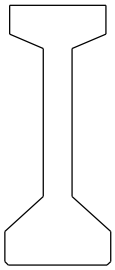
EAST FACE



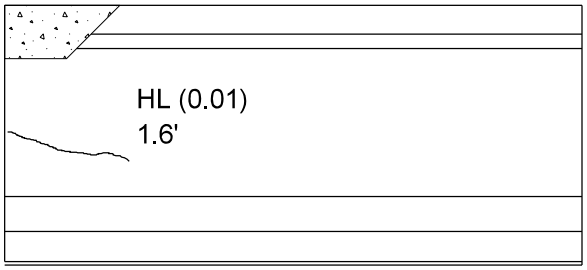
BEAM: 12

WEST FACE





EAST FACE



BEAM: 11

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	<1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
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DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

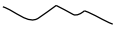
SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

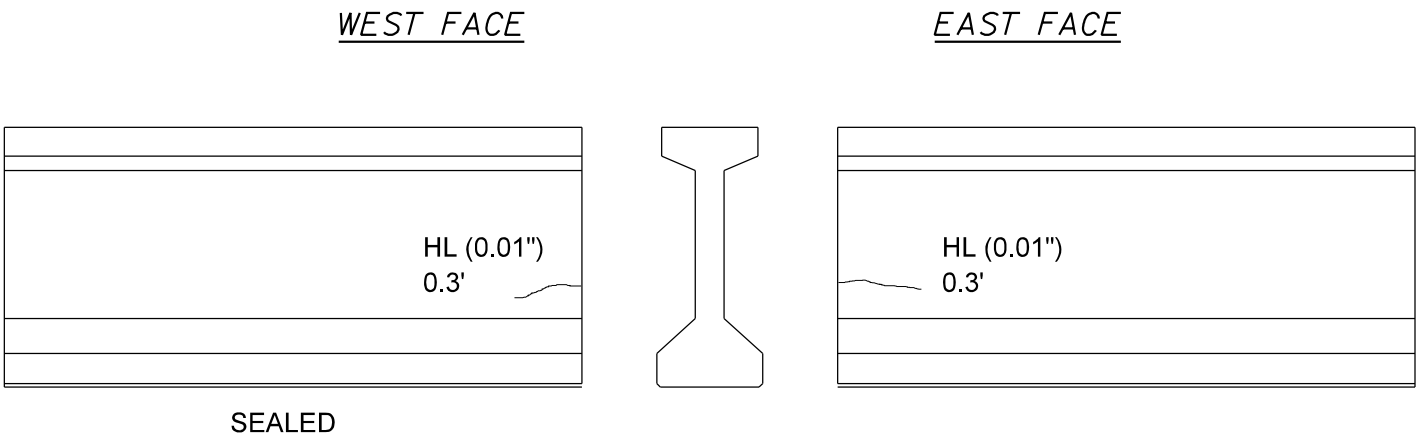
CRACK TYPE (WIDTH)



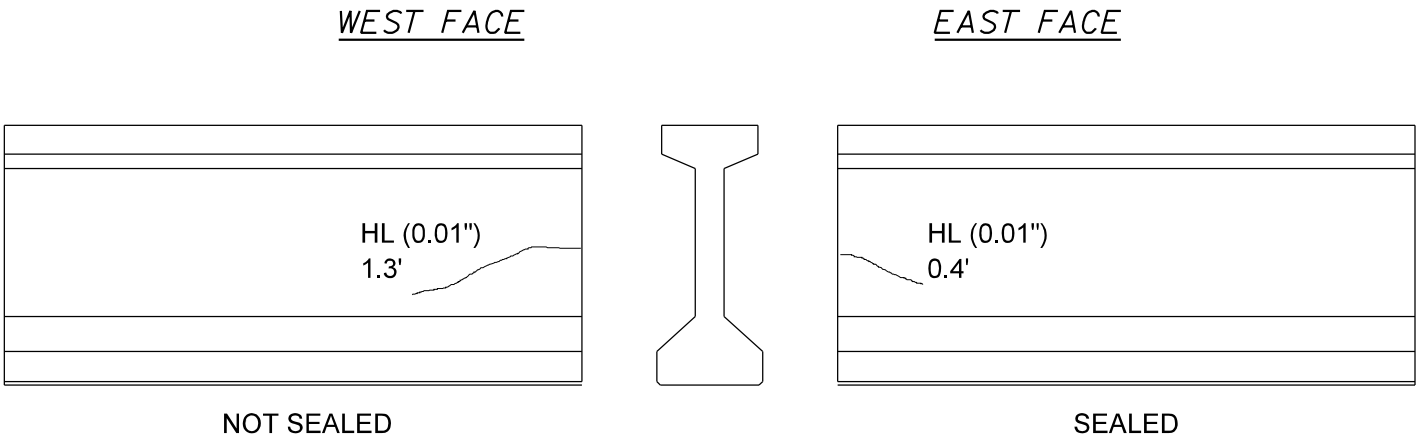
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT N. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



BEAM: 2



BEAM: 1

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

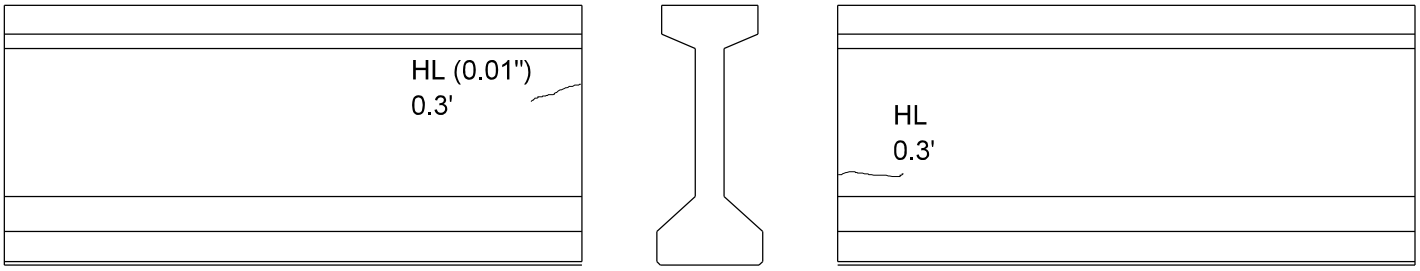
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER N. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE

EAST FACE

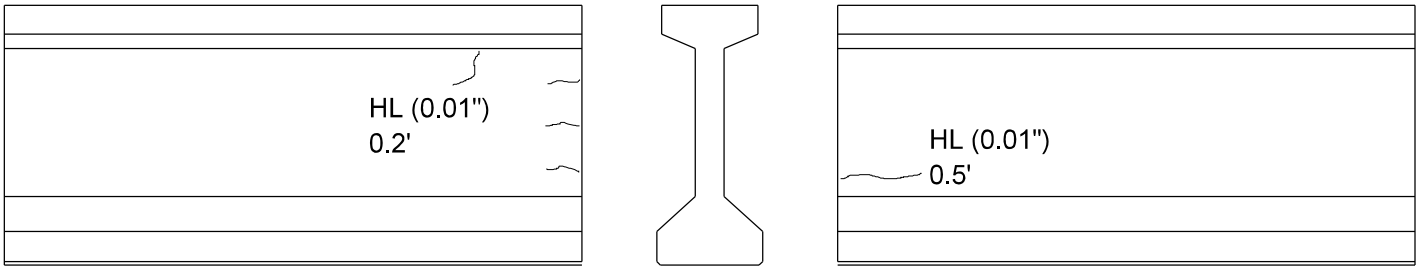


SEALED

BEAM: 4

WEST FACE

EAST FACE



SEALED

SEALED

BEAM: 3

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

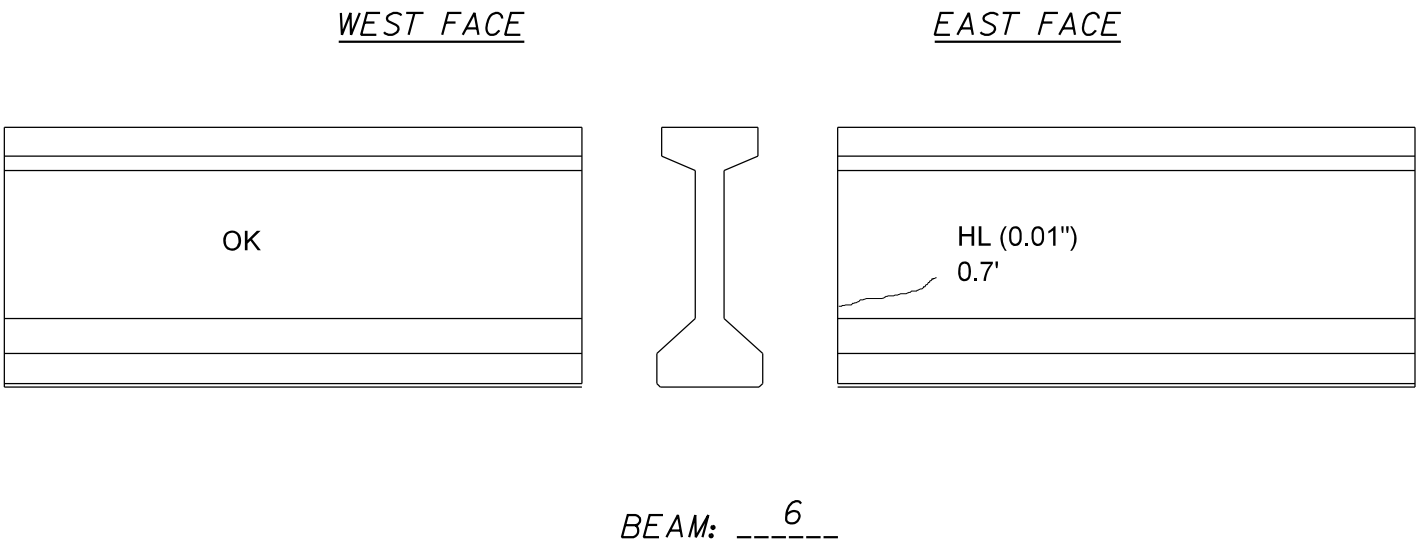
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER N. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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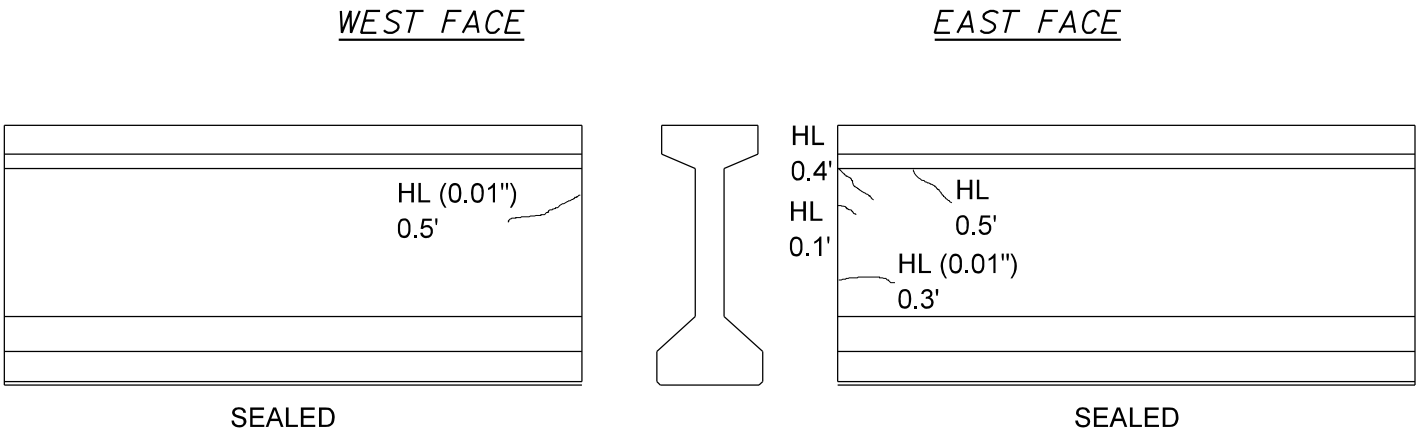


BEAM: 5

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

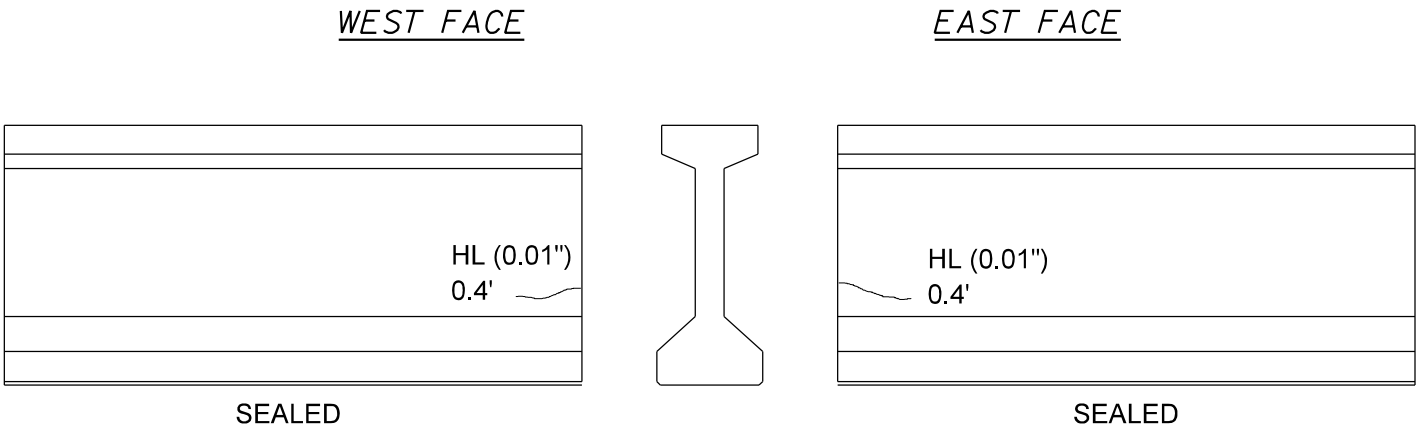
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER N. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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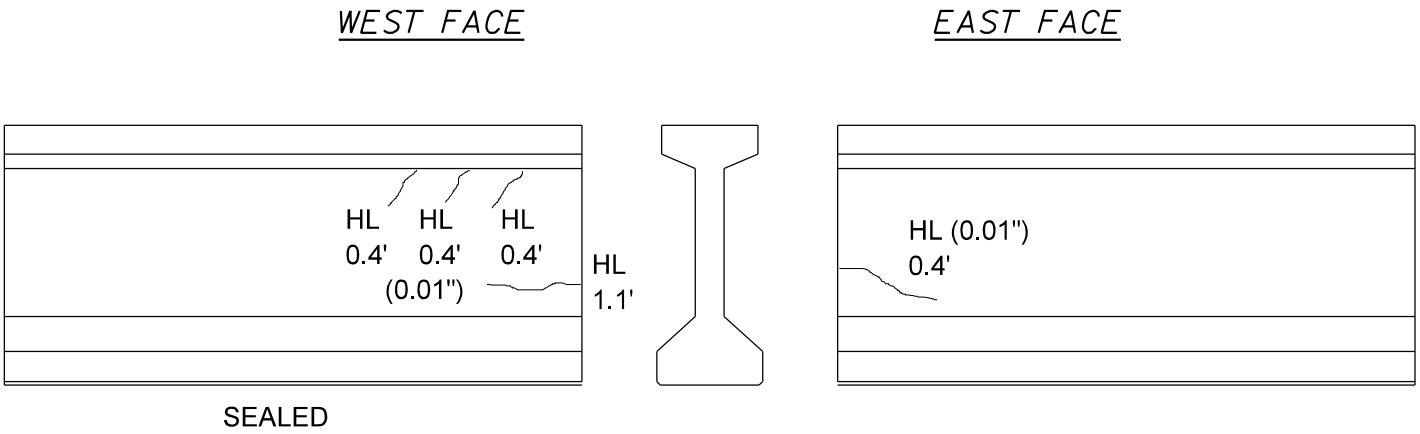


BEAM: 7

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

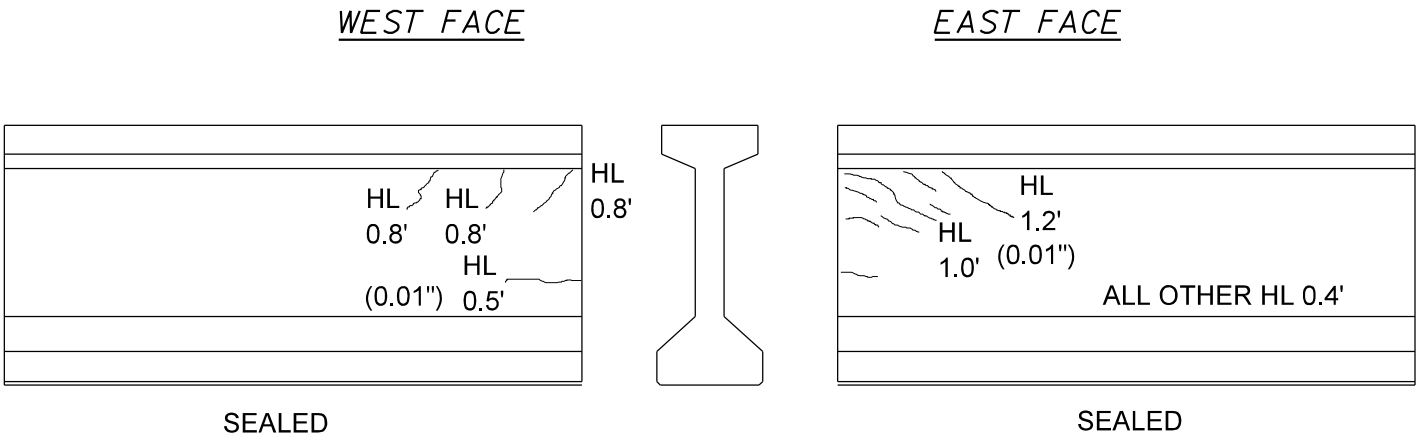
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER N. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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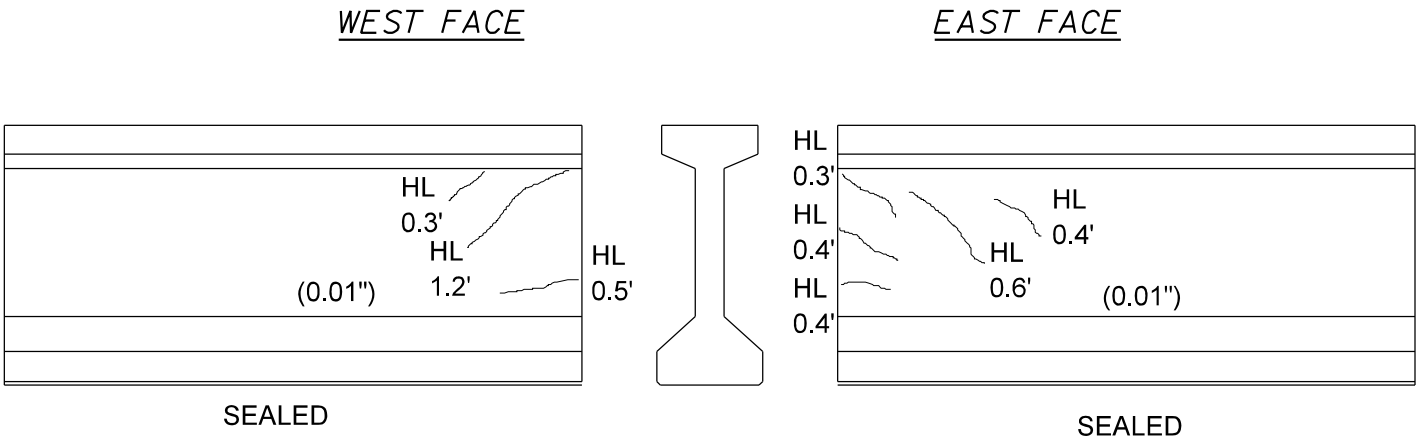


BEAM: 9

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

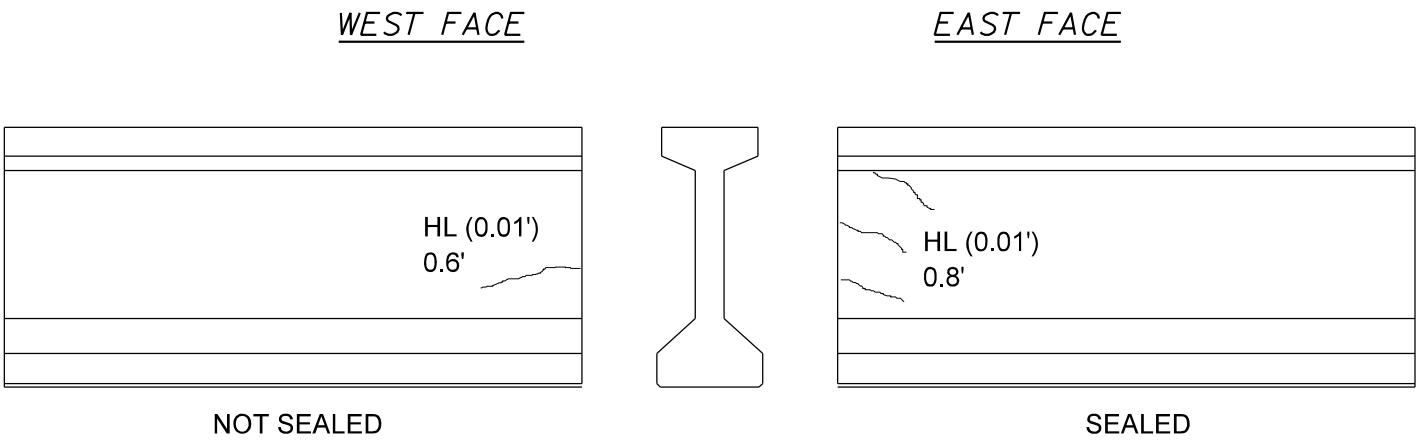
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER N. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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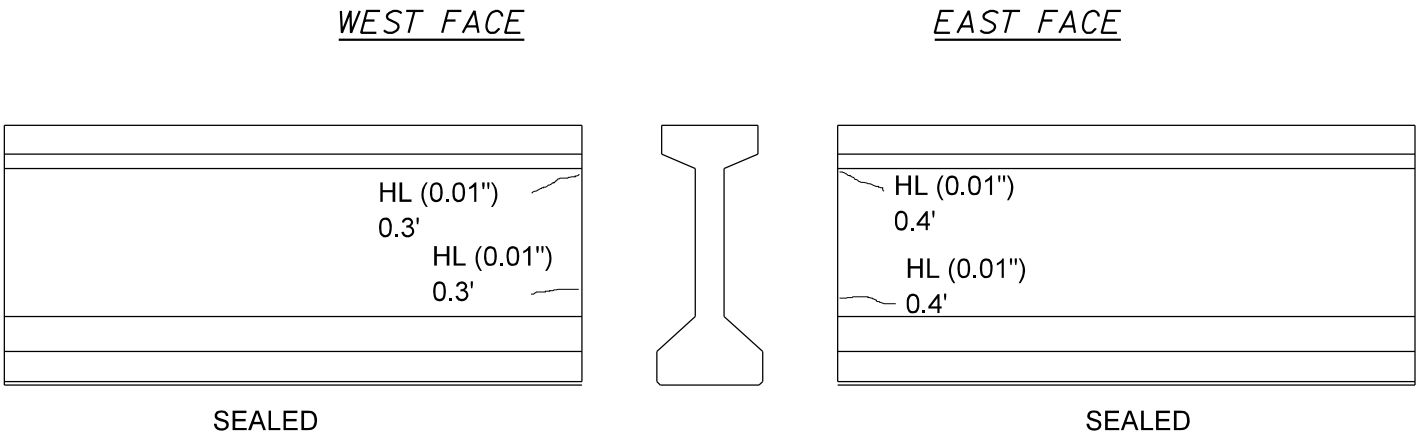


BEAM: 11

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

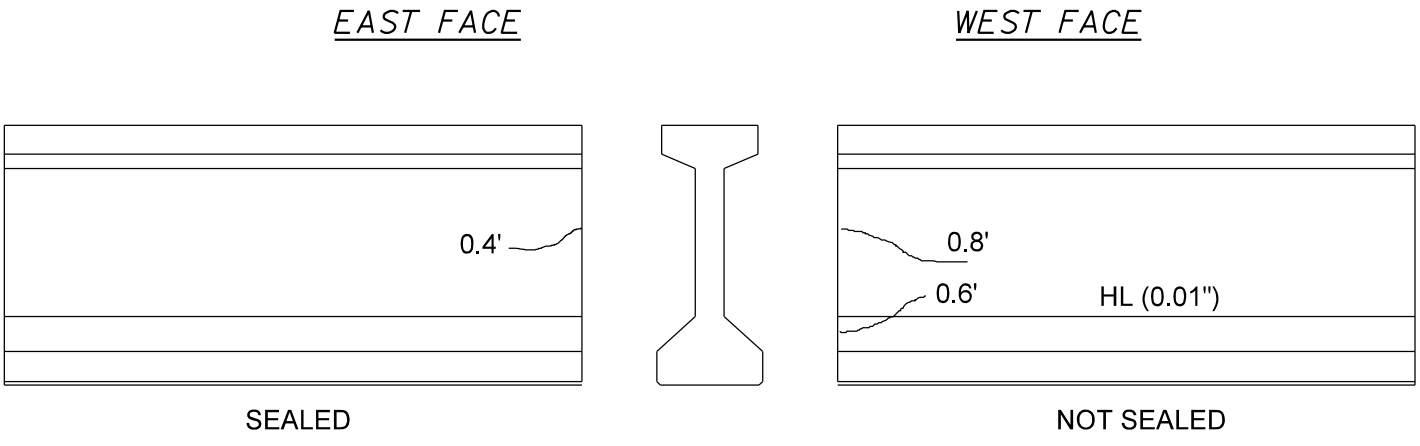
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER N. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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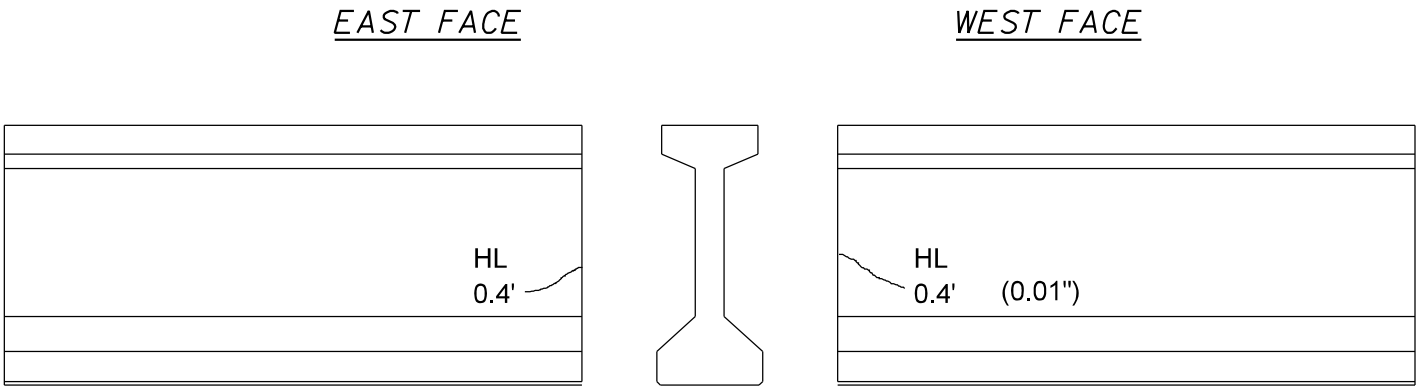


BEAM: 2

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

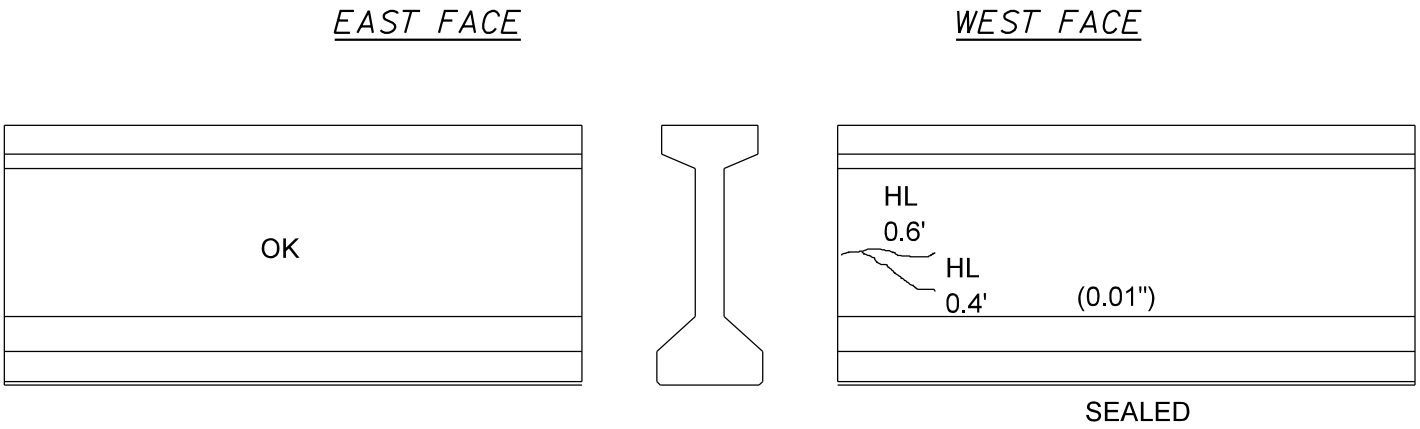
CRACK LENGTH

NTS

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
BEAMS AT PIER S. FACE
ATTACHMENT D

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112



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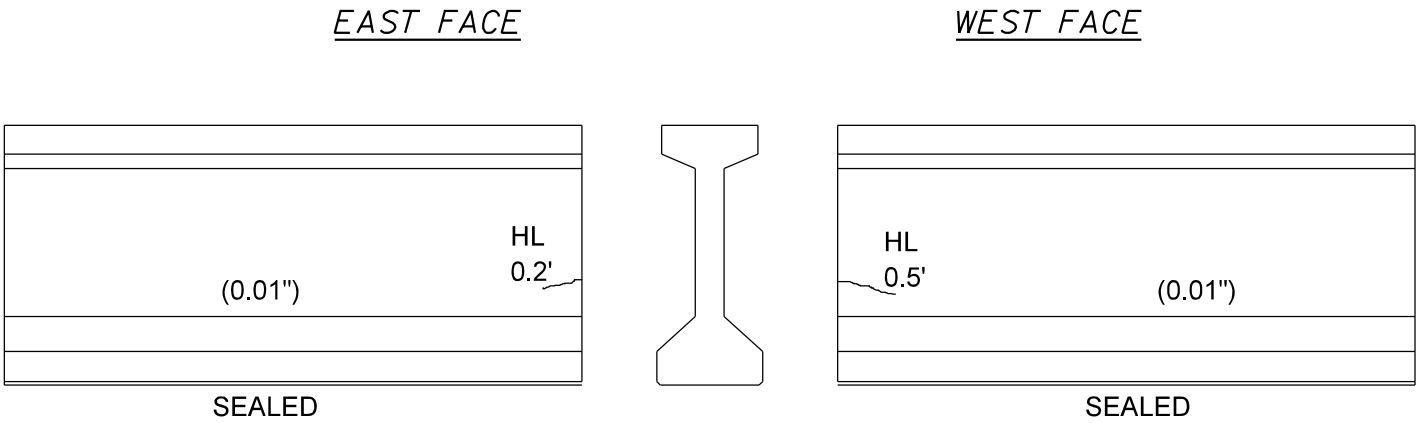


BEAM: 4

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

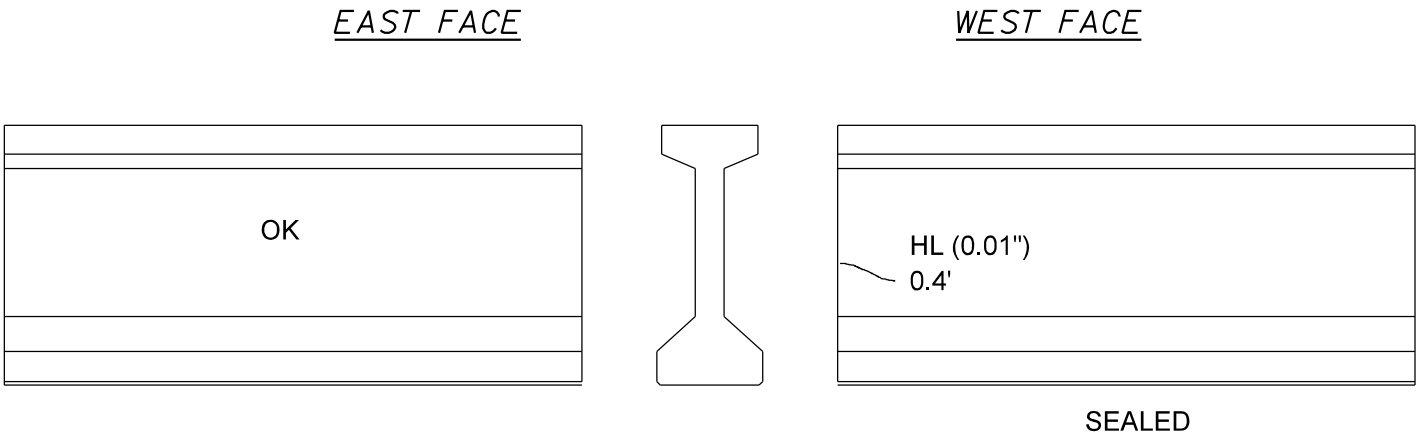
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER S. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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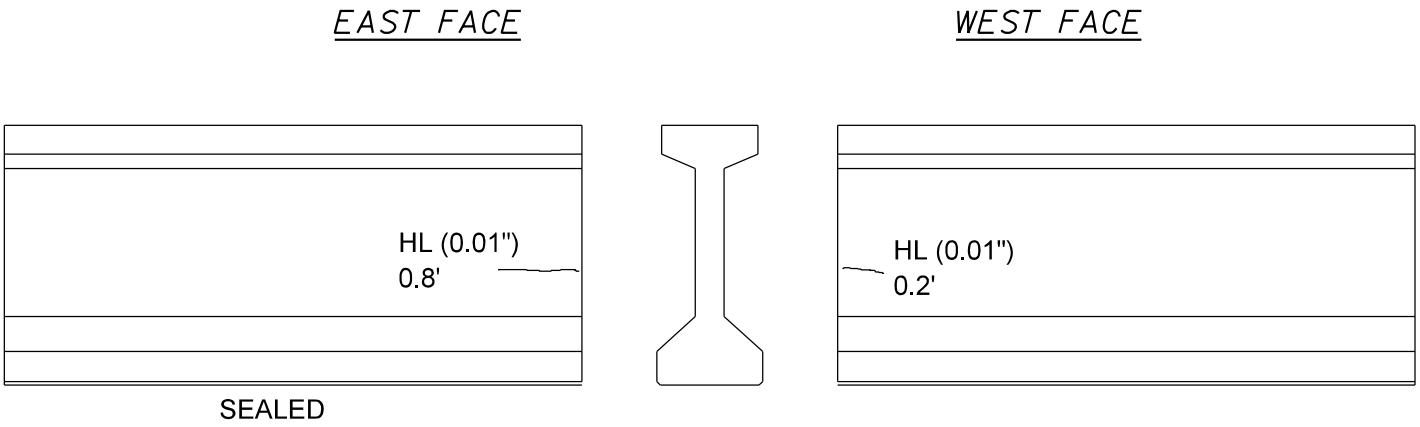


BEAM: 6

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

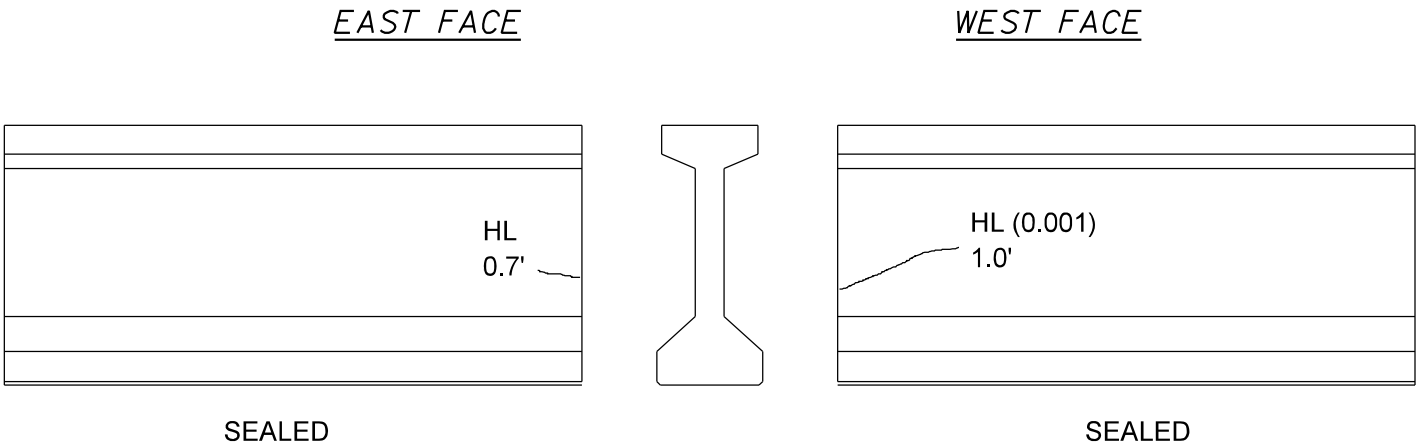
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER S. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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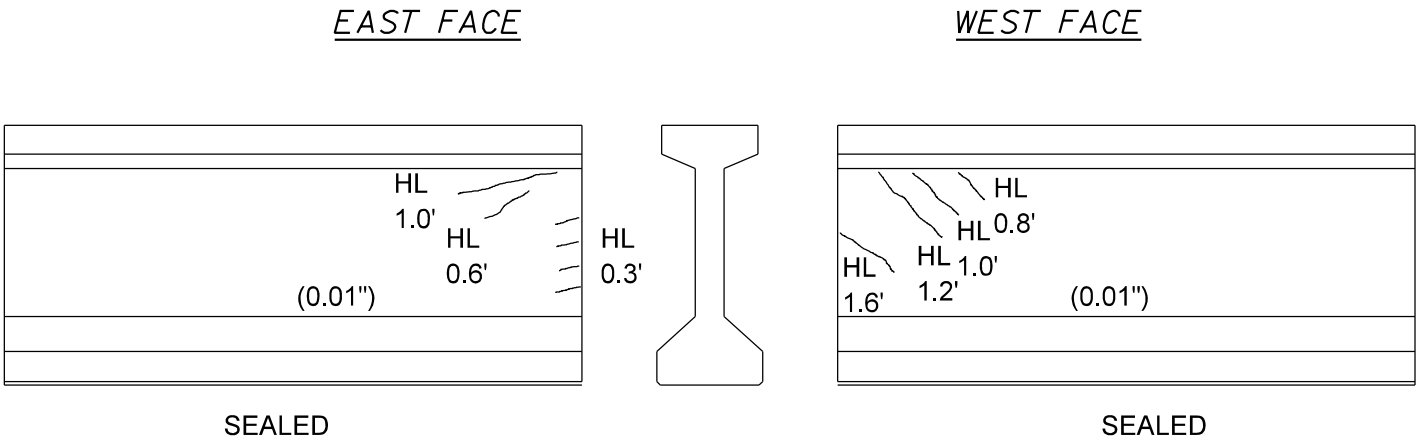


BEAM: 8

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

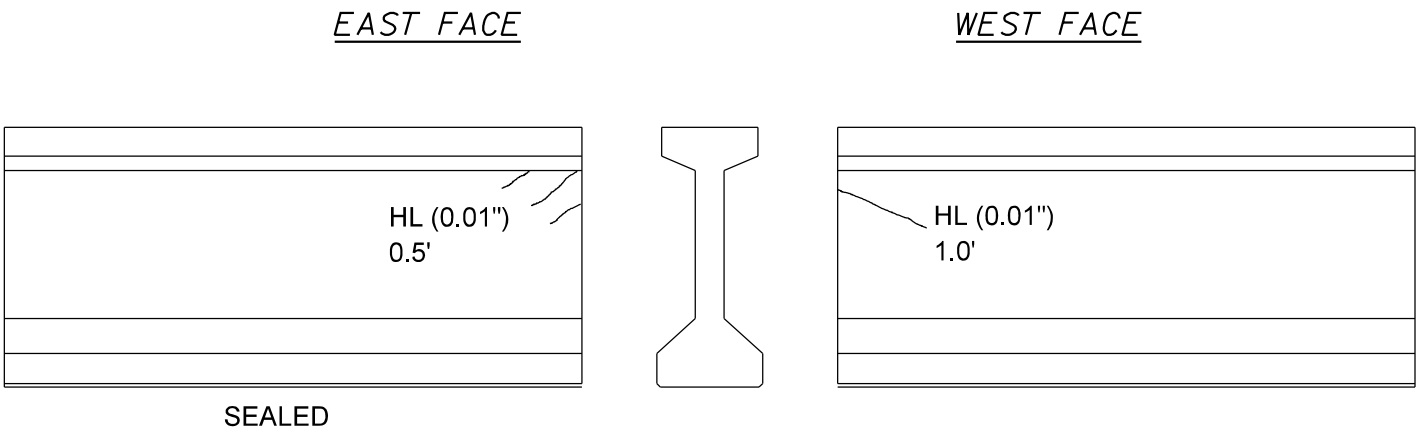
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER S. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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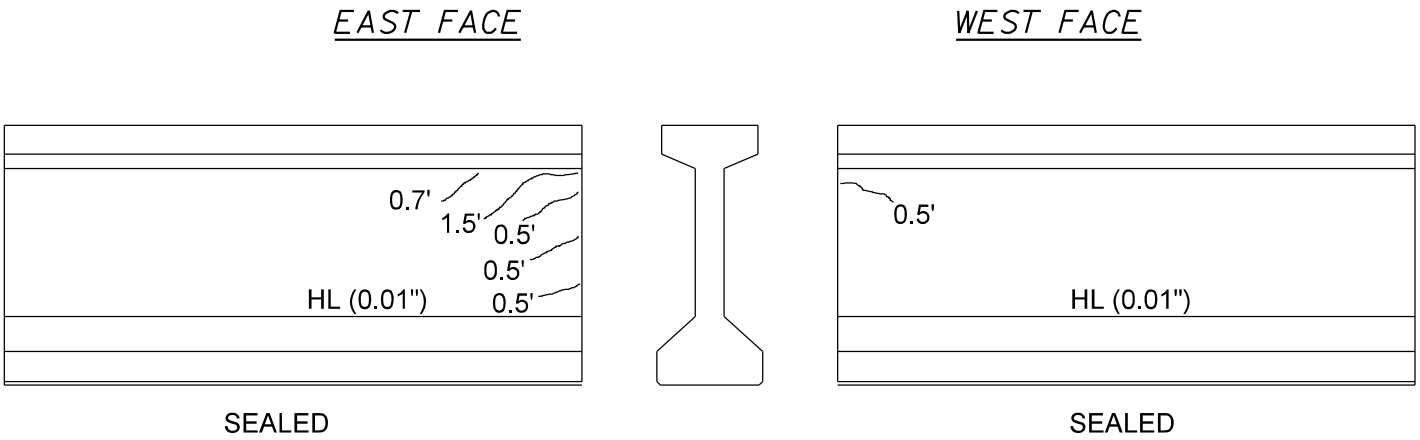


BEAM: 10

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

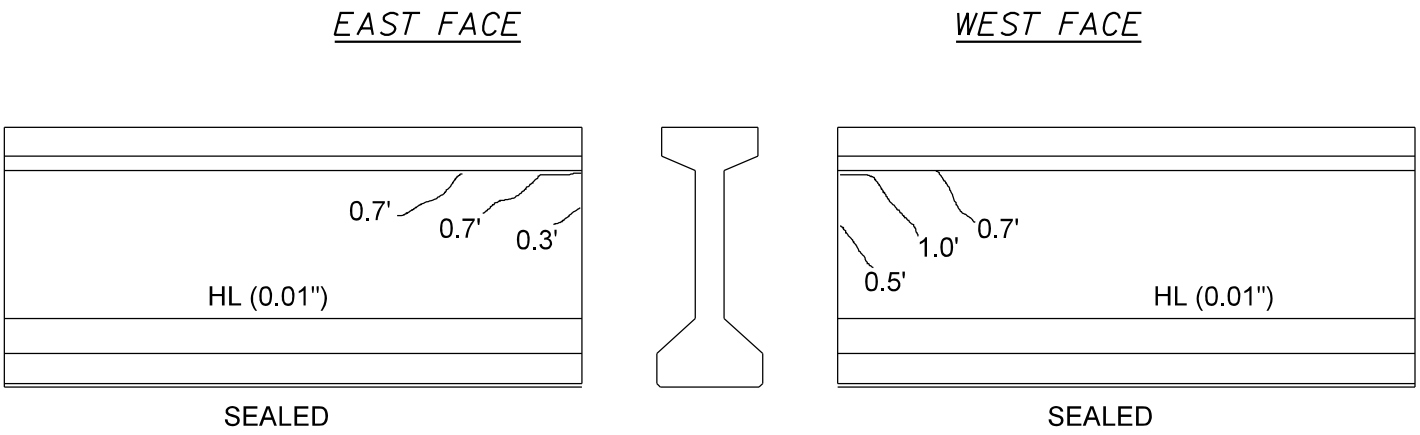
CRACK LENGTH

NTS

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
BEAMS AT PIER S. FACE
ATTACHMENT D

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112



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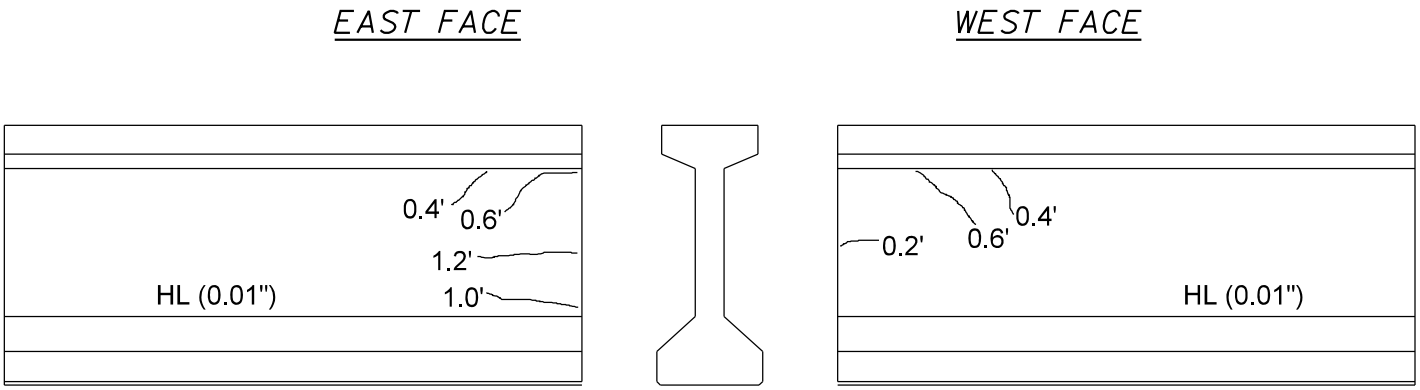


BEAM: 12

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

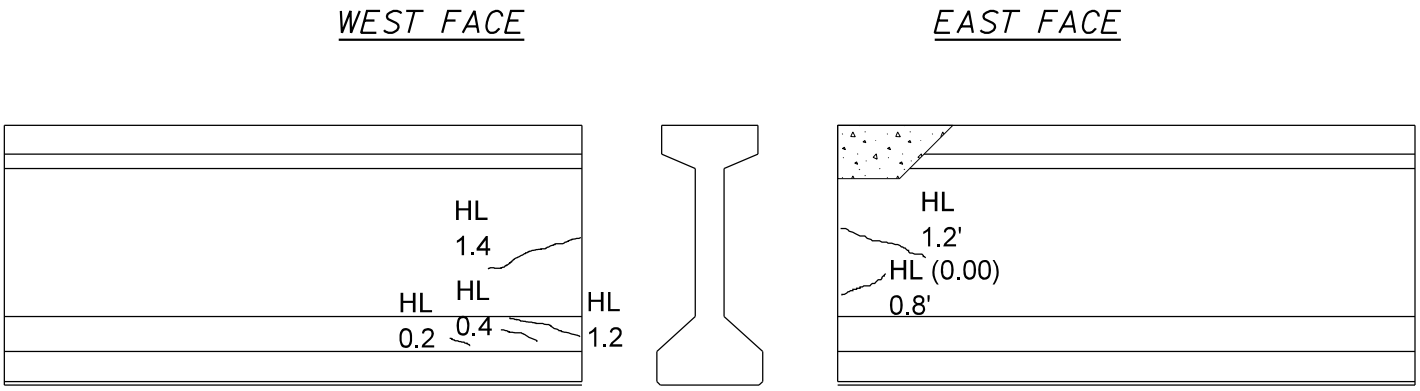
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

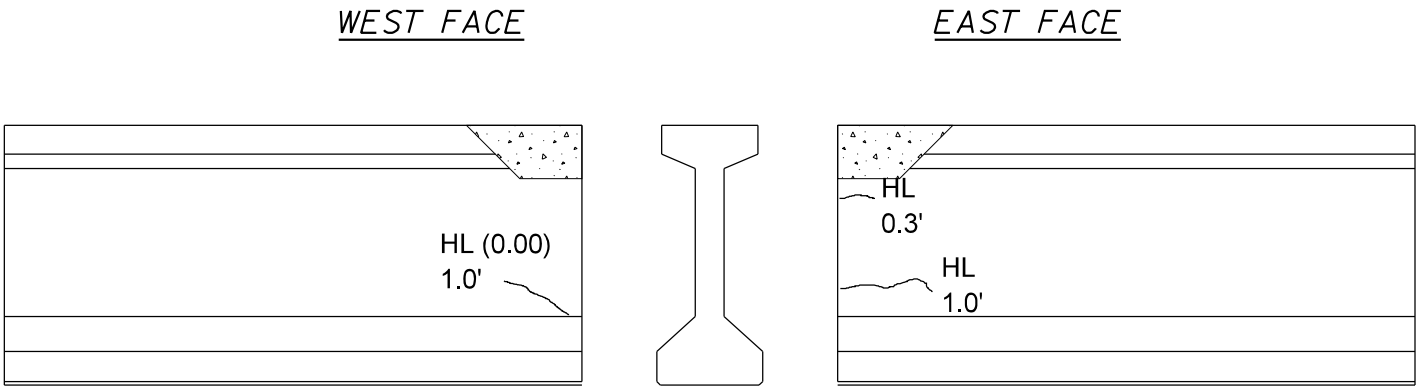
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT PIER S. FACE ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



BEAM: 1



BEAM: 2

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

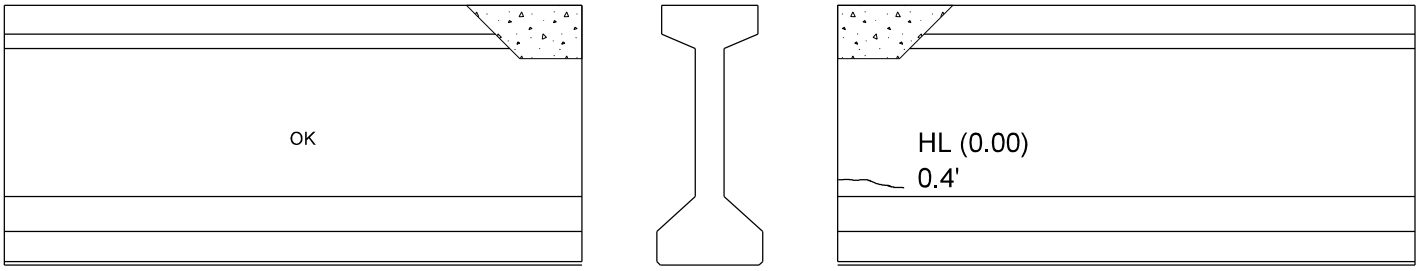
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT S. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE

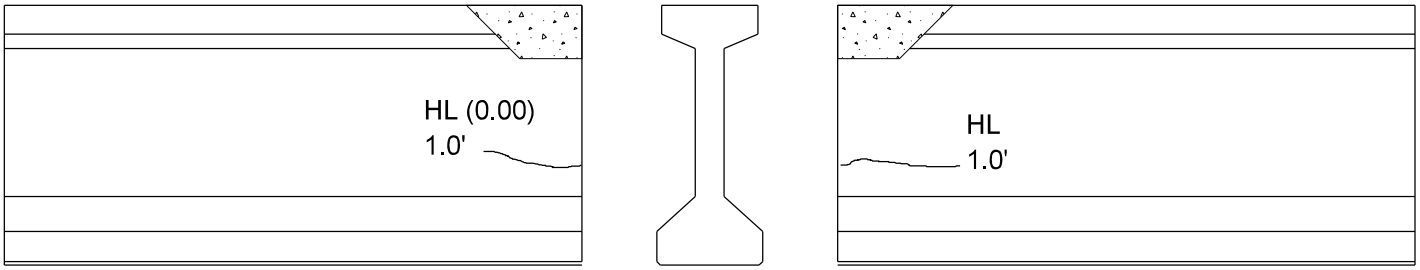
EAST FACE



BEAM: 3

WEST FACE

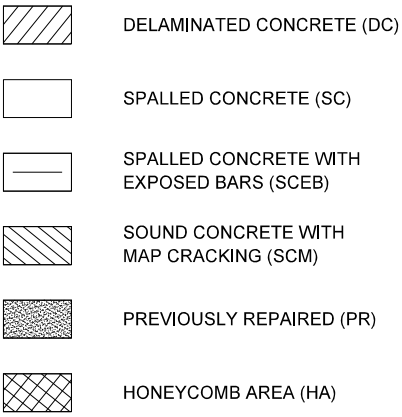
EAST FACE



BEAM: 4

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

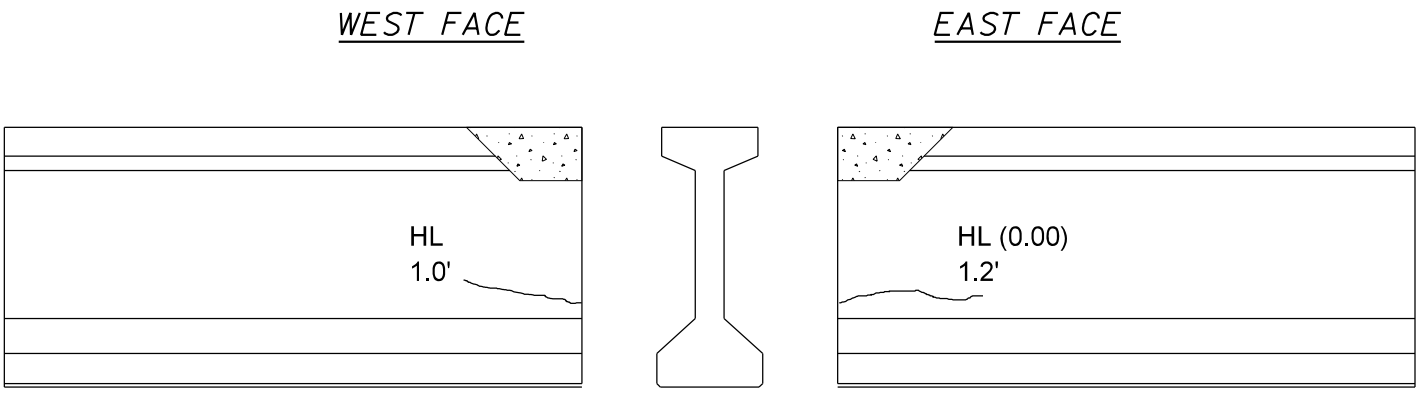


CRACK TYPE (WIDTH)

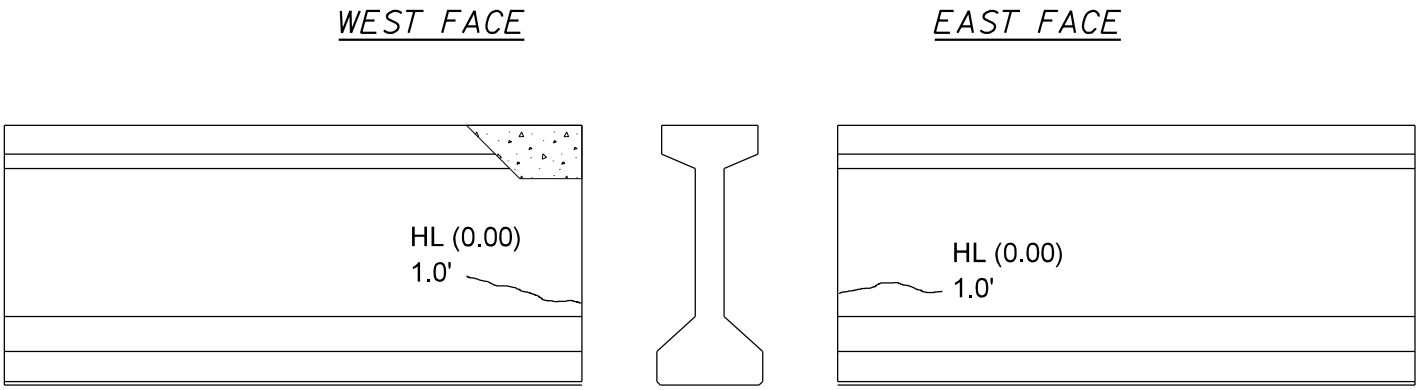
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT S. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



BEAM: 5



BEAM: 6

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

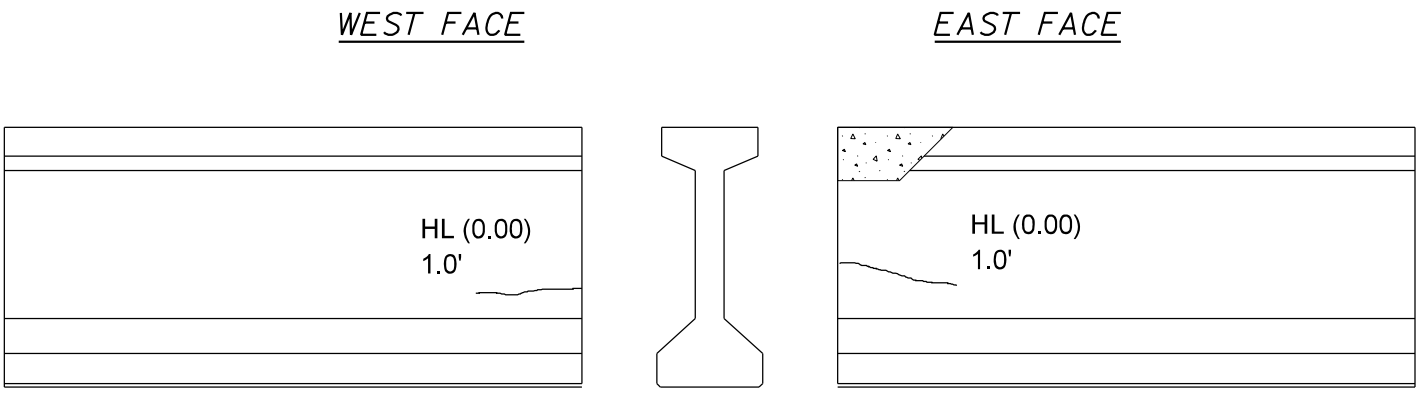
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT S. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112



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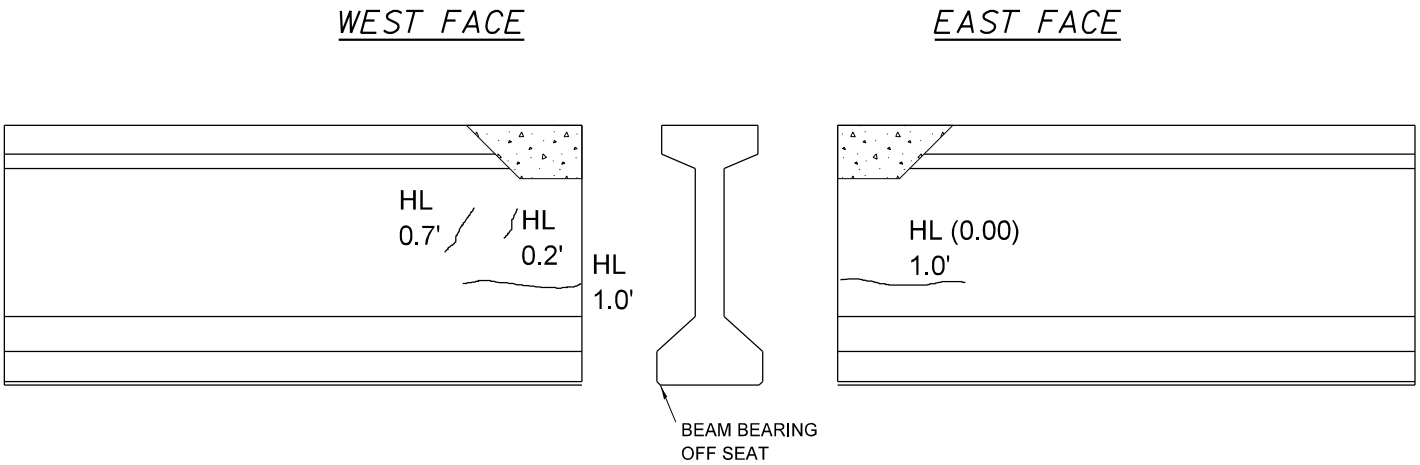


BEAM: 8

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

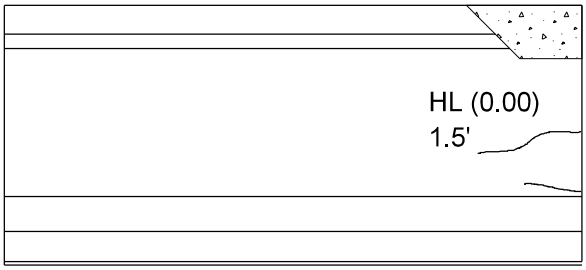
CRACK TYPE (WIDTH)

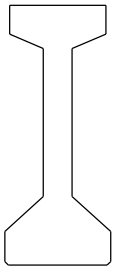
CRACK LENGTH

NTS

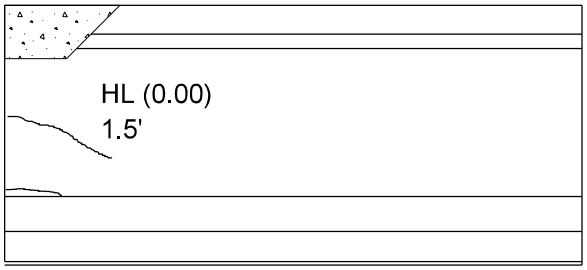
STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT S. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE



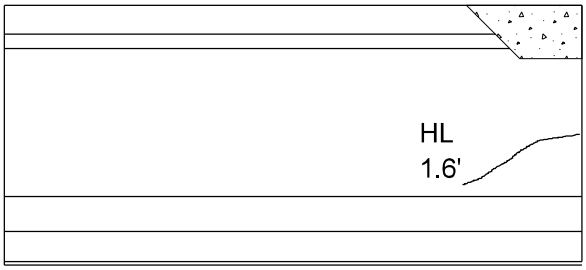


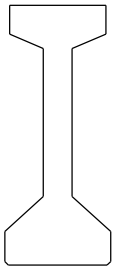
EAST FACE



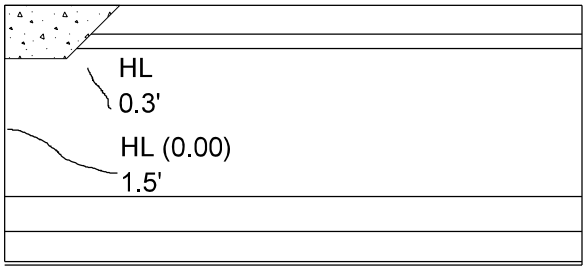
BEAM: 9

WEST FACE





EAST FACE



BEAM: 10

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

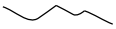
SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)



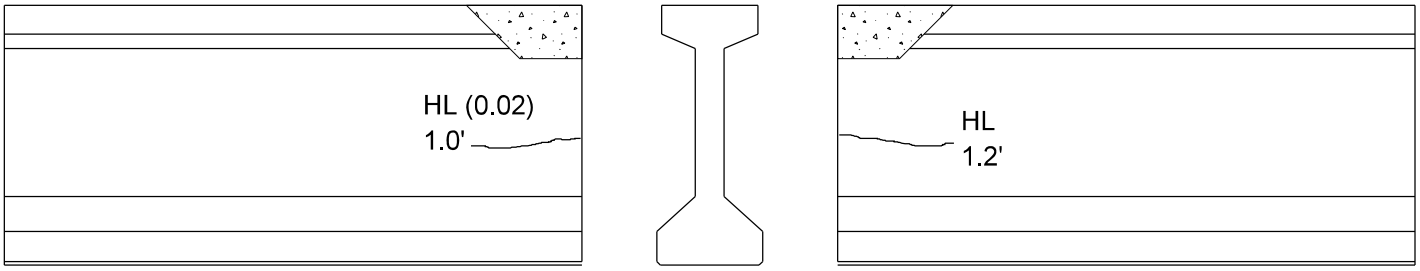
CRACK LENGTH

NTS

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT S. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

WEST FACE

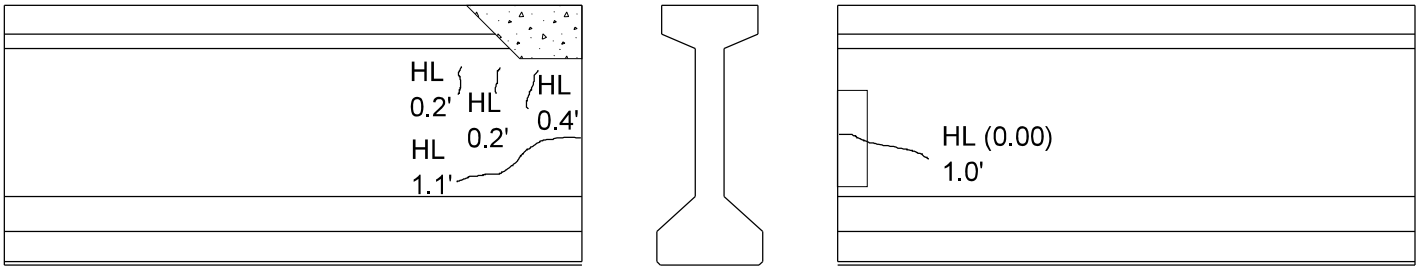
EAST FACE



BEAM: 11

WEST FACE

EAST FACE



BEAM: 12

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

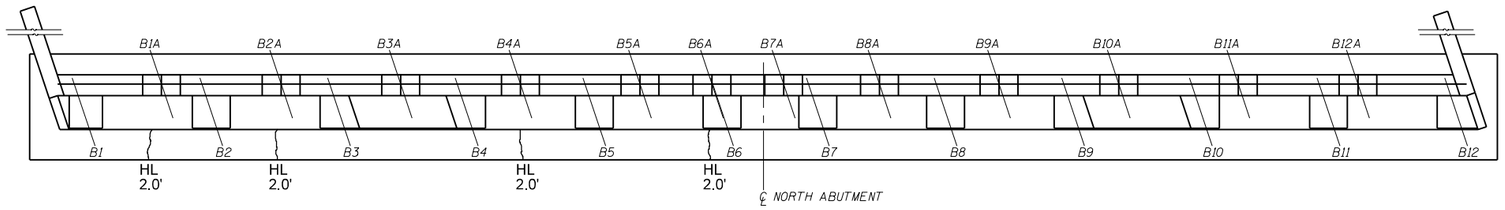
CRACK LENGTH

NTS

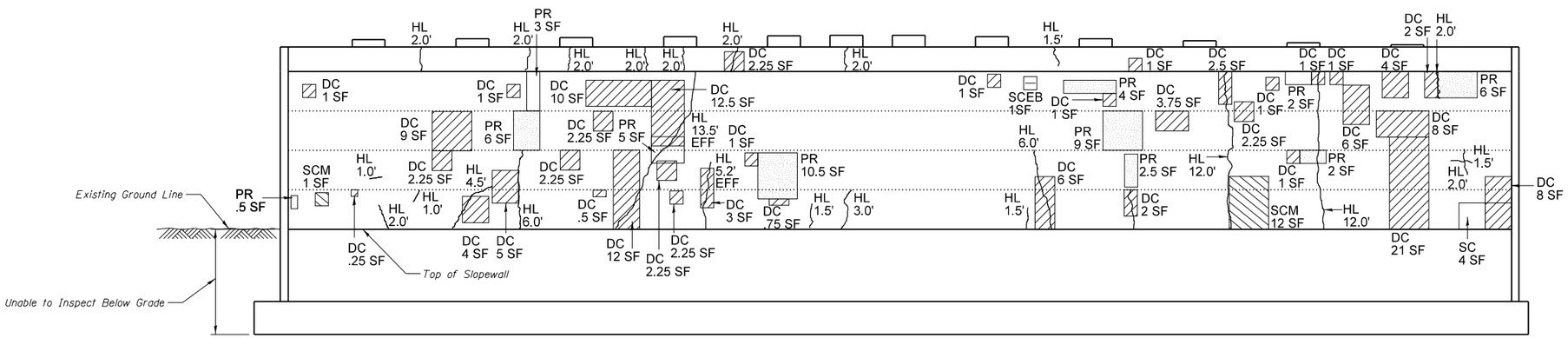
STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 BEAMS AT S. ABUTMENT ATTACHMENT D	GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112

ATTACHMENT E

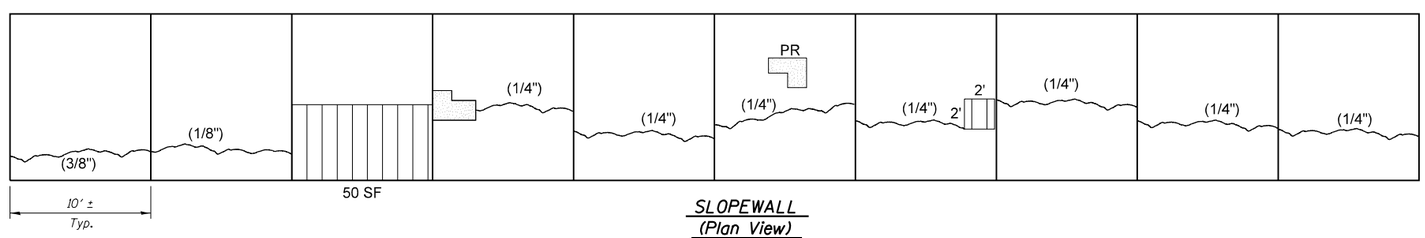
Substructure Condition Surveys



NORTH ABUTMENT
WALL TOP VIEW



NORTH ABUTMENT
WALL ELEVATION



SLOPEWALL
(Plan View)

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

REMOVE AND REPLACE

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED ABUTMENT DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	145
SC	SQ. FT.	4
SCEB	SQ. FT.	1
SCM	SQ. FT.	13
PR	SQ. FT.	145
HA	SQ. FT.	0
CRACK	FOOT	96

OBSERVED SLOPEWALL DEFICIENCIES

ITEM	UNIT	TOTAL
REMOVE & REPLACE	SQ. FT.	54
CRACK	FOOT	90

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
NORTH ABUTMENT
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

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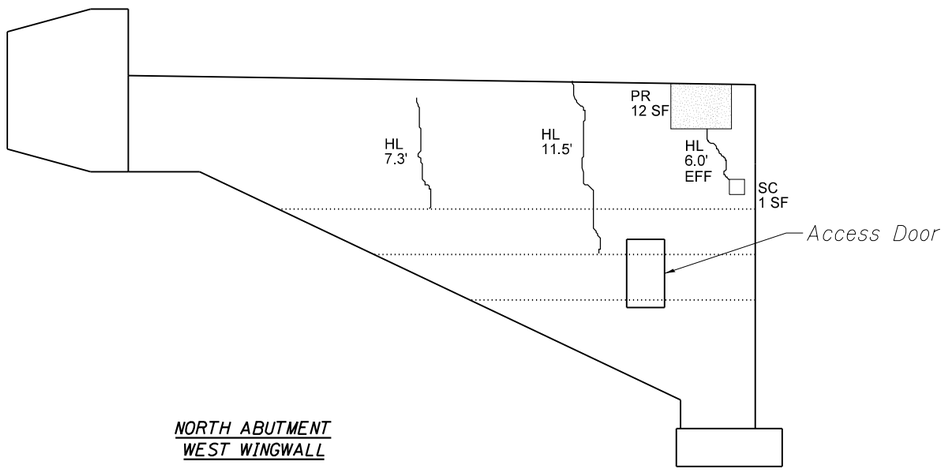
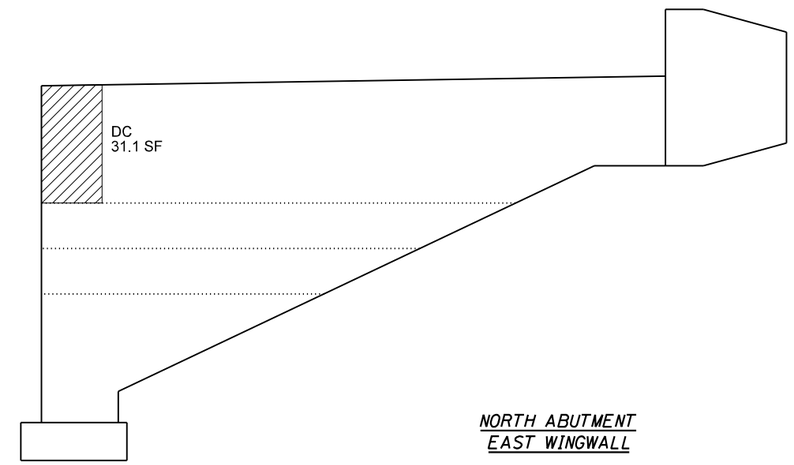


NORTH ABUTMENT
WEST WINGWALL



NORTH ABUTMENT
EAST WINGWALL

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	31
SC	SQ. FT.	1
SCEB	SQ. FT.	0
SCM	SQ. FT.	0
PR	SQ. FT.	12
HA	SQ. FT.	0
CRACK	FOOT	25

GRāEF
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
NORTH ABUTMENT WINGWALLS
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

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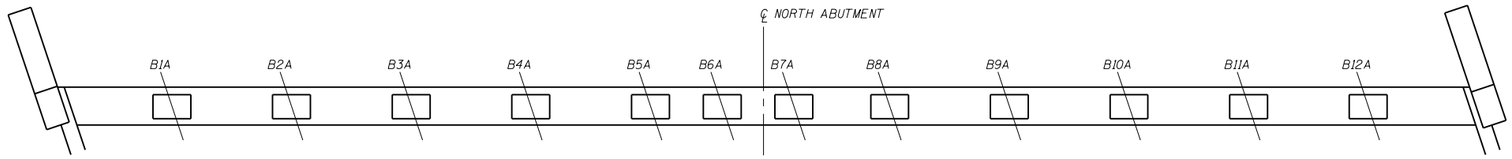
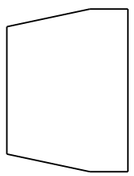
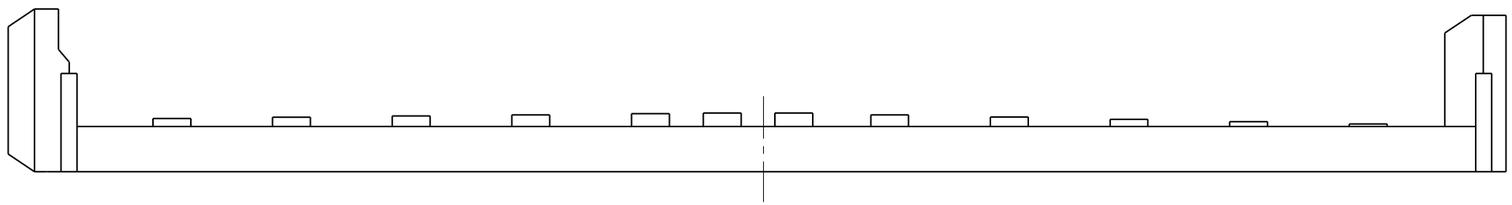


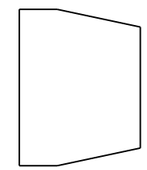
NORTH ABUTMENT
TOP VIEW



NORTH ABUTMENT
WEST END



NORTH ABUTMENT
WALL ELEVATION



NORTH ABUTMENT
EAST END

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

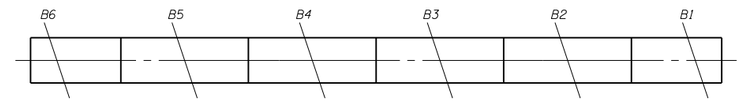
HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

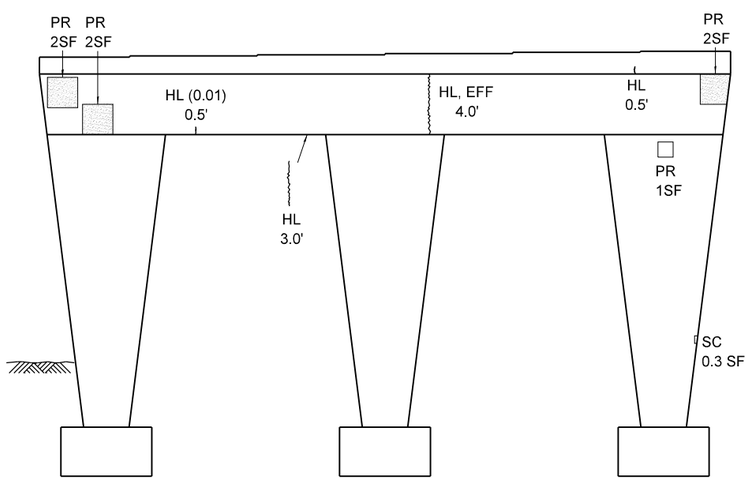
CRACK LENGTH

Note: The end bents at the North Abutment appeared to show water leaking through the end dam with minor occurrences of efflorescence along the top of the beams seats, but no cracks of significance or other noticeable defects were observed at the time of inspection.

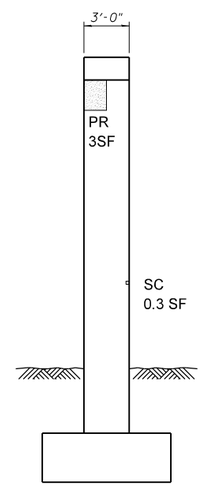
Attachment E



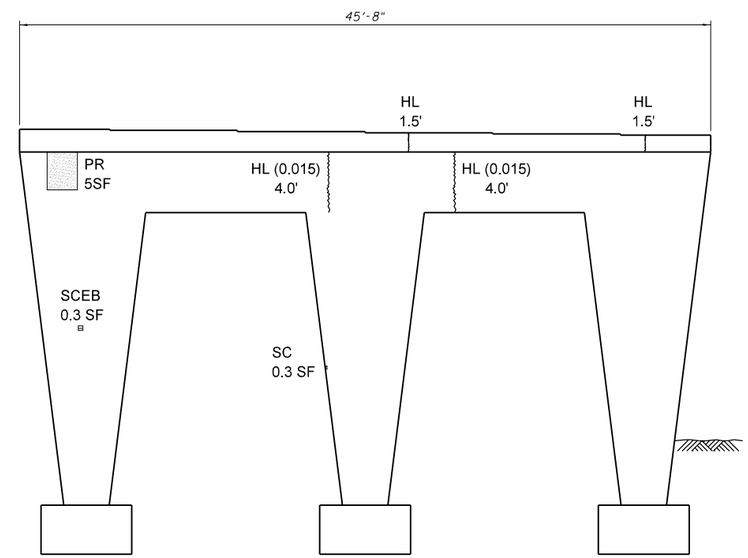
WEST PIER TOP VIEW



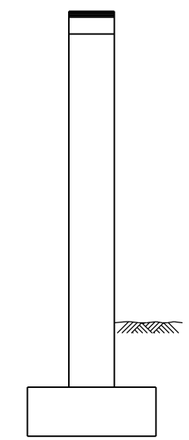
WEST PIER ELEVATION
SOUTH FACE



WEST PIER END VIEW
LOOKING WEST



WEST PIER ELEVATION
NORTH FACE



WEST PIER END VIEW
LOOKING EAST

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	0
SC	SQ. FT.	1
SCEB	SQ. FT.	1
SCM	SQ. FT.	0
PR	SQ. FT.	14
HA	SQ. FT.	0
CRACK	FOOT	19

NOTES

GRAEF
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Chicago, Illinois 60631; (773) 399-0112

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	CHECKED - NDR	REVISED -	
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
WEST PIER
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

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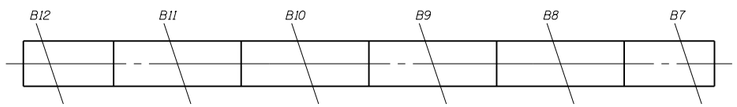
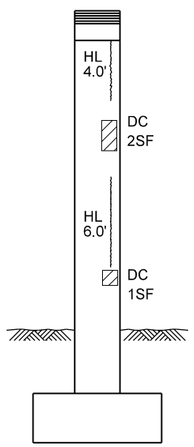
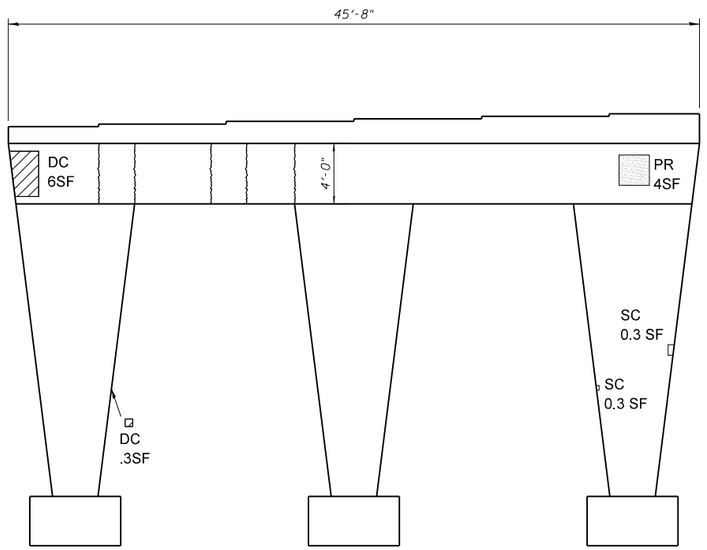


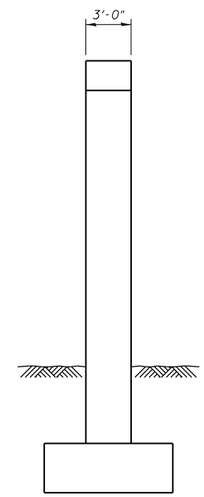
EAST PIER TOP VIEW



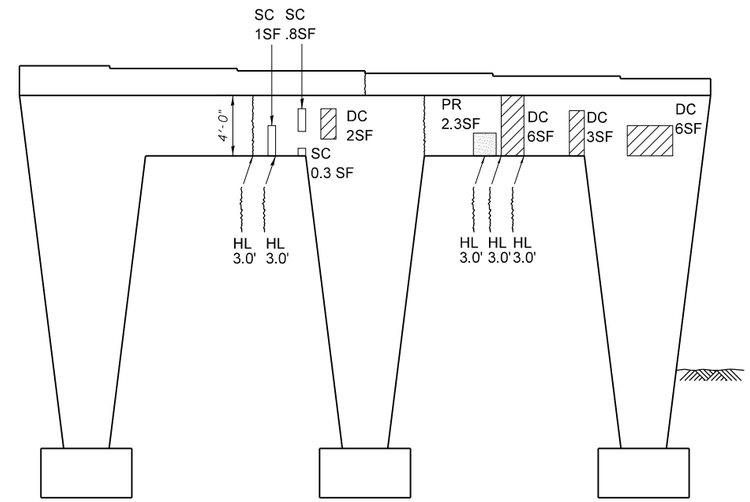
EAST PIER END VIEW
LOOKING WEST



EAST PIER ELEVATION
NORTH FACE



EAST PIER END VIEW
LOOKING EAST



EAST PIER ELEVATION
SOUTH FACE

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

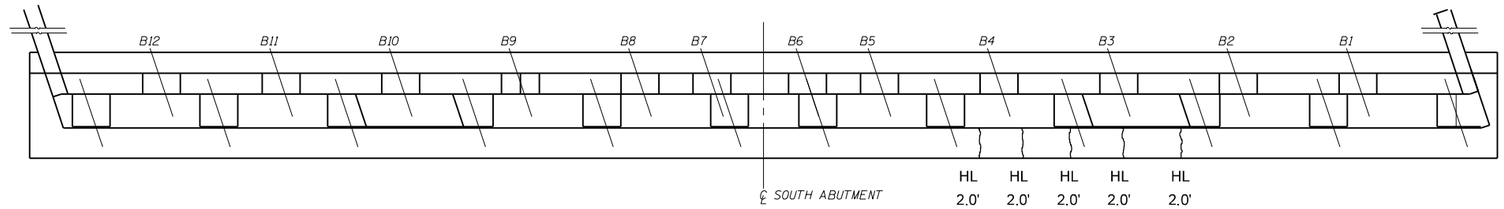
CRACK TYPE (WIDTH)

CRACK LENGTH

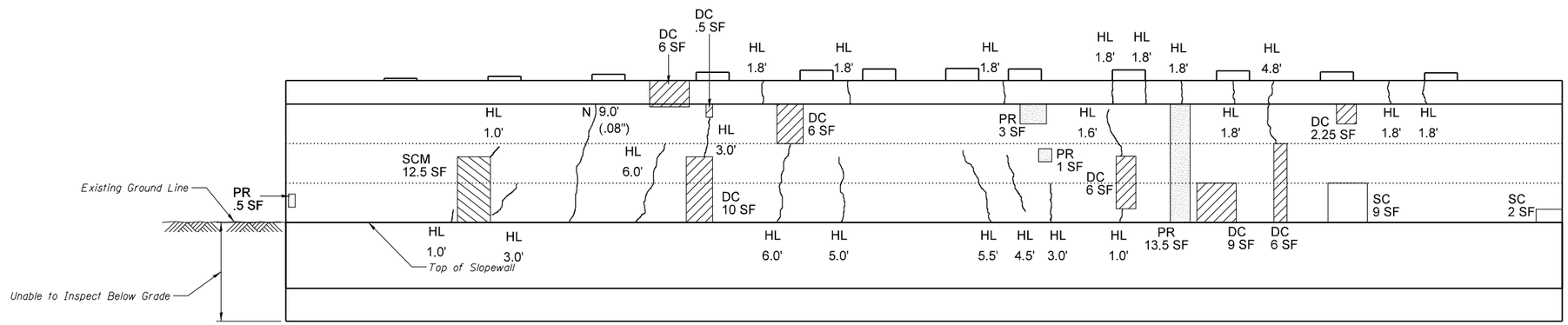
OBSERVED DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	26
SC	SQ. FT.	2
SCEB	SQ. FT.	0
SCM	SQ. FT.	0
PR	SQ. FT.	7
HA	SQ. FT.	0
CRACK	FOOT	53

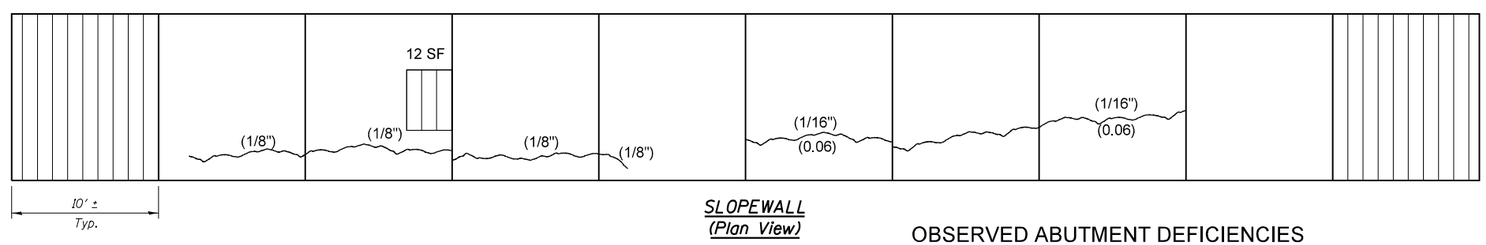
NOTES



SOUTH ABUTMENT TOP VIEW



SOUTH ABUTMENT WALL ELEVATION



SLOPEWALL (Plan View)

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

REMOVE AND REPLACE

CRACK TYPE (WIDTH)

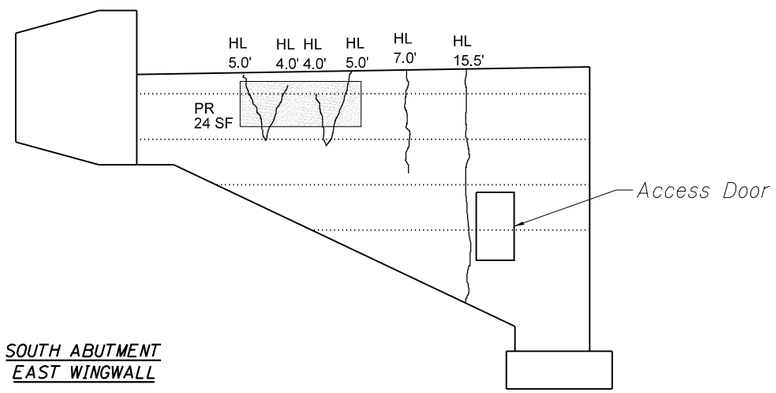
CRACK LENGTH

OBSERVED ABUTMENT DEFICIENCIES

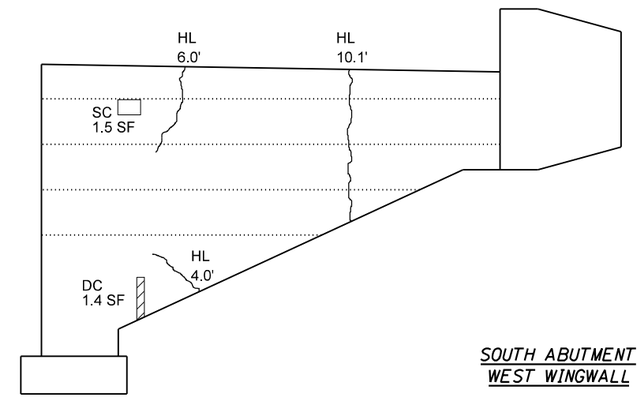
ITEM	UNIT	TOTAL
DC	SQ. FT.	46
SC	SQ. FT.	11
SCEB	SQ. FT.	0
SCM	SQ. FT.	13
PR	SQ. FT.	18
HA	SQ. FT.	0
CRACK	FOOT	81

OBSERVED SLOPEWALL DEFICIENCIES

ITEM	UNIT	TOTAL
REMOVE & REPLACE	SQ. FT.	232
CRACK	FOOT	60



SOUTH ABUTMENT
EAST WINGWALL



SOUTH ABUTMENT
WEST WINGWALL

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCIES

ITEM	UNIT	TOTAL
DC	SQ. FT.	2
SC	SQ. FT.	2
SCEB	SQ. FT.	0
SCM	SQ. FT.	0
PR	SQ. FT.	0
HA	SQ. FT.	0
CRACK	FOOT	66

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME = 1908	DESIGNED -	REVISED -	
	CHECKED - NDR	REVISED -	
PLOT SCALE = 10:0 9/64 ':" / in.	DRAWN - TCK	REVISED -	
PLOT DATE = 3:11:13 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0082
SOUTH ABUTMENT WINGWALLS
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

3/30/2017
3:11:13 PM
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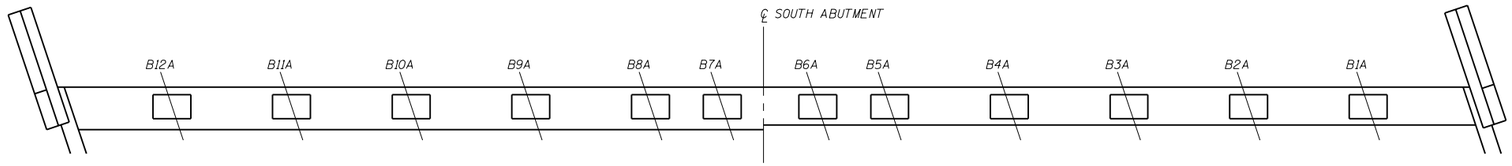
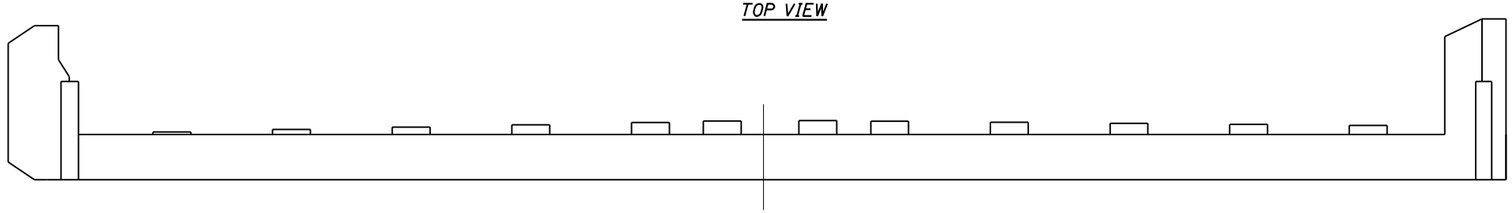
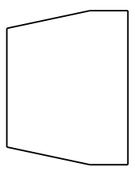


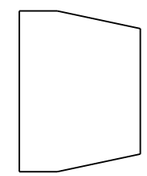
SOUTH ABUTMENT
TOP VIEW



SOUTH ABUTMENT
WALL ELEVATION



SOUTH ABUTMENT
EAST END



SOUTH ABUTMENT
WEST END

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

Note: The end bents at the South Abutment appeared to show water leaking through the end dam with minor occurrences of efflorescence along the top of the beams seats, but no cracks of significance or other noticeable defects were observed at the time of inspection.

Attachment E

ATTACHMENT F

Cost Estimate

CONSTRUCTION COST ESTIMATE
ALTERNATIVE 1
EXISTING BRIDGE REHABILITATION

ITEM NUMBER	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
50102400	CONCRETE REMOVAL	CU YD	151	$900.00	$135,900
50104650	SLOPE WALL REMOVAL	SQ YD	286	$41.00	$11,726
50157300	PROTECTIVE SHIELD	SQ YD	459	$50.00	$22,950
50300255	CONCRETE SUPERSTRUCTURES	CU YD	130	$1,100.00	$143,000
50300260	BRIDGE DECK GROOVING	SQ YD	2,519	$10.75	$27,079
50800205	REINF BARS, EPOXY CTD	POUND	29,000	$1.62	$46,980
50901720	BICYCLE RAILING	FOOT	298	$160.00	$47,680
50901750	PARAPET RAILING	FOOT	298	$90.00	$26,820
51100100	SLOPE WALL 4 INCH	SQ YD	286	$131.00	$37,466
59000200	EPOXY CRACK INJECTION	FOOT	11	$200.00	$2,200
Z0006012	BRIDGE DECK LATEX CONCRETE OVERLAY, 2 1/4 IN.	SQ YD	2,586	$133.00	$343,938
Z0012130	BRIDGE DECK SCARIFICATION 3/4"	SQ YD	2,930	$40.00	$117,200
Z0012754	STRUCT REPAIR OF CONC (DEPTH = TO OR < 5 IN.)	SQ FT	341	$140.00	$47,740
Z0051200	REMOVING AND REPLACING EXPANSION JOINT	FOOT	212	$200.00	$42,400
JS121200	LOW PRESSURE EPOXY INJECTION	FOOT	188.0	$50.00	$9,400

SUBTOTAL:	$1,062,000
CONTINGENCY (10%):	$106,000
TOTAL:	**$1,168,000**

NOTES:
1. Approach roadway pay items and costs are not included.
2. Costs are in 2017 dollars.
3. Repair quantities have been increased by 25% to account for additional defects occurring between the inspection and the start of construction plus likely increases found during construction.

CONSTRUCTION COST ESTIMATE
ALTERNATIVE 2
COMPLETE BRIDGE REMOVAL AND REPLACEMENT

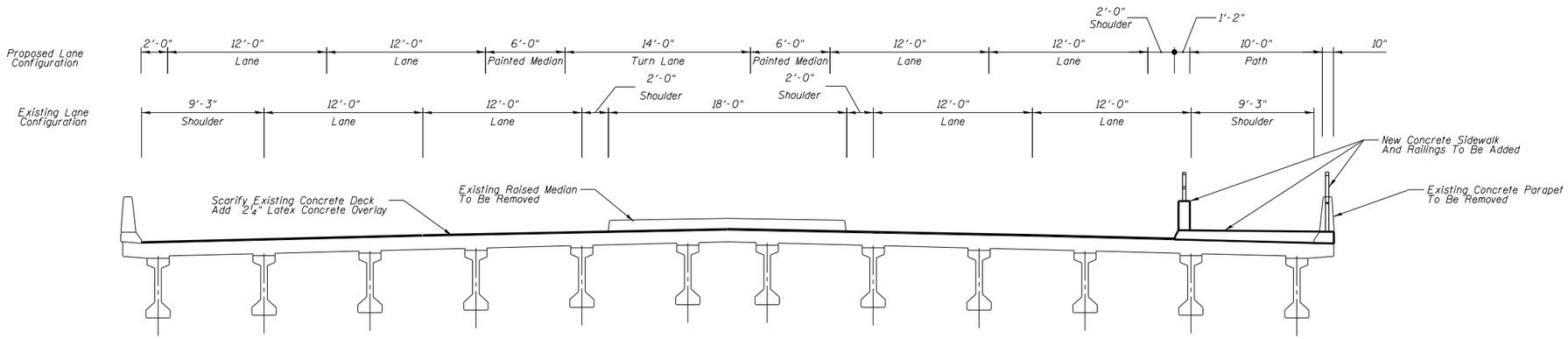
ITEM NUMBER	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
	BRIDGE REMOVAL AND REPLACEMENT	SQ FT	21,908	$190.00	$4,162,585

TOTAL (Rounded): **$4,163,000**

NOTES:
1. Approach roadway pay items and costs are not included.
2. Costs are in 2017 dollars.

ATTACHMENT G

Proposed Structure



PROPOSED CROSS SECTION

(LOOKING NORTH)

3/30/2017
3:11:15 PM
H:\Jobs2015\20153000\CAD\Structural\dgn\refs\045-0082_PARCLO Bridge Section.dgn

GRAEF 8501 W. Higgins Road; Suite 280 Chicago, Illinois 60631; (773) 399-0112	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	STRUCTURE NO. 045-0082 PROPOSED STRUCTURE ATTACHMENT G	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED - TCK	REVISED -							
	PLOT SCALE =	DRAWN - NDR	REVISED -					CONTRACT NO.		
	PLOT DATE =	CHECKED -	REVISED -				ILLINOIS	FED. AID PROJECT		

ATTACHMENT H

Structure Photos

Photo Number: 1

Structure Number:
045-0082

Photo File Name:
DSCF5807.JPG

Date of Photo:
3/30/2016

View: E

Feature / Location:
Misc: Name Plate

Misc: Detail Photo -

Photo Description: Name Plate for SN 045-0082, showing "Rebuilt" information. The original name plate was not located.

Photo Number: 2

Structure Number:
045-0082

Photo File Name:
DSCF5802.JPG

Date of Photo:
3/30/2016

View: S

Feature / Location:
72 - Approach Rdwy
Align: Approach

Roadway: Typical Section -

Photo Description: View of South Approach to Bridge.

Photo Number: 3

Structure Number:
045-0082

Photo File Name:
DSCF5805.JPG

Date of Photo:
3/30/2016

View: N

Feature / Location:
72 - Approach Rdwy Align: Approach

Roadway: Typical Section - South of

Photo Description: View of approach roadway at South end of bridge looking North onto structure.

Photo Number: 4

Structure Number:
045-0082

Photo File Name:
DSCF5804.JPG

Date of Photo:
3/30/2016

View: W

Feature / Location:
72 - Approach Rdwy Align: Approach

Roadway: Exit Ramp - at Approach to Structure

Photo Description: View of exit from Eastbound I-88 exit Ramp To IL-47, South of bridge.

Photo Number: 5

Structure Number:
045-0082

Photo File Name:
DSCF5803.JPG

Date of Photo:
3/30/2016

View: S

Feature / Location:
72 - Approach Rdwy Align: Approach

Roadway: Exit Ramp - South of Structure

Photo Description: View of Turn Lane from Eastbound I-88 exit Ramp To IL-47

Photo Number: 6

Structure Number:
045-0082

Photo File Name:
DSCF5788.JPG

Date of Photo:
3/30/2016

View: S

Feature / Location:
Facility Carried Typical Section

Roadway: Typical Section - North of

Photo Description: View of deck cross Section Looking South

Photo Number: 7

Structure Number:
045-0082

Photo File Name:
DSCF5786.JPG

Date of Photo:
3/30/2016

View: N

Feature / Location:
72 - Approach Rdwy Align: Approach

Misc. Approach Roadway -

Photo Description: View of roadway section from North Approach, looking North away from bridge.

Photo Number: 8

Structure Number:
045-0082

Photo File Name:
DSCF5792.JPG

Date of Photo:
3/30/2016

View: W

Feature / Location:
Site: Facilities Near

Roadway: Entrance Ramp - North of Structure

Photo Description: West bound access Ramp for I-88 to North of bridge

Photo Number: 9

Structure Number:
045-0082

Photo File Name:
DSCF5806.JPG

Date of Photo:
3/30/2016

View: NE

Feature / Location:
72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Traffic Barrier Terminal Type 6 -

Photo Description: Typical view of Type 6 approach guardrail transition onto bridge.

Photo Number: 10

Structure Number:
045-0082

Photo File Name:
DSCF5813.JPG

Date of Photo:
3/30/2016

View: SE

Feature / Location:
72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Traffic Barrier Terminal Type 6 -

Photo Description: Traffic Barrier Terminal Type 6 present at North Approach, Southbound lanes of Il-47.

Photo Number: 11

Structure Number:
045-0082

Photo File Name:
DSCF5812.JPG

Date of Photo:
3/30/2016

View: SE

Feature / Location:
72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Traffic Barrier Terminal Type 6 -

Photo Description: Traffic Barrier Terminal Type 6 present at North Departure, Northbound lanes of IL-47.

Photo Number: 12

Structure Number:
045-0082

Photo File Name:
DSCF5801.JPG

Date of Photo:
3/30/2016

View: N

Feature / Location:
72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Traffic Barrier Terminal Type 6 -

Photo Description: Typical condition of departure terminal for Southbound lanes of IL-47.

Photo Number: 13

Structure Number:
045-0082

Photo File Name:
DSCF5992.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:
Site: Site Elevation

Misc: Site View -

Photo Description: Elevation view of IL 47 over I-88.

Photo Number: 14

Structure Number:
045-0082

Photo File Name:
DSCF6030.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:
Site: Site Elevation

Misc: Site View -

Photo Description: Elevation view of east side of IL Route 47 Bridge over I-88.

Photo Number: 15

Structure Number:
045-0082

Photo File Name:

DSCF6018.JPG

Date of Photo:

4/13/2016

View: W

Feature / Location:

Feature Crossed Lane Alignment

Roadway: Typical Section - West of

Photo Description: View ahead along I-88, West of Structure

Photo Number: 16

Structure Number:
045-0082

Photo File Name:

DSCF6029.JPG

Date of Photo:

4/13/2016

View: W

Feature / Location:

Misc: Impact Attenuators

Traffic Barriers: Impact Attenuator -

Photo Description: View of median impact attenuators placed around Pier.

Photo Number: 17

Structure Number:
045-0082

Photo File Name:
DSCF6027.JPG

Date of Photo:
4/13/2016

View: E

Feature / Location:

Misc: Impact Attenuators

Traffic Barriers: Impact Attenuator -

Photo Description: View of median impact protection for Pier along Eastbound lanes.

Photo Number: 18

Structure Number:
045-0082

Photo File Name:
DSCF6028.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:

Misc: Impact Attenuators

Traffic Barriers: Impact Attenuator -

Photo Description: View of barrier rail and cable attenuators in front of Pier.

Photo Number: 19

Structure Number:
045-0082

Photo File Name:

DSCF6019.JPG

Date of Photo:

4/13/2016

View: E

Feature / Location:

Feature Crossed Typical Section

Roadway: Typical Section - through

Photo Description: View through Span 2 showing lane and shoulder alignment.

Photo Number: 20

Structure Number:
045-0082

Photo File Name:

DSCF5965.JPG

Date of Photo:

4/12/2016

View: W

Feature / Location:

Feature Crossed Lane Alignment

Span 3 -

Photo Description: View of lane alignment through structure in Span 3.

Photo Number: 21

Structure Number:
045-0082

Photo File Name:

DSCF5935.JPG

Date of Photo:

4/12/2016

View: E

Feature / Location:

Feature Crossed
Typical Section

Roadway: Lane Alingment - through

Photo Description: Typical view of Westbound lane alignment through structure at Span 2.

Photo Number: 22

Structure Number:
045-0082

Photo File Name:

DSCN3314.JPG

Date of Photo:

3/7/2017

View: W

Feature / Location:

58 - Deck Condition: Misc

South Abutment: Pile Bent - Closure Pour

Photo Description:

Photo Number: 23

Structure Number:
045-0082

Photo File Name:

DSCN3313.JPG

Date of Photo:

3/7/2017

View: E

Feature / Location:

58 - Deck Condition: Misc

South Abutment: Pile Bent - Closure Pour

Photo Description:

Photo Number: 24

Structure Number:
045-0082

Photo File Name:

DSCN3311.JPG

Date of Photo:

3/7/2017

View: E

Feature / Location:

Misc: Approach Slab

Roadway: Approach Pavement - Joint

Photo Description:

Photo Number: 25

Structure Number:
045-0082

Photo File Name:
DSCN3317.JPG

Date of Photo:
3/7/2017

View: W

Feature / Location:
Misc: Approach Slab

Roadway: Approach Pavement - Joint

Photo Description:

Photo Number: 26

Structure Number:
045-0082

Photo File Name:
DSCN3297.JPG

Date of Photo:
3/7/2017

View: E

Feature / Location:
Misc: Deck Joint

Deck Joint: Neoprene Joint - Typical Condition

Photo Description: View of Expansion joint seal over South Abutment Stem, showing plow damage to neoprene.

Photo Number: 27

Structure Number:
045-0082

Photo File Name:
DSCF5799.JPG

Date of Photo:
3/30/2016

View: E

Feature / Location:
58 - Deck Condition: Expansion Joint

Deck Joint: Neoprene Joint -

Photo Description: Typical condition of deck joint between Spans 3 and 4 in NB lanes, at South Abutment.

Photo Number: 28

Structure Number:
045-0082

Photo File Name:
DSCF5808.JPG

Date of Photo:
3/30/2016

View: W

Feature / Location:
58 - Deck Condition: Expansion Joint

Deck Joint: Neoprene Joint -

Photo Description: Typical condition of neoprene expansion joint between Span 3 and 4 over South Abutment.

Photo Number: 29

Structure Number:
045-0082

Photo File Name:

DSCF5811.JPG

Date of Photo:

3/30/2016

View: W

Feature / Location:

58 - Deck Condition: Expansion Joint

Bridge Deck: Span 3 - Typical Condition

Photo Description: View of expansion joint between Spans 1 and 2, NB Lanes

Photo Number: 30

Structure Number:
045-0082

Photo File Name:

DSCN3316.JPG

Date of Photo:

3/7/2017

View: W

Feature / Location:

58 - Deck Condition: Misc

North Abutment: Pile Bent - Closure Pour

Photo Description:

Photo Number: 31

Structure Number:
045-0082

Photo File Name:

DSCN3315.JPG

Date of Photo:

3/7/2017

View: E

Feature / Location:

58 - Deck Condition: Misc

North Abutment: Pile Bent - Closure Pour

Photo Description:

Photo Number: 32

Structure Number:
045-0082

Photo File Name:

DSCF5814.JPG

Date of Photo:

3/30/2016

View: E

Feature / Location:

58 - Deck Condition: Deck Slab

Bridge Deck: Span 1 - Transverse Crack

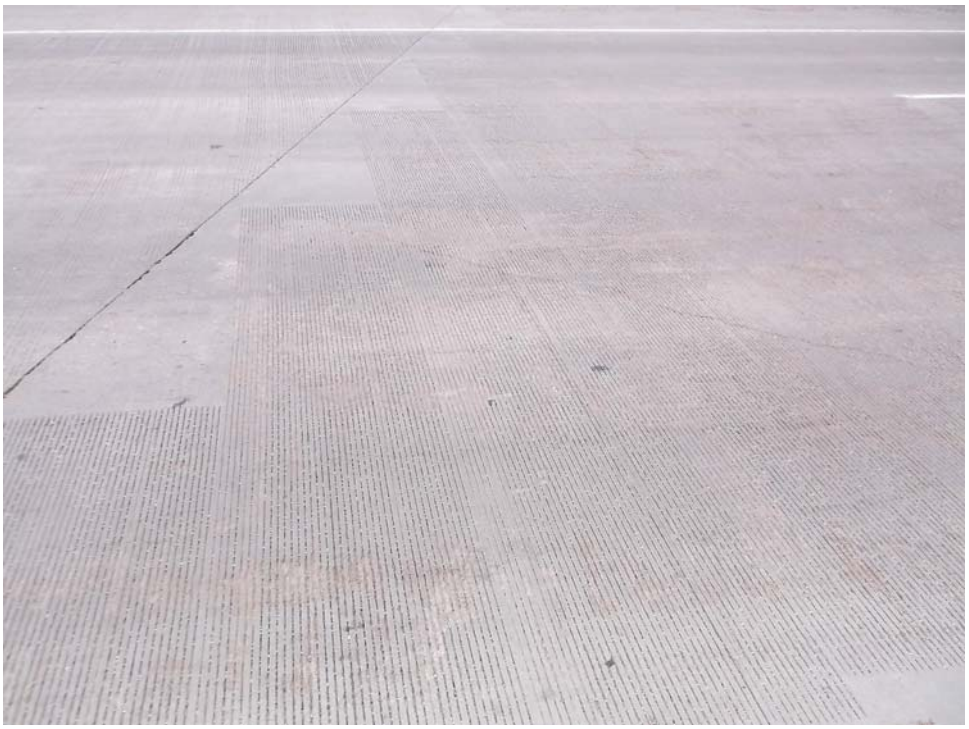


Photo Description: Patterned cracking present in Span 1, Northbound lanes.

Photo Number: 33

Structure Number:
045-0082

Photo File Name:
DSCF5815.JPG

Date of Photo:
3/30/2016

View: S

Feature / Location:
58 - Deck Condition: Deck Slab

Bridge Deck: Span 1 - Longitudinal Crack

Photo Description: Span 1, Northbound lanes, showing longitudinal cracking in deck slab near beam line location.

Photo Number: 34

Structure Number:
045-0082

Photo File Name:
DSCF5794.JPG

Date of Photo:
3/30/2016

View: W

Feature / Location:
58 - Deck Condition: Deck Slab

Bridge Deck: Span 1 - Map Cracking

Photo Description: Patterned cracking in deck slab, Span 1, in vaulted slab area.

Photo Number: 35

Structure Number:
045-0082

Photo File Name:

DSCF5796.JPG

Date of Photo:

3/30/2016

View: W

Feature / Location:

58 - Deck Condition: Deck Slab

Bridge Deck: Span 2 - Longitudinal Crack

Photo Description: Longitudinal Crack in deck slab, Southbound IL-47 lanes in Span 2

Photo Number: 36

Structure Number:
045-0082

Photo File Name:

DSCF6056.JPG

Date of Photo:

4/22/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Slab

Span 2 - South Bound Lanes

Photo Description: View of longitudinal and transverse cracking in deck slab.

Photo Number: 37

Structure Number:
045-0082

Photo File Name:
DSCF6057.JPG

Date of Photo:
4/22/2016

View: W

Feature / Location:
58 - Deck Condition: Deck Slab

Span 2 - South Bound Lanes

Photo Description: View of map-cracked areas over Pier. Note area below shows heavy efflorescence under Beams 8 through 11.

Photo Number: 38

Structure Number:
045-0082

Photo File Name:
DSCF6066.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 2 - North Bound Lanes

Photo Description: View of longitudinal cracking in deck slab in Span 2, North Bound Lanes.

Photo Number: 39

Structure Number:
045-0082

Photo File Name:
DSCF6065.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 2 - North Bound Lanes

Photo Description: View of longitudinal cracking in deck slab

Photo Number: 40

Structure Number:
045-0082

Photo File Name:
DSCF6064.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 2 - North Bound Lanes

Photo Description: View of longitudinal cracking in deck slab

Photo Number: 41

Structure Number:
045-0082

Photo File Name:
DSCF6063.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 3 - North Bound Lanes

Photo Description: View of longitudinal cracking in deck slab near Pier, Span 3 NB Lanes.

Photo Number: 42

Structure Number:
045-0082

Photo File Name:
DSCF6060.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 3 - South Bound Lanes

Photo Description: View of longitudinal cracking in deck slab continuing into Span 3.

Photo Number: 43

Structure Number:
045-0082

Photo File Name:
DSCF6058.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 3 - South Bound Lanes

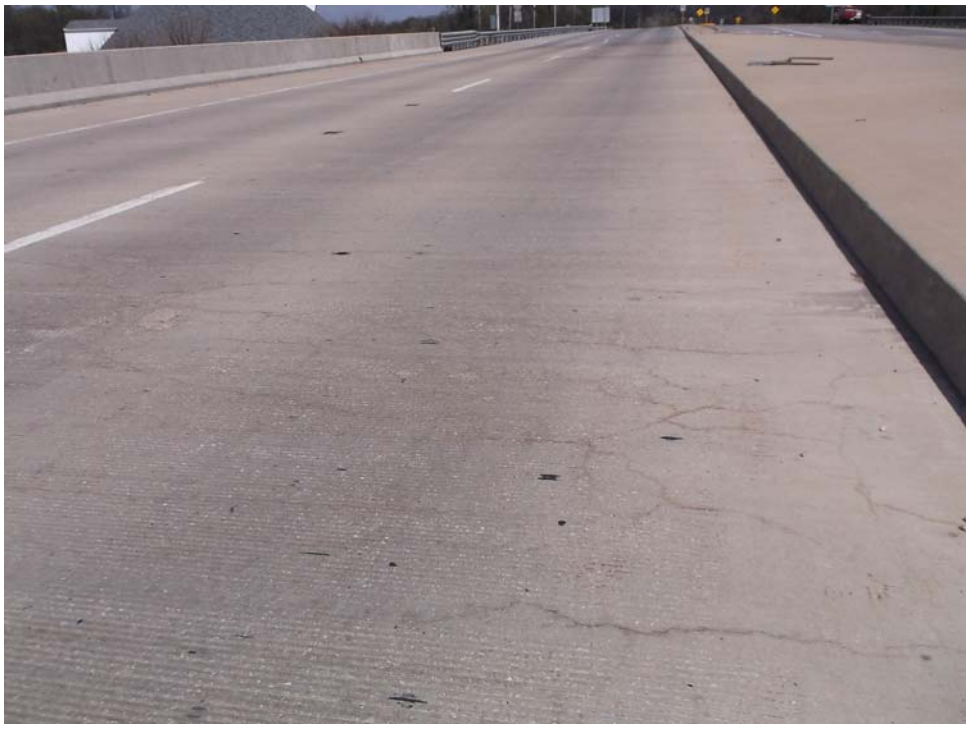


Photo Description: View of map-cracked areas in deck slab, with delamination over Pier.

Photo Number: 44

Structure Number:
045-0082

Photo File Name:
DSCN3312.JPG

Date of Photo:
3/7/2017

View: E

Feature / Location:
Misc: Approach Slab

Roadway: Approach Pavement - Joint

Photo Description:

Photo Number: 45

Structure Number:
045-0082

Photo File Name:
DSCF6059.JPG

Date of Photo:
4/22/2016

View: W

Feature / Location:
58 - Deck Condition: Deck Slab

Span 3 - South Bound Lanes

Photo Description: View of longitudinal and transverse cracking in deck slab.

Photo Number: 46

Structure Number:
045-0082

Photo File Name:
DSCF6062.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 4 - South Bound Lanes

Photo Description: View of longitudinal cracking in deck slab in South Bound lanes.

Photo Number: 47

Structure Number:
045-0082

Photo File Name:
DSCF6061.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Span 4 - South Bound Lanes

Photo Description: View of longitudinal cracking in deck slab in Span 4. This is a vaulted slab with reflective cracking shown underneath.

Photo Number: 48

Structure Number:
045-0082

Photo File Name:
DSCF5800.JPG

Date of Photo:
3/30/2016

View: E

Feature / Location:
58 - Deck Condition: Deck Slab

Bridge Deck: Span 4 -

Photo Description: View of longitudinal crack in deck, Span 4, Southbound lanes of IL-47.

Photo Number: 49

Structure Number:
045-0082

Photo File Name:
DSCF5797.JPG

Date of Photo:
3/30/2016

View: W

Feature / Location:
58 - Deck Condition: Deck Slab

Bridge Deck: Span 2 - Map Cracking

Photo Description: Map cracking present over Pier 2, South Bound Lanes.

Photo Number: 50

Structure Number:
045-0082

Photo File Name:
DSCF6083.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Soffit

Bay 2 - Deck Cracking

Photo Description: View of diagonally oriented transverse through crack in soffit with efflorescence on deck and tops of beams in vaulted slab.

Photo Number: 51

Structure Number:
045-0082

Photo File Name:
DSCF6070.JPG

Date of Photo:
4/22/2016

View: Upward

Feature / Location:
58 - Deck Condition: Deck Soffit

Span 1 - North Bound Lanes

Photo Description: Showing longitudinal cracking with efflorescence in deck soffit of vaulted span.

Photo Number: 52

Structure Number:
045-0082

Photo File Name:
DSCF6069.JPG

Date of Photo:
4/22/2016

View: Upward

Feature / Location:
58 - Deck Condition: Deck Soffit

Span 1 - North Bound Lanes

Photo Description: Showing longitudinal cracking with efflorescence in deck soffit of vaulted span.

Photo Number: 53

Structure Number:
045-0082

Photo File Name:
DSCF6068.JPG

Date of Photo:
4/22/2016

View: Upward

Feature / Location:
58 - Deck Condition: Deck Soffit

Span 1 - North Bound Lanes

Photo Description: Showing longitudinal cracking with efflorescence in deck soffit in vaulted span.

Photo Number: 54

Structure Number:
045-0082

Photo File Name:
DSCF6023.JPG

Date of Photo:
4/13/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Soffit

Span 2 - Detail Photo

Photo Description: View of deck soffit between Beams 4 thru 6.

Photo Number: 55

Structure Number:
045-0082

Photo File Name:

DSCF6021.JPG

Date of Photo:

4/13/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Span 2 - Detail Photo

Photo Description: View of deck soffit between Beams 8 thru 10, note frequency of horizontal efflorescent cracking.

Photo Number: 56

Structure Number:
045-0082

Photo File Name:

DSCF5990.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Bridge Deck: Span 3 - Eff. Cracking

Photo Description: Typical view of frequency of deck cracking within span.

Photo Number: 57

Structure Number:
045-0082

Photo File Name:

DSCF6020.JPG

Date of Photo:

4/13/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Span 2 - Detail Photo

Photo Description: View of deck soffit between Beams 10 thru 12, note frequency of horizontal efflorescent cracking.

Photo Number: 58

Structure Number:
045-0082

Photo File Name:

DSCF5986.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Bridge Deck: Span 3 - Eff. Cracking

Photo Description: Soffit view between beams 1 and 2 showing eff. cracking transverse across deck.

Photo Number: 59

Structure Number:
045-0082

Photo File Name:
DSCF5987.JPG

Date of Photo:
4/12/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Soffit

Bridge Deck: Span 3 - Eff. Cracking

Photo Description: Typical view of frequency of deck cracking within span.

Photo Number: 60

Structure Number:
045-0082

Photo File Name:
DSCF5988.JPG

Date of Photo:
4/12/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Soffit

Bridge Deck: Span 3 - Eff. Cracking

Photo Description: Typical view of frequency of deck cracking within span.

Photo Number: 61

Structure Number:
045-0082

Photo File Name:

DSCN3303.JPG

Date of Photo:

3/7/2017

View: S

Feature / Location:

58 - Deck Condition: Deck Soffit

Span 4 - Detail Photo

Photo Description:

Photo Number: 62

Structure Number:
045-0082

Photo File Name:

DSCF6075.JPG

Date of Photo:

4/22/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Bay -

Photo Description: View of diagonally oriented transverse through crack in soffit with efflorescence within vaulted span.

Photo Number: 63

Structure Number:
045-0082

Photo File Name:
DSCF6082.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Soffit

Bay 4 - Deck Cracking

Photo Description: View of longitudinally oriented transverse through crack in soffit with efflorescence in vaulted span.

Photo Number: 64

Structure Number:
045-0082

Photo File Name:
DSCF6084.JPG

Date of Photo:
4/22/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Soffit

Bay 1 - Deck Cracking

Photo Description: View of diagonally oriented transverse through crack in soffit with efflorescence on deck and tops of beams in vaulted slab.

Photo Number: 65

Structure Number:
045-0082

Photo File Name:
DSCF6003.JPG

Date of Photo:
4/13/2016

View: Upward

Feature / Location:
58 - Deck Condition: Deck Soffit

Bay 9 - Honey combed area in deck soffit.

Photo Description: Spots of light honey combing were discovered throughout the deck soffit. This defect was isolated.

Photo Number: 66

Structure Number:
045-0082

Photo File Name:
DSCF6039.JPG

Date of Photo:
4/13/2016

View: Upward

Feature / Location:
58 - Deck Condition: Deck Soffit

Bay 4 - Efflorescent Cracking

Photo Description: View of cracking in deck soffit, note longitudinal tails to cracks

Photo Number: 67

Structure Number:
045-0082

Photo File Name:

DSCF6007.JPG

Date of Photo:

4/13/2016

View: S

Feature / Location:

58 - Deck Condition: Deck Soffit

Bay 6 - Typical Condition

Photo Description: Typical Condition of deck soffit between piers.

Photo Number: 68

Structure Number:
045-0082

Photo File Name:

DSCF5975.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Bay 11 - Typical Condition

Photo Description: Typical Condition of deck between beams

Photo Number: 69

Structure Number:
045-0082

Photo File Name:

DSCF5973.JPG

Date of Photo:

4/12/2016

View: Upward

Feature / Location:

58 - Deck Condition:
Deck Soffit

Bay 10 - Hairline Cracking

Photo Description: View of longitudinal cracking on bottom of deck

Photo Number: 70

Structure Number:
045-0082

Photo File Name:

DSCF5957.JPG

Date of Photo:

4/12/2016

View: Upward

Feature / Location:

58 - Deck Condition:
Deck Soffit

Bay 5 - Hairline Cracking

Photo Description: Efflorescent cracking in deck near edge beam, at acute angle in bridge deck moving out into span.

Photo Number: 71

Structure Number:
045-0082

Photo File Name:

DSCF5947.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Bay 1 - Typical Condition

Photo Description: Typical Condition of deck between beams

Photo Number: 72

Structure Number:
045-0082

Photo File Name:

DSCF6048.JPG

Date of Photo:

4/13/2016

View: N

Feature / Location:

59 - Superstructure Cond: Beam

Beam 9 - Efflorescence

Photo Description: Heavy efflorescence under Beam 9, deck above has significant patterned map cracking.

Photo Number: 73

Structure Number:
045-0082

Photo File Name:
DSCF5999.JPG

Date of Photo:
4/13/2016

View: S

Feature / Location:
59 - Superstructure Cond: Interior

Bay 9 - Typical Condition

Photo Description: Typical Condition of Beam diaphragm at fixed Pier. Note Efflorescent cracking above Pier in Bridge Deck.

Photo Number: 74

Structure Number:
045-0082

Photo File Name:
DSCF5946.JPG

Date of Photo:
4/12/2016

View: S

Feature / Location:
58 - Deck Condition: Edge Beam

Bay 1 - Typical Condition

Photo Description: Typical Condition of Edge Beam.

Photo Number: 75

Structure Number:
045-0082

Photo File Name:
DSCF5809.JPG

Date of Photo:
3/30/2016

View: Downw

Feature / Location:
Misc: Drainage Scupper

Span 3 -

Photo Description: View of drainage scupper in Span 3, Northbound lanes of Il-47.

Photo Number: 76

Structure Number:
045-0082

Photo File Name:
DSCF5976.JPG

Date of Photo:
4/12/2016

View: S

Feature / Location:
Misc: Deck Drainage System

Span 3 - at South Abutment

Photo Description: View of condition of drainage system in Bay 11 at South Abutment, condition in Bay 1 is similar. Note discoloration in deck at scupper downspout.

Photo Number: 77

Structure Number:
045-0082

Photo File Name:
DSCF5948.JPG

Date of Photo:
4/12/2016

View: S

Feature / Location:
Misc: Deck Drainage System

Span 3 - at South Abutment

Photo Description: View of condition of drainage system in Bay 1 at South Abutment. Condition in Bay 11 is similar.

Photo Number: 78

Structure Number:
045-0082

Photo File Name:
DSCF6004.JPG

Date of Photo:
4/13/2016

View: S

Feature / Location:
59 - Superstructure Cond: Interior

Bay 8 - Typical Condition

Photo Description: Typical Condition of beam diaphragm at fixed Pier, with heavy efflorescent deck crack in foreground of photo.

Photo Number: 79

Structure Number:
045-0082

Photo File Name:
DSCF6015.JPG

Date of Photo:
4/13/2016

View: S

Feature / Location:
59 - Superstructure
Cond: Interior

Bay 1 - Typical Condition

Photo Description: Typical Condition of beam diaphragm at fixed Pier, note tight spacing of efflorescent cracks in deck.

Photo Number: 80

Structure Number:
045-0082

Photo File Name:
DSCF6002.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:
59 - Superstructure
Cond: Beam

Beam 9 - Typical Condition

Photo Description: View of Sealed cracks in Beam 9 at south face of Pier diaphragm.

Photo Number: 81

Structure Number:
045-0082

Photo File Name:
DSCF5932.JPG

Date of Photo:
4/12/2016

View: E

Feature / Location:
59 - Superstructure Cond: Beam

Beam 1 - :Cracks in Web

Photo Description: Cracking present in web (unsealed) at Beam 1, North Abutment.

Photo Number: 82

Structure Number:
045-0082

Photo File Name:
DSCF5913.JPG

Date of Photo:
4/12/2016

View: E

Feature / Location:
59 - Superstructure Cond: Beam

Beam 7 - Cracks in Web

Photo Description: View of cracks in the Beam 7 web without an applied sealant.

Photo Number: 83

Structure Number:
045-0082

Photo File Name:
DSCF5942.JPG

Date of Photo:
4/12/2016

View: N

Feature / Location:
59 - Superstructure Cond: Beam

Span 3 - West Fascia

Photo Description: Fascia view of Beam 1 in Span 3, typical condition.

Photo Number: 84

Structure Number:
045-0082

Photo File Name:
DSCF5978.JPG

Date of Photo:
4/12/2016

View: N

Feature / Location:
59 - Superstructure Cond: Beam

Span 3 - East Fascia

Photo Description: View of Beam 12 fascia in Span 3, showing typical condition.

Photo Number: 85

Structure Number:
045-0082

Photo File Name:
DSCF5933.JPG

Date of Photo:
4/12/2016

View: E

Feature / Location:
59 - Superstructure Cond: Beam

Span 2 - West Fascia

Photo Description: Typical View of West Fascia over WB lanes.

Photo Number: 86

Structure Number:
045-0082

Photo File Name:
DSCF6079.JPG

Date of Photo:
4/22/2016

View: E

Feature / Location:
59 - Superstructure Cond: Beam

Beam 7A - Pop-outs

Photo Description: View of Beam 7A web to east of stage construction line, pop outs full length of web and top flange.

Photo Number: 87

Structure Number:
045-0082

Photo File Name:
DSCF6078.JPG

Date of Photo:
4/22/2016

View: S

Feature / Location:
59 - Superstructure
Cond: Beam

Beam 7A - Pop-outs

Photo Description: View of Beam 7A web to east of stage construction line, pop outs full length of web and top flange. See next photo.

Photo Number: 88

Structure Number:
045-0082

Photo File Name:
DSCF5977.JPG

Date of Photo:
4/12/2016

View: W

Feature / Location:
59 - Superstructure
Cond: Beam

Beam 12 - Cracks in Web

Photo Description: View of Beam 12 at South Abutment. Note filled crack in web and presence of cracked area at end of web.

Photo Number: 89

Structure Number:
045-0082

Photo File Name:
DSCF6054.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:
59 - Superstructure Cond: Beam

Beam 12 - Cracks in Web

Photo Description: View of cracks in Beam 12 over Pier, East Fascia

Photo Number: 90

Structure Number:
045-0082

Photo File Name:
DSCF6001.JPG

Date of Photo:
4/13/2016

View: E

Feature / Location:
59 - Superstructure Cond: Beam

Beam 10 - Typical Condition

Photo Description: View of sealed cracks in Beam 10

Photo Number: 91

Structure Number:
045-0082

Photo File Name:
DSCF6008.JPG

Date of Photo:
4/13/2016

View: E

Feature / Location:
59 - Superstructure Cond: Beam

Beam 7 - Typical Condition

Photo Description: Sealed cracks in beam

Photo Number: 92

Structure Number:
045-0082

Photo File Name:
DSCF6016.JPG

Date of Photo:
4/13/2016

View: SE

Feature / Location:
59 - Superstructure Cond: Beam

Beam 1 - Hairline Cracking

Photo Description: View of Beam 1 fascia, showing cracks in beams without applied sealant.

Photo Number: 93

Structure Number:
045-0082

Photo File Name:

DSCF6031.JPG

Date of Photo:

4/13/2016

View: E

Feature / Location:

59 - Superstructure Cond: Beam

Beam 1 - Hair line cracking in web

Photo Description: View of cracks in fascia of Beam line 1 over Pier. These cracks do not appear to have sealant applied.

Photo Number: 94

Structure Number:
045-0082

Photo File Name:

DSCF6045.JPG

Date of Photo:

4/13/2016

View: NE

Feature / Location:

59 - Superstructure Cond: Beam

Beam 8 - Crack in Web

Photo Description: View of sealed cracks in web at South face of Pier.

Photo Number: 95

Structure Number:
045-0082

Photo File Name:
DSCF5952.JPG

Date of Photo:
4/12/2016

View: W

Feature / Location:
59 - Superstructure Cond: Bearing

Bearings: Side Retainer - Typical Condition

Photo Description: View of side retainer and bearing position (showing slight translation towards pier)

Photo Number: 96

Structure Number:
045-0082

Photo File Name:
DSCF5951.JPG

Date of Photo:
4/12/2016

View: S

Feature / Location:
59 - Superstructure Cond: Bearing

Bearings: Elastomeric Bearing - Typical

Photo Description: Elevation view of bearing under Beam 2 at South Abutment

Photo Number: 97

Structure Number:
045-0082

Photo File Name:
DSCF5930.JPG

Date of Photo:
4/12/2016

View: E

Feature / Location:
59 - Superstructure Cond: Bearing

Bearings: Elastomeric Bearing - Elevation View

Photo Description: View of bearing at Beam 1, showing grout packed between anchor bolt at side retainer. Construction debris was left on the beam seat at North Abut.

Photo Number: 98

Structure Number:
045-0082

Photo File Name:
DSCF5929.JPG

Date of Photo:
4/12/2016

View: N

Feature / Location:
59 - Superstructure Cond: Bearing

Bearings: Elastomeric Bearing - Elevation View

Photo Description: Elevation view of Elastomeric Bearing at Beam 1

Photo Number: 99

Structure Number:
045-0082

Photo File Name:
DSCF5928.JPG

Date of Photo:
4/12/2016

View: NW

Feature / Location:
59 - Superstructure Cond: Bearing

Bearings: Side Retainer - Minor Section Loss

Photo Description: View of grout packed between nut and retainer, also showing typical condition of steel protective coatings.

Photo Number: 100

Structure Number:
045-0082

Photo File Name:
DSCF5927.JPG

Date of Photo:
4/12/2016

View: N

Feature / Location:
59 - Superstructure Cond: Bearing

Bearings: Side Retainer - Minor Section Loss

Photo Description: Example of elastomeric bearing plate and side retainer with protective coating failures.

Photo Number: 101

Structure Number:
045-0082

Photo File Name:

DSCF5962.JPG

Date of Photo:

4/12/2016

View: S

Feature / Location:

59 - Superstructure
Cond: Bearing

Beam 8 - at South Abutment

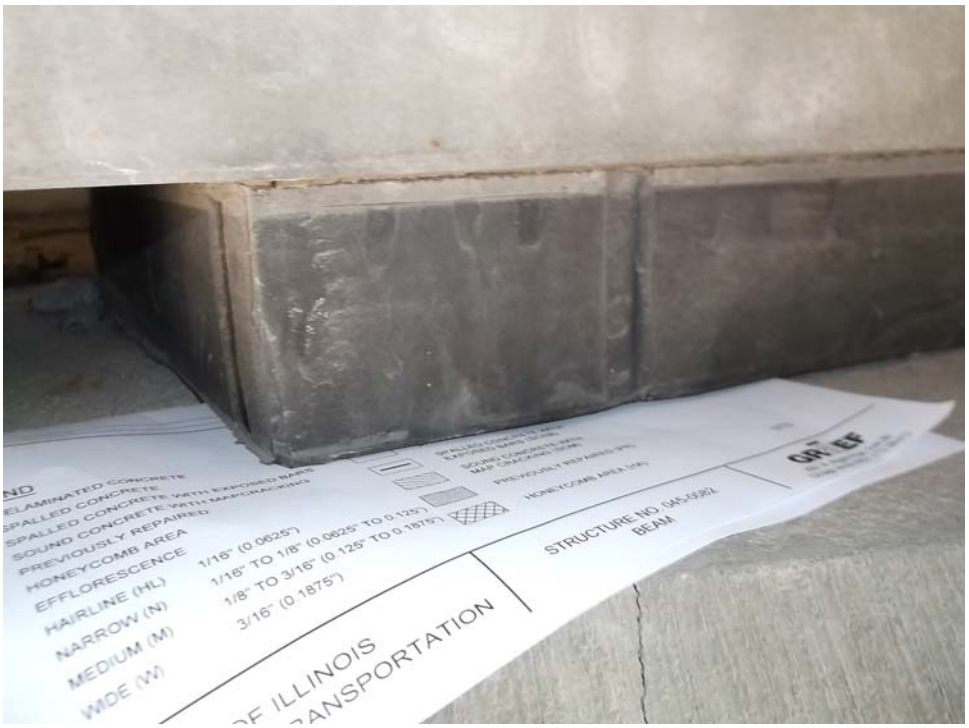


Photo Description: Elastomeric Bearing pad at Beam 8 is not in full contact with bearing seat at this location.

Photo Number: 102

Structure Number:
045-0082

Photo File Name:

DSCF6017.JPG

Date of Photo:

4/13/2016

View: NE

Feature / Location:

60 - Substructure
Cond: Abutment

North Abutment: Wall Stem - Elevation View

Photo Description: Elevation view of North Abutment wall stem. Note cracking and previous repairs visible at abutment and on slope protection.

Photo Number: 103

Structure Number:
045-0082

Photo File Name:

DSCF5934.JPG

Date of Photo:

4/12/2016

View: E

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wall Stem - Elevation View

Photo Description: View along North Abutment Wall Stem and Seats showing condition of abutment wall.

Photo Number: 104

Structure Number:
045-0082

Photo File Name:

DSCF5936.JPG

Date of Photo:

4/12/2016

View: NW

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wall Stem - Typical Condition

Photo Description: Wall stem showing staining, previous repairs, delaminations and cracking

Photo Number: 105

Structure Number:
045-0082

Photo File Name:

DSCF5898.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wall Stem - Delaminated

Photo Description: Additional areas of delaminated concrete have been identified and are shown in inspection exhibits.

Photo Number: 106

Structure Number:
045-0082

Photo File Name:

DSCF5937.JPG

Date of Photo:

4/12/2016

View: W

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wing Wall - Typical Condition

Photo Description: Elevation view of east wingwall, showing typical condition.

Photo Number: 107

Structure Number:
045-0082

Photo File Name:

DSCF5931.JPG

Date of Photo:

4/12/2016

View: E

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wall Stem -

Photo Description: Typical View at West end of Abutment showing cracking and rust staining

Photo Number: 108

Structure Number:
045-0082

Photo File Name:

DSCF5941.JPG

Date of Photo:

4/12/2016

View: E

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wing Wall - Typical Condition

Photo Description: Elevation View of West wingwall, showing typical condition at North Abutment.

Photo Number: 109

Structure Number:
045-0082

Photo File Name:

DSCF6071.JPG

Date of Photo:

4/22/2016

View: W

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Stem -

Photo Description: Looking along back of wall stem within vault showing Typical Condition.

Photo Number: 110

Structure Number:
045-0082

Photo File Name:

DSCF5939.JPG

Date of Photo:

4/12/2016

View: W

Feature / Location:

Site:

-

Photo Description: View of slope paving in front of North Abutment

Photo Number: 111

Structure Number:
045-0082

Photo File Name:
DSCF6086.JPG

Date of Photo:
4/22/2016

View: W

Feature / Location:
Misc: Slope Protection

North Abutment: Slope Wall - Typical Condition

Photo Description: View of cracks and displacements in slope wall. Some previously repaired areas are visible in photo.

Photo Number: 112

Structure Number:
045-0082

Photo File Name:
DSCF6074.JPG

Date of Photo:
4/22/2016

View: E

Feature / Location:
60 - Substructure Cond: Abutment

North Abutment: Pile Bent -

Photo Description: View along Pile Bent at North end of Span 1. Significant presence of water passing under end diaphragm with efflorescence under beams.

Photo Number: 113

Structure Number:
045-0082

Photo File Name:

DSCF6085.JPG

Date of Photo:

4/22/2016

View: E

Feature / Location:

Misc: Slope Protection

North Abutment: Slope Wall - Typical Condition

Photo Description: View of cracks and displacements in slope wall. Previously repaired areas are visible in photo.

Photo Number: 114

Structure Number:
045-0082

Photo File Name:

DSCF6080.JPG

Date of Photo:

4/22/2016

View: NW

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Pile Bent -

Photo Description: View of heavy efflorescence and water passing over bent cap.

Photo Number: 115

Structure Number:
045-0082

Photo File Name:
DSCF6076.JPG

Date of Photo:
4/22/2016

View: W

Feature / Location:
60 - Substructure Cond: Abutment

North Abutment: Pile Bent -

Photo Description: View along Pile Bent at North end of Span 1, note flow of water through beam seat.

Photo Number: 116

Structure Number:
045-0082

Photo File Name:
DSCF5982.JPG

Date of Photo:
4/12/2016

View: W

Feature / Location:
Misc:

Misc: -

Photo Description: View of slopewall with cracking and disjointing of slabs, presence of water along shoulder indicates lack of grade to aid in drainage.

Photo Number: 117

Structure Number:
045-0082

Photo File Name:
DSCF6049.JPG

Date of Photo:
4/13/2016

View: E

Feature / Location:
60 - Substructure Cond: Pier

Pier 1: Cap - Spalled Concrete

Photo Description: Under Beam 9, cap showing spalls with exposed stirrup bars and delamination

Photo Number: 118

Structure Number:
045-0082

Photo File Name:
DSCF6052.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:
60 - Substructure Cond: Pier

Pier 1: Cap - Delaminated Concrete

Photo Description: View of Pier cap under Beams 10 and 11. Delaminated concrete present in cap face.

Photo Number: 119

Structure Number:
045-0082

Photo File Name:
DSCF6012.JPG

Date of Photo:
4/13/2016

View: W

Feature / Location:
60 - Substructure Cond: Pier

Pier 1: Cap - Typical Condition

Photo Description: View along Pier cap showing typical condition and rebuilt beam seat.

Photo Number: 120

Structure Number:
045-0082

Photo File Name:
DSCF6011.JPG

Date of Photo:
4/13/2016

View: E

Feature / Location:
60 - Substructure Cond: Pier

Pier 1: Cap - Typical Condition

Photo Description: View along Pier cap showing typical conditions.

Photo Number: 121

Structure Number:
045-0082

Photo File Name:

DSCF5993.JPG

Date of Photo:

4/13/2016

View: S

Feature / Location:

60 - Substructure Cond: Pier

Pier 1: Cap - Delaminated Concrete

Photo Description: Delaminated Concrete at abandoned drainage element anchor

Photo Number: 122

Structure Number:
045-0082

Photo File Name:

DSCF5938.JPG

Date of Photo:

4/12/2016

View: S

Feature / Location:

60 - Substructure Cond: Pier

Pier 1: Elevation - (East Half)

Photo Description: View of North Face of pier, East Half.

Photo Number: 123

Structure Number:
045-0082

Photo File Name:

DSCF5940.JPG

Date of Photo:

4/12/2016

View: S

Feature / Location:

60 - Substructure Cond: Pier

Pier 1: Elevation - (West Half)

Photo Description: View of North Face of Pier, West Half.

Photo Number: 123

Structure Number:
045-0082

Photo File Name:

DSCF5985.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

60 - Substructure Cond: Pier

Pier 1: Elevation - (East Half)

Photo Description: Typical view of Pier under Beams 7 thru 12, showing East half.

Photo Number: 125

Structure Number:
045-0082

Photo File Name:

DSCF5984.JPG

Date of Photo:

4/12/2016

View: N

Feature / Location:

60 - Substructure
Cond: Pier

Pier 1: Elevation - (West Half)

Photo Description: Typical view of Pier under Beams 1 thru 6, showing West half.

Photo Number: 126

Structure Number:
045-0082

Photo File Name:

DSCF5983.JPG

Date of Photo:

4/12/2016

View: S

Feature / Location:

60 - Substructure
Cond: Abutment

South Abutment: Wall Stem - Narrow Cracking

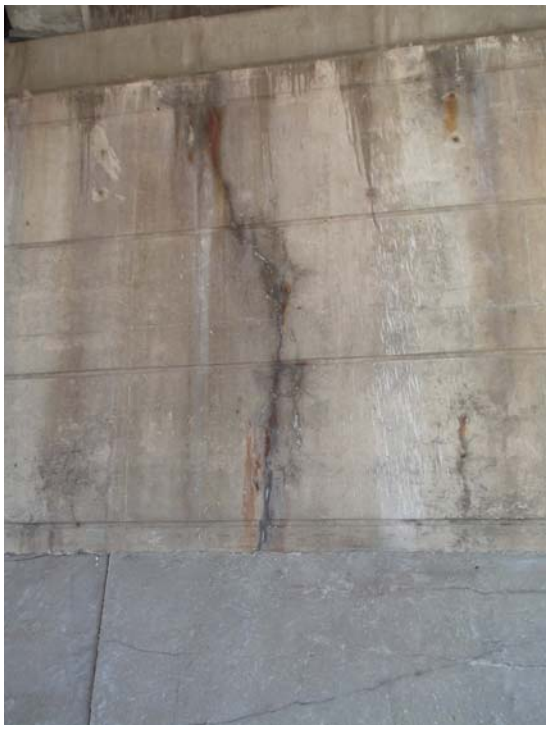


Photo Description: View of Narrow Crack in wall with staining and water passage, delaminations in area.

Photo Number: 127

Structure Number:
045-0082

Photo File Name:

DSCF5980.JPG

Date of Photo:

4/12/2016

View: W

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wall Stem - Elevation View

Photo Description: View along stem and beam seat showing typical condition.

Photo Number: 128

Structure Number:
045-0082

Photo File Name:

DSCN3310.JPG

Date of Photo:

3/7/2017

View: NW

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Stem - Typical Condition

Photo Description: Typical condition of stem wall, note embankment is place further up stem than opposing abutment.

Photo Number: 129

Structure Number:
045-0082

Photo File Name:

DSCF5969.JPG

Date of Photo:

4/12/2016

View: S

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wall Stem - Delaminated

Photo Description: View of upper portion of abutment stem wall, near beams 10 and 11. Defects such as delamination, cracking and staining were present.

Photo Number: 130

Structure Number:
045-0082

Photo File Name:

DSCF5981.JPG

Date of Photo:

4/12/2016

View: SW

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wing Wall -

Photo Description: View of edge of Abutment and Wing Wall joint, showing defects present under deck joint.

Photo Number: 131

Structure Number:
045-0082

Photo File Name:
DSCF5943.JPG

Date of Photo:
4/12/2016

View: S

Feature / Location:
60 - Substructure Cond: Abutment

South Abutment: Wing Wall - Spalled Concrete

Photo Description: View of concrete spalling at South Abutment and wingwall connection, likely due to leaking deck joint.

Photo Number: 132

Structure Number:
045-0082

Photo File Name:
DSCF5944.JPG

Date of Photo:
4/12/2016

View: SE

Feature / Location:
60 - Substructure Cond: Abutment

South Abutment: Wing Wall - Spalled Concrete

Photo Description: View of concrete spalling at abutment and wing wall connection

Photo Number: 133

Structure Number:
045-0082

Photo File Name:

DSCF5945.JPG

Date of Photo:

4/12/2016

View: SE

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wing Wall -

Photo Description: Elevation view of West wingwall at South Abutment, showing typical condition.

Photo Number: 134

Structure Number:
045-0082

Photo File Name:

DSCF5979.JPG

Date of Photo:

4/12/2016

View: W

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wing Wall - Hairline Cracking

Photo Description: View Wing Wall at South Abutment showing staining, hairline cracking under deck joint.

Photo Number: 135

Structure Number:
045-0082

Photo File Name:

DSCN3298.JPG

Date of Photo:

3/7/2017

View: E

Feature / Location:

Misc: Slopewall

South Abutment: Slope Wall - Void

Photo Description: View of void under south slopewall, measuring 1 foot in depth.

Photo Number: 136

Structure Number:
045-0082

Photo File Name:

DSCN3307.JPG

Date of Photo:

3/7/2017

View: S

Feature / Location:

Misc: Embankment

South Abutment: Embankment -

Photo Description: View of South Abutment vault embankment condition.

ATTACHMENT I

Hydraulic Analysis Summary

This Attachment is not required for SN 045-0082.

ATTACHMENT J

Proposed Plan & Profile

This attachment will include the proposed plan and profile. This information is currently unavailable, as the Phase 1 report is currently under development.

ATTACHMENT K

Existing & Proposed Roadway Cross Sections

This attachment will include existing and proposed approach cross sections. This information is currently unavailable, as the Phase 1 report is under development.

ATTACHMENT L

Abbreviated Existing Plans

Included in this attachment are the existing General Plan and Elevation and superstructure cross section sheets for SN 049-0082, IL Route 47 over I-88 E/W Tollway.

045-0082

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	E-8-4-B	KANE	65	1

CONTRACT NO. 62531
D-91-321-02
ISTHA CONTRACT RR-02-5129
ISTHA BRIDGE NO. 1101

8-4-06 Letting, Item 025

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

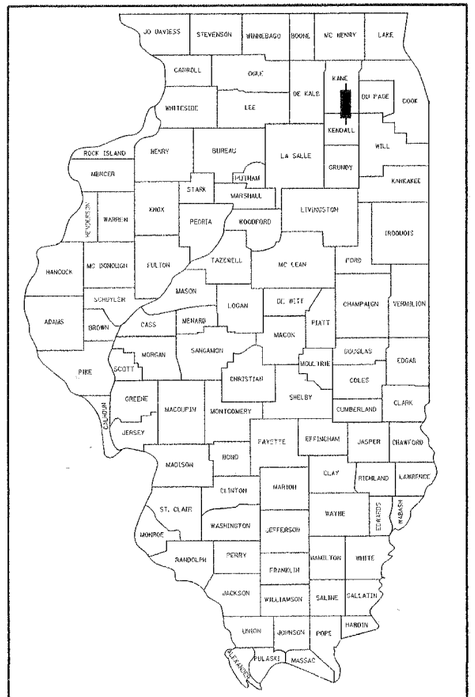
PROPOSED HIGHWAY PLANS

FOR INDEX OF SHEETS, SEE SHEET NO. 2

FUNCTIONAL CLASSIFICATION: OTHER PRINCIPAL ARTERIAL
1999 ADT = 10,400
2020 ADT = 11,500

IL 47 DESIGN SPEED LIMIT = 55 MPH
IL 47 POSTED SPEED LIMIT = 55 MPH

F.A.P. ROUTE 326 (IL 47)
SECTION E-8-4-B
OVER I-88 (E-W TOLLWAY)
SUPERSTRUCTURE REPLACEMENT & SUBSTRUCTURE REPAIRS
KANE COUNTY
C-91-321-02

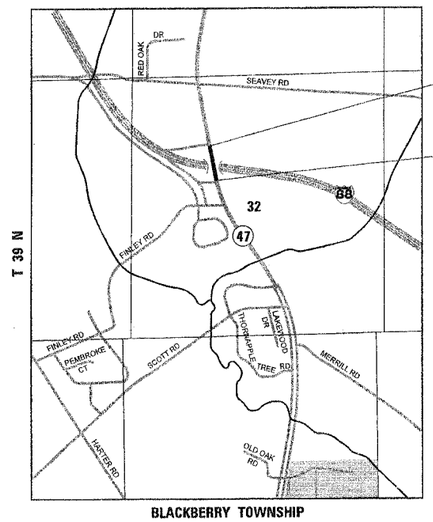


LOCATION OF SECTION INDICATED THUS:-

IMPROVEMENT IS LOCATED IN UNINCORPORATED BLACKBERRY TOWNSHIP, KANE COUNTY

IL 47 OVER I-88
SN: 045-0082 (EXIST.)
REMOVE AND REPLACE EXISTING 2-SPAN SUPERSTRUCTURE WITH 48" P.P.C. I-BEAMS AND NEW DECK. REMOVE AND REPLACE EXISTING VAULTED ABUTMENT SLABS, APPROACH SLABS AND ALL JOINTS UTILIZING STAGED CONSTRUCTION.

R 7 E



END IMPROVEMENT
STA 58+56.92

BEGIN IMPROVEMENT
STA 55+45.92

BLACKBERRY TOWNSHIP

LOCATION MAP
NOT TO SCALE

GROSS & NET LENGTH = 311 FT. = 0.059 MI.

rjngroup
Excellence through Ownership
License # 184-000813
200 West Front Street
Wheaton, Il 60187

MICROFILMED _____
REEL NUMBER _____
AWARDED _____
RESIDENT ENGINEER _____
AS BUILT CHANGES WERE MADE
ON THE FOLLOWING SHEETS _____

0 50' 100' — 1" = 50'
0 50' 100' — 1" = 20'

FULL SIZE PLANS HAVE BEEN PREPARED USING STANDARD ENGINEERING SCALES. REDUCED SIZED PLANS WILL NOT CONFORM TO STANDARD SCALES. IN MAKING MEASUREMENTS ON REDUCED PLANS, THE ABOVE SCALES MAY BE USED.

J.U.L.I.E.
JOINT UTILITY LOCATION INFORMATION FOR EXCAVATION
1-800-892-0123

CONTRACT NO. 62531

MICHAEL R. HEUTSCHER
LICENSED PROFESSIONAL ENGINEER
062-060594
STATE OF ILLINOIS

Michael R. Heutscher 5/7/06 11-30-07
REGISTERED P.E., STATE OF ILLINOIS EXPIRES

STATE OF ILLINOIS
WILLIAM J. VEGRZYN
4983
HANOVER PARK
IL
LICENSED STRUCTURAL ENGINEER

William J. Vegrzyn 5/7/06 11-30-06
REGISTERED S.E., STATE OF ILLINOIS EXPIRES

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SUBMITTED May 4 20 06
Diane M. O'Keefe /cnl
DEPUTY DIRECTOR OF HIGHWAYS, REGION ENGINEER

June 30, 20 06
Mike Hine
ENGINEER OF DESIGN AND ENVIRONMENT

June 30, 20 06
Milton R. Sees, P.E.
DIRECTOR OF HIGHWAYS, CHIEF ENGINEER

PRINTED BY THE AUTHORITY OF THE STATE OF ILLINOIS

DISTRICT ONE - BUREAU OF DESIGN
PROJECT MANAGER: RUSS SINHA (847) 705-4209

Attachment L

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.P. 326	0910-IBR-84	KANE	62	19
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT-		

SHEET NO. 1
32 SHEETS

Contract #62531
ISTHA Contract #RR-02-5129
ISTHA Bridge No. 1101

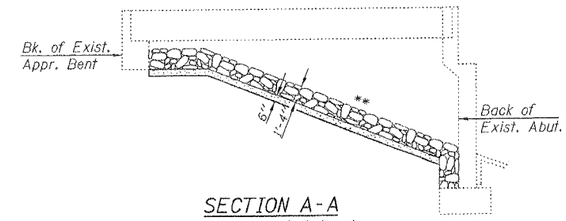
Benchmark:
Square cut in eastern corner of metal base of light pole at southwest corner of Route 47 & I-88 EB off ramp.
El. = 747.79

Existing structure:
The existing structure No. 045-0082 was originally constructed in 1972 and rehabilitated in 1997. The existing structure consists of two vaulted approach spans and two main spans. The vaulted approach spans consist of a 4½" thick reinforced concrete slab and 2½" thick precast concrete planks supported on 36" deep (simply supported) PPC I-Beams. The main spans consist of a 5" thick reinforced concrete slab and 2½" thick precast concrete planks supported on 54" deep (simply supported) PPC I-Beams.
The substructure consists of reinforced concrete vaulted abutments, pile bents and two three-column piers at ℄ of I-88 (E-W Tollway).
The abutments, piers and pile bents are reinforced concrete elements supported on cast-in-place concrete piles.
The overall structure length is 239'-0" back to back of pile bents.
IL Rte 47 carries 4 lanes of traffic (2-12' lanes in each direction) with a 12' left turn lane in the northbound direction. There is a tapered raised center median. There are 9'-3" shoulders on both sides. The out to out of deck width is 91'-8" and face to face of curb dimension is 88'-6". One lane of traffic in each direction and one left turn lane shall be maintained during the rehabilitation using stage construction.

Salvage: The existing aluminum handrail shall be salvaged and delivered to the Bridge Office in Elk Grove Village. Contact Tom Matyas at (847) 956-1444 prior to delivery.

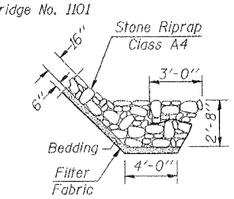
STATION 57+00.12
REBUILT 20 BY
STATE OF ILLINOIS
F.A.P. RT. 326
SEC. 0910-IBR-84
LOADING HS20
STR. NO. 045-0082

NAME PLATE
See Std. 515001

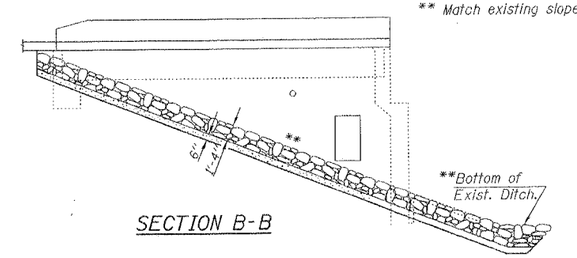


SECTION A-A
Through vaulted abutment

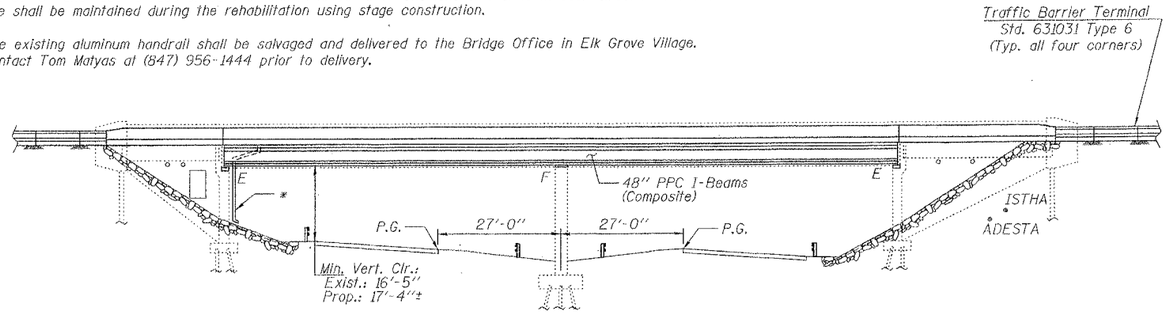
** Match existing slope



TOE DETAIL

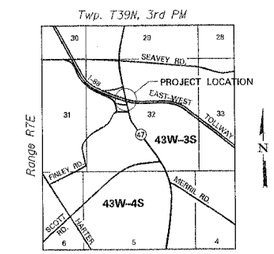


SECTION B-B

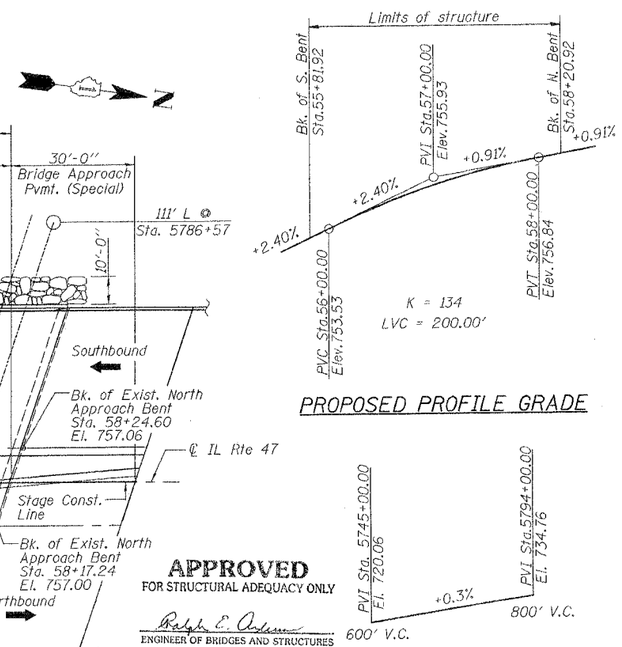


* Type DS-33 Drainage Scupper - .
See Sheet 18 of 32 for Drainage System.

ELEVATION



LOCATION SKETCH



PROPOSED PROFILE GRADE

PROFILE GRADE - TOLLWAY

LOADING HS20-44

Allow 25 pounds/Sq.Ft. for future wearing surface.
New beams only.

DESIGN SPECIFICATIONS

2002 AASHTO (17th Edition).

DESIGN STRESSES

NEW FIELD UNITS
f'_c = 3,500 psi
f_y = 60,000 psi (Reinf.)

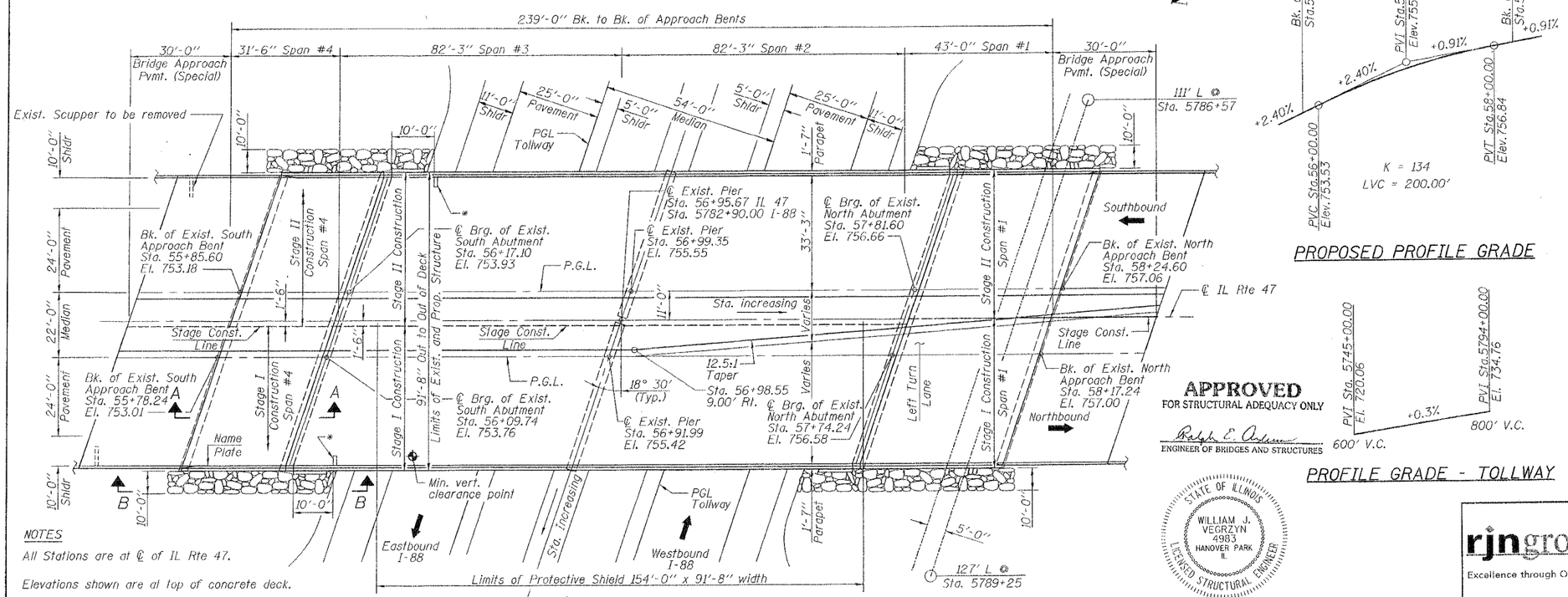
NEW PRECAST PRESTRESSED UNITS
f'_c = 7,000 psi
f'_{ci} = 6,000 psi
f'_s = 270,000 psi (½" low relax. strands)
f_{si} = 201,960 psi (½" low relax. strands)

Existing Substructure Field Units
f'_c = 3,500 psi
f_y = 40,000 psi (Reinf.)

Existing 36" PPC-I Beam Units
f'_{ci} = 5,000 psi
f'_s = 270,000 psi (½" stress relieved strands)

SEISMIC DATA

Seismic Performance Category (SPC) = A
Bedrock Acceleration Coefficient (A) = .04g
Site Coefficient (S) = 1.0



PLAN

NOTES
All Stations are at ℄ of IL Rte 47.
Elevations shown are at top of concrete deck.
Protective Shield shall extend at least 10'-0" outside the edge of each shoulder of I-88.

APPROVED
FOR STRUCTURAL ADEQUACY ONLY
Ralph E. Anderson
ENGINEER OF BRIDGES AND STRUCTURES

STATE OF ILLINOIS
WILLIAM J. VEGRZYN
4983
HANOVER PARK, IL
LICENSED STRUCTURAL ENGINEER
William J. Vegrzyn 5-31-06
Expires 11-30-06

rjngroup
Excellence through Ownership
200 West Front Street
Wheaton, Il 60187

ILLINOIS DEPARTMENT OF TRANSPORTATION
GENERAL PLAN AND ELEVATION
IL RTE. 47 OVER I-88 (E-W TOLLWAY)
KANE COUNTY
STRUCTURE NO. 045-0082

DATE: 2-01-2006
DRAWN BY BLB
CHECKED BY WJV

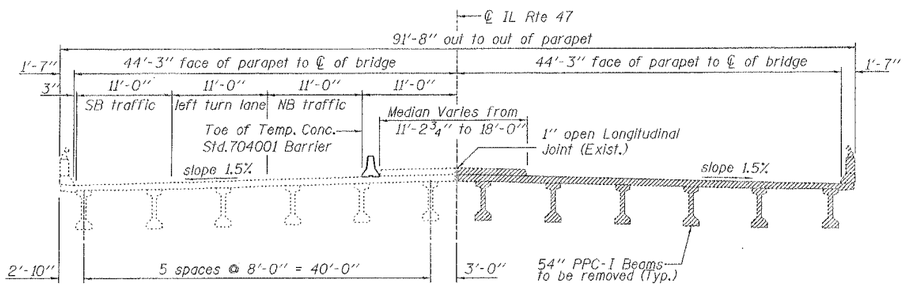
5/31/2006 K:\11182521\Structures\IL-47 over I-88\Final Plans_Revised.dgn

Attachment L

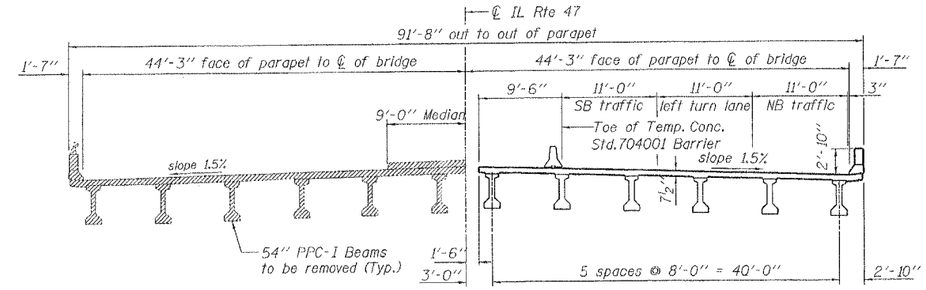
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.P. 326	0910-1BR-84	KANE	62	21
FED. ROAD DIST. NO. 7		ILLINOIS	FED. AID PROJECT-	

SHEET NO. 3
32 SHEETS

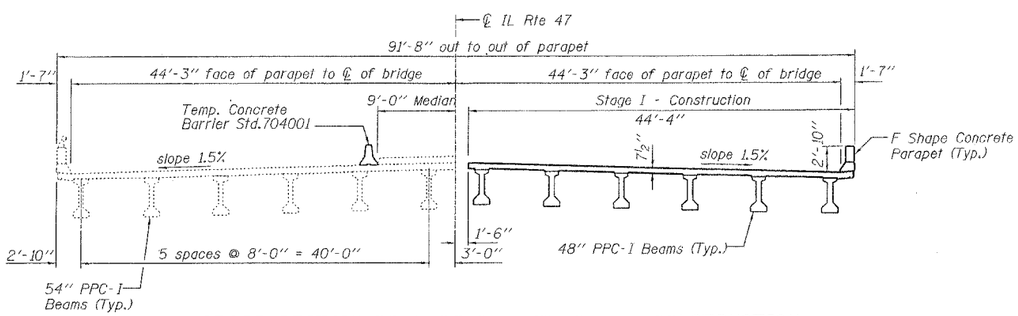
Contract #62531
ISTHA Contract #RR-02-5129
ISTHA Bridge No. 1101



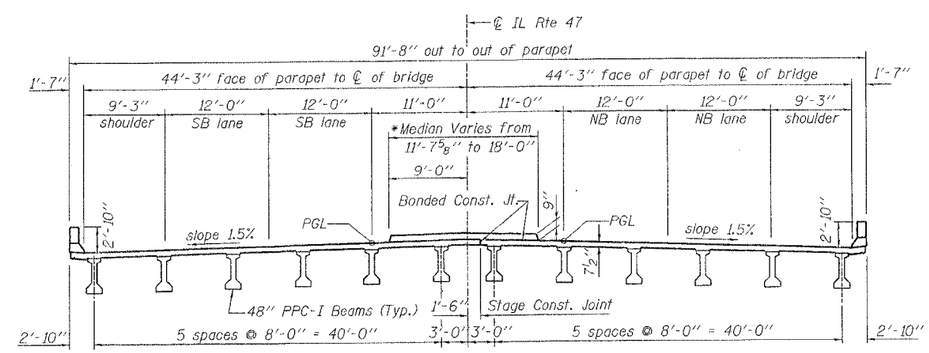
CROSS SECTION SPAN #2 & 3, STAGE I - REMOVAL
(Looking North)



CROSS SECTION SPAN #2 & 3, STAGE II - REMOVAL
(Looking North)



CROSS SECTION SPAN #2 & 3, STAGE I - CONSTRUCTION
(Looking North)



CROSS SECTION SPAN #2 & 3, STAGE II - CONSTRUCTION
(Looking North)

LEGEND:

Superstructure Removal

* Median to be constructed after completion of Stage II - Construction.

NOTE:

Removal of the existing bridge rail is included with Removal of Existing Superstructures.

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200 West Front Street
Wheaton, Il 60187

DELTA ENGINEERING, INC.
CONSULTING ENGINEERS, CHICAGO ILLINOIS.

ILLINOIS DEPARTMENT OF TRANSPORTATION
STAGE CONSTRUCTION - BRIDGE
IL RTE. 47 OVER I-88 (E-W TOLLWAY)
KANE COUNTY
STRUCTURE NO. 045-0082

DATE: 2-01-2006
DRAWN BY JLA
CHECKED BY GBC

5/5/2006 K:\1182921\Structures\IL-47 over I-...\Final_Plans_Revised.dgn

Attachment L

E-8B II

THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY

NORTHERN ILLINOIS TOLL HIGHWAY

EAST-WEST TOLLWAY EXTENSION

CONTRACT E-8B

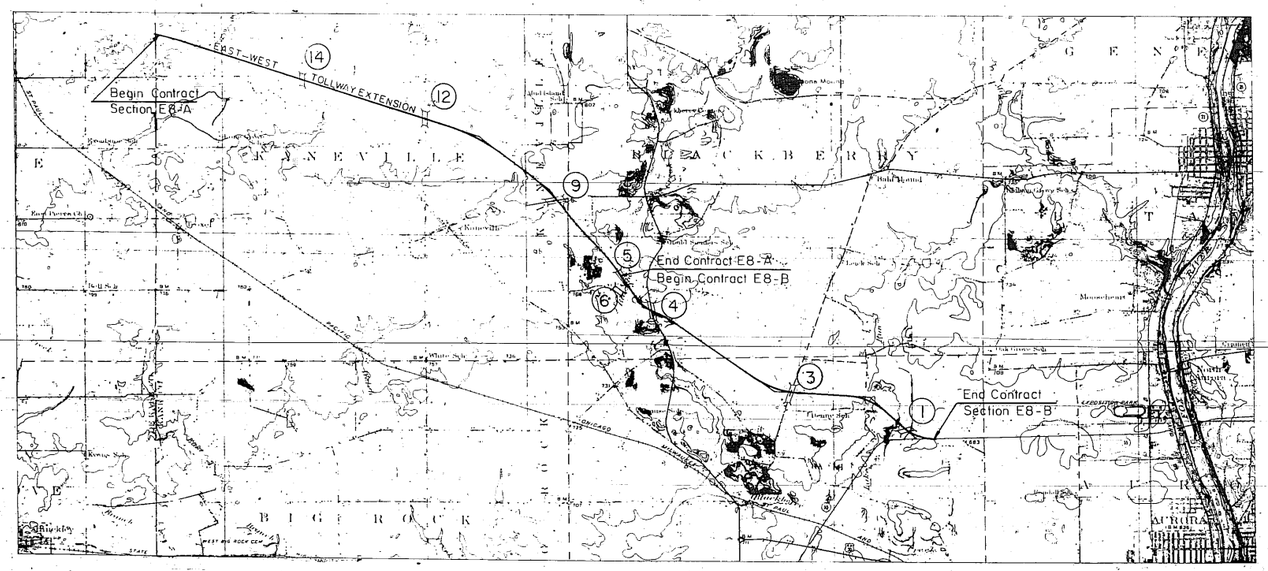
STATION 5750+00.00 TO STATION 6025+24.67

LENGTH 5.213 MILES

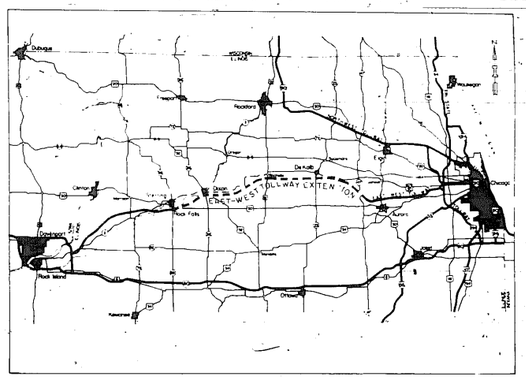
STRUCTURE PLANS
PART II

INDEX OF SHEETS

DRAWING NO	TITLE
S1	TITLE SHEET – STRUCTURE PLANS – PART II
S2 - S6	STRUCTURE E8-6, BELOCKI ROAD OVER BLACKBERRY CREEK
S7 - S15	STRUCTURE E8-5, TOLLWAY OVER BLACKBERRY CREEK
S16 - S27	STRUCTURE E8-4, ILLINOIS ROUTE 47 BRIDGE
S28 - S47	STRUCTURE E8-3, BLISS ROAD BRIDGE
S48 - S69	STRUCTURE E8-1, EAST TERMINUS – RAMP A BRIDGE
ST70-1	STANDARD PARAPET AND RAILING DETAILS
ST70-2	STANDARD SLOPE PAVING, LIMIT OF STRUCTURAL EXCAVATION AND PILE DETAILS
ST70-3	STANDARD NEOPRENE BRIDGE DECK EXPANSION JOINTS AND BEARINGS
ST70-4	36" AND 54" PRESTRESSED PRECAST CONCRETE BEAMS



MAP OF CONSTRUCTION SECTION



LOCATION MAP

BRIGHTON ENGINEERING CO. Section Engineer

BY [redacted]

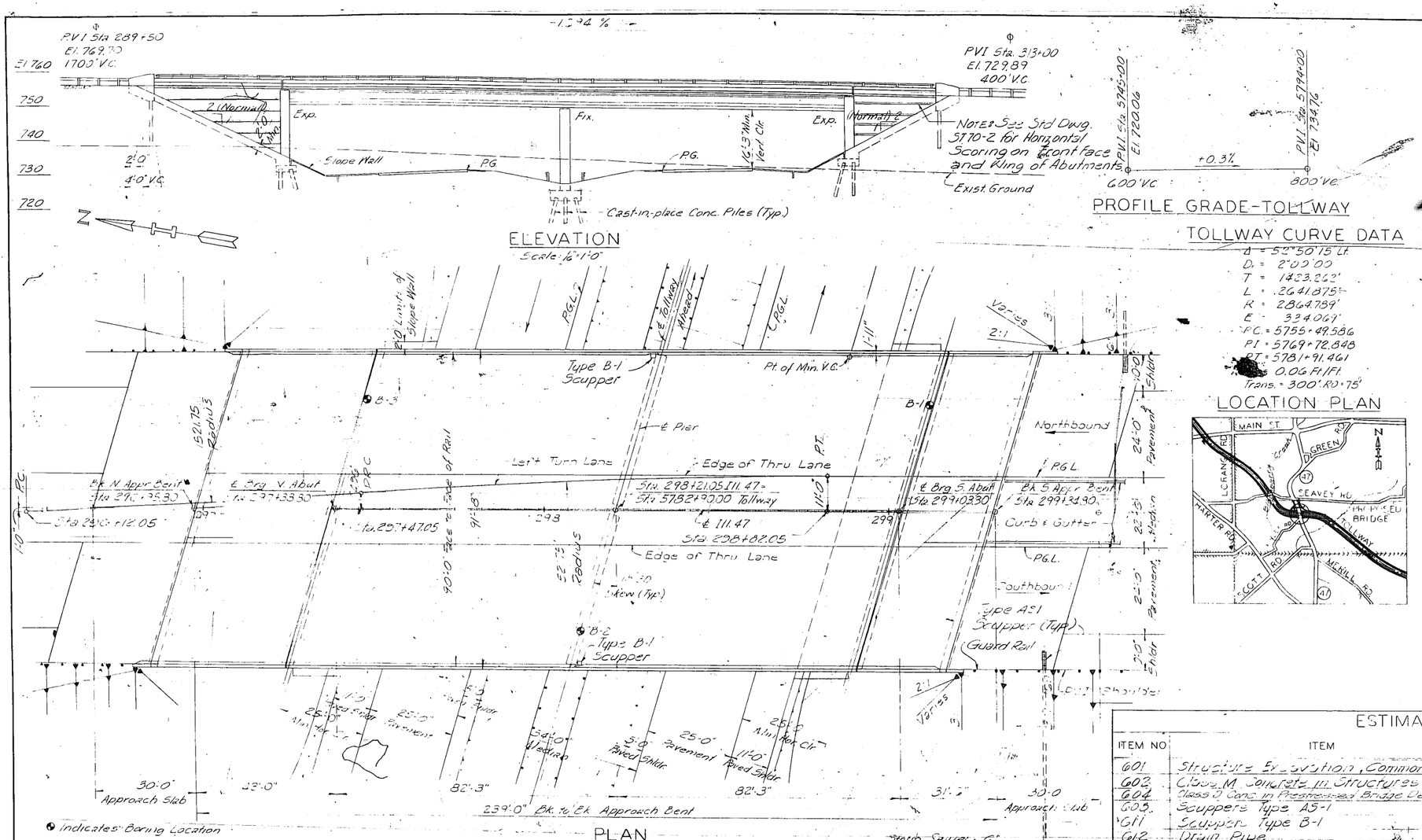
KNOERLE, BENDER, STONE & ASSOCIATES INC. Consulting Engineer

BY Arthur N. Stone

ILLINOIS STATE TOLL HIGHWAY AUTHORITY

By [illegible] Chief Engineer

Date JUNE 23, 1971



BENCH MARK

B.M. A-9 Iron pin w/cap on east side of State Route 47, 145' Lt. Sta. 5782+65 El. 735.82

TOLLWAY CURVE DATA

Δ = 52°50'15" Lt.
D_c = 2°00'00"
T = 1433.262'
L = .2641875
R = 2864.789'
E = 334.069'
P.C. = 5755+49.586
P.I. = 5769+72.848
P.T. = 5781+91.461
[redacted] = 0.06 Ft/Ft.
Trans. = 300' RO 75'

LOCATION PLAN

GENERAL NOTES

Construction Specifications: Standard Specifications of the Illinois State Toll Highway Authority dated 1971, and Special Provisions.

Design Specifications: A.A.S.H.O. Standard Specifications for Highway Bridges, 1969 with Interim Specifications 1970, except as modified by the Bridge Design Criteria for the Northern Illinois Toll Highway.

Design Loading: HS20-44 with allowance of 25 psf for future wearing surface.

Concrete: Class "D" for Bridge Deck and Diaphragms
f'_c = 4000 psi ; f_c = 1200 psi
Class "M" all other
f'_c = 3500 psi , f_c = 1400 psi

For Prestressed Concrete see Dwg ST70-4 & sheets 17 and 18.

Chamfer all exposed edges of concrete 3/4" x 3/4" unless otherwise shown or noted.

Reinforcement: AISM AGIS grade 40, f_s = 20000 psi. All dimensions of reinforcing steel on detail drawings are to centerline of bar except where clear distance is noted from the face of concrete. Reinforcement shall be 2" clear of concrete surfaces unless otherwise shown or noted. All reinforcing steel shall be spliced a minimum of 24 bar diameters except dowels in footings shall have an embedment or projection of 40 diameters.

Piles: Piles shall be Cast-in-Place Concrete Piles. Holes for piles shall be drilled through depth of fill so that piles are driven into natural ground. Maximum pile load 50 tons

Slope Wall: Slope Wall shall be reinforced with welded wire fabric 6"x6" mesh, weighing 58 lbs per 100 sq. ft.

Test Piles: The contractor shall drive a test pile in a permanent location at each substructure unit as directed by the Engineer before ordering the remainder of piles.

Approach Piles: Concrete piles at approach bents shall be driven in holes precored through the embankment in accordance with Article 513.09(c) of the Standard Specifications.

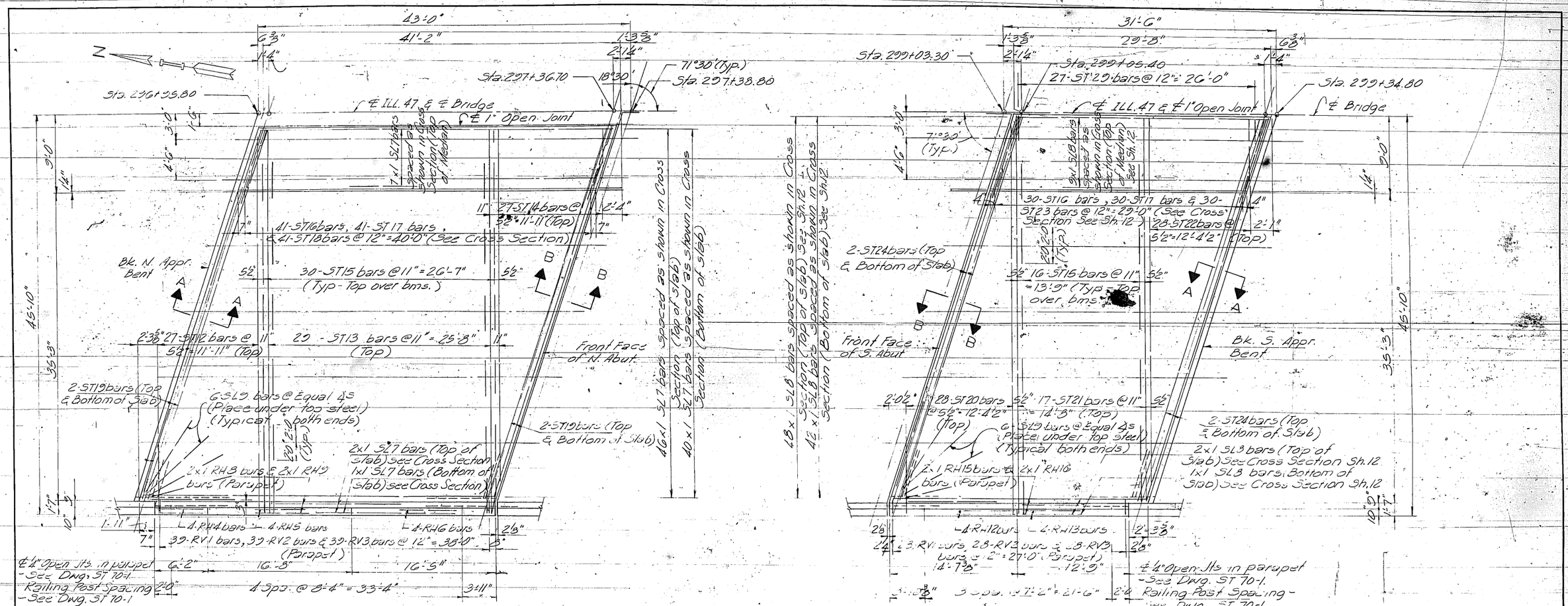
ESTIMATED QUANTITIES

ITEM NO.	ITEM	UNITS	ABUTMENTS	PIERS	SUPER STRUCTURE	TOTAL
601	Structure Excavation, Common	C.Y.	560	120		680
602	Class "M" Concrete in Structures	C.Y.	588.6	148.6		737.2
604	Class "D" Conc. in Prestressed Bridge Deck	C.Y.	212.1		427.0	639.1
603	Scuppers Type A51-1	ea.	4			4
611	Scuppers Type B-1	ea.		2		2
612	Drain Pipe	L.F.				
612	Reinforcing Steel	Lb.	90413	13,756	104478	213,647
614	Furnishing Metal Pile Shells-12 Inch	L.F.	[redacted]	850		3,970
615	Driving and Filling Metal Pile Shells-12 Inch	L.F.	[redacted]	850		3,970
616	Test Piles-Cast in Place Concrete	L.F.	150	70		220
617	Prestressed Concrete Girders, Erected 36	L.F.	832			832
619	Prestressed Concrete Girders, Erected 54	L.F.			1,986	1,986
620	Prestressed Concrete Deck Plank Erected	S.F.	5,180		11,230	16,410
621	Bridge Seat Sealant	S.F.	440	280		720
622	Protective Coat	S.Y.	775		1,790	2,565
623	Storm Sewer-6" polyethylene, Schedule 40	L.F.	250			250
624	Concrete Slope Wall-4 Inch	S.Y.	390			390
625	Aluminum Pipe Handrail	L.F.	134		334	468
626	Neoprene Exp. Jt. Type J-1	L.F.			190	190

GENERAL PLAN & ELEVATION
Sheet 1 of 22

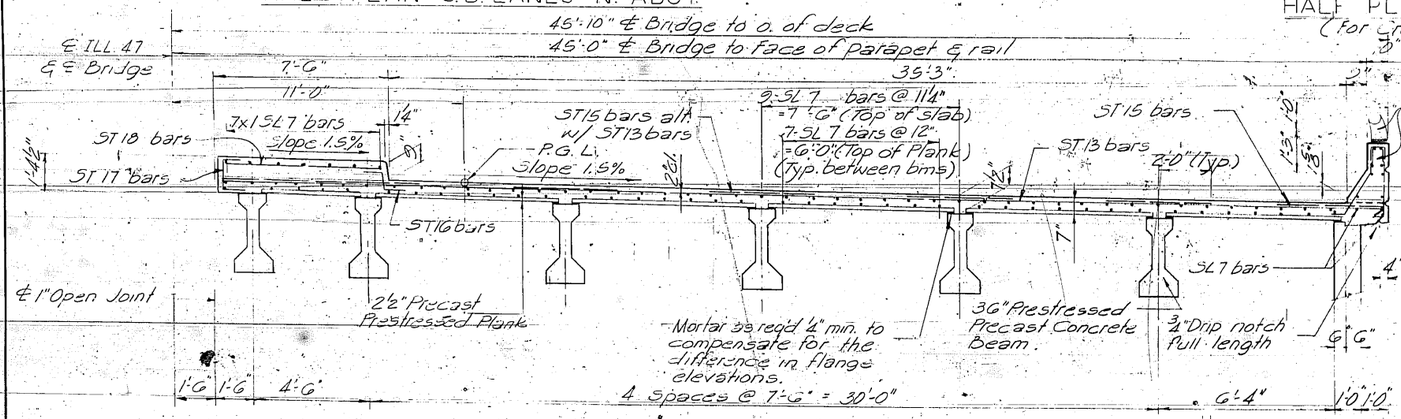
DRAWN J.M.N.	DATE February 1971	BRIGHTON ENGINEERING COMPANY	THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY	REVISIONS (NO. / DATE / DESCRIPTION)	EAST-WEST TOLLWAY EXTENSION CONTRACT E-8B
CHECKED P.C.W.	SCALE As Noted	FRANKFORT, KENTUCKY — GLEN ELLYN, ILLINOIS	EAST-WEST TOLLWAY AND MIDWEST ROAD, OAK BROOK, ILLINOIS 60521		BRIDGE E8-4 ILL. 47 STA. 5782+90.00

DRAWING NO. 16 OF 369



HALF PLAN - S.B. LANES - N. ABUT.

HALF PLAN - S.B. LANES - S. ABUT.
(For Cross Section - See Sh. 12.)



CROSS SECTION - S.B. LANES - N. ABUT.
(Looking Ahead @ Stations)

NOTE - For Parapet and Railing details see Dwg. ST 70-1 and Sheet 11.

NOTE - Bars indicated thus 45x1-SL, etc., indicates 45 lines of bars with 1 length per line.
Min. [redacted] dia.
For Section A-A and B-B see Sheet No. 13.
For Reinforcing Steel Schedule see Sheet No. 12.
For Estimate of Quantities see Sh. No. 12.

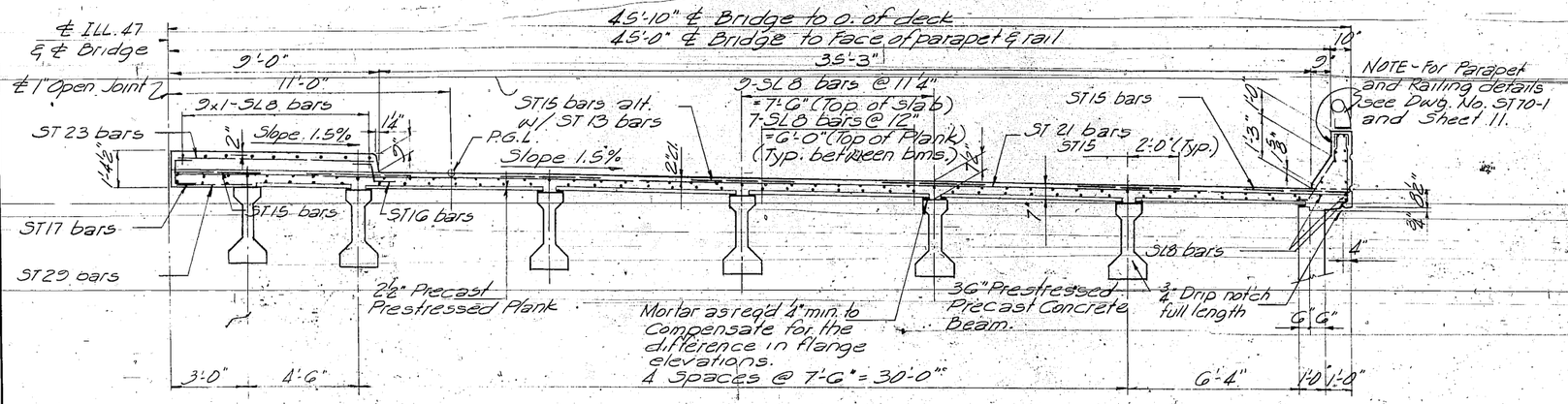
PLAN OF APPROACH SPANS
S.B. LANES

Sheet 10 of 22

DRAWN BEG	DATE 6-71	BRIGHTON ENGINEERING COMPANY	THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY	EAST-WEST TOLLWAY EXTENSION CONTRACT E-8B	DRAWING NO.
CHECKED DB	SCALE 6-71	FRANKFORT, KENTUCKY GLEN ELLYN, ILLINOIS	EAST-WEST TOLLWAY AND MIDWEST ROAD OAK BROOK, ILLINOIS 60521	BRIDGE E8-4 ILL. 47 STA. 5782+90.00	S25 of S69

REVISIONS

NO.	DATE	DESCRIPTION



CROSS SECTION - S. ABUT.

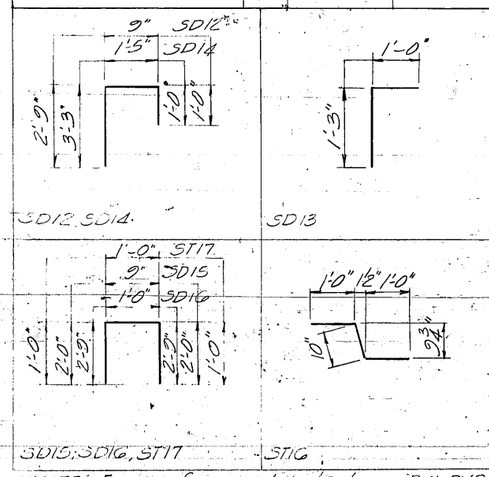
(S.B. Lanes Looking Ahead @ Stations, N.B. Lanes Looking back @ Stations)

REINFORCING STEEL SCHEDULE

Mark	No. N. Abut.	No. S. Abut.	Size	Length	Shape
SD7	6	—	6	44'-3"	---
SD8	6	—	6	47'-3"	---
SD9	—	12	6	46'-10"	---
SD10	4	4	5	5'-7"	---
SD11	8	8	5	6'-1"	---
SD12	74	74	5	4'-6"	B
SD13	74	74	5	2'-3"	B
SD14	74	74	5	5'-8	B
SD15	16	16	5	6'-0"	---
SD16	32	32	5	7'-0"	---
SD17	2	4	5	2'-11"	---
SD18	4	8	5	3'-11"	---
SD19	2	—	5	4'-6"	---
SD20	4	—	5	5'-6"	---
SD21	4	—	5	1'-0"	---
SD22	2	4	5	2'-1"	---
SD23	4	8	5	2'-7"	---
SD24	74	74	5	4'-9"	B
SD25	74	74	5	6'-6"	B
SL7	196	—	5	40'-10"	---
SL8	—	204	5	29'-4"	---
SL9	24	24	5	10'-0"	---
ST12	27	—	5	Varies *	---
ST13	29	—	5	44'-0"	---
ST14	27	—	5	Varies*	---
ST15	406	224	5	4'-0"	---
ST16	82	60	5	2'-10"	B
ST17	82	60	5	3'-1"	B
ST18	41	—	5	7'-0"	---
ST19	8	—	5	46'-3"	---
ST20	—	28	5	Varies *	---
ST21	—	34	5	45'-6"	---
ST22	—	28	5	Varies*	---
ST23	—	60	5	8'-6"	---
ST24	—	16	5	47'-10"	---
ST25	29	—	5	Varies*	---
ST26	29	—	5	46'-11"	---
ST27	29	—	5	Varies*	---
ST28	8	—	5	49'-5"	---
ST29	39	54	5	3'-1"	---
ST30	30	—	5	Varies*	---
ST31	—	28	5	Varies*	---
ST32	—	28	5	Varies*	---
RH4	8	—	4	5'-10"	---
RH5	8	—	4	16'-4"	---
RH6	4	—	4	16'-2"	---
RH7	4	—	4	15'-9"	---
RH8	2	—	8	39'-0"	---
RH9	2	—	4	39'-0"	---
RH10	2	—	8	38'-7"	---
RH11	2	—	4	38'-7"	---
RH12	4	4	4	14'-4"	---
RH13	[illegible]	8	4	12'-5"	---
RH14	[illegible]	[illegible]	[illegible]	[illegible]7"	---
RH15	—	[illegible]	[illegible]	[illegible]1"	---
RH16	—	2	4	27'-1"	---
RH17	—	2	8	27'-5"	---
RH18	—	2	4	27'-5"	---
RV1	78	56	4	2'-1"	B
RV2	78	56	4	3'-3"	B
RV3	78	56	5	3'-6"	B

ESTIMATE OF QUANTITIES

Items	Units	N. Abut.	S. Abut.
Reinforcing Steel	Lbs.	41,391	49,022
Class 'D' Concrete	C.Y.	116.3	95.8
Class 'M' Concrete	C.Y.	299.5	289.1
12" C.I.P. Concrete Piles	L.F.	1545	1575
Test Piles	L.F.	75	75



NOTE: For reinforcing details bars RV1, RV2 & RV3 see Dwg. ST70-1.

*ST12 - 7'-10" to 43'-6" 1 ea. V.B. 1'-4½"
*ST14 - 3'-2" to 38'-10" 1 ea. V.B. 1'-4½"
*ST20 - 7'-1" to 44'-1" 1 ea. V.B. 1'-4½"
*ST22 - 3'-10" to 39'-5" 1 ea. V.B. 1'-4½"
*ST25 - 6'-9" to 45'-3" 1 ea. V.B. 1'-4½"
*ST27 - 5'-11" to 44'-5" 1 ea. V.B. 1'-4½"
*ST30 - 1'-3" to 3'-3" 3 ea. V.B. 3"
*ST31 - 4'-2" to 41'-3½" 1 ea. V.B. 1'-4½"
*ST32 - 7'-0" x 44'-1½" 1 ea. V.B. 1'-4½"

APPROACH SPAN DETAILS

Sheet 12 of 22

DRAWN BEC	DATE 5-71	BRIGHTON ENGINEERING COMPANY	THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY	REVISIONS: NO. / DATE / DESCRIPTION	EAST-WEST TOLLWAY EXTENSION CONTRACT E-8B
CHECKED DB	SCALE 6-71	FRANKFORT, KENTUCKY — GLEN ELLYN, ILLINOIS	EAST-WEST TOLLWAY AND MIDWEST ROAD OAK BROOK, ILLINOIS 60521		BRIDGE E8-4 ILL. 47 STA. 5782+90.00

DRAWING NO. S27 OF S69

ATTACHMENT M

Additional Testing Results

This attachment will not be required as no additional testing appears to be warranted.

BRIDGE CONDITION REPORT

REGION: 1
DISTRICT: 1
ROUTE: FAP Route 326 (IL Route 47)
COUNTY: Kane County
JOB NUMBER: P-91-015-14
SECTION: 14-00028-00-CH
STRUCTURE NUMBER: 045-2001
LOCATION: FAP Route 326 (IL Route 47) over Blackberry Creek Tributary C

Prepared by: GRAEF
Submittal Date: 1/19/2017
Date Inspected: 3/30/2016 & 10/19/2016
Proposed Letting date: TBD

Illinois Department of Transportation
Division of Public Transportation

TABLE OF CONTENTS

I.	Geographical & Administrative Data	Pg. 1
II.	Physical Description of Structure	Pg. 1
III.	Field Inspection & Physical Evaluation	Pg. 2
IV.	Potential Scope of Work Determination & Analysis	Pg. 4
V.	Discussion and Recommended Scope	Pg. 7

Attachments:

A. Location Map

B. IDOT Master Structure Report

C. Bridge Inspection Reports

D. Culvert Condition Surveys

E. Cost Estimate

F. Proposed Structure

G. Hydraulic Analysis Summary

H. Structure Photos

I. Proposed Plan & Profile *(not available)*

J. Existing and Proposed Roadway Cross Sections *(not available)*

K. Existing Plans

L. Additional Testing Results *(not applicable)*

I. Geographical and Administrative Data:

The following report documents the condition of Structure Number 045-2001, Illinois Route 47 over Blackberry Creek Tributary C located in Kane County, Illinois. Maintenance of the structure falls under the jurisdiction of IDOT District 1. See Attachment A for a location map and TABLE I-A for pertinent data regarding this structure.

TABLE I-A

Structure Number:	045-2001
County:	Kane
Route Carried:	FAP Route 326 (IL Route 47)
Route Carried (Original Construction):	FA-64
Feature Crossed:	Blackberry Creek Tributary C
Section (Current):	14-00028-00-CH
Station (Current):	144+56
Roadway Classification:	Other Principal Arterial
Design / Posted Speed:	60 MPH / 55 MPH
ADT (Current / Design):	9,650 (2015) / 14,400 (2040)
ADTT (Current / Design):	26%
DHV (two-way):	978
Inventory Rating :	*1.320 (HS-20)
Operating Rating:	*2.750 (HS-20)
Sufficiency Rating:	*100.0

*Information obtained from IDOT's SIMS Structure Summary Report dated October 4, 2016, see Attachment B.

Construction / Reconstruction / Repair History:

Structure Number 045-2001 was originally constructed in 1971 under Section 107(W&RS) as part of F.A. Route 64.

There is no record of repairs conducted at this structure and no repair work was apparent at the time of the inspection.

II. Physical Description of Structure:

The existing structure is a three-barrel concrete box culvert that carries Illinois Route 47 over Blackberry Creek Tributary C. Tributary C is also referred to as Seavey Road Run. The structure is located in Blackberry Township, within Kane County, IL. See Attachment A for a location map.

Per the original plans, the three culvert barrels are each 7'-0" wide and 8'-0" rise and the culvert length is 89'-0". The interior and exterior walls are 8" thick, the top slab is 6.5" thick and the bottom slab is 7.5" thick. The original plans also indicate the culvert is perpendicular to the IL 47 alignment (no skew) and there is about 5 feet of fill (including the pavement) above the culvert top slab at the centerline of the roadway.

The roadway has one 12' wide through lane (striped) in each direction. The surface material is bituminous concrete. The shoulders on each side are 12' wide and consist of 3' of bituminous concrete and 9' of gravel. There is no guardrail in the area of the culvert and no utilities are attached to the culvert. There are weep holes spaced at about 8' on center in both exterior culvert walls.

The culvert is located within a sag vertical curve. The entrance grade is about -0.86% and the exit grade (toward the north) is about +2.9%. Horizontally, the structure is within a tangent alignment.

The plans for the existing structure can be found in Attachment K. For general views of the roadway at the culvert and of the stream channel, see Photos 1 through 6 in Attachment H.

III. Field Inspection and Physical Evaluation:

The culvert wingwalls were inspected on March 30, 2016 and the culvert barrels were inspected on October 19, 2016. The team leader for the wingwall inspection was Nathan Rick and the team leader for the barrel inspection was John Zerfas. All areas of the culvert were assessed at arm's length using chest waders. The culvert elements were inspected both visually and through sounding with masonry hammers.

Field inspection documentation was prepared following the Illinois Department of Transportation's "Bridge Condition Report Procedures and Practices" (December 2011 edition) with consideration to the National Bridge Inspection Standards (NBIS) published through the Federal Highway Administration. Condition exhibits were created from the documented findings and can be found in Attachment D. Photo documentation of the observed deficiencies was recorded and is reported in Attachment H with applicable descriptions for each photograph.

The observations noted within this report were used to determine a condition rating based on the current in-service conditions. In our opinion, the current condition is "Good". Our rating corresponds to an NBIS and IDOT condition rating of 7. This value agrees with the value reported in the current Structure Summary Report and the most recent NBIS Routine Inspection Report. See Attachment B for the current IDOT Structure Summary Report and Attachment C for the most recent NBIS Routine Inspection Report and Element Level Inspection Report. A summary of our inspection findings is reported in the following sections.

Top Slab:

Overall the top slab was in good condition.

For the South Barrel (Barrel 1), five hairline cracks were noted and two of these cracks had light rust stains. One of the rust-stained cracks is shown in Photo 8. There was also a small delaminated area and an additional .08" wide crack near the west end of the south barrel (See Photo 9).

For the Center Barrel (Barrel 2), three hairline cracks were noted and two of these had light rust stains. One of the rust-stained cracks is shown in Photo 11. There was also a small delaminated area and an additional .06" wide crack near the west end of the south barrel (See Photo 12).

For the North Barrel (Barrel 3), two hairline cracks were noted and one of these had light rust stains. The rust-stained crack is shown in Photo 14.

Exterior Walls:

Overall the exterior walls were in good condition. The south exterior wall had three hairline cracks and the north exterior wall four hairline cracks. One of the cracks in the north wall had light rust stains. Typical conditions for the exterior walls are shown in Photos 15 and 16.

Interior Walls:

Overall the interior walls were in good condition. There were scattered vertical cracks, but none of them had rust stains.

The north wall of Barrel 1 had four vertical cracks. The crack widths ranged from hairline to 0.06". The widest of these cracks is shown in Photo 17.

The south wall of Barrel 2 had four vertical cracks. The crack widths ranged from hairline to 0.04".

The north wall of Barrel 2 had six vertical cracks. The crack widths ranged from hairline to 0.04". The widest of these cracks is shown in Photo 19.

The south wall of Barrel 3 had ten vertical cracks. Nine of the cracks were considered hairline cracks and one was 0.05" wide (See Photo 21).

Bottom Slab:

The depth of the water and silt at the time of the inspection was about 2'-8". Therefore the bottom slab could not be visually inspected. No apparent slab defects were detected while walking through the culvert barrels. However, since the entire surface of the bottom slab was covered with soft silt, only very major defects could have been detected through waders.

Wingwalls:

The four wingwalls were in good condition. Typical conditions are shown in Photos 22 through 25. The Northeast Wingwall had two spalled areas along the top edge of the wall but there was no exposed reinforcing steel. Each spall was about 2" by 12". There are expansion joints in the wingwalls where they meet the culvert barrels. The joint filler material was missing from the joints at the face of the walls.

The plumbness of all four wingwalls was checked with a carpenter's level. The Southeast Wingwall was leaning outward about 1/8" over 2 feet. No significant lean was noted in the other three wingwalls.

There were trees growing behind both wingwalls at the south end of the culvert. The trees have not yet caused any visible damage, but their roots will likely increase the horizontal pressure against the back of the wingwalls. This could eventually cause the wingwalls to lean outward.

Headwalls:

Both headwalls were in good condition. The headwalls each have three drainage openings centered above the culvert barrels. There was minor spalling around these openings. The typical condition of the headwalls is shown in Photo 26. The culvert name plate is embedded in the west headwall and is shown in Photo 27.

Scour and Slope Protection:

No significant scour or slope protection issues were noted. There was a thick layer of soft, silty soil at both ends of the culvert, but there were no scour holes or other indications of scour issues. The channel embankments were well vegetated and appeared to be stable. The channel flow bends roughly 30 degrees to the south (left) as it enters the culvert (see Photo 6), but the channel flow is centered on the culvert barrels. There was a small pile of debris downstream of the culvert (see Photos 4 and 5), but the debris was not having a significant negative effect on stream flow.

Inspection History (NBIS Ratings):

The two most recent historical NBIS ratings for this structure are reported in TABLE III-A. See Attachment B for more information.

TABLE III-A

Year	Culvert	Channel and Protection
2016	7	7
2012	7	7

Hydraulic Data:

A Hydraulic Report dated January 2017 was prepared by Lin Engineering, Ltd. The Hydraulic Report lists the Design (50 year) Headwater Elevation as 708.2 for the existing culvert and the Low Edge of Pavement Elevation as 714.9. These elevations indicate there is 6.7' of freeboard. Therefore the 3' freeboard requirement is easily met and the culvert is hydraulically adequate. The Waterway Information Table from the Hydraulic Report is included as Attachment G.

The Hydraulic Report states that "Upstream of the Illinois Route 47 culvert crossing, there is a large amount of debris and brush…". At the time of the inspections for this Condition Report, the upstream debris was not present, but the possibility of debris build-up should be considered in any modifications to the existing culvert.

High Quality Aquatic Resource:

The wetlands along Blackberry Creek Tributary C have been designated as a High Quality Aquatic Resource (HQAR) – High Functional Value by the Illinois Natural History Survey, Wetland Science Program. Therefore any of the Blackberry Creek Tributary C wetlands that are eliminated due to the box culvert improvement will need to be replaced at a 5.5:1 ratio.

IV. Potential Scope of Work Determination and Analysis:

A detailed inspection was performed to evaluate the in-service condition of this structure. Areas of concern were documented in the narrative in Section III of this report and in the exhibits located in Attachment D. Photographs have been used to identify typical features of this culvert as well areas with any deficiencies. These photos are presented in Attachment H.

The culvert condition is rated GOOD and very little rehabilitation is necessary. The Structure Summary Report indicates the culvert has an inventory rating of HS 26.4 which is considered acceptable to remain in service. The approach roadway alignment is considered to be EQUAL TO PRESENT DESIRABLE CRITERIA. The culvert was originally constructed in 1971. Therefore it has been in service for approximately 45 years.

Presented below are two alternatives for Structure Number 045-2001. The first alternative consists of rehabilitating and extending the existing concrete box culvert. The extension would be at a 30 degree skew, while the existing culvert is perpendicular to IL 47. The second alternative is complete replacement of the culvert with a new concrete box culvert.

A third possible alternative would be to extend the existing culvert on its current alignment (perpendicular to IL 47). With this alternative, the culvert would be extended about 66' to the east. On the east side of IL 47 (upstream side) the creek channel has a 30 degree bend at the existing headwall. If the culvert were extended perpendicular to IL 47, it would no longer align with the creek channel. Therefore a substantial length of creek channel would need to be realigned. This alternative was eliminated due to the large area of stream disturbance that would be required.

Description and Analysis of Alternatives

A detailed description of the scope of work for the two presented alternatives is provided below. Also provided is discussion regarding elements such as initial cost, service life and construction staging.

Alternative 1 – Culvert Extension

The scope of work proposed for Alternative 1 consists of rehabilitating and extending the existing concrete box culvert. The existing concrete box culvert is in good condition and only a small amount of concrete patching and crack injection would be required. The culvert extension would consist of 3 barrels, each 7' wide by 8' rise to match the existing.

At the structure location, IL 47 is currently a two lane road with gravel shoulders. Proposed roadway work includes widening IL 47 to two 12' lanes in each direction, adding 10' shoulders on each side, adding a 30' median, adding a 10' wide multi-use path on the east side and adding a 5' wide sidewalk on the west side. The proposed work will require substantial widening of the roadway cross sectional width. The additional width would be added entirely to the east side of IL 47. The centerline of IL 47 would be moved 31.2' to the east.

To accommodate the widened roadway cross section, the east culvert headwall would need to move to an offset 66' further east. The creek channel is at a 30 degree skew as it flows into the east end of the culvert. The culvert extension would be constructed on a 30 degree skew in order to align with the channel. Therefore the culvert extension would be about 76' long. A plan, elevation and cross section for Alternative 1 is shown in Attachment F.

The existing culvert inventory load rating (HS 26.4) indicates the structure is adequate to routinely carry legal truck loads for an indefinite period of time. The proposed rehabilitation work would not change the load rating. Standard Steel Plate Beam Guardrail would be required to protect the drop-off at the headwall and wingwalls on each side of IL 47.

The existing culvert has been in service for 45 years. It remains in good condition. There were two small delaminated areas near the west end of the culvert but no other significant deterioration. Therefore we believe this structure has at least 30 years of remaining service life.

The estimated construction cost for Alternative 1 is $373,000. This cost does not include roadway items, guardrail or embankment costs.

The waterway opening would consist of 3 barrels, each 7' wide by 8' rise. Since this matches the existing opening, there will be no reduction in the waterway opening. The existing structure provides 6.7' of freeboard. The culvert extension and the bend in the culvert are expected to have a very small effect on the Design Headwater Elevation, but since the existing freeboard is much greater than the 3' required, we do not anticipate a hydraulic deficiency. The Hydraulic Report noted that there was a large amount of debris at the upstream end of the culvert and that debris build-up should be considered when determining the proposed structure. The 30 degree bend in the Alternative 1 culvert could potentially be a debris concern, but in our opinion this bend would not make the condition worse than existing.

The wetlands along Blackberry Creek Tributary C are designated as a High Quality Aquatic Resource (HQAR) – High Functional Value. A portion of these wetlands will need to be filled with embankment for the widened roadway cross section. The area to be filled will not be affected (increased or decreased) by construction for Alternative 1.

Alternative 1 requires extending the culvert entirely on the east side of IL 47. We believe this work can be completed without relocating or closing any existing traffic lanes. Therefore no construction staging is needed to accommodate traffic. Construction staging would be required in order to maintain stream flow. We believe it would be necessary to construct about half of the structure in one stage and the other half in a second stage.

Alternative 2 – Culvert Replacement

The scope of work proposed for Alternative 2 consists of complete removal of the existing concrete box culvert and constructing a new concrete box culvert. The new culvert is anticipated to consist of 2 barrels, each 11' wide by 8' rise. Two barrels would be used rather than the existing 3 barrels because current standards have a width greater than or equal to the culvert rise. In addition, only one interior wall is needed with the 2 barrel configuration. Less interior walls should decrease the likelihood of debris build-up at the culvert entrance.

The roadway cross section would be the same for Alternative 2 as for Alternative 1. As with Alternative 1, the additional width would be added entirely to the east side of IL 47 and the centerline of IL 47 would be moved 31.2' to the east.

The culvert headwalls and wingwalls would be located approximately at the same location as those for Alternative 1. The culvert barrels would be approximately 160' long and they would have a skew of approximately 14 degrees.

The new culvert would be designed using the current LRFD Design Load of HL-93. This design load is adequate to routinely carry legal truck loads for an indefinite period of time. Standard Steel Plate Beam Guardrail would be required to protect the drop-off at the headwall and wingwalls on each side of IL 47. We believe the new structure would have a service life of at least 50 years.

The estimated construction cost for Alternative 2 is $825,000. This cost does not include roadway items, guardrail or embankment costs.

The waterway opening would consist of 2 barrels, each 11' wide by 8' rise. This would provide a waterway opening that is less than 5% larger than the existing opening. The existing structure provides 6.7' of freeboard. A new longer culvert is expected to have a very small effect on the Design Headwater Elevation, but since the existing freeboard is much greater than the 3' required, we do not anticipate a hydraulic deficiency.

The wetlands along Blackberry Creek Tributary C are designated as a High Quality Aquatic Resource (HQAR) – High Functional Value. A portion of these wetlands will need to be filled with embankment for the widened roadway cross section. The area to be filled would not be affected (increased or decreased) by construction for Alternative 2.

The Alternative 2 culvert could be constructed with two traffic stages. First the east side of the structure would be constructed with traffic moved to the west. In a second stage, traffic would be moved to the east while the west side would be constructed. It appears at least one additional sub-stage would be required in order to maintain stream flow.

V. Discussion and Recommended Scope of Work:

Two alternatives were developed and analyzed in Section IV. In this section, the positive and negative merits of the two alternatives are compared and summarized.

Cost: The estimated construction cost for Alternative 1 is $373,000 and the estimated construction cost for Alternative 2 is $825,000. Alternative 1 is $452,000 less expensive and the cost is only 45% of the Alternative 2 cost. Per IDOT's "Bridge Condition Report Procedures & Practices" manual, modifying a structure may be considered if the cost to modify is less than 60% of the replacement cost. Since the cost to extend the culvert is well below the 60% threshold, extending the culvert appears to be a prudent option.

Staging and Constructability: Alternative 1 can be constructed with little disturbance to existing traffic. Alternative 2 will require traffic staging and stream flow staging. Less construction stages would make Alternative 1 easier to construct and would reduce traffic delays during construction.

Hydraulics: The two alternatives have approximately the same waterway opening and should perform very similarly. The 30 degree bend in the Alternative 1 culvert could possibly result in debris build-ups, but this is not believed to be a significant concern.

Service Life: The remaining life for Alternative 1 is estimated be at least 30 years while the remaining life for Alternative 2 is estimated to be 50 years.

Other: Both alternatives would provide the same roadway cross section, guardrail type and guardrail location. Therefore there would be no safety advantage for either alternative. Also, both structures would be capable of routinely carrying legal loads for an indefinite period of time, therefore neither alternative offers an advantage in regards to load carrying capacity. The proposed roadway cross section will require embankment widening on the east side of IL 47. The added embankment will

require the placement of fill in the HQAR wetland. The location of the east headwall would be the same for both alternatives, therefore there is no wetland advantage with either alternative.

Recommended Scope of Work

Alternative 1 has a considerably lower initial cost than Alternative 2. In addition, Alternative 1 can be constructed without moving the existing traffic lanes. Therefore Alternative 1 would be easier to build and would have a shorter construction duration. The primary advantage of Alternative 2 is a longer service life. We believe that cost and constructability advantages out-weigh the perceived service life advantage when consideration is given to the condition of the existing structure. Therefore we recommend Alternative 1.

Following is the recommended scope of work for Alternative 1:

1. Temporarily direct the streamflow as necessary to allow culvert construction.

2. Construct the concrete box culvert extension on the east side of IL 47. The three-barrel extension is to be approximately 76' long and on a 30 degree skew. The barrel clear dimensions should be 7' wide by 8' rise. The culvert is expected to be constructed in two stages in order to maintain stream flow.

3. Construct wingwalls on the east side.

4. Repair the cracked and delaminated areas near the west end of the culvert using Epoxy Crack Injection and Structural Repair of Concrete (Depth equal to or less than 5 inches).

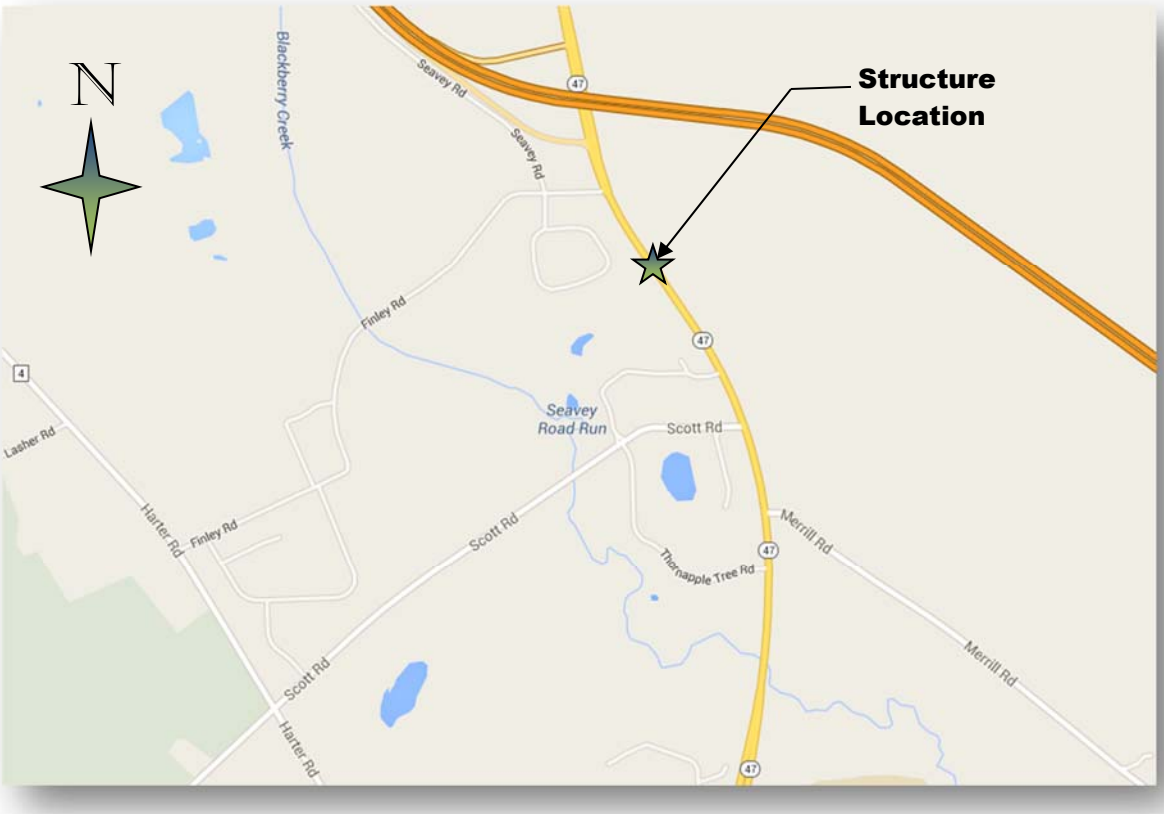
5. Construct the new embankment, roadway, shoulders and guardrail.

6. Remove the trees growing behind the existing West Wingwalls.

The estimated construction cost for Alterative 1 is $373,000. A detailed breakdown of the cost estimate, including preliminary quantities and contingency can be found in Attachment E. The cost is in 2017 dollars and should be escalated when the construction year is determined.

ATTACHMENT A

Location Map



ATTACHMENT B

IDOT Master Structure Report

Illinois Department of Transportation
Structures Information Management System
Structure Summary Report

Structure Number: 045-2001 **District:** 1

Inventory Data

Facility Carried: IL 47
Feature Crossed: BLACKBERRY CREEK TRB
Bridge Remarks:
Bridge Status: 1 OPEN - NO RESTRICT
Status Remarks:
Maint County: 045 KANE
Maint Responsibility: 01 I.D.O.T.
Service On/Under: 1 HIGHWAY 5 / WATERWAY
Reporting Agency: 1 I.D.O.T. - BUREAU OF MAINTENANCE
Main Span Matl/Type: 2 CONCRETE CONTINUOUS / 19 CULVERT
Nbr Of Main Spans: 3 **Nbr Of Approach Spans:** 0
*****Approaches*****
Near #1 Matl/Type: /
Near #2 Matl/Type: /
Far #1 Matl/Type: /
Far #2 Matl/Type: /
Median Width/Type: 0 Ft. / 0 None
Guardrail Type L/R: 0None / 0 None
Toll Facility Indicator: 0 No Toll
Latitude: 41.81405181 **S** **Longitude:** 88.46397272 **S**
Deck Structure Type: N N/A
Sidewalks Under Structure: 0 None

Bridge Name:
Location: 0.4 M S OF I-88
Status Date: 04/1988
Maint Township: 04 BLACKBERRY

Sufficiency Rating: 100.0
HBP Eligible: No
Replaced By: -
Replaces: -
Last Update Date: 09/13/2015
Parallel Structure: None
Multi-Level Structure Nbr:
Skew Direction: N None
Skew Angle: 0 **D**
Structure Flared: No
Historical Significance: No
Border Bridge State:
Bdr State SN:
Bdr State % Responsibility: 0
Structural Steel Wt 0
Substructure Material:

Structure Length: 23.7
AASHTO Bridge Length: 22.3
Length of Long Span: 7.7
Bridge Roadway Width: 0.0
Appr Roadway Width: 32.0
Deck Width: 0.0
Sidewalk Width Right: 0.0
Sidewalk Width Left: 0.0
Navigation Control: 0 No
Navigation Horiz Clear: 0
Navigation Vert Clear: 0
Culvert Fill Depth: 5.0
Number Culvert Cells: 3
Culvert Opening Area: 168.0
Culvert Cell Height: 8.00
Culvert Cell Width: 7.00

Rated By: 2 IDOT **Rate Method:** 7
Inventory Rating: 1.320(47) **Load Rating Date:** 05/28/1993
Operating Rating: 2.750(99)
Design Load: 02 HS20
Deck Structure Thickness: 0 **SD:** N **FO:** N
RR Vertical Underclear: 0 **Ft** 0 **In**

Railroad Crossing Info
Crossing 1 Nbr:
Crossing 1 Nbr:
RR Lateral Underclear: 0.0

Key Route On Data

Key Route Nbr: FEDERAL-AID PRIMARY 0326
Appurtenances Main Route 00000
Inventory County: 045 KANE
Township/Road Dist 04 BLACKBERRY
Municipality 0000
Urban Area: 1051 1051
Functional Class: 3 OTHER PRINCIPAL ARTERIAL
**** CLEARANCES **** **South/East** **North/West**
Max Rdwy Width: 32.0
Horizontal: 90.0 0.0
Lateral:

Station: 24.8600
Segment:
Linked: Y
Natl. Hwy System: On NHS
Inventory Direction:
Curr AADT Yr/Count: 2015 / 9650
Est Truck Percentage: 25
Number Of Lanes: 2
One Or Two Way: 2 Two-Way
Bypass Length: 0
Future AADT Yr/Cnt: 2032 / 12569
Designated Truck Rte: CLASS II
Special Systems: Yes

Key Route Under Data

South/East **North/West**

Station:
Segment:
Linked:
Natl. Hwy System:
Inventory Direction:
Curr AADT Yr/Count: /
Est Truck Percentage:
Number Of Lanes:
One Or Two Way:
Bypass Length:
Future AADT Yr/Cnt: /
Designated Truck Rte:
Special Systems:

*** Marked Route On Data ***

	Designation	Kind	Number
Route #1:	1 Mainline	3 State Highway	047
Route #2:	1 Mainline		
Route #3:	1 Mainline		

*** Marked Route Under Data ***

Designation	Kind	Number

Attachment B

Illinois Department of Transportation
Structures Information Management System
Structure Summary Report

Structure Number: 045-2001 **District:** 1

Data Related to Inspection Information

*** Inspection Intervals ***				*** Maximum Allowable Posting Limits ***				Bridge Posting Level:	
Routine NBIS:	48 MOS	**Underwater:**	0 MOS	**One Truck At A Time:**	0	**Combination Type 3S-1:**	Tons	5	No Posting Required
		Special:	N	**Single Unit Vehicles:**	Tons	**Combination Type 3S-2**	Tons		

Inspection/Appraisal Information

Inspection Date:	02/04/2016	**Inspection Temperature:**	30Deg. F					** Actual Posted Limits **	
Deck:	N	NOT APPLICABLE						**Single Unit Vehicles:**	Tons
Superstructure:	N	NOT APPLICABLE						**Combination Type 3S-1:**	Tons
Substructure:	N	NOT APPLICABLE						**Combination Type 3S-2:**	Tons
Culvert:	7	GOOD CONDITION - SOME MINOR PROBLEMS						**One Truck At A Time:**	0
Channel and Protection:	7	GOOD CONDITION - SOME MINOR PROBLEMS		**Deck Wearing Surf:**	N	N/A - NO DECK		**Last Paint Type:**	
Structural Evaluation:	7	BETTER THAN PRESENT MINIMUM CRITERIA		**Deck Membrane:**	N	N/A			
Deck Geometry:	N	NOT APPLICABLE		**Deck Protection:**	N	N/A			
Underclearance-Vert/Lat.:	N	NOT APPLICABLE		**Total Deck Thick:**	0.0				
Waterway Adequacy:	7	BETTER THAN PRESENT MINIMUM CRITERIA		**Last Paint Date:**					
Approach Roadway Align:	8	EQUAL TO PRESENT DESIRABLE CRITERIA							
Bridge Railing Appraisal:	N	N/A							
Approach Guardrail:	NNN	N/A	N/A	N/A					
Pier Navig Protection:	N	N/A							

Underwater Inspection/Appraisal Information

Inspection Date:
Temperature: **Inspection Method:**
Appraisal Rating:

Scour Critical Information

Rating: 8 CALCULATED SCOUR ABOVE FOOTING **Evaluation Method:** B Rational Analysis
Analysis Date: 09/13/1994

Miscellaneous

Microfilm Data Recorded: Yes

Construction Information

Year: 1971 Original Reconstructed
Route: FA-64 **Sta:** 320+06 **Sta:**
Section Nbr: 107-(W,RS)
Contract Nbr: 28070
Fed Aid Pr#: RF 158(13)
Built By: 1 I.D.O.T.

Attachment B

ATTACHMENT C

Bridge Inspection Reports

Illinois Department of Transportation

Routine Inspection Report

SN:	045-2001	**District:**	1	**Spans:**	3	**Appr. Spans:**	0	**Skew:**	0	**ADT:**	9650	**Truck Pct:**	25
ADT Un:		**Maint. Co:**	KANE	**Twsp:**	BLACKBERRY			**Status:**	OPEN - NO RESTRICT				
Facility Carried:	IL 47					**Feature Crossed:**	BLACKBERRY CREEK TRB						
Location	0.4 M S OF I-88			**Municipality:**				**Team/Sub:**	129/475	**Insp/Rte:**	029		
Bridge Name:						**Material & Type:**	CONCRETE CONTINUOUS/CULVERT						
Insp. Intervals Routine:	48	**Fracture Critical:**	0	**Underwater:**	0	**Special:**	N/A	**Element Level:**	48				

90 – Inspection Date:	/ /	90C – Temp. (ºF)		90B1 – In-Depth	■
Is Delinquent:	■	Reason:			
90A – Agency Program Manager:		90A3 – Consultant Program Manager:			
90A1 – Team Leader:		90A2 – Inspector:			

90B – Inspection Remarks:

Previous Inspection

In-depth inspection notes: 3 span RC culvert, walk/float through visual. chestwaders & bellyboat definitely needed. SPANS #ED S-N

Resources

Time to Inspect (H:M):	1:0	:	Traffic Control:			Boat:			Waders:	W		Snooper:			
Ladder:			Manlift:			Bucket Truck:			Other:	Belly Boat					

Inspector's Appraisals

	Prev	New	Comments
58 – Deck Condition:	N		
59 – Superstructure Cond:	N		
60 – Substructure Cond:	N		
62 – Culvert Condition:	7		
61 – Channel Condition:	7		
71 – Waterway Adequacy:	7		
72 – Approach Rdw Align:	8		
111 – Pier Navig Protection:	N		

90B – Inspector Remarks:

Routine Inspection Report

Structure Number: 0452001

Additional Inspection Data

	Prev	New
36A – Bridge Railing Adequacy:	N	

Rail Types:

	Prev	New		New		New
Approach Guardrail Adequacy: 36B – Transitions:	N		36C – Guardrail:	N	36D – Ends:	N

	Prev	New	
108A – Wearing Surface Type:	N		If "L-Other" Describe:
108B – Type of Membrane:	N		If "E-Other" Describe:
108C – Deck Protection:	N		If "I-Other" Describe:
108D – Total Deck Thickness (in):	0.0		

	Prev	New
59A – Paint Date (Mo/Yr):		/
59B – Paint Type:		__ __ __ __ __ __ __ __

Color: Fascia - ____: Inter. - ____: Railing - ____.

59C – Utilities Attached:	NNN	__ __ __

If "B-Other" Describe: _____

		Prev	New
Weight Limit Posting:	70A2 – Single Unit Vehicles:		Tons
	70B2 – Combination Type 3S-1 (3 or 4 axles):		Tons
	70C2 – Combination Type 3S-2 (5 or more axles):		Tons
	70D2 – One Truck at a Time:	0	

Joint Openings (In.) _____

90B – Inspector Remarks Continued:

	Signature	Date
Inspection Team Leader:		/ /
Consultant Program Manager:		/ /
Agency Program Manager:		/ /

Illinois Department of Transportation

Element Level Inspection Report

SN:	045-2001	**District:**	1	**Spans:**	3	**Appr. Spans:**	0	**Skew:**	0	**ADT:**	9650	**Truck Pct:**	25
ADT Un:		**Maint. Co:**	KANE	**Twsp:**	BLACKBERRY					**Status:**	OPEN - NO RESTRICT		
Facility Carried:	IL 47					**Feature Crossed:**	BLACKBERRY CREEK TRB						
Location	0.4 M S OF I-88			**Municipality:**						**Team/Sub:**	129/475	**Insp/Rte:**	029
Bridge Name:						**Material & Type:**	CONCRETE CONTINUOUS/CULVERT						
Insp. Intervals Routine:	48	**Fracture Critical:**	0	**Underwater:**	0	**Special:**	N/A					**Element Level:**	48
93D – Inspection Date:						90C – Temp. (ºF)							
Is Delinquent:	☐	Reason:											
90E – Agency Program Manager:						90E3 – Consultant Program Manager:							
90E1 – Team Leader:						90E2 – Inspector:							

Resources

Time to Inspect (H:M):	0:0	:	Traffic Control:			Boat:			Waders:			Snooper:			
Ladder:			Manlift:			Bucket Truck:			Other:						

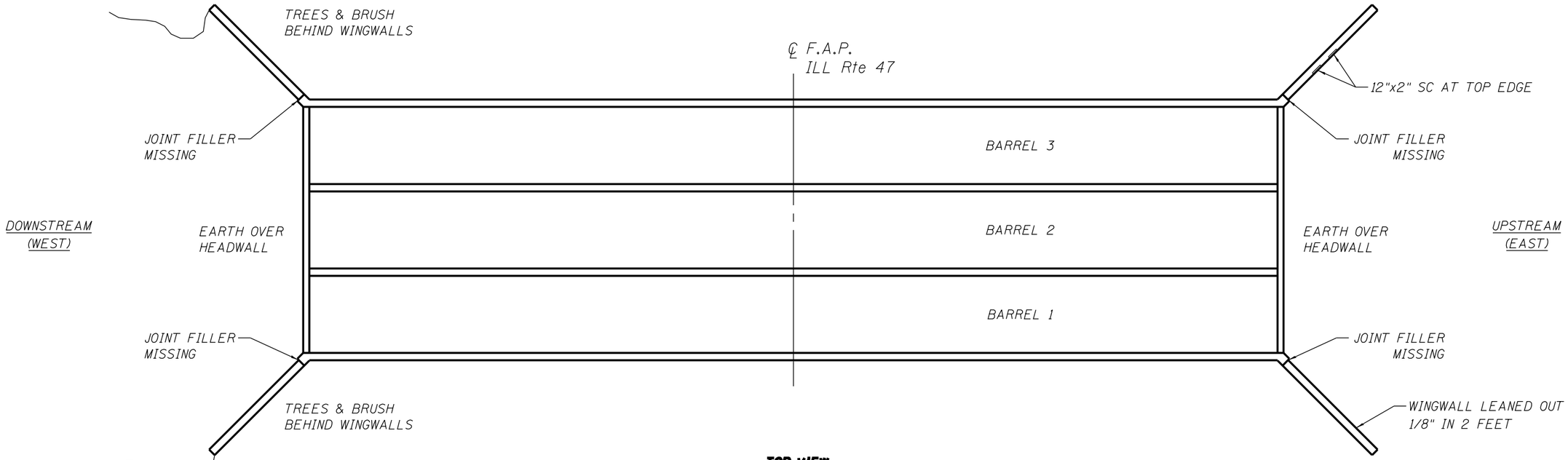
Inspector's Appraisals

Element	Element Description	Env	Quantity	Unit	CS1	CS2	CS3	CS4
215	Reinforced Conc Abutment	1	755	SF				
	Remarks: Wings: small edge spalls @ NE, lt settle @ all wings							
241	Concrete Culvert	1	267	LF				
	Remarks: Walls: scattered hl vert cracking thru-out. Top: HL-narrow edge cracking & HP's @ W end spans 1,2 & 3 from S, scatt HL lon							

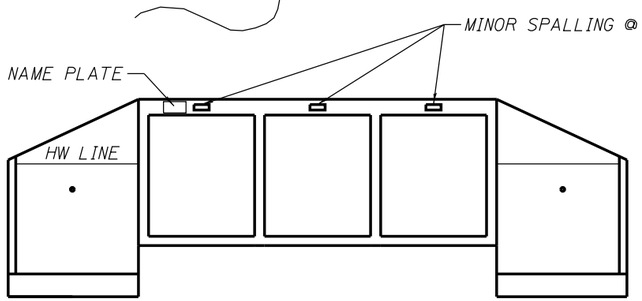
	Signature	Date
Inspection Team Leader:		/ /
Consultant Program Manager:		/ /
Agency Program Manager:		/ /

ATTACHMENT D

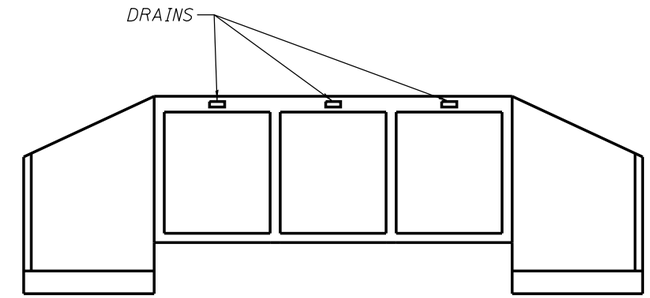
Culvert Condition Surveys



TOP VIEW



BLACKBERRY CREEK
WEST END



BLACKBERRY CREEK
EAST END

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCES

ITEM	UNIT	TOTAL
DC	SQ. FT.	0.0
SC	SQ. FT.	0.3
CRACK > 1/16"	FOOT	0.0

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GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

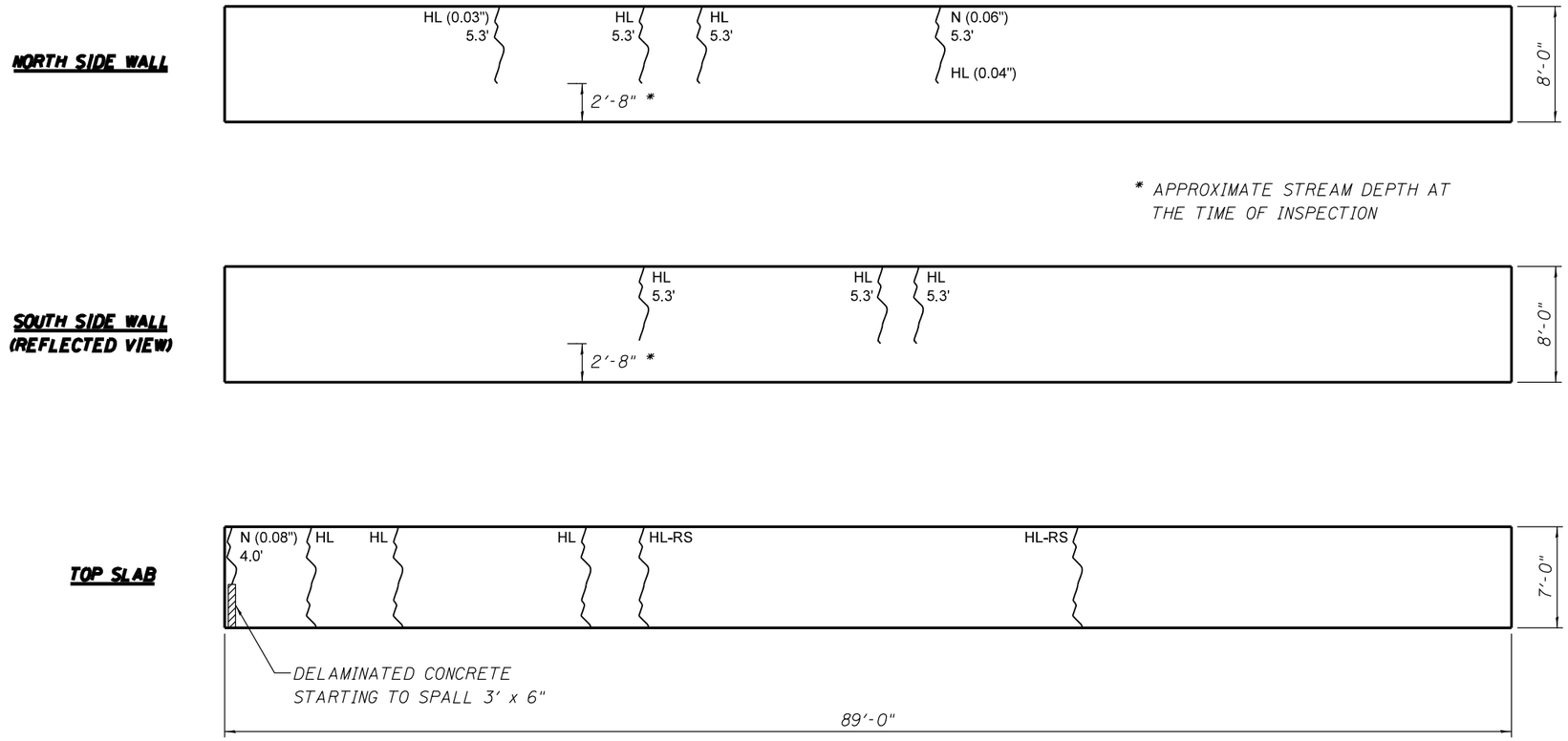
USER NAME =	DESIGNED -	REVISED -	
	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN -	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CONDITION SURVEY STRUCTURE NO. 045-2001
TOP VIEW

SHEET NO. 1 OF 4 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		KANE	4	1
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	



LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCES

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SC	SQ. FT.	0.0
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	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN -	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

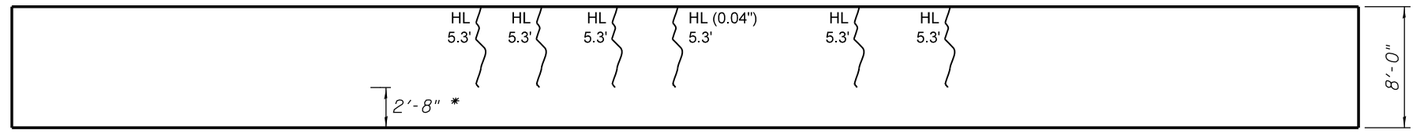
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CONDITION SURVEY STRUCTURE NO. 045-2001
BARREL 1 (SOUTH BARREL)

SHEET NO. 2 OF 4 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		KANE	4	2
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	

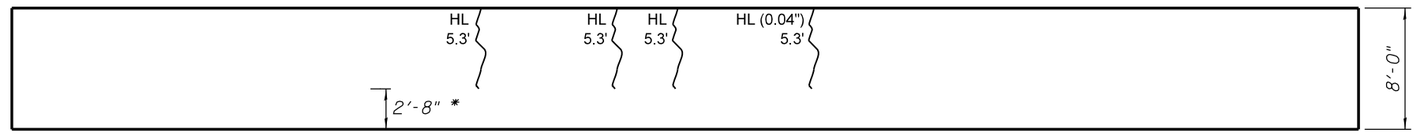
NORTH SIDE WALL



* APPROXIMATE STREAM DEPTH AT THE TIME OF INSPECTION

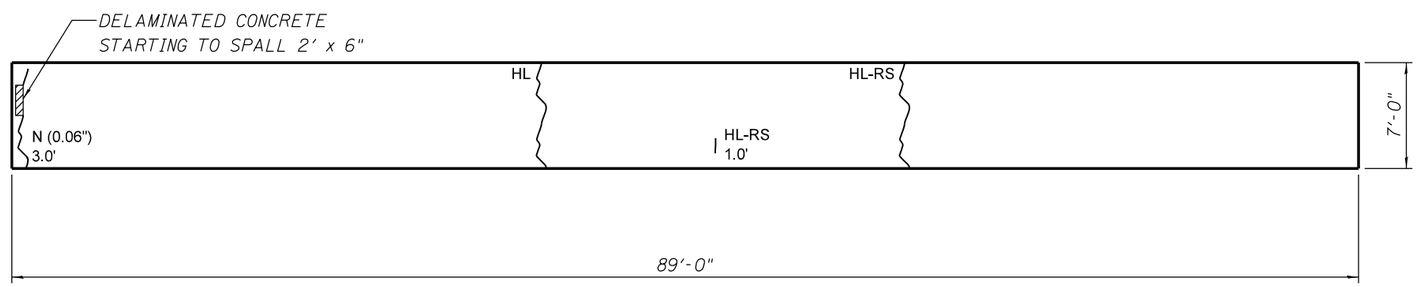
DOWNSTREAM (WEST)

SOUTH SIDE WALL (REFLECTED VIEW)



UPSTREAM (EAST)

TOP SLAB



LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
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DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCES

ITEM	UNIT	TOTAL
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SC	SQ. FT.	0.0
CRACK > 1/16"	FOOT	3.0

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GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME =	DESIGNED -	REVISED -	
	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN -	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CONDITION SURVEY STRUCTURE NO. 045-2001
BARREL 2 (CENTER BARREL)

SHEET NO. 3 OF 4 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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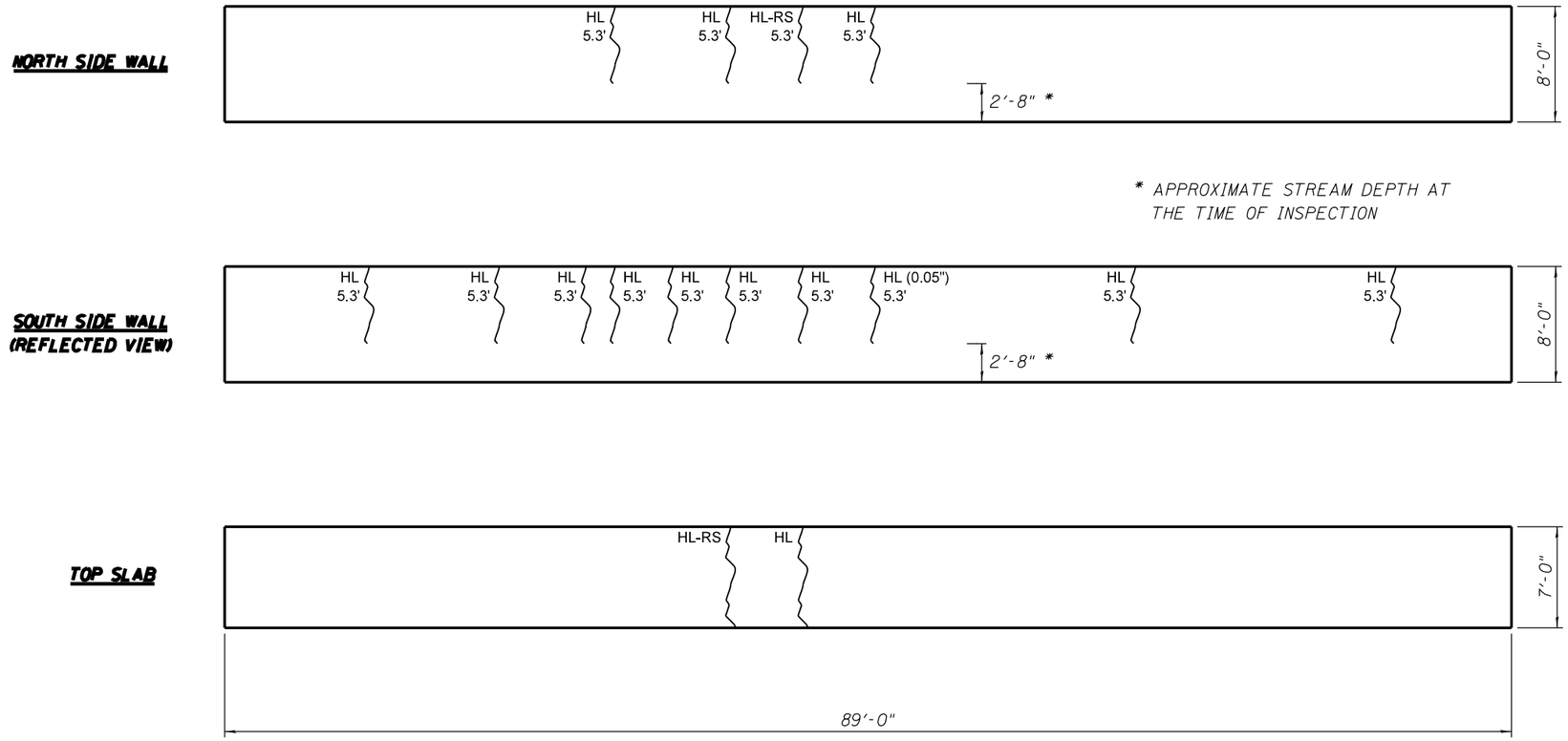
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	



LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
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DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

OBSERVED DEFICIENCES

ITEM	UNIT	TOTAL
DC	SQ. FT.	0.0
SC	SQ. FT.	0.0
CRACK > 1/16"	FOOT	0.0

1/16/2017
7:55:42 AM
H:\Jobs2015\20153000\CAD\Structural\dgn\refs\045-2001_BARREL 3 NORTH.dgn

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME =	DESIGNED -	REVISED -	
	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN -	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CONDITION SURVEY STRUCTURE NO. 045-2001
BARREL 3 (NORTH BARREL)

SHEET NO. 4 OF 4 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		KANE	4	4
		CONTRACT NO.		
		ILLINOIS	FED. AID PROJECT	

ATTACHMENT E

Cost Estimate

CONSTRUCTION COST ESTIMATE
ALTERNATIVE 1
EXTEND THE EXISTING CONCRETE BOX CULVERT AT A 30 DEGREE SKEW

ITEM NUMBER	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
501	REMOVAL OF EXIST STRUCT	CU YD	10	$200.00	$2,000
50200100	STRUCTURE EXCAVATION	CU YD	470	$40.00	$18,800
50200300	COFFERDAM EXCAVATION	CU YD	100	$50.00	$5,000
50201101	COFFERDAM TYPE 1	EACH	2	$35,000.00	$70,000
50800205	REINF BARS, EPOXY CTD	POUND	44,200	$1.25	$55,250
54003000	CONCRETE BOX CULVERTS	CU YD	201	$850.00	$170,850
59000200	EPOXY CRACK INJECTION	FOOT	11	$80.00	$880
Z0012754	STRUCT REPAIR OF CONC (DEPTH<5")	SQ FT	3	$240.00	$720
	STAGED CONSTRUCTION (0%)	L SUM			$0

SUBTOTAL:	$324,000
CONTINGENCY (15%):	$49,000
TOTAL:	**$373,000**

NOTES:
1. Roadway and embankment pay items and costs are not included.
2. Costs are in 2017 dollars.

CONSTRUCTION COST ESTIMATE
ALTERNATIVE 2
COMPLETE REPLACEMENT OF THE EXISTING CONCRETE BOX CULVERT

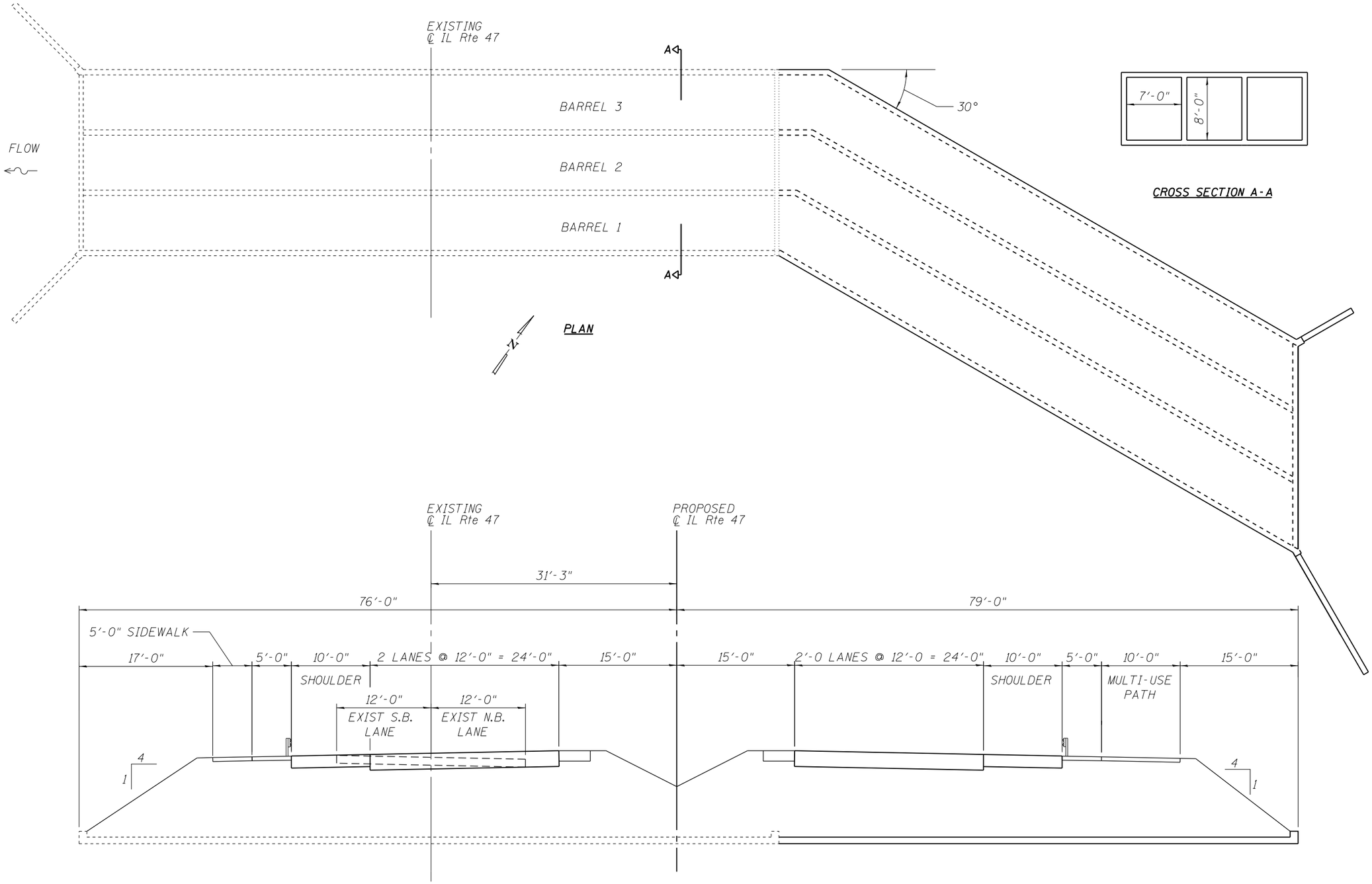
ITEM NUMBER	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
501	REMOVAL OF EXIST STRUCT	CU YD	85	$200.00	$17,000
50200100	STRUCTURE EXCAVATION	CU YD	1,550	$40.00	$62,000
50200300	COFFERDAM EXCAVATION	CU YD	150	$50.00	$7,500
50201101	COFFERDAM TYPE 1	EACH	3	$32,000.00	$96,000
50800205	REINF BARS, EPOXY CTD	POUND	91,800	$1.25	$114,750
54003000	CONCRETE BOX CULVERTS	CU YD	417	$850.00	$354,450
	STAGED CONSTRUCTION (10%)	L SUM	1	$65,000.00	$65,000

SUBTOTAL:	$717,000
CONTINGENCY (15%):	$108,000
TOTAL:	**$825,000**

NOTES:
1. Roadway and embankment pay items and costs are not included.
2. Costs are in 2017 dollars.

ATTACHMENT F

Proposed Structure



ELEVATION

1/18/2017
11:04:33 AM
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GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME =	DESIGNED -	REVISED -	
	CHECKED -	REVISED -	
PLOT SCALE =	DRAWN -	REVISED -	
PLOT DATE =	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-2001
PROPOSED STRUCTURE

SHEET NO. 1 OF 1 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		KANE	1	1
CONTRACT NO.				
ILLINOIS	FED. AID PROJECT			

ATTACHMENT G

Hydraulic Analysis Summary

Illinois Department of Transportation

Table 1.1 (DESIGN)

Culvert Waterway Information Table

Route:	IL Route 47	Existing SN:	045-2001		
Waterway:	Seavey Road Run (Tributary C)	Proposed SN:	T.B.D		
Section:	107	Prepared by:	KU	Date:	12/8/2016
County:	Kane	Checked by:	SGL	Date:	12/8/2016

Drainage Area = 6.6 square miles

Existing Overtopping Elev. = 714.90 at Sta. 143+57

Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	363	119		707.0	0.1		707.1	
Design	50	623	137		707.8	0.3		708.2	
Base	100	755	144		708.1	0.5		708.6	
Scour Design Check									
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	1115	160		708.9	0.9		709.8	

Datum:

All-Time H.W.E. & Date: 710.00 (1954) ft

Surveyed Normal Water Level: 704.40 ft

10-Year Velocity through Existing Structure = 3.03 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 150 ft^3/s

EXISTING STRUCTURE		PROPOSED STRUCTURE	
Type:	Box Culvert	Culvert Type:	
Length/Width:	90' / 22.2' (3 cell total)	Length Of Span:	
# Spans/Cells:	3 - 7' (H) x 8' (W)	# Cells:	
Low Chord:		Top Of Crown Elev.: Beam:	
Skew:	0 (relative to road)	Skew:	(relative to road)
Clearance:		Culvert Invert Elev.:	(u/s) (d/s)
Bridge Flow Line:	(u/s) (d/s)	Low E.O.P:	
Low E.O.P:	714.90	Freeboard:	
Freeboard:	6.75		
Culvert Inverts:	701.26 (u/s) 701.15 (d/s)		

EXISTING EMBEDMENT		PROPOSED EMBEDMENT	
Depth:	0.0	Depth:	
U/S Streambed Elev.:	701.26	U/S Streambed Elev.:	
D/S Streambed Elev.:	701.15	D/S Streambed Elev.:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

ATTACHMENT H

Structure Photos

Photo Number: 1

Structure Number:
045-2001

Photo File Name:
DSCF6474.JPG

Date of Photo:
10/14/2016

View: N

Feature / Location:
Facility Carried
Typical Section

Roadway: Typical Section - through

Photo Description: IL 47 roadway looking north. Culvert is at the arrows.

Photo Number: 2

Structure Number:
045-2001

Photo File Name:
DSCF6459.JPG

Date of Photo:
10/14/2016

View: S

Feature / Location:
Facility Carried
Typical Section

Roadway: Typical Section - through

Photo Description: IL 47 roadway looking south. Culvert is at the arrows.

Photo Number: 3

Structure Number:
045-2001

Photo File Name:

DSCF5772.JPG

Date of Photo:

3/30/2016

View: E

Feature / Location:

61 - Channel Condition: Upstream

Culvert: U/S End Section - Typical Condition

Photo Description: Upstream channel looking upstream from roadway. The channel flow bends left as it enters the culvert barrels.

Photo Number: 4

Structure Number:
045-2001

Photo File Name:

DSCF5760.JPG

Date of Photo:

3/30/2016

View: SW

Feature / Location:

61 - Channel Condition:

Culvert: D/S End Section - Typical Condition

Photo Description: Downstream channel looking downstream from roadway. Note debris accumulation.

Photo Number: 5

Structure Number:
045-2001

Photo File Name:

DSCF5763.JPG

Date of Photo:

3/30/2016

View: E

Feature / Location:

62 - Culvert
Condition: Culvert

Culvert: D/S End Section -

Photo Description: Downstream channel looking upstream through the culvert barrels.

Photo Number: 6

Structure Number:
045-2001

Photo File Name:

DSCF6485.JPG

Date of Photo:

10/14/2016

View: W

Feature / Location:

61 - Channel
Condition: Upstream

Misc: Site View -

Photo Description: Upstream channel looking downstream. Channel bends left as it enters the culvert barrels.

Photo Number: 7

Structure Number:
045-2001

Photo File Name:
DSCF6496.JPG

Date of Photo:
10/19/2016

View: W

Feature / Location:
62 - Culvert
Condition: Top Slab

Culvert: Barrel 1 - Typical Condition

Photo Description: Barrel 1 (South Barrel) shown. Top slab and walls were generally in good condition.

Photo Number: 8

Structure Number:
045-2001

Photo File Name:
DSCF6512.JPG

Date of Photo:
10/19/2016

View: N

Feature / Location:
62 - Culvert
Condition: Top Slab

Culvert: Barrel 1 - Hairline Cracking

Photo Description: Hairline crack with light rust staining. Crack was located approximately 60' from the east end of the culvert.

Photo Number: 9

Structure Number:
045-2001

Photo File Name:

DSCF6521.JPG

Date of Photo:

10/19/2016

View: Upward

Feature / Location:

62 - Culvert
Condition: Top Slab

Culvert: Barrel 1 - Delaminated Concrete

Photo Description: Top slab at the west end of the South Barrel. The concrete near the cracks to the right of the photo was delaminated.

Photo Number: 10

Structure Number:
045-2001

Photo File Name:

DSCF6529.JPG

Date of Photo:

10/19/2016

View: E

Feature / Location:

62 - Culvert
Condition: Top Slab

Culvert: Barrel 2 - Typical Condition

Photo Description: Top slab of the Center Barrel near the west end. The top slab was generally in good condition.

Photo Number: 11

Structure Number:
045-2001

Photo File Name:

DSCF6537.JPG

Date of Photo:

10/19/2016

View: Upward

Feature / Location:

62 - Culvert
Condition: Top Slab

Culvert: Barrel 2 - Hairline Cracking

Photo Description: Hairline crack with light rust stains in the top slab about 30' from the east end.

Photo Number: 12

Structure Number:
045-2001

Photo File Name:

DSCF6523.JPG

Date of Photo:

10/19/2016

View: SE

Feature / Location:

62 - Culvert
Condition: Top Slab

Culvert: Barrel 2 - Delaminated Concrete

Photo Description: West end of Center Barrel. Note cracks and rust stains. A portion of this area, about 2' by 6", was also delaminated.

Photo Number: 13

Structure Number:
045-2001

Photo File Name:

DSCF6542.JPG

Date of Photo:

10/19/2016

View: W

Feature / Location:

62 - Culvert
Condition: Top Slab

Culvert: Barrel 3 - Typical Condition

Photo Description: Top slab of North Barrel (Barrel 3) near the east end. The top slab was typically in good condition.

Photo Number: 14

Structure Number:
045-2001

Photo File Name:

DSCF6544.JPG

Date of Photo:

10/19/2016

View: Upward

Feature / Location:

62 - Culvert
Condition: Top Slab

Culvert: Barrel 3 - Hairline Cracking

Photo Description: Top slab hairline crack with areas with light rust stains. Crack was about 54' from the east end of the culvert.

Photo Number: 15

Structure Number:
045-2001

Photo File Name:

DSCF6516.JPG

Date of Photo:

10/19/2016

View: SE

Feature / Location:

62 - Culvert
Condition: Culvert

Culvert: Barrel 1 - Typical Condition

Photo Description: South exterior wall. Wall was in good condition.

Photo Number: 16

Structure Number:
045-2001

Photo File Name:

DSCF6550.JPG

Date of Photo:

10/19/2016

View: NE

Feature / Location:

62 - Culvert
Condition: Culvert

Culvert: Barrel 3 - Typical Condition

Photo Description: North exterior wall. Wall was in good condition.

Photo Number: 17

Structure Number:
045-2001

Photo File Name:
DSCF6509.JPG

Date of Photo:
10/19/2016

View: N

Feature / Location:
62 - Culvert
Condition: Culvert

Culvert: Barrel 1 - Narrow Cracking

Photo Description: Vertical crack in north wall (interior wall) of Barrel 1 near the midpoint of the culvert. The crack width varied from 0.04" to 0.06".

Photo Number: 18

Structure Number:
045-2001

Photo File Name:
DSCF6527.JPG

Date of Photo:
10/19/2016

View: SE

Feature / Location:
62 - Culvert
Condition: Culvert

Culvert: Barrel 2 - Typical Condition

Photo Description: Barrel 2, south wall (interior wall), near west end. The interior walls were in good condition.

Photo Number: 19

Structure Number:
045-2001

Photo File Name:

DSCF6534.JPG

Date of Photo:

10/19/2016

View: N

Feature / Location:

62 - Culvert
Condition: Culvert

Culvert: Barrel 2 - Narrow Cracking

Photo Description: Vertical crack in north wall (interior wall) of Barrel 2 about 45' from the east end of the culvert. The crack width was 0.04".

Photo Number: 20

Structure Number:
045-2001

Photo File Name:

DSCF6540.JPG

Date of Photo:

10/19/2016

View: SW

Feature / Location:

62 - Culvert
Condition: Culvert

Culvert: Barrel 3 - Typical Condition

Photo Description: Barrel 3, south wall (interior wall), near the east end. The interior walls were in good condition.

Photo Number: 21

Structure Number:
045-2001

Photo File Name:

DSCF6543.JPG

Date of Photo:

10/19/2016

View: S

Feature / Location:

62 - Culvert
Condition: Culvert

Culvert: Barrel 3 - Narrow Cracking

Photo Description: Vertical crack in the south wall (interior wall) of Barrel 3 about 44' from the east end of the culvert. The crack width was 0.05".

Photo Number: 22

Structure Number:
045-2001

Photo File Name:

DSCF5770.JPG

Date of Photo:

3/30/2016

View: SW

Feature / Location:

62 - Culvert
Condition: End

Culvert: U/S End Section - Typical Condition

Photo Description: Southeast Wingwall in good condition.

Photo Number: 23

Structure Number:
045-2001

Photo File Name:

DSCF5769.JPG

Date of Photo:

3/30/2016

View: NW

Feature / Location:

62 - Culvert
Condition: End

Culvert: U/S End Section - Typical Condition

Photo Description: Northeast Wingwall with waterline staining. Note two small areas with spalled concrete at the top edge of the wingwall.

Photo Number: 24

Structure Number:
045-2001

Photo File Name:

DSCF5761.JPG

Date of Photo:

3/30/2016

View: N

Feature / Location:

62 - Culvert
Condition: End

Culvert: D/S End Section - Typical Condition

Photo Description: Northwest Wingwall. Note tree growing behind the wall. Wall was in good condition.

Photo Number: 25

Structure Number:
045-2001

Photo File Name:
DSCF6491.JPG

Date of Photo:
10/14/2016

View: SE

Feature / Location:
62 - Culvert
Condition: End

Culvert: D/S End Section - Typical Condition

Photo Description: Southwest Wingwall in good condition. Note trees growing behind the wall.

Photo Number: 26

Structure Number:
045-2001

Photo File Name:
DSCF6557.JPG

Date of Photo:
10/19/2016

View: W

Feature / Location:
62 - Culvert
Condition: End

Culvert: U/S End Section - Typical Condition

Photo Description: Upstream end of the culvert at Barrels 1 and 2. The headwalls were in good condition.

Photo Number: 27

Structure Number:
045-2001

Photo File Name:

DSCF6554.JPG

Date of Photo:

10/19/2016

View: E

Feature / Location:

62 - Culvert
Condition: End

Culvert: D/S End Section - Typical Condition

Photo Description: Name Plate at the north end of the west headwall.

ATTACHMENT I

Proposed Plan & Profile (not available)

ATTACHMENT J

Existing & Proposed Roadway Cross Sections

(not available)

ATTACHMENT K

Existing Plans

FEDERAL-AID ROUTE NO.	SEC.	COUNTY	TOTAL SHEETS	SHEET NO.
64	107 (W&RS)	KANE	239	1

STATE | ILLINOIS | PROJECT RF-158

P-91-236-64

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
PLANS FOR PROPOSED
FEDERAL AID HIGHWAY

IL 47 Kane Co

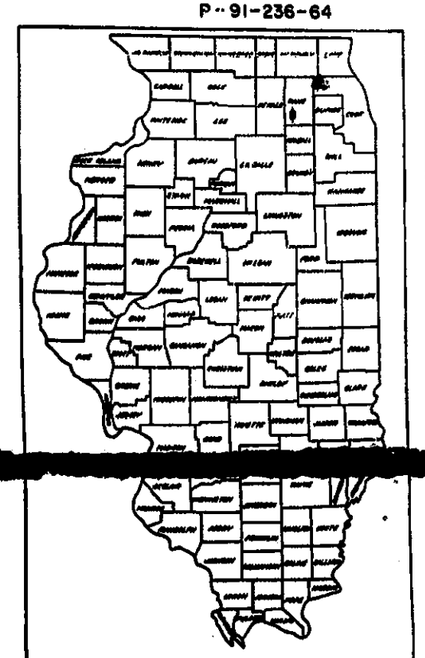
SCALES { 1" = 1 MILE; PROFILE HOR. 1 INCH = 50 FT.; PROFILE, VERT. 1 INCH = 5 FT.; CROSS-SECTIONS 1 INCH = 5 FT. VERT., 10 FT. HOR.

Sta 320+06 Triple 7'x8'
045-2001

FOR INDEX OF SHEETS
SEE SHEET NO. 9

F. A. ROUTE 64 (ILL. RTE. 47)
SECTION 107 (W&RS)
PROJECT RF-158(13)
KANE COUNTY

C-91-577-67



LOCATION OF SECTION INDICATED THUS:—

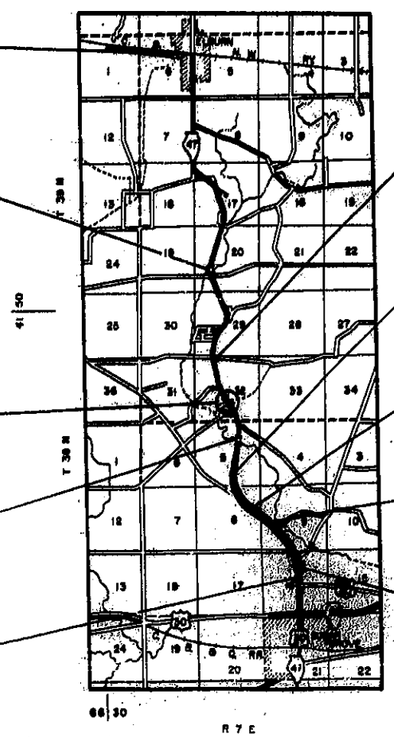
PROJECT RF-158(13)
BEGINS STA. 17+73.5

OMISSION
STA. 207+00 – STA. 208+00

SECTION 107(W&RS)
INCLUDES TRIPLE 7' x 8' BOX CULVERT AT STA. 320+06

OMISSION
STA. 351+75 – STA. 354+24.65

PROJECT RF-158(13)
END STA. 469+50



STATION EQUATION
STA. 281+[illegible] BK. = STA. 282+09.10 AH.

STATION EQUATION
STA. 378+56.5 BK. = STA. 378+57.9 AH.

STATION EQUATION
STA. 410+04.05 BK. = STA. 410+40.15 AH.

STATION EQUATION
STA. 434+06.46 BK. = STA. 434+20.50 AH.

STATION EQUATION
STA. 478+02.36 BK. = STA. 478+34.68 AH.

NET LENGTH OF PROJECT = 46,[illegible] LIN. FT. = 8.834 MI.

LAYOUT SCALE: 1" = 1 MILE

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
SUBMITTED 6/27 1970
RECOMMENDED 6/28 1970
PASSED 6/29 1970
APPROVED 6/30 1970
APPROVED 6/30 1970

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED
DIVISION ENGINEER DATE

REVISED SET
6-15-71

JOB NUMBER CONTRACT NO. 28070

KANE COUNTY SECTION 107(W&RS) F. A. ROUTE 64

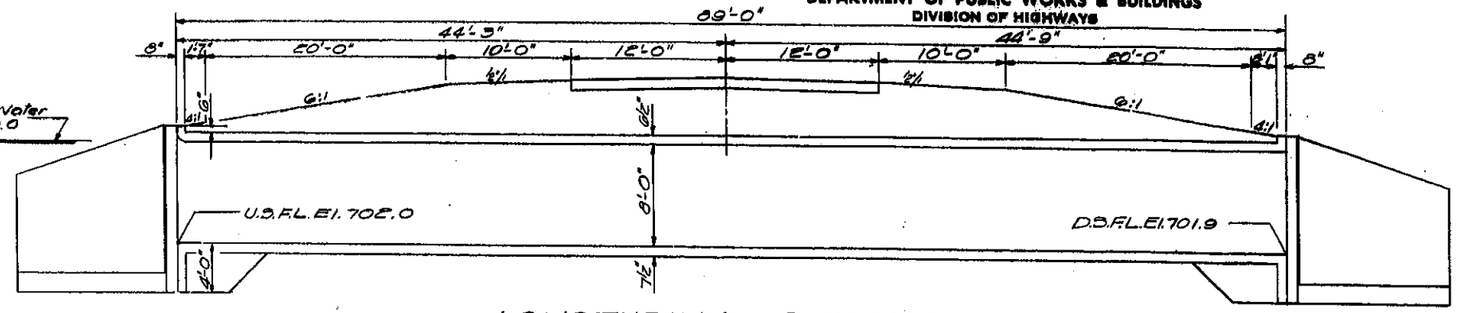
Rev. 4-26-70

B.M.: #16 At West Edge of Box Culvert. El. 713.41
Existing Structure: 3'x8' Triple Box Culvert, 14' Rdwy. Width
To be removed by Contractor at Time of Construction.
No Salvage.
Temporary Bridge not required.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.R. 64	107 W&RS	Kane	239	101
FED. ROAD DIST. NO. 7	HARVARD	FED. A.I.D. PROJECT-		

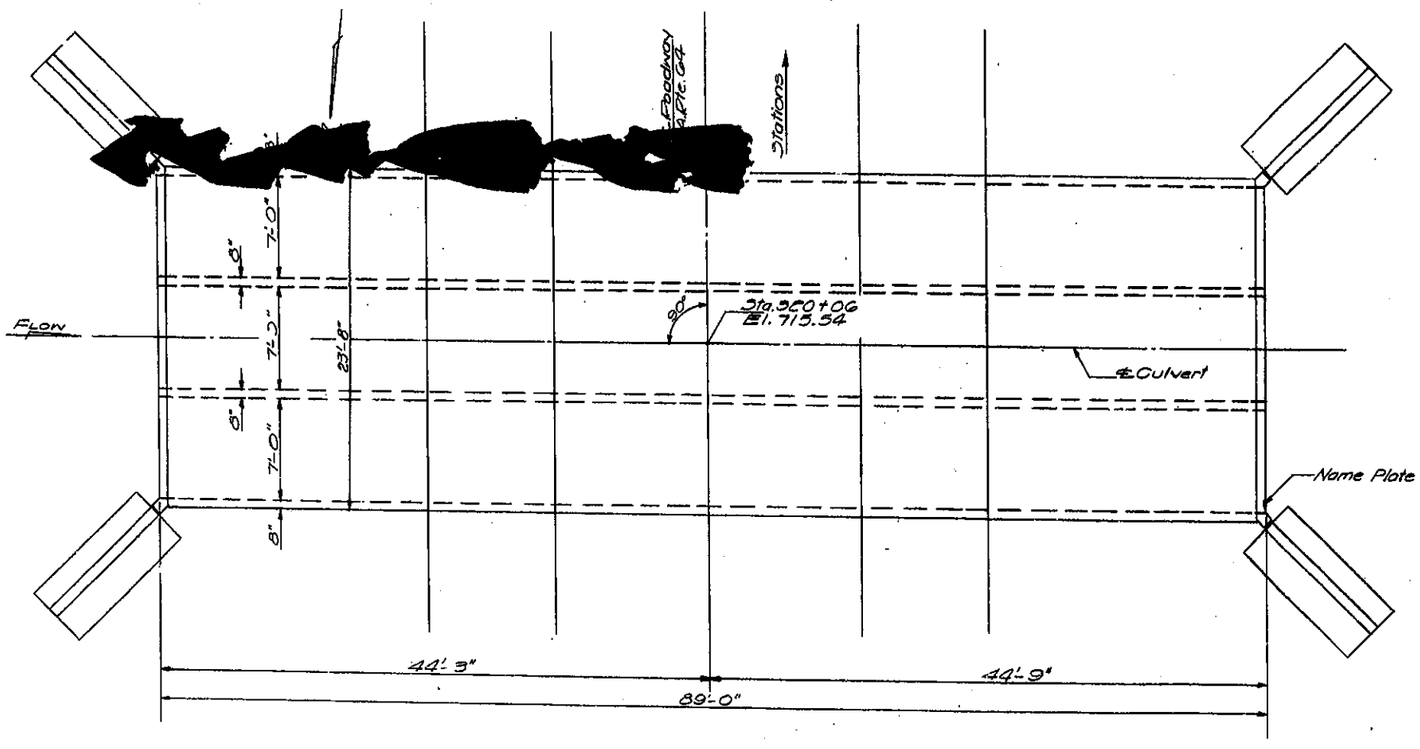
SHEET NO. 1
2 SHEETS



LONGITUDINAL SECTION

STATION 320+06
BUILT 197 BY
STATE OF ILLINOIS
F.A. RT. 64 SEC. 107(W&RS)
F.A. PROJ. F-158(13)
LOADING HS20

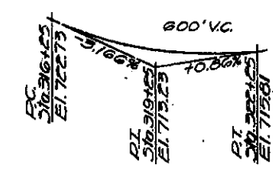
NAME PLATE
See Std. 2119-1



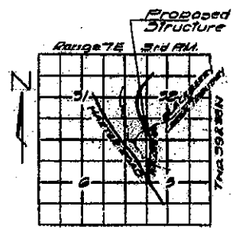
PLAN

TOTAL BILL OF MATERIAL

Item		Quantity
Class X Concrete	Cu. Yds.	200.8
Reinforcement Bars	Lbs.	40920
Name Plate	Ea.	1
Removal of Exist. Struct.	Ea.	1



PROFILE-F.A. RTE. 64



DESIGNED	J. M. Patel
CHECKED	A. R. Hakan
DRAWN	J. M. P. A. Barroza
CHECKED	

MAY 1 1970
EXAMINED
PASSED
APPROVED

WATERWAY INFORMATION
Drainage Area — 4.37 Sq. Miles
Character — Rolling
Required Opening — 30 Year Flood — 170 Sq. Ft.
Present Opening — 196 Sq. Ft.
Proposed Opening — 168 Sq. Ft.
Q (30) = 773 c.f.s.

DESIGN STRESSES
fc = 1400 psi. Barrel
fc = 1000 psi. Wings
fs = 20,000 psi. Reinf.
Vc = 75 psi Ftgs.
n = 10
Allowable Future [redacted] 25#/s'

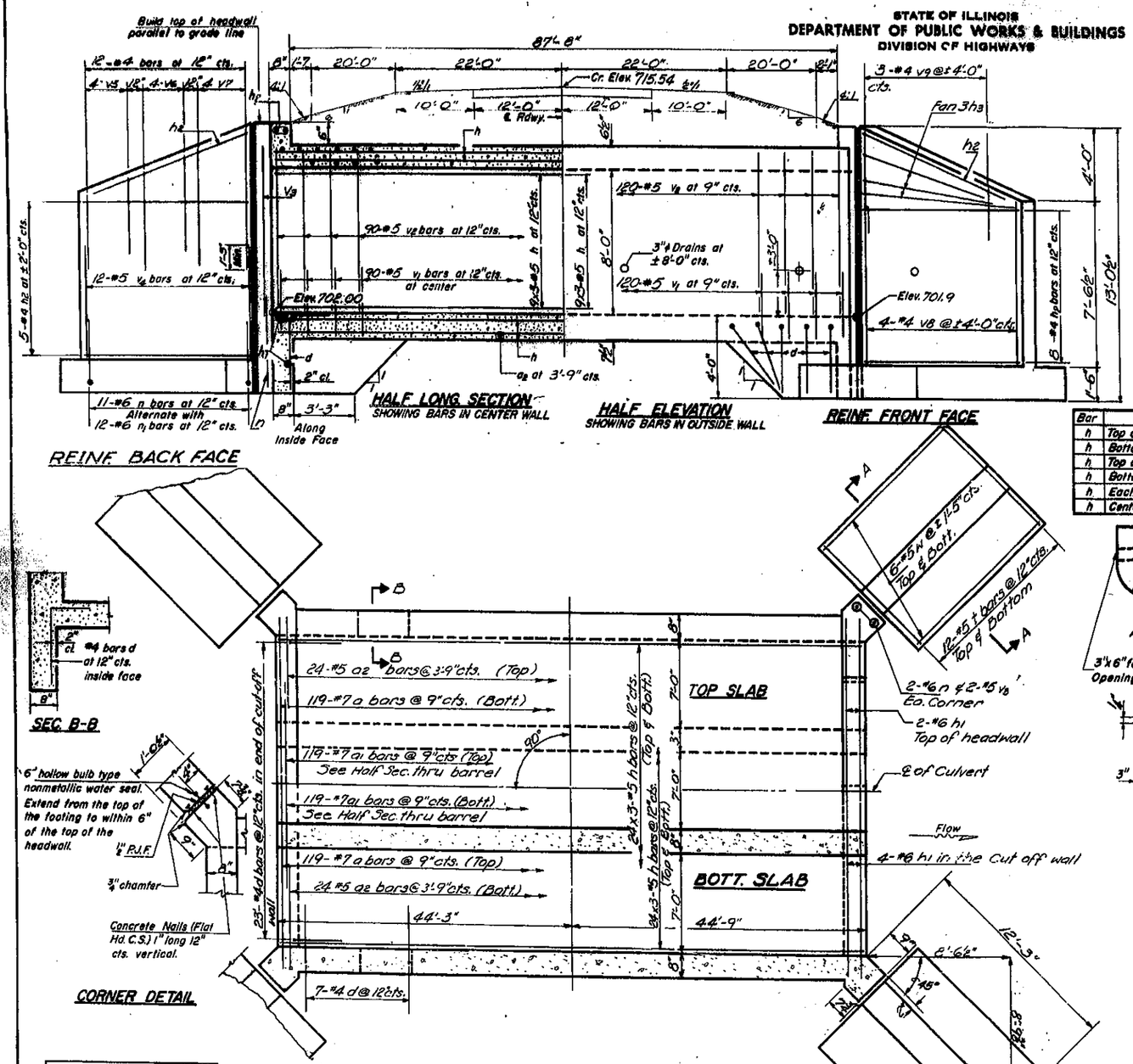
LOADING HS20-44

GENERAL PLAN & ELEVATION
PROJ. F-158 (13)
F.A. ROUTE 64
OVER TRIBUTARY OF
BLACKBERRY CREEK
F.A. RTE. 64 (ILL. RTE 47)
SECTION 107 (W&RS)
KANE COUNTY
STATION 320+06

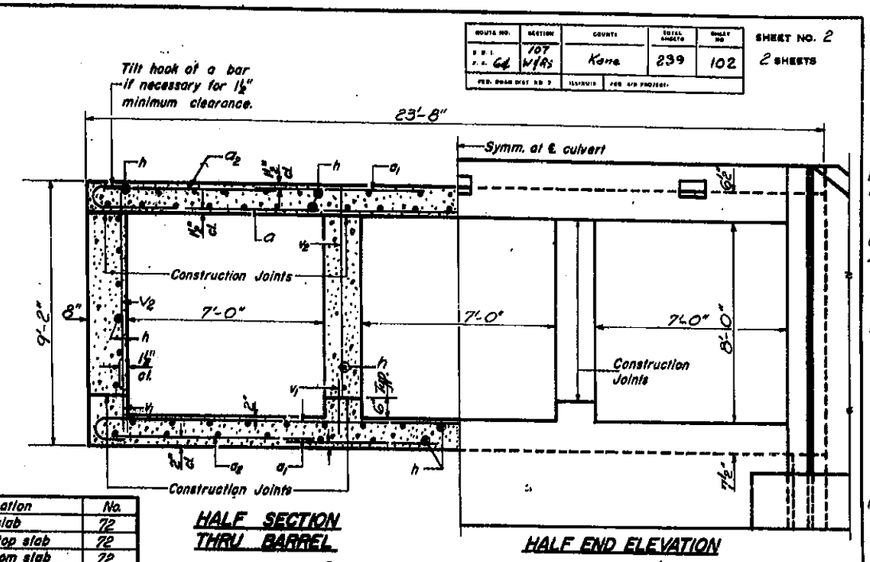
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

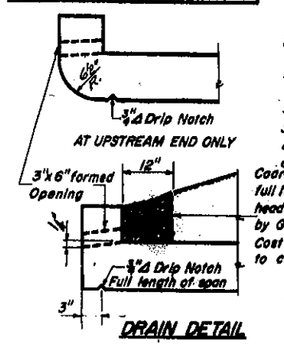
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.P. 64	107 W&RS	Kane	239	102
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT		

SHEET NO. 2
2 SHEETS



Bar	Location	No.
h	Top of top slab	72
h	Bottom of top slab	72
h	Top of bottom slab	72
h	Bottom of bottom slab	72
h	Each outside wall	27
h	Center walls Ea.	27

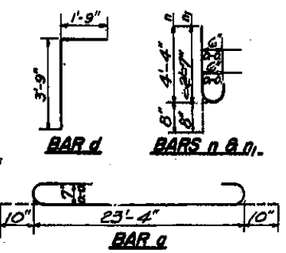


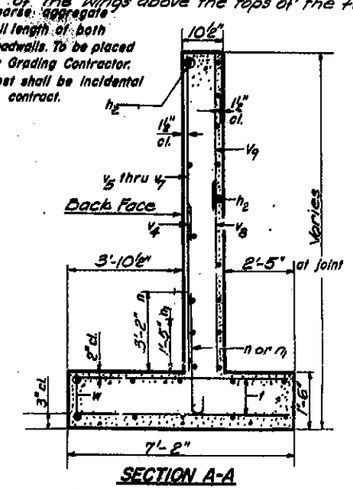


GENERAL NOTES

Exposed edges shall be beveled ¾" except as shown.
For backfilling and embankment see Standard Specifications.
All bars shall be lapped 24 diameters unless otherwise shown.
The following surfaces of the culvert shall be waterproofed; the top of the top slab, the backs of the exterior walls above the lower construction jt. & the backs of the wings above the tops of the footings.

Coarse aggregate full length of both headwalls. To be placed by Grading Contractor. Cost shall be incidental to contract.





BILL OF MATERIAL

Bar	No.	Size	Length	Bar	No.	Size	Length
a	238	#7	25'-0"	t	96	#5	6'-11"
a1	238	#7	15'-5"				
a2	96	#5	6'-0"				
				v1	420	#5	2'-3"
d	72	#4	5'-6"	v2	420	#5	7'-9"
h	996	#5	30'-6"	v3	8	#5	9'-0"
h1	12	#6	23'-3"	v4	48	#5	4'-6"
h2	60	#4	11'-3"	v5	16	#4	3'-9"
h3	12	#4	11'-6"	v6	16	#4	7'-6"
				v7	16	#4	8'-3"
				v8	16	#4	7'-3"
				v9	12	#4	5'-0"
n	52	#6	5'-0"	w	48	#5	11'-3"
n1	48	#6	3'-3"				
Class X Concrete					Cu. Yds.		200.8
Reinforcement Bars					Lbs.		40,920

Note: Bars indicated thus 20x3 #5 etc. [illegible]

DESIGN STRESSES

[illegible] p.s.i.
[illegible] p.s.i. Barrel
[illegible] p.s.i. Wings
vc = 90 p.s.i. Barrel
vc = 75 p.s.i. Wings
n = 10
Comp. Max. Soil Pressure [illegible]-44

DESIGNED J. M. Patel
CHECKED B. R.
CHECKED
MAY 1 1970
APPROVED Richard H. Hollerman
ENGINEER OF DESIGN
CHIEF HIGHWAY ENGINEER

TB-T-L Drawn 1-11-68

FA. RTE. 64 SEC. 107 (W&R) [illegible]
KANE COUNTY
STA. 320+06 [illegible]

F.A. RTE. 64 SEC. 107 (W&R) KANE CO. D.H.X. 1

ATTACHMENT L

Additional Testing Results (not applicable)

BRIDGE CONDITION REPORT

REGION: 1
DISTRICT: 1
ROUTE: FAP Route 326 (IL Route 47)
COUNTY: Kane County
JOB NUMBER: P-91-015-14
SECTION: 14-00028-00-CH
STRUCTURE NUMBER: 045-0024
LOCATION: FAP Route 326 (IL Route 47) over Blackberry Creek

Prepared by: GRAEF
Date Inspected: April 2016
Proposed Letting date: TBD

Illinois Department of Transportation
Division of Public Transportation

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III.	Field Inspection & Physical Evaluation	Pg. 3
IV.	Potential Scope of Work Determination & Analysis	Pg. 6
V.	Discussion and Recommended Scope	Pg. 9

Attachments:

A. Location Map

B. IDOT Master Structure Report

C. Bridge Inspection Report

D. Top and Bottom of Deck Condition Surveys

E. Substructure Condition Surveys

F. Cost Estimate

G. Proposed Structure

H. Structure Photos

I. Hydraulic Analysis Summary

J. Proposed Plan & Profile *(currently unavailable)*

K. Existing and Proposed Roadway Cross Sections *(currently unavailable)*

L. Abbreviated Existing Plans

M. Additional Testing Results *(not required)*

I. Geographical and Administrative Data:

The following report documents the condition of Structure Number 045-0024, Illinois Route 47 over Blackberry Creek located in the Village of Sugar Grove, within Kane County, Illinois. Maintenance of the structure falls under the jurisdiction of IDOT District 1. See Attachment A for a location map and TABLE I-A for pertinent data regarding this structure.

TABLE I-A

Structure Number:	045-0024
County:	Kane
Route Carried:	FAP Route 326 (IL Route 47)
Feature Crossed:	Blackberry Creek
Section:	14-00028-00-CH
Station:	111+25.00
Roadway Classification:	Other Principal Arterial
Design / Posted Speed:	60 MPH / 55 MPH
ADT (Current / Design):	9,650 (2015) / 14,400 (2040)
ADTT (Current / Design):	25%
DHV (two-way):	978
Inventory Rating:	*1.680 (HS-20)
Operating Rating:	*2.750 (HS-20)
Sufficiency Rating:	*98.0

*Information obtained from IDOT's Bridge Information System database. The Structure Summary Report was last updated July 5, 2012, see Attachment B.

Construction / Reconstruction / Repair History:

Structure Number 045-0024 was originally constructed in 1968 as part of Route 64 construction under Section 107-B-1-I. The structure was built as a two span, precast prestressed concrete box beam bridge. The pier and abutment foundations are supported on piles, with the center pier being located near the perceived centerline of Blackberry Creek.

In 2003, under Section 107-B-1-R-1, the following reconstruction activities took place:

- The bridge deck beams were removed and replaced with rolled steel W-section beams supporting a reinforced concrete bridge deck (7.5" thickness).
- The existing open abutments were converted to semi-integral abutments.
- The pier cap was removed and replaced to account for bearing seat elevation changes and to abate concrete degradation.
- Special approach pavements were constructed at each end of the bridge.

II. Physical Description of Structure:

The existing structure is a two span bridge that carries Illinois Route 47 over Blackberry Creek. The structure is located in within Kane County. See Attachment A for location map.

The structure is comprised of two spans arranged in a single continuous framing unit. The bridge omission length is recorded as 116'-10" and the out-to-out bridge width is recorded as 47'-2". The superstructure is framed with rolled W-shape steel beams that are spaced at a uniform spacing of 6'-1" on centers full length of bridge, with bearing lines that are aligned on a 30 degree left ahead skew. The superstructure supports a 7½" thick deck without an overlay or wearing surface. The parapet over hang measures 2'-3½" from edge of deck to centerline of the fascia beam. For beam type and span information see TABLE II-A.

TABLE II-A

Framing Unit	Span No.	Span Length	Beam Type
UNIT 1	1	55' - 5"	W24 x 104
	2	55' - 5"	W24 x 104

The clear roadway width is recorded as 44'-0", which allows for one 12'-0" lane in each direction. The structure was constructed on a local tangent alignment while the roadway is aligned on a horizontal curve. This results in shoulders that are variable in width, with the minimum dimension recorded as 9'-9 7/8" and the maximum as 10'-2 1/8". The opposing lanes of traffic are divided by striping. The exterior barrier is a TYPE-F parapet that measures 2'-10" in height.

The substructure consists of stub abutments that were converted to semi-integral abutments and a center wall type pier. The pier cap was reconstructed to account for the changes in structure depth when the superstructure was replaced. All foundations are supported on driven piles. The slopes that wrap around the abutments as well as the stream bed around the center pier are protected with dump stone rip-rap.

There are no expansion joints on the bridge. There are two 4" preformed joint seals that connect the special approach pavement to a flexible pavement connector to account for thermal movements of the bridge.

The reported design minimum vertical clearance is 2'-6". The design channel width was reported as +/- 48'-0" on the available existing drawings. See Attachment B for more information.

The existing bridge is constructed on a crest vertical curve with an entrant grade of 0.63% and an exit grade of -0.513%. The vertical crown of the bridge based on the roadway profile is located just south of the pier centerline on the structure, with the PGL aligning with the CL of IL 47. The roadway lane alignment is based on a horizontally curving geometry. The deck cross section in this location is fully super elevated with a grade of 2% sloping from East to West. Deck drains are located along the west edge of shoulder to assist in removing water from the deck surface.

There were no observed utilities or other appurtenances attached to either the superstructure or the substructure. Overhead power lines were observed to the East of the bridge, as well as markers for underground fiber optic and cable lines were located to the West of the bridge.

A set of abbreviated existing plans for this structure can be found in Attachment L.

III. Field Inspection and Physical Evaluation:

The structure was inspected on April 1, 2016 by GRAEF. The inspectors of record are Nathan D. Rick and Leo Toyota. All accessible areas of the superstructure and substructure were assessed at arm's length and inspected both visually and through sounding with masonry hammers. The bearings were investigated for proper alignment and displacement properties with respect to the ambient temperature at the time of inspection. The structural steel was investigated for section losses, paint condition, fastener condition and the presence of fatigue prone details. The underside of the bridge deck was inspected visually from the banks of the creek. The top side of the bridge deck and approach slabs were inspected visually by walking the surface and with a chain drag.

Field inspection documentation was prepared following the Illinois Department of Transportation's "Bridge Condition Report Procedures and Practices" (December 2011 edition) with consideration to the National Bridge Inspection Standards (NBIS) published through the Federal Highway Administration. Exhibits were created from the documented findings and can be seen in Attachments D and E for the superstructure and substructure respectively. Photo documentation of observed deficiencies was recorded and reported in Attachment H with applicable descriptions for each photograph. The observations noted within this report will be used to verify the current bridge appraisals and if required will be used to adjust the ratings based on the in-service conditions. Detailed information is provided to identify and locate areas of concern when present regarding the in-service condition of the bridge. A summary of the findings is reported as follows.

Superstructure:

Deck: The deck superstructure is in GOOD condition, which corresponds to and NBIS and IDOT condition rating of 7. This value is equal the value reported in the current structure summary report of GOOD, 7. See Attachment B for the current IDOT Master Structure Report and Attachment C for the most recent NBIS and PONTIS Bridge Inspection Report.

For the Top of Deck survey, while minor hairline cracking was observed, it was infrequent and did not appear to present as map cracking in any significant manner. A chain drag over the deck did not reveal any suspected areas of delamination. A deck thermograph was not ordered for this bridge as it has been in service for just over 10 years, and nothing observed during the inspection appeared to justify a request for additional testing.

For the Deck Soffit evaluations, elements that factored into the condition rating of the deck include the presence of infrequent hairline cracks at spacing of greater than 5' spacing, minor localized map cracking present between several of these crack occurrences, and the presence of two distinct longitudinal cracks at the north east corner of the bridge deck near the North Abutment. The longitudinal cracks intersect several of the transverse hairline cracks in this area, and appear to be located near where the wheel load of the design vehicles should be expected to be applied. All cracks appear to be less than 0.06" in width, with only minor efflorescence present. Examples of the observed conditions can be seen in the photos provided in Attachment H.

The inside face-to-inside face of parapet dimension was taken from the existing drawings and is recorded as 44'-0". The approximate length of the existing bridge deck based on the existing drawings is reported as 114'-11". These values are used to calculate an approximate bridge deck riding surface area of 5,056 square feet. Areas estimated at 1.0 square feet on the top side of the deck were recorded as

spalled or delaminated concrete that could be considered for partial depth patching. Areas estimated at 47.5 square feet on the deck soffit were recorded as Map Cracked with sound concrete, while no areas of delamination were discovered.

The top and bottom of deck survey can be found in Attachment D which will show the locations of all observed deficiencies. These surveys in combination with IDOT's Structural Service Manual will be used to evaluate the type of deck repair required, if any, at this location. This evaluation can be found in Section IV.

The bridge parapet was observed to be a standard barrier (TYPE F) with a height of 2'-10" above the top of the deck. There were infrequent hairline cracks that passed vertically through the parapet full height and observed pop-outs throughout. The approach guardrail transitions, guardrail typical section and the end impact attenuator no longer meet currently acceptable IDOT standards. Small areas of map cracking were observed near the connections for the guardrail transition section on the outside face of the parapet.

Documentation of the condition of these elements can be seen in the photos provided in Attachment H.

Beams: The beam superstructure was observed to be in VERY GOOD condition, which corresponds to an NBIS and IDOT condition rating of 8. This value agrees with the value reported of 8 in the current structure summary report. There were no locations observed that showed visible rust on the superstructure, nor were any indicators of distress observed at the time of inspection.

The condition of the paint as well as the painting information can be seen in the photos provided in Attachment H. Graffiti was present at several locations along the fascia and on the interior webs of the beams. Minor dust or dirt accumulation was present on the webs and bottom flanges of several beams. While no de-bonding, pitting or rusting was observed in the protective coatings, this type of material can act to trap moisture and may be an issue in the future if left to accumulate.

Joints: The bonded construction joint between the semi-integral diaphragm and the approach slab is showing deterioration. Small spalls on the deck side are present as is wear that is allowing debris to sit in the construction joint. It is unclear if the joint bond is still intact as a gap of (1/4") was observed between the deck and approach.

The 4" PJF that closes the joint between the approach slab and the flexible pavement connector appears to be intact and functioning as intended. Minor debris accumulation is present, as is minor wear to the approach edge of this joint.

These recorded conditions can be seen in the photos provided in Attachment H.

Approach Pavement: The bridge approach pavement is a special design due to the sharp skew of this bridge. It was observed that diagonal hair line cracks are present at the acute corners of the pavement and is present at each slab where the bonded joint meets the semi-integral abutment diaphragm. These cracks run perpendicular to the joint line, but are spaced infrequently.

These recorded conditions can be seen in the photos provided in Attachment H.

Bearings: The beam bearings are in GOOD CONDITION which corresponds to a NBIS and IDOT condition rating of 7.

Elements that factored into the evaluation of the bearings included the condition of the paint, the appearance of the anchor bolts and the general alignment of the expansions bearing. These features can be seen in the Photos in Attachment H.

The bearing inspection occurred during a day with the ambient temperature being approximately 50 degrees at the time of inspection. Several bearings at the abutments were noted to have displacement toward the abutment back wall, instead of having no displacement as would be expected with ambient temperatures at time of inspection. One location was noted where the side retainer appeared to not be properly aligned with the top bearing plate, and the anchor bolt was not installed plum at this location.

Substructure:

Abutments: The abutments are in GOOD CONDITION, which corresponds to an NBIS and IDOT condition rating of 7. This value agrees with the value reported of 7 in the current structure summary report. Elements that factored into the evaluation of the abutment included the presence of cracks in the abutment stem, the alignment of the wing walls and the condition of the concrete. These features can be seen in the Photos in Attachment H.

There are multiple hairline cracks in the abutment stems, several showing efflorescence. The substructure was inspected after a light rain had fallen, and several cracks were present with water passing through them. The concrete on the beam seat was sound, but water was accumulating at several spots. Debris left after the abutment rehabilitation will allow this moisture to stay on top of this concrete.

The wing walls appear to be plumb and in proper alignment with the abutment seat. The concrete was sound and no apparent defects were observed at the time of inspection.

Pier: The pier is in GOOD CONDITION which corresponds to an NBIS and IDOT condition rating of 7. This value agrees with the value reported of 7 in the current structure summary report. An assessment exhibit of the Pier can be found in Attachment E, with photos of the Pier found in Attachment H.

The pier cap has seen minor patching for a delaminated and spalled area that was located at the east end of the wall stem. The repair appeared to be sound and in good condition. The pier cap and bearing seats were rebuilt during the superstructure replacement. The demolition left significant staining on the wall face, which made it difficult to identify cracking present. Due to access limitations and silting near the pier, only the lower portion of the wall was sounded. No delamination or spalls were observed, nor was any significant cracking identified.

Scour / Slope Protection: The scour / slope protection is in SATISFACTORY condition, which corresponds to and NBIS and IDOT condition rating of 6. This agrees with the current Structure Summary Report listed in the IDOT database, as shown in Attachment B. The slope protection present through the channel is Class A4 dumped stone rip-rap with filter fabric bedding. The details for the slope protection can be seen in Attachment L or in the Photo Exhibits in Attachment H.

The rip rap slope walls were well formed and intact at the time of inspection, with minor displacements of the bedding and rock near the banks through the channel. Minor erosion was noted at the banks but did not appear to be of immediate concern at this time. The channel is well silted in through the bridge opening, the pier footing appeared to be covered with sediments and river bedding material, leading to the belief that no significant scour was present at the time of inspection. There was no in-service scour protection or countermeasures observed at the Pier.

Inspection History (NBIS Ratings):

The three most current historical NBIS ratings for this structure are reported in TABLE III-A. See Attachment B for more information.

TABLE III-A

Year	Deck	Superstructure	Substructure	Channel
2016	7	8	7	6
2012	7	8	7	6
2010	8	8	7	7

Geometric, Horizontal and Vertical Clearance Data:

As noted above, the existing bridge is constructed on a crest vertical curve with an entrant grade of 0.63% and an exit grade of -0.513%. The vertical crown of the bridge based on the roadway profile is located just south of the pier centerline on the structure, with the PGL aligning with the CL of IL 47. As the roadway lane alignment is based on a horizontally curving geometry, the deck cross section appeared to be fully super elevated with a grade of 2% sloping from East to West.

This structure spans over a water feature thus vertical and horizontals clearance issues, including design freeboard, will be discussed in the Hydraulic Data section below.

Hydraulic Data:

The existing stream section through the bridge is well defined, and appeared to be without debris or obstructions built up in the channel near the structure. The riprap slope walls were well formed and intact at the time of inspection. Minor erosion was noted at the banks but did not appear to be of immediate concern at this time. The channel is well silted in through the bridge opening, and probing for scour did not appear to reveal any significant pitting at the upstream end of the pier. The pier footing appeared to be covered with sediments and river bedding material, leading to the belief that no significant scour was present at the time of inspection.

As part of the ongoing Phase 1 study in this region, an updated Waterway Information Table has been created, see Attachment I for more information. The existing bridge plans, located in Attachment L, listed the minimum vertical clearance as 2.59’ compared to a minimum required value of 2.0’. The current version from the Phase 1 report listed the calculated freeboard as 3.92’ compared to a minimum required value of 3.0’. No indication of water staining or damage to the structure or channel gave the impression that overtopping or freeboard encroachment is an issue with this bridge.

IV. Potential Scope of Work Determination and Analysis:

A detailed inspection was performed to evaluate the in service condition of this structure. Areas of concern were documented in the narrative in Section III of this report and in the exhibits located in Attachments D and E. Photographs have been used to identify typical features of this bridge as well areas that appear to be in distress or functionally deficient. These photos are presented in Attachment H.

The bridge deck elements are rated in GOOD condition and will require very little rehabilitation. The superstructure is considered to be in VERY GOOD condition and is structurally rated for an HS 33.6 loading (Inventory) which is considered acceptable to remain in service along this route. The substructure is in GOOD condition and will not require rehabilitation. The approach roadway alignment is considered to be EQUAL TO PRESENT DESIRABLE CRITERIA; the approach guardrail is rated NOT ACCEPTABLE; and the waterway adequacy is rated SUPERIOR TO PRESENT DESIRABLE CRITERIA.

The bridge structure was originally constructed in 1967, and the superstructure (deck and beams) was replaced in 2003. At the time of inspection, the original bridge elements have been in service for approximately 50 years. The estimated remaining service lives of the structural elements are listed in TABLE IV-A. These values are presented for discussion purposes only to aid in the evaluation of alternatives for the rehabilitation or replacement of the in-service structure.

TABLE IV-A

Element	Estimated Service Life	Element In-Service Age	Service Life Remaining
Deck	50	14	36
Beams	80	14	66
Substructure	100	50	50

A Phase I Project Report is currently being prepared for an approximate 2.1-mile-long segment of IL 47 and the associated interchange with I-88. The IL 47 bridge over Blackberry Creek (SN 045-0024) is located within the project limits. The report indicates the roadway needs to be widened to two lanes in each direction to accommodate projected traffic volumes. In addition, a 10' wide future multi-use path is anticipated on the east side of IL 47 and a 5' wide future sidewalk is anticipated on the west side of IL 47. The currently proposed bridge deck width will include the width required for the future path and sidewalk. The proposed bridge cross section is shown in Attachment G.

During development of the Project Report, a determination was made by District 1 Programming that a new bridge (if recommended) should provide for a wildlife crossing below the bridge superstructure. A portion of the wildlife crossing might be converted to a bicycle path in the future. The wildlife crossing should be adjacent to the stream channel and located on the north side of the stream. The wildlife crossing should be 20' wide and should provide 9' of vertical clearance. The elevation of the wildlife crossing should be approximately 2' higher than the normal stream elevation.

Description and Analysis of Alternatives

Presented below are two alternatives for Structure Number 045-0024. One is for rehabilitation and widening of the existing bridge and the second is for complete removal and replacement of the bridge. Both alternatives have been developed with consideration given to initial construction cost, service life remaining, staged construction constraints, established design criteria and department policies governing similar structures.

Alternative 1 – Bridge Widening

The scope of work for Alternative 1 primarily consists of widening the existing bridge structure. Most of the existing bridge structure would remain in service, therefore minor repairs to the

existing bridge are included. The minor repairs include one small area of deck patching and the application of concrete sealer on the bridge deck. During the inspection, limited deck areas with narrow width cracks were noted. The concrete sealer is intended seal the cracks in order to slow deck deterioration.

The widening work would increase the out-to-out width of the deck from 47'-2" to 106'-0". The abutments and piers would be widened (extended) using cross sectional dimensions similar to the existing. The back-to-back of abutments length would remain as 116'-10". Steel beams similar to the existing beams would be added on each side of the deck. The existing parapets and a portion of the existing deck would be removed. Approximately 37' of the existing 47'-2" wide deck would remain in service and would be widened on each side.

The existing inventory load rating (HS 33.6) indicates the bridge is adequate to routinely carry legal truck loads for an indefinite period of time. The proposed rehabilitation work would not change the load rating.

The estimated construction cost for **Alternative 1** is **$2,166,000**. A detailed breakdown of the estimated cost is included in Attachment F. This cost does not include roadway items, guardrail or embankment costs.

We believe the existing bridge could be widened in two construction stages. The existing bridge has a clear width between the parapets of 44'-0". In Stage I the traffic could be moved to the west side of the bridge while the east side is widened and a portion of the east side of the bridge is removed and replaced. The east parapet (protecting the multi-use path) would also be constructed in Stage I. In Stage II the traffic would be moved next to the new east parapet while the west side of the bridge is widened and replaced.

Alternative 2 – Complete Bridge Replacement

The scope of work of Alternative 2 consists of complete removal and replacement of the existing bridge. As with Alternative 1, the out-to-out width of the bridge would be 106'-0".

To accommodate the wildlife crossing/bicycle path discussed above, the back-to-back of abutments length would be 145'-0" and the proposed North Abutment would be located approximately 18' north of the existing North Abutment. The proposed South Abutment would be located about 1' south of the existing South Abutment. Integral abutments are proposed.

The initial assumption is that the proposed bridge would have two spans and the deck would be supported by rolled steel beams, but the final determination would be made during the TSL Phase.

The profile of the new bridge would need to be raised about 3.4' to provide the 9' of vertical clearance required over the wildlife crossing/future bicycle path.

The new culvert would be designed using the current LRFD Design Load of HL-93. This design load is adequate to routinely carry legal truck loads for an indefinite period of time.

The estimated construction cost for **Alternative 2** is **$3,517,000**. A detailed breakdown of the estimated cost is included in Attachment F. This cost does not include roadway items, guardrail or embankment costs.

Similar to Alternative 1, we believe the existing bridge could be replaced in two construction stages. In Stage I the traffic could be moved to west side of the bridge while the east side is widened and a portion of the east side of the bridge is removed and replaced. In Stage II the traffic would be moved against the new east parapet while the remainder of the bridge is replaced.

A third alternative, Complete Replacement with Dual Bridge Structures was also given brief consideration. This alternative would provide a lower cost than Alternative 2 by eliminating the deck and beams in the median area. The proposed median is 14' wide. With dual structures, two 1'-7" wide parapets would be required at the median. Therefore, 10'-10" of deck width would be eliminated. With the relatively small space between the structures, the abutments and pier would be continuous across the full width (as with Alternative 2). The dual structures alternative would require guardrail barrier terminals in the median to protect the ends of the median parapets. The net cost saving with the dual structures alternative would be about $155,000 (deck and beam savings minus costs for added median parapets and guardrail). The presence of median parapets and guardrail creates additional safety hazards. In addition, the parapets and guardrail reduce the roadway aesthetics. In our opinion, the safety and aesthetic improvements are sufficient to offset the $155,000 cost savings. Therefore, the dual structures alternative was eliminated.

V. Discussion and Recommended Scope of Work:

Alternatives were developed and analyzed in Section IV to address the observed and recorded deficiencies for Structure Number 045-0024, IL 47 over Blackberry Creek. In this section, the positive and negative merits of the potential scopes of work are evaluated and summarized. The reasoning for the selection of the proposed scope of work will be documented as well as any known external constraints that would affect the selection of a desired course of action.

Cost: The estimated construction cost for Alternative 1 is $2,166,000 and the estimated construction cost for Alternative 2 is $3,517,000. Alternative 1 is $1,351,000 less expensive and the cost is 61.6% of the Alternative 2 cost. Per IDOT's "Bridge Condition Report Procedures & Practices" manual, modifying the existing structure may be considered if the cost to modify is less than 60% of the replacement cost. Since the cost to widen the existing bridge is greater than the 60% threshold, widening does not appear to be a prudent option.

Staging and Constructability: Both alternatives can be constructed in two stages. It is believed Alternative 2 would have a longer duration since it requires construction of a larger structure area. A constructability issue is present with Alternative 1 that would require additional time for careful removal of portions of the existing structure and for field drilled connections to the existing steel and concrete.

Hydraulics: Both structures will meet the hydraulic design requirements presented in Attachment I, although Alternative 2 would provide a larger waterway opening. Alternative 2 requires a raise to the roadway profile which would further reduce any potential for roadway overtopping or channel restrictions based on the provided hydraulic analysis.

Service Life: The remaining life for Alternative 1 deck is estimated be 36 years while the remaining life for the Alternative 2 deck is estimated to be 50 years. The remaining service life of the Alternative 1 substructure is estimated to be 50 years while the remaining life for the Alternative 2 substructure is estimated to be 100 years.

Aesthetics/Maintenance: Both alternatives provide a 106' proposed deck width. For Alternative 1, about 37' of the width (35%) would remain in-service from the 2003 construction. The Alternative 1 deck appearance would be less desirable due to the mix of new and older deck. It is also undesirable to have a relatively small portion of the deck on a different maintenance cycle.

Other: Both alternatives would provide the same roadway cross section, guardrail type and guardrail location. Therefore, there would be no safety advantage for either alternative. Also, both structures would be capable of routinely carrying legal loads for an indefinite period of time, therefore neither alternative offers an advantage in regards to load carrying capacity. Alternative 2 provides for a wildlife crossing/future bicycle path that is desired by IDOT District 1 and the Forest Preserve District of Kane County. The Alternative 1 abutment locations (existing) are too close to the stream channel to provide a specific area for animals to cross IL 47.

Recommended Scope of Work

The initial construction cost for Alternative 1 (widening) is greater than 60% of the cost for Alternative 2 (complete replacement). Per IDOT guidelines, complete replacement is the recommended alternative for this condition. Alternative 2 will provide for an animal crossing and future bicycle path that are not possible with Alternative 1. In addition, with Alternative 1, only 35% of the existing structure would remain in-service. We believe this is an undesirable condition in regards to aesthetics, future maintenance and remaining service life. We recommend Alternative 2, complete removal and replacement of the existing bridge.

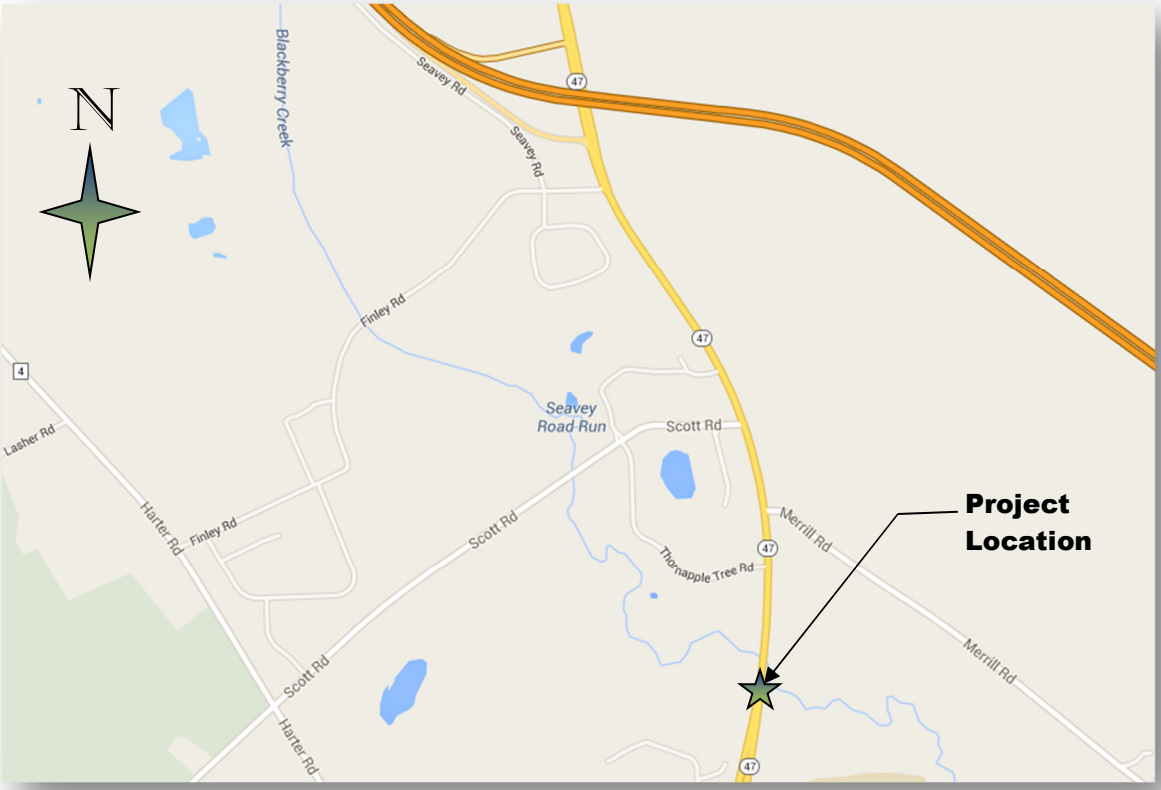
Following is the recommended scope of work for Alternative 2. All work would occur in two construction stages:

1. Remove the existing superstructure and substructure.
2. Construct new wider (longer) integral abutments behind the existing abutments.
3. Install riprap on the embankment in front of the abutments.
4. Construct one (assumed) new pier north of the existing pier. A cofferdam is anticipated for this work. The wider (longer) pier and the abutments should be on a 30 degree skew.
5. Fabricate, and erect new beams. The total structure length will be approximately 145' (back-to-back of abutments)
6. Construct a new 8" thick concrete deck including parapets and railings. The deck width will be approximately 106'.
7. Construct bridge approach slabs.
8. Construct the new embankment, roadway, shoulders and guardrail.

The proposed bridge is shown in Attachment G. The estimated construction cost for **Alterative 2** is **$3,517,000**. A detailed breakdown of the cost estimate, including preliminary quantities and contingency can be found in Attachment F. The cost is in 2017 dollars and should be escalated when the construction year is determined.

ATTACHMENT A

Location Map



ATTACHMENT B

IDOT Master Structure Report

Included in this attachment is the current IDOT Structure Summary Report, last updated on February 5th, 2016 for Structure Number 045-0024, IL Route 47 over Blackberry Creek.

Illinois Department of Transportation
Structures Information Management System
Structure Summary Report

Structure Number: 045-0024 **District:** 1

Inventory Data

Facility Carried: IL 47
Feature Crossed: BLACKBERRY CREEK
Bridge Remarks:
Bridge Status: 1 OPEN - NO RESTRICT
Status Remarks:
Maint County: 045 KANE
Maint Responsibility: 01 I.D.O.T.
Service On/Under: 1 HIGHWAY 5 / WATERWAY
Reporting Agency: 1 I.D.O.T. - BUREAU OF MAINTENANCE
Main Span Matl/Type: 4 STEEL CONTINUOUS / 02 STRINGER/MULTI-BEAM/GIRDER
Nbr Of Main Spans: 2 **Nbr Of Approach Spans:** 0
*****Approaches*****
Near #1 Matl/Type: /
Near #2 Matl/Type: /
Far #1 Matl/Type: /
Far #2 Matl/Type: /
Median Width/Type: 0 Ft. / 0 None
Guardrail Type L/R: 0None / 0 None
Toll Facility Indicator: 0 No Toll
Latitude: 41.80493709 **S Longitude:** 88.46049669 **S**
Deck Structure Type: A CIP CON NRMLLY FORM
Sidewalks Under Structure: 0 None

Bridge Name:
Location: 1.0 M S OF I-88
Status Date: 12/2003
Maint Township: 15 SUGAR GROVE

Sufficiency Rating: 98.0
HBP Eligible: No
Replaced By: -
Replaces: -
Last Update Date: 07/05/2012
Parallel Structure: None
Multi-Level Structure Nbr:
Skew Direction: L Left
Skew Angle: 30 **D**
Structure Flared: No
Historical Significance: No
Border Bridge State:
Bdr State SN:
Bdr State % Responsibility: 0
Structural Steel Wt 114500
Substructure Material:

Structure Length: 116.8
AASHTO Bridge Length: 99.9
Length of Long Span: 55.4
Bridge Roadway Width: 44.0
Appr Roadway Width: 44.0
Deck Width: 47.2
Sidewalk Width Right: 0.0
Sidewalk Width Left: 0.0
Navigation Control: 0 No
Navigation Horiz Clear: 0
Navigation Vert Clear: 0
Culvert Fill Depth: 0.0
Number Culvert Cells: 0
Culvert Opening Area: 0.0
Culvert Cell Height: 0.00
Culvert Cell Width: 0.00

Rated By: 2 IDOT **Rate Method:** 6
Inventory Rating: 1.680(60) **Load Rating Date:** 03/08/2004
Operating Rating: 2.750(99)
Design Load: 02 HS20
Deck Structure Thickness: 7.5 **SD:** N **FO:** N
RR Vertical Underclear: 0 **Ft** 0 **In**

Railroad Crossing Info
Crossing 1 Nbr:
Crossing 1 Nbr:
RR Lateral Underclear: 0.0

Key Route On Data

Key Route Nbr: FEDERAL-AID PRIMARY 0326
Appurtenances Main Route 00000
Inventory County: 045 KANE
Township/Road Dist 15 SUGAR GROVE
Municipality 0000
Urban Area: 1051 1051
Functional Class: 3 OTHER PRINCIPAL ARTERIAL
**** CLEARANCES **** **South/East** **North/West**
Max Rdwy Width: 44.0
Horizontal: 45.2 0.0
Lateral:

Station: 25.5400
Segment:
Linked: Y
Natl. Hwy System: On NHS
Inventory Direction:
Curr AADT Yr/Count: 2015 / 9650
Est Truck Percentage: 25
Number Of Lanes: 2
One Or Two Way: 2 Two-Way
Bypass Length: 0
Future AADT Yr/Cnt: 2032 / 12569
Designated Truck Rte: CLASS II
Special Systems: Yes

Key Route Under Data

South/East **North/West**

Station:
Segment:
Linked:
Natl. Hwy System:
Inventory Direction:
Curr AADT Yr/Count: /
Est Truck Percentage:
Number Of Lanes:
One Or Two Way:
Bypass Length:
Future AADT Yr/Cnt: /
Designated Truck Rte:
Special Systems:

*** Marked Route On Data ***

	Designation	Kind	Number
Route #1:	1 Mainline	3 State Highway	047
Route #2:	1 Mainline		
Route #3:	1 Mainline		

*** Marked Route Under Data ***

Designation	Kind	Number

Attachment I

Illinois Department of Transportation
Structures Information Management System
Structure Summary Report

Structure Number: 045-0024 **District:** 1

Data Related to Inspection Information

*** Inspection Intervals ***				*** Maximum Allowable Posting Limits ***				Bridge Posting Level:	
Routine NBIS:	48 MOS	**Underwater:**	0 MOS	**One Truck At A Time:**	0	**Combination Type 3S-1:**	Tons	5	No Posting Required
		Special:	N	**Single Unit Vehicles:**	Tons	**Combination Type 3S-2**	Tons		

Inspection/Appraisal Information

Inspection Date: 02/05/2016 **Inspection Temperature:** 28Deg. F

Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS						**Single Unit Vehicles:**	Tons
Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED						**Combination Type 3S-1:**	Tons
Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS						**Combination Type 3S-2:**	Tons
Culvert:	N	NOT APPLICABLE						**One Truck At A Time:**	0
Channel and Protection:	6	SATISFACTORY CONDITION - MINOR DETERIORATION	**Deck Wearing Surf:**	A	BARE DECK NO OVRLAY			**Last Paint Type:**	S
Structural Evaluation:	7	BETTER THAN PRESENT MINIMUM CRITERIA	**Deck Membrane:**	F	NONE			SHP ZINC&FLD ACRYL	
Deck Geometry:	6	EQUAL TO PRESENT MINIMUM CRITERIA	**Deck Protection:**	A	EPOXY COATED REINF				
Underclearance-Vert/Lat.:	N	NOT APPLICABLE	**Total Deck Thick:**	7.5					
Waterway Adequacy:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA	**Last Paint Date:**	05/2004					
Approach Roadway Align:	8	EQUAL TO PRESENT DESIRABLE CRITERIA							
Bridge Railing Appraisal:	3	Meets Standards							
Approach Guardrail:	222	Not Acceptable	Not Acceptable	Not Acceptable					
Pier Navig Protection:	N	N/A							

** Actual Posted Limits **

Underwater Inspection/Appraisal Information

Inspection Date:
Temperature: **Inspection Method:**
Appraisal Rating:

Scour Critical Information

Rating: 5 CALCULATED SCOUR ACCEPTABLE **Evaluation Method:** B Rational Analysis
Analysis Date: 06/19/1996

Miscellaneous

Microfilm Data Recorded: Yes

Construction Information

Year:	1968	Original	2003	Reconstructed	
Route:	FA-64	**Sta:** 353+40	FAP326		**Sta:** 353+60.00
Section Nbr:		107-B-1-I		107-B-1-R-1	
Contract Nbr:				62031	
Fed Aid Pr#:		F 1580012000		ACBHF-326(47)	
Built By:	1	I.D.O.T.	1	I.D.O.T.	

Attachment I

ATTACHMENT C

Bridge Inspection Report

Included in this attachment is the three most current available NBIS Bridge Inspection Report (BIR) data files and the provided PONTIS information for Structure Number 045-0024, IL Route 47 over Blackberry Creek.

Illinois Department of Transportation

Routine Inspection Report

SN: 045-0024	District: 1	Spans: 2	Appr. Spans: 0	Skew: 30	ADT: 9650	Truck Pct: 26
ADT Un:	Maint. Co: KANE		Twsp: SUGAR GROVE		Status: OPEN, NO RESTRICTIONS	
Facility Carried: IL 47			Feature Crossed: BLACKBERRY CREEK			
Location: 1.0 M S OF I-88	Municipality:				Team/Sub Section: 129/475	Insp/Rte: 029
Bridge Name:			Material & Type: STEEL CONTINUOUS/MULTI-BEAM			
Insp. Intervals Routine: 48	Fracture Critical: 0	Underwater: 0			Special: N/A	Element Level: 48

90 - Inspection Date:	02/05/16	90C - Temp. (°F):	28	90B1 - In-Depth	☒
Is Delinquent:	N	Reason:			
90A - Agency Program Manager:	MastnySC	90A3 - Consultant Program Manager:			
90A1 - Team Leader:	ValentineMA	90A2 - Inspector:	ADELEKE PA 2/8/16		
90B - Inspection Remarks:					

Previous Inspection: ITEM58:DUE TO NUMER HL TRANSV CRACKS THRUOUT & HL RANDOM&LONGIT CRACK ALONG ABTT BONDED JTS. ITEM60:NUMER HP'S MOST TO N FACE PIER. ITEM61:MOD EROSION TO UP & DOWNSTREAM BANKS. ELEMENTS #ED ACCORDING TO PLANS

1:30 2-8-16

Resources

Time to Inspect(H:M):		~~2:0~~	Traffic Control:			Boat:			Waders		W	Snooper:			
Ladder:			Manlift:			Bucket Truck:			Other:			~~Chest~~waders 2/8/16			

Inspector's Appraisals

	Prev	New	
58 - Deck Condition:	7	7	Top:Small edge spall SB along N&S abt bonded jt, numer HL transv cracks, HL random crack following skew of abt @ N&S along w/numer fine hl shrinkage type map cracks. Soffit:Scattered fine HL transv cracking, lt deck seperatation from T/F bms 2,7 over pier
59 - Superstructure Cond:	8	8	
60 - Substructure Cond:	7	7	Pier stem: HL vert cracking N & S faces, numer small-med HP's NF pier isol on S face, hl hoirz cracking below cap north face & HL map cracking to W end
62 - Culvert Condition:	N	N	
61 - Channel Condition:	6	6	Lt-moder erosion to up and downstream banks
71 - Waterway Adequacy:	9	9	
72 - Approach Rdwy Align:	8	8	
111 - Pier Navig Protection:	N	N	

Additional Inspection Data

	Prev	New		Prev	New		Prev	New		Prev	New
36A - Bridge Railing Adequacy:	3	3	Approach Guardrail Adequacy: 36B - Transitions:	3	2	36C - Guardrail:	3	2	36CD - Ends:	3	2

Attachment C

Illinois Department of Transportation

Structure Number: 045-0024

Routine Inspection Report

	Prev	New	
108A - Wearing Surface Type:	A	A	If 'L-Other' Describe:
108B - Type of Membrane:	F	F	If 'E-Other' Describe:
108C - Deck Protection:	A	A	If 'I-Other' Describe:
108D - Total Deck Thickness (In.):	7.5	7.5	

59A - Paint Date(Mo/Yr):	05/2004	05/2004	
59B - Paint Type:	S	S	Color: Fascia - _____; Inter. - _____; Railing - _____.
59C - Utilities Attached:	N N N	N N N	If 'B-Other' Describe:

		Prev	New	
Weight Limit Posting:	70A2 - Single Unit Vehicles:			Tons
	70B2 - Combination Type 3S-1 (3 or 4 axles):			Tons
	70C2 - Combination Type 3S-2 (5 or more axles):			Tons
	70D2 - One Truck at a Time:			

Joint Openings (In.): _____

90B - Inspection Remarks:

In-depth inspection notes: Semi-integral abts, bm ends are encased in concrete. Can access abt brgs by slopewall and pier brgs w/medium ladder or UB 50 if needed. ELEMENTS #ED ACCORDING TO PLANS (S-N & W-E)

	Signature	Date
Inspection Team Leader:	MV-SM	2/8/16
Consultant Program Manager:		/ /
Agency Program Manager:	[signature]	2/16/16

Attachment C

Illinois Department of Transportation

Element Level Inspection Report

SN: 045-0024	District: 1	Spans: 2	Appr. Spans: 0	Skew: 30	ADT: 9650	Truck Pct: 26
ADT Un:	Maint. Co: KANE		Twsp: SUGAR GROVE		Status: OPEN, NO RESTRICTIONS	
Facility Carried: IL 47			Feature Crossed: BLACKBERRY CREEK			
Location: 1.0 M S OF I-88	Municipality:				Team/Sub Section: 129/475	Insp/Rte: 029
Bridge Name:			Material & Type: STEEL CONTINUOUS/MULTI-BEAM			
Insp. Intervals Routine: 48	Fracture Critical: 0		Underwater: 0		Special: N/A	Element Level: 48

93D - Inspection Date:	2/5/16	93C6 - Temp. (°F):	28°
Is Delinquent		Reason:	
90E - Agency Program Manager:	MASTNY SC	90E3 - Consultant Program Manager:	
90E1 - Team Leader:	VALENTINE MH	90E2 - Inspector:	

Resources

Time to Inspect(H:M):	0:0	:	Traffic Control:			Boat:			Waders			Snooper:	
Ladder:			Manlift:			Bucket Truck:			Other:				

Inspector's Appraisals

Element	Element Description	Env	Quantity	Unit	CS1	CS2	CS3	CS4
8026	Concrete Deck Protected w/ Coated Bars	3	5513	SF	5512	1	0	0
	Remarks: Top:Small edge spall SB@ N&S abt bonded jt, numer HL transv cracks, HL random following skew of abts N&S. Soffit:Scattered fine HL transv cracking, lt deck seperation from T/F bms 2,7 over pier							
8118	Non-Lead Painted Steel Open Girder	4	6992	SF	6992	0	0	0
	Remarks							
210	Reinforced Conc Pier Wall	1	1218	SF	1103	49	66	0
	Remarks: HL vert cracking N&S faces, numer small HP's NF pier isol on S face & HL map cracking to W end							
215	Reinforced Conc Abutment	1	420	SF	420	0	0	0
	Remarks							
234	Reinforced Conc Pier or Abutment Cap	1	166	LF	166	0	0	0
	Remarks: Pier: isol HL vert crack below bay 7							
310	Elastomeric Bearing	4	16	EA	16	0	0	0
	Remarks							
313	Fixed Bearing	4	8	EA	8	0	0	0
	Remarks							
8323	Approach Pavement	3	2	EA	2	0	0	0
	Remarks: Isol HL transv & diag cracking in SB N appr lane							
331	Concrete Bridge Railing	3	234	LF	234	0	0	0
	Remarks: Cement finish chipping off thru-out							

	Signature	Date
Inspection Team Leader:	Michael Valentine	2 / 8 / 16
Consultant Program Manager:		/ /
Agency Program Manager:		2 / 16 / 16

Attachment C

045-0024
2/5/16
28°
M.V. Y.A

ELEVATIONS ALONG PIER

PIER

SP1 (S)

	ELEV
1 = 1.5	= 695.08
2 = 2.0	= 694.58
3 = 1.83	= 694.75
4 = 1.17'	= 695.41
5 = 1.33	= 695.25
6 = 1.5	= 695.08
7 = 1.5	= 695.08
8 = 1.42'	= 695.16

SP2 (N)

	ELEV
1 = 1.0'	= 695.58
2 = .83	= 695.75
3 = 1.17	= 695.41
4 = 1.0'	= 695.58
5 = 1.25'	= 695.33
6 = 1.33	= 695.25
7 = 1.33	= 695.25
8 = 1.25	= 695.33

H_2O = 696.58

NO SIGNIFICANT CHANGES

TOP OF FOOTING ELEV = 691.41

BOTTOM OF FOOTING ELEV = 689.69

Attachment C

045-0024

2/5/16

28°

▽ = 16.90'   M.Y., YA

H_2O = 696.58

E

~~S. ABT = 0'~~ =

SE WW Top = 5.18

Station	Reading	ELEV.
S. ABT = 0'	10.6'	702.88
10'	10.28	703.20
20'	15.50	697.98
23'	15.72	697.76
25	17.56	695.92
30	17.72	695.75
40	17.48	696.00
50	17.91	695.57
Pier Nose	17.82	695.66
60	18.97	694.51
70	18.06	695.42
80	18.10	695.38
85	17.24	696.24
85	15.70	697.78
90	15.16	698.32
100	12.54	700.94
Nabt	10.50'	702.98

WEST

~~SW WW Top~~:

Station	Reading	ELEV.
S. ABT = 0'	10.80	702.68
10'	13.47	700.01
20	17.50	695.98
30	18.16	695.32
40	18.00	695.48
50	18.55	694.93
P Nose	17.92	695.56
60	17.82	695.66
70	18.42	695.06
80	18.22	695.26
83	17.76	695.72
85	16.00	697.48
90	15.40	698.08
100	12.34	701.14
Nabt	10.80	702.68

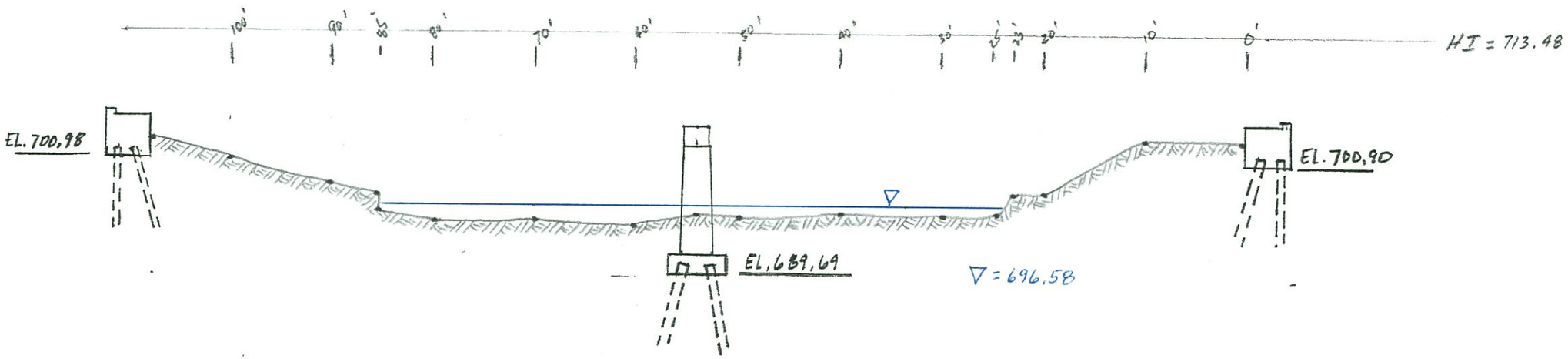
ELEV. SE WW TOP = 708.30
+ 5.18
HI = 713.48

Attachment C

045-0024
IL.47/BLACKBERRY CR.

EAST ELEVATION

LOOKING EAST

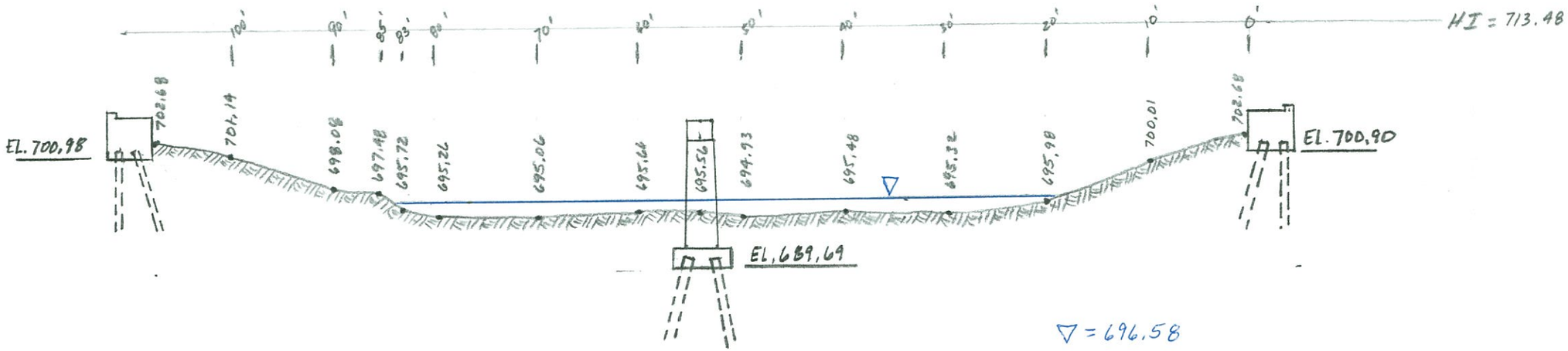


Attachment C

IL 47/BLACKBERRY CR

WEST ELEVATION

LOOKING EAST



Attachment C

Illinois Department of Transportation

Bridge Repairs Report

Structure Number: 0450024

Location & Inventory Information

Facility Carried: IL 47 | Feature Crossed: BLACKBERRY CREEK

Location: 1.0 M S OF I-88 | Team Section: 129

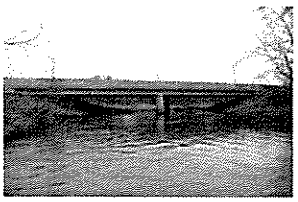
Mat/Type/#Spans: Steel continuous/Multi-beam/2

*** PROPOSED MAINTENANCE REPAIRS ***							
(Only Active IWC's are Shown)							
Repair Code	**Repair Description**	**IWC Date**	**Completed By**	**Prty. Code**	**Qty.**	**Unit**	**Inspector**
Status	**Comments**						
455	BRIDGE SEALING	02/05/2016	CM	M	918	SQ. YD.	VALENTINEMA
AP	Seal the entire wearing surface and approaches. Last sealed 2012 CN: 60R92						
551	PARTIAL DEPTH BRIDGE DECK PATCHING	02/05/2016	BC	M	1	SQ. YD.	VALENTINEMA
AP	Repair small construction PD patch SB lane @ N & S abt						
751	BRIDGE EPOXY INJECTION	02/05/2016	BC	L	94	LIN. FT.	VALENTINEMA
AP	Seal the bonded jts at the abuts that have opened up						

SM

Attachment C

045-0024
2/5/16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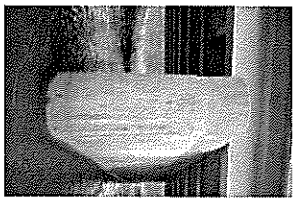
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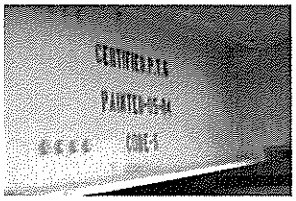
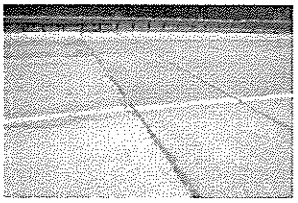
4_201625_0031_Elevation-Ea


1625_0032_SuperStructure-P

_020516_0000 Appraoch looki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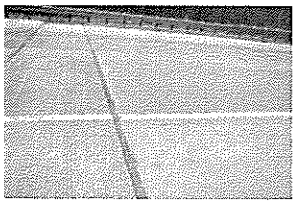
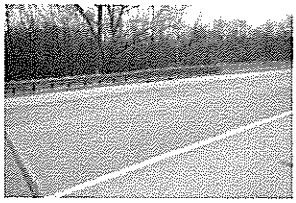
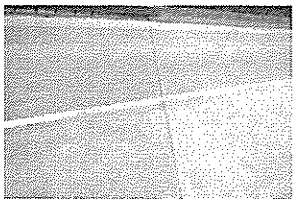

ment relief joint and S half of S


516_0003_S approach pvt loo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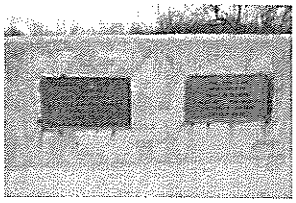
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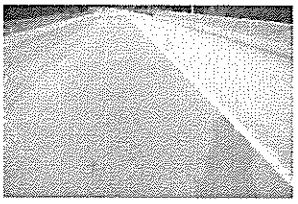
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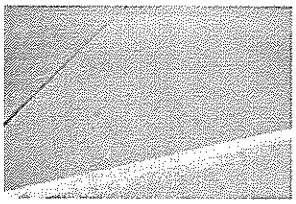
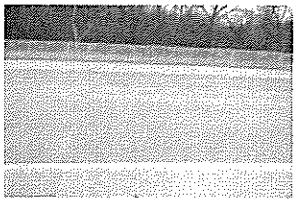

007_ NB lane near S bonded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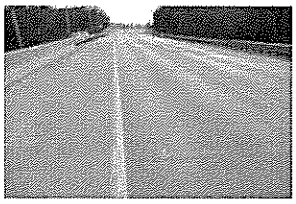
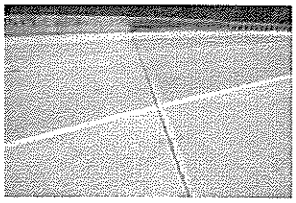

516_0009_S half of NB lane L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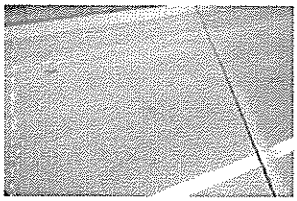
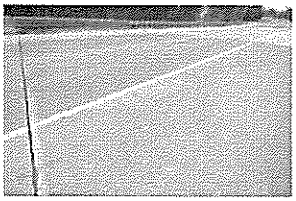
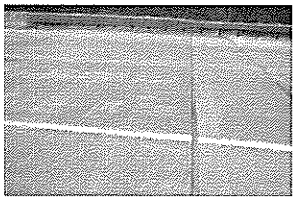
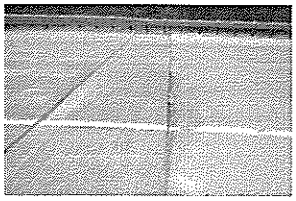
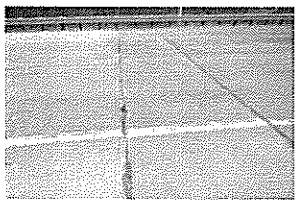

011_NB lane along N abt bonc

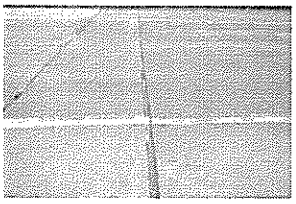

ıbut bonded joing & N approac

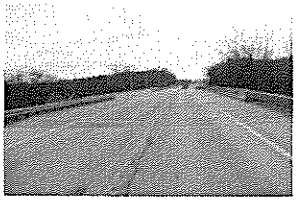
020516_0013 _N Appr looking

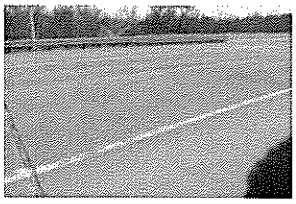

proach pavement & N pavem

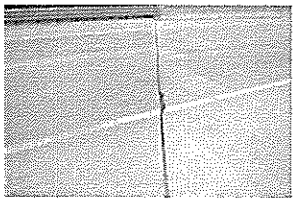

20516_0015 N connector look

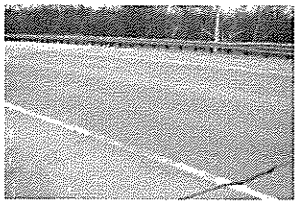

020516_0016 N connector lool

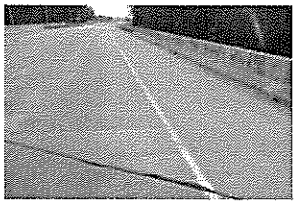

5_0017_ N pavement relief joir


4_020516_0018 Appr looking

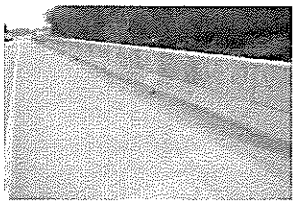

5_0019 N approach pavement

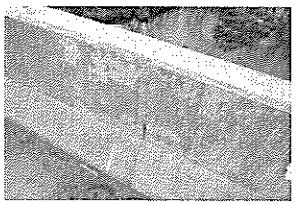

516_0020_N abut bonded joint


_0021_ N approach pavemen

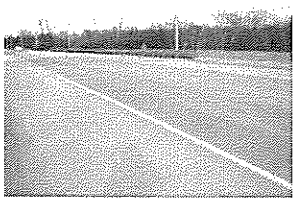

_020516_0022 _SB lane lookii

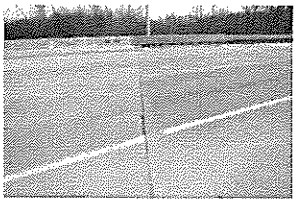
24_020516_0023 E bridge rai

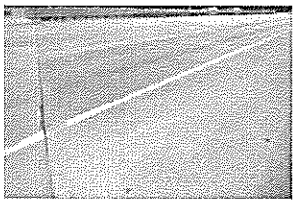

20516_0024 W bridge rail lool

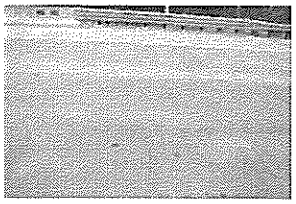

20516_0025 W bridge rail ove

_020516_0026 Over Pier looki


0516_0027 N half of bridge lo

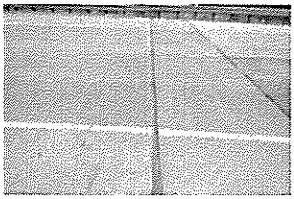

_0028_ S abutment bonded jc


6_0029 S approach pavement

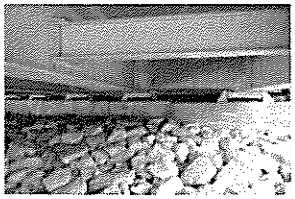

5_0030_ S approach pavemen

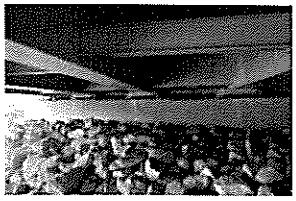
Attachment C

)031_ South approach pavem

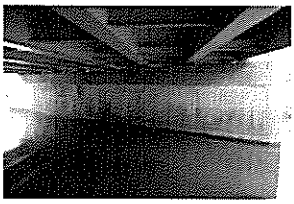

6_0032_ S pavement relief joi

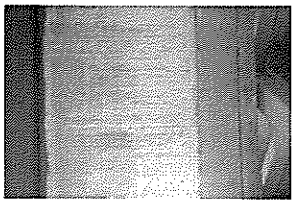
!4_201625_0000_Abutment-S


1625_0001_Abutment-S abt b

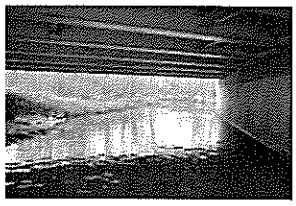

1625_0002_Abutment-S abt b

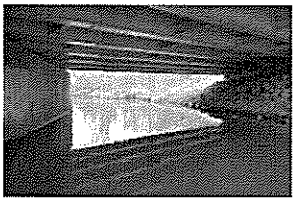
24_201625_0003_Wingwalls-S

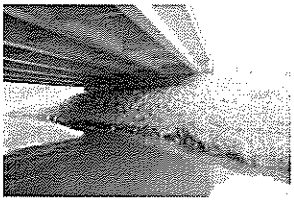

201625_0004_Pier-South elev

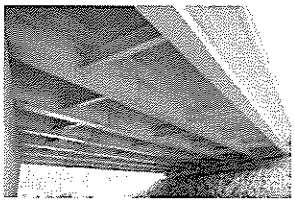

_Pier-S elevation below bm 7 l

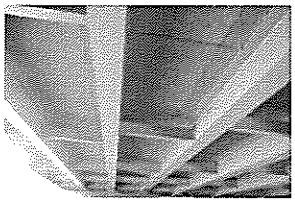
)06_Channel-Downsteam eas

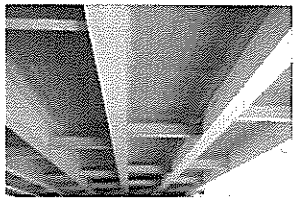

-Sp1 from S looking upstream

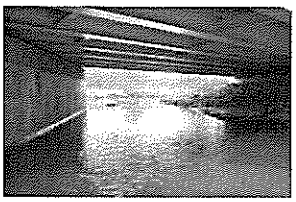

-Sp2 from S looking upstream


0009_Slope Protection-N slop

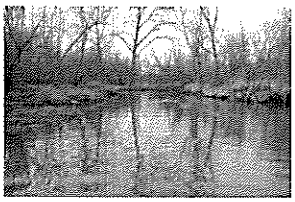

uperStructure-Sp2 from S ger

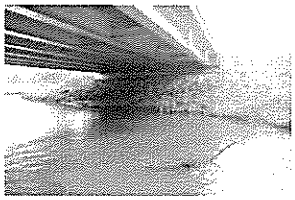

11_Deck Soffit-Sp1 from S bel

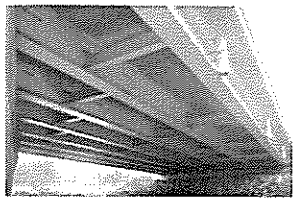

12_Deck Soffit-Sp1 from S bel

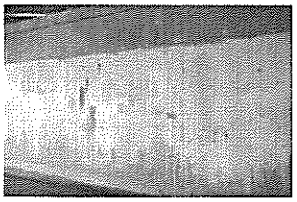

el-Sp1 from S looking downstr

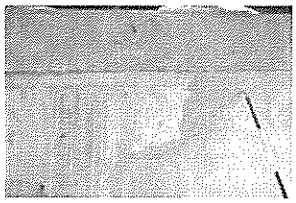
el-Sp2 from S looking downstr

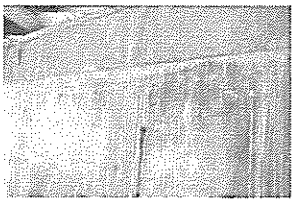

)015_Channel-Upstream east

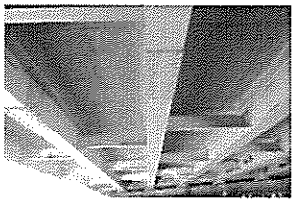

)16_Slope Protection-South sl

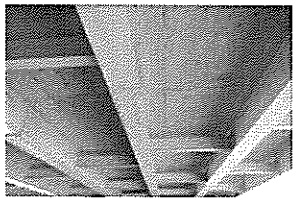

)017_SuperStructure-Sp1 fron


Pier-N face below bms 5 & 6 fr


9_Pier-N face below bm 2 fron

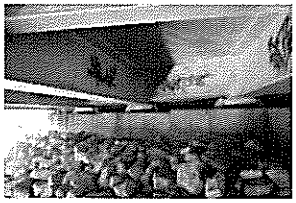

_Pier-N face below bm 3 from


21_Deck Soffit-Sp2 from S bel

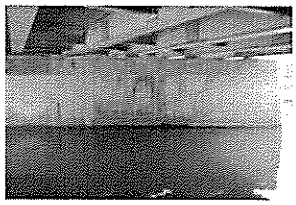

22_Deck Soffit-Sp2 from S bel

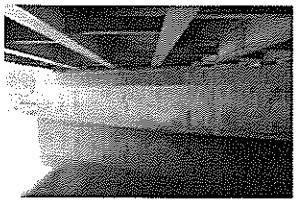
24_201625_0023_Wingwalls-N

1625_0024_Abutment-N abt b


1625_0025_Abutment-N abt b

4_201625_0026_Wingwalls-N


1625_0027_Pier-N elevation b


1625_0028_Pier-N elevation b

Attachment C

Inspection Appraisal Data 1

Today's Date: 03/10/2016

Structure Number:	045-0024 **(2) District:** 1	**(41) Bridge Status:**	1 OPEN - NO RESTRICT
(6) Feature Crossed:	BLACKBERRY CREEK	**(7) Facility Carried:**	IL 47
(9) Location:	1.0 M S OF I-88	**(7A) Bridge Name:**	
(90) Inspection Date:	02/05/2016	**Interval Date:**	02/29/2016
Delinquent Inspection:	N	**(90B1) In-Depth:**	☑
Delinquent Reason:			

(58) Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Deck Comments:	Top:Small edge spall SB along N&S abt bonded jt, numer HL transv cracks, HL random crack following			
(36A) Bridge Railing Appraisal:	3	Meets Standards		
(36B,C,D) Approach Guardrail:	222	Not Acceptable	Not Acceptable	Not Acceptable
(59) Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED		
Superstructure Comments:				
(60) Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS		
Substructure Comments:	Pier stem: HL vert cracking N & S faces, numer small-med HP's NF pier isol on S face, hl hoir			
(61) Channel - Protection:	6	SATISFACTORY CONDITION - MINOR DETERIORATION		
Channel Comments:	Lt-moder erosion to up and downstream banks			
(111)Pier/Abut. Prot:	N	N/A		
Pier Nav. Prot. Comments:				
(62) Culvert & Retaining Wall:	N	NOT APPLICABLE		
Culvert Comments:				
(70) Bridge Posting Level:	5	No Posting Required		
(71) Waterway Adequacy:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA		
Waterway Comments:				
(67) Structure Condition:	7	BETTER THAN PRESENT MINIMUM CRITERIA		
(68) Deck Geometry:	6	EQUAL TO PRESENT MINIMUM CRITERIA		
(69) Underclear- Vert/Lat.:	N	NOT APPLICABLE		
(72) Approach Roadway Align:	8	EQUAL TO PRESENT DESIRABLE CRITERIA		
Approach Rdwy Comments:				

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 2

Today's Date: 03/10/2016

Structure Number: 045-0024 **(2) District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: BLACKBERRY CREEK **(7) Facility Carried:** IL 47

(9) Location: 1.0 M S OF I-88 **(7A) Bridge Name:**

(90) Inspection Date: 02/05/2016 **Interval Date:** 02/29/2016

(90C) Temperature: 28

(70D2) OTAT: 0 No **Posting 70A:** **70B:** **70C:**

(108) Wearing Surf On: A BARE DECK NO OVRLAY F NONE A EPOXY COATED REINF

Other Wearing Surf Type: Top:Small edge spall SB alo

(108D) Total DeckThick: 7.5

(59A) Last Paint Date: 05/2004 **(59C) Utilities Attached:** N N/A

S SHP ZINC&FLD ACRY N N/A

N N/A

Other Utility:

(90A) Agency Program Manager: MastnySC

(90A3) Consultant Program Manager:

(90A1) Team Leader: ValentineMA **(90A2) Inspector:**

(90B) Inspection Remarks: In-depth inspection notes: Semi-integral abts, bm ends are encased in concrete. Can access abt brgs by slopewall and pier brgs w/medium ladder or UB 50 if needed. ELEMENTS #ED ACCORDING TO PLANS (S-N & W-E)

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 1

Today's Date: 03/10/2016

Structure Number:	045-0024 **(2) District:** 1	**(41) Bridge Status:**	1 OPEN - NO RESTRICT
(6) Feature Crossed:	BLACKBERRY CREEK	**(7) Facility Carried:**	IL 47
(9) Location:	1.0 M S OF I-88	**(7A) Bridge Name:**	
(90) Inspection Date:	02/28/2012	**Interval Date:**	
Delinquent Inspection:	N	**(90B1) In-Depth:**	☐
Delinquent Reason:			

(58) Deck:	7	GOOD CONDITION - SOME MINOR PROBLEMS
Deck Comments:		
(36A) Bridge Railing Appraisal:	3	Meets Standards
(36B,C,D) Approach Guardrail:	333	Acceptable / Acceptable / Acceptable
(59) Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED
Superstructure Comments:		
(60) Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS
Substructure Comments:		
(61) Channel - Protection:	6	SATISFACTORY CONDITION - MINOR DETERIORATION
Channel Comments:		
(111)Pier/Abut. Prot:	N	N/A
Pier Nav. Prot. Comments:		
(62) Culvert & Retaining Wall:	N	NOT APPLICABLE
Culvert Comments:		
(70) Bridge Posting Level:	5	No Posting Required
(71) Waterway Adequacy:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA
Waterway Comments:		
(67) Structure Condition:	7	BETTER THAN PRESENT MINIMUM CRITERIA
(68) Deck Geometry:	6	EQUAL TO PRESENT MINIMUM CRITERIA
(69) Underclear- Vert/Lat.:	N	NOT APPLICABLE
(72) Approach Roadway Align:	8	EQUAL TO PRESENT DESIRABLE CRITERIA
Approach Rdwy Comments:		

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 2

Today's Date: 03/10/2016

Structure Number: 045-0024 **(2) District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: BLACKBERRY CREEK **(7) Facility Carried:** IL 47

(9) Location: 1.0 M S OF I-88 **(7A) Bridge Name:**

(90) Inspection Date: 02/28/2012 **Interval Date:**

(90C) Temperature: 57

(70D2) OTAT: 0 No **Posting 70A:** **70B:** **70C:**

(108) Wearing Surf On: A BARE DECK NO OVRLAY F NONE A EPOXY COATED REINF

Other Wearing Surf Type:

(108D) Total DeckThick: 7.5

(59A) Last Paint Date: 05/2004 **(59C) Utilities Attached:** N N/A

S SHP ZINC&FLD ACRY N N/A

N N/A

Other Utility:

(90A) Agency Program Manager: ValentineMA

(90A3) Consultant Program Manager:

(90A1) Team Leader: ValentineMA **(90A2) Inspector:**

(90B) Inspection Remarks: ITEM58:DUE TO NUMER HL TRANSV CRACKS THRUOUT & HL RANDOM&LONGIT CRACK ALONG ABTT BONDED JTS. ITEM60:NUMER HP'S MOST TO N FACE PIER. ITEM61:MOD EROSION TO UP & DOWNSTREAM BANKS. ELEMENTS #ED ACCORDING TO PLANS

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 1

Today's Date: 03/10/2016

Structure Number:	045-0024 **(2) District:** 1	**(41) Bridge Status:**	1 OPEN - NO RESTRICT
(6) Feature Crossed:	BLACKBERRY CREEK	**(7) Facility Carried:**	IL 47
(9) Location:	1.0 M S OF I-88	**(7A) Bridge Name:**	
(90) Inspection Date:	03/19/2010	**Interval Date:**	
Delinquent Inspection:	N	**(90B1) In-Depth:**	☐
Delinquent Reason:			

(58) Deck:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED
Deck Comments:		
(36A) Bridge Railing Appraisal:	3	Meets Standards
(36B,C,D) Approach Guardrail:	333	Acceptable / Acceptable / Acceptable
(59) Superstructure:	8	VERY GOOD CONDITION - NO PROBLEMS NOTED
Superstructure Comments:		
(60) Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS
Substructure Comments:		
(61) Channel - Protection:	7	GOOD CONDITION - SOME MINOR PROBLEMS
Channel Comments:		
(111)Pier/Abut. Prot:	N	N/A
Pier Nav. Prot. Comments:		
(62) Culvert & Retaining Wall:	N	NOT APPLICABLE
Culvert Comments:		
(70) Bridge Posting Level:	5	No Posting Required
(71) Waterway Adequacy:	9	SUPERIOR TO PRESENT DESIRABLE CRITERIA
Waterway Comments:		
(67) Structure Condition:	7	BETTER THAN PRESENT MINIMUM CRITERIA
(68) Deck Geometry:	6	EQUAL TO PRESENT MINIMUM CRITERIA
(69) Underclear- Vert/Lat.:	N	NOT APPLICABLE
(72) Approach Roadway Align:	8	EQUAL TO PRESENT DESIRABLE CRITERIA
Approach Rdwy Comments:		

Download Date: 03/10/2016

Attachment C

Inspection Appraisal Data 2

Today's Date: 03/10/2016

Structure Number: 045-0024 **(2) District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: BLACKBERRY CREEK **(7) Facility Carried:** IL 47

(9) Location: 1.0 M S OF I-88 **(7A) Bridge Name:**

(90) Inspection Date: 03/19/2010 **Interval Date:**

(90C) Temperature: 59

(70D2) OTAT: 0 No **Posting 70A:** **70B:** **70C:**

(108) Wearing Surf On: A BARE DECK NO OVRLAY F NONE A EPOXY COATED REINF

Other Wearing Surf Type:

(108D) Total DeckThick: 7.5

(59A) Last Paint Date: 06/2004 **(59C) Utilities Attached:** N N/A

S SHP ZINC&FLD ACRY N N/A

N N/A

Other Utility:

(90A) Agency Program Manager: ValentineMA

(90A3) Consultant Program Manager:

(90A1) Team Leader: ValentineMA **(90A2) Inspector:**

(90B) Inspection Remarks: ITEM 60 LOWERED DUE TO SCATTERED SMALL HP'S TO NF PIER

Download Date: 03/10/2016

Attachment C

Pontis

Today's Date: 03/09/2016

Structure Number: 045-0024 **District:** 1 **(41) Bridge Status:** 1 OPEN - NO RESTRICT

(6) Feature Crossed: BLACKBERRY CREEK **(7) Facility Carried:** IL 47

(9) Location: 1.0 M S OF I-88 **(7A) Bridge Name:**

Element Inspection Date: 02/05/2016

(90E) Agency Program Manager: MastnySC **(90E3) Consultant Program Manager:**

(90E1) Team Leader: ValentineMA **(90E2) Inspector:**

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Reinforced Conc Pier Wall										
210	1	91	1,103	4	49	5	66	0	0	1,218
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks: HL vert cracking N&S faces, numer small HP's NF pier isol on S face & HL map cracking to W end										
Reinforced Conc Abutment										
215	1	100	420	0	0	0	0	0	0	420
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks:										
Reinforced Conc Pier or Abutment Cap										
234	1	100	166	0	0	0	0	0	0	166
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks: PIer: isol HL vert crack below bay 7										
Elastomeric Bearing										
310	4	100	16	0	0	0	0	0	0	16
		No deterioration	Minor deterioration		Major deterioration					
Remarks:										
Fixed Bearing										
313	4	100	8	0	0	0	0	0	0	8
		No deterioration	Minor deterioration		Advanced corrosion					
Remarks:										
Concrete Bridge Railing										
331	3	100	234	0	0	0	0	0	0	234
		No deterioration	Minor cracks/spalls		Analysis warranted					
Remarks: Cement finish chipping off thru-out										
Concrete Deck Protected w/ Coated Bars										
8026	3	100	5,512	0	1	0	0	0	0	5,513
Remarks: Top:Small edge spall SB@ N&S abt bonded jt, numer HL transv cracks, HL random following skew of abts N&S. Soffit:Scattered fine HL transv cracking, lt deck seperation from T/F bms 2,7 over pier										

Attachment C

Non-Lead Painted Steel Open Girder

8118	4	100	6,992	0	0	0	0	0	0	6,992

Remarks:

Approach Pavement

8323	3	100	2	0	0	0	0	0	0	2

Remarks: Isol HL transv & diag cracking in SB N appr lane

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Reinforced Conc Pier Wall										
210	1	91	1,103	4	49	5	66	0	0	1,218
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks: HL vert cracking N&S faces, numer small HP's NF pier isol on S face & HL map cracking to W end										
Reinforced Conc Abutment										
215	1	100	420	0	0	0	0	0	0	420
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks:										
Reinforced Conc Pier or Abutment Cap										
234	1	100	166	0	0	0	0	0	0	166
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks: PIer: isol HL vert crack below bay 7										
Elastomeric Bearing										
310	4	0	0	100	16	0	0	0	0	16
		No deterioration	Minor deterioration		Major deterioration					
Remarks:										
Fixed Bearing										
313	4	0	0	100	8	0	0	0	0	8
		No deterioration	Minor deterioration		Advanced corrosion					
Remarks:										
Concrete Bridge Railing										
331	3	0	0	100	234	0	0	0	0	234
		No deterioration	Minor cracks/spalls		Analysis warranted					
Remarks: Cement finish chipping off thru-out										
Concrete Deck Protected w/ Coated Bars										
8026	3	100	5,512	0	1	0	0	0	0	5,513
Remarks: Top:Small edge spall SB @ N abt bonded jt, numer HL transv cracks, HL random following skew of abts N&S. Soffit:Scattered fine HL transv cracking,Deck starting to seperate from T/F bms 2,7 over pier										

Attachment C

Non-Lead Painted Steel Open Girder

8118	4	100	6,992	0	0	0	0	0	0	6,992

Remarks:

Approach Pavement

8323	3	100	2	0	0	0	0	0	0	2

Remarks: Isol HL transv & diag cracking in SB N appr lane

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty

Reinforced Conc Pier Wall

210	1	97	1,176	3	32	1	10	0	0	1,218
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			

Remarks: HL vert cracking, scatt small spalls NF pier & HL map cracking to W end

Reinforced Conc Abutment

215	1	100	420	0	0	0	0	0	0	420
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			

Remarks:

Reinforced Conc Pier or Abutment Cap

234	1	100	166	0	0	0	0	0	0	166
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			

Remarks: PIer: isol HL vert crack

Elastomeric Bearing

310	4	0	0	100	16	0	0	0	0	16
		No deterioration	Minor deterioration		Major deterioration					

Remarks:

Fixed Bearing

313	4	0	0	100	8	0	0	0	0	8
		No deterioration	Minor deterioration		Advanced corrosion					

Remarks:

Concrete Bridge Railing

331	3	0	0	100	234	0	0	0	0	234
		No deterioration	Minor cracks/spalls		Analysis warranted					

Remarks: Cement finish chipping off thru-out

Concrete Deck Protected w/ Coated Bars

8026	3	100	5,513	0	0	0	0	0	0	5,513

Remarks: Top:Isol HL transv cracks, HL random following skew of abts N&S. Soffit:Scattered fine transv cracking,Deck starting to seperate from T/F bms 2,7 over pier

Attachment C

Non-Lead Painted Steel Open Girder

8118	4	100	6,992	0	0	0	0	0	0	6,992

Remarks:

Approach Pavement

8323	3	100	2	0	0	0	0	0	0	2

Remarks: Isol HL transv & diag cracking in SB N appr lane

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty

Reinforced Conc Pier Wall

210	1	100	1,218	0	0	0	0	0	0	1,218
		No deterioration		Minor cracks/spalls	Delams/spalls		Analysis warranted			

Remarks: HL vert cracking

Reinforced Conc Abutment

215	1	100	420	0	0	0	0	0	0	420
		No deterioration		Minor cracks/spalls	Delams/spalls		Analysis warranted			

Remarks:

Reinforced Conc Pier or Abutment Cap

234	1	100	166	0	0	0	0	0	0	166
		No deterioration		Minor cracks/spalls	Delams/spalls		Analysis warranted			

Remarks:

Elastomeric Bearing

310	4	0	0	100	16	0	0	0	0	16
		No deterioration		Minor deterioration	Major deterioration					

Remarks:

Fixed Bearing

313	4	0	0	100	8	0	0	0	0	8
		No deterioration		Minor deterioration	Advanced corrosion					

Remarks:

Concrete Bridge Railing

331	3	0	0	100	234	0	0	0	0	234
		No deterioration		Minor cracks/spalls	Analysis warranted					

Remarks: Cement finish chipping off thru-out

Concrete Deck Protected w/ Coated Bars

8026	3	100	5,513	0	0	0	0	0	0	5,513

Remarks: Top:Isol HL transv cracks, HL random following skew of abts N&S. Soffit:Scattered fine transv cracking

Attachment C

Non-Lead Painted Steel Open Girder

8118	4	100	6,992	0	0	0	0	0	0	6,992

Remarks:

Approach Pavement

8323	3	100	2	0	0	0	0	0	0	2

Remarks: Isol HL transv & diag cracking in SB N appr lane

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
Reinforced Conc Pier Wall										
210	1	100	1,218	0	0	0	0	0	0	1,218
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		
Remarks:										
Reinforced Conc Abutment										
215	1	100	420	0	0	0	0	0	0	420
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		
Remarks:										
Reinforced Conc Pier or Abutment Cap										
234	1	100	166	0	0	0	0	0	0	166
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		
Remarks:										
Elastomeric Bearing										
310	4	0	0	100	16	0	0	0	0	16
		No deterioration		Minor deterioration		Major deterioration				
Remarks:										
Fixed Bearing										
313	4	0	0	100	8	0	0	0	0	8
		No deterioration		Minor deterioration		Advanced corrosion				
Remarks:										
Concrete Bridge Railing										
331	3	0	0	100	234	0	0	0	0	234
		No deterioration		Minor cracks/spalls		Analysis warranted				
Remarks:										
Concrete Deck Protected w/ Coated Bars										
8026	3	100	5,513	0	0	0	0	0	0	5,513
Remarks:										

Attachment C

Non-Lead Painted Steel Open Girder

8118	4	100	6,992	0	0	0	0	0	0	6,992

Remarks:

Approach Pavement

8323	3	100	2	0	0	0	0	0	0	2

Remarks:

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty

P/S Conc Closed Web/Box Girder

104	3	91	1,232	1	19	3	41	5	64	1,356
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		

Remarks:

Reinforced Conc Pier Wall

210	1	98	1,248	0	0	3	32	0	0	1,280
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		

Remarks: CS#3 nw face of w nose of pier

Reinforced Conc Abutment

215	1	100	291	0	0	0	0	0	0	291
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		

Remarks:

Reinforced Conc Pier or Abutment Cap

234	1	100	165	0	0	0	0	0	0	165
		No deterioration		Minor cracks/spalls		Delams/spalls		Analysis warranted		

Remarks:

Preformed Joint Seal

302	3	0	0	0	0	100	106	0	0	106
		No deterioration		Minor deterioration		Major deterioration				

Remarks:

Concrete Bridge Railing

331	3	0	0	100	234	0	0	0	0	234
		No deterioration		Minor cracks/spalls		Analysis warranted				

Remarks:

Precast Concrete Deck Protected w/HMA Overlay

8036	3	0	0	100	5,433	0	0	0	0	5,433

Remarks:

Attachment C

Keyway

8108	3	23	301	56	721	20	263	0	0	1,285

Remarks: CS#3 bm 9 sp 1 & 2; bm 4 sp 2

Approach Pavement

8323	3	0	0	100	2	0	0	0	0	2

Remarks:

Element Insp. Delinquent: 0 Element Insp. Delinquent Reason:

Element Description

Elem	Env	% 1	Qty 1	% 2	Qty 2	% 3	Qty 3	% 4	Qty 4	Tot Qty
P/S Conc Closed Web/Box Girder										
104	3	59	799	1	14	23	312	17	231	1,356
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks:										
Reinforced Conc Pier Wall										
210	1	98	1,254	0	0	0	0	2	26	1,280
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks:										
Reinforced Conc Abutment										
215	1	100	291	0	0	0	0	0	0	291
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks:										
Reinforced Conc Pier or Abutment Cap										
234	1	71	117	26	43	0	0	3	5	165
		No deterioration	Minor cracks/spalls		Delams/spalls		Analysis warranted			
Remarks:										
Preformed Joint Seal										
302	3	0	0	0	0	100	106	0	0	106
		No deterioration	Minor deterioration		Major deterioration					
Remarks:										
Concrete Bridge Railing										
331	3	0	0	100	234	0	0	0	0	234
		No deterioration	Minor cracks/spalls		Analysis warranted					
Remarks:										
Precast Concrete Deck Protected w/HMA Overlay										
8036	3	5	272	95	5,161	0	0	0	0	5,433
Remarks:										

Keyway

8108	3	9	115	68	874	14	180	9	116	1,285

Remarks:

Approach Pavement

8323	3	0	0	100	2	0	0	0	0	2

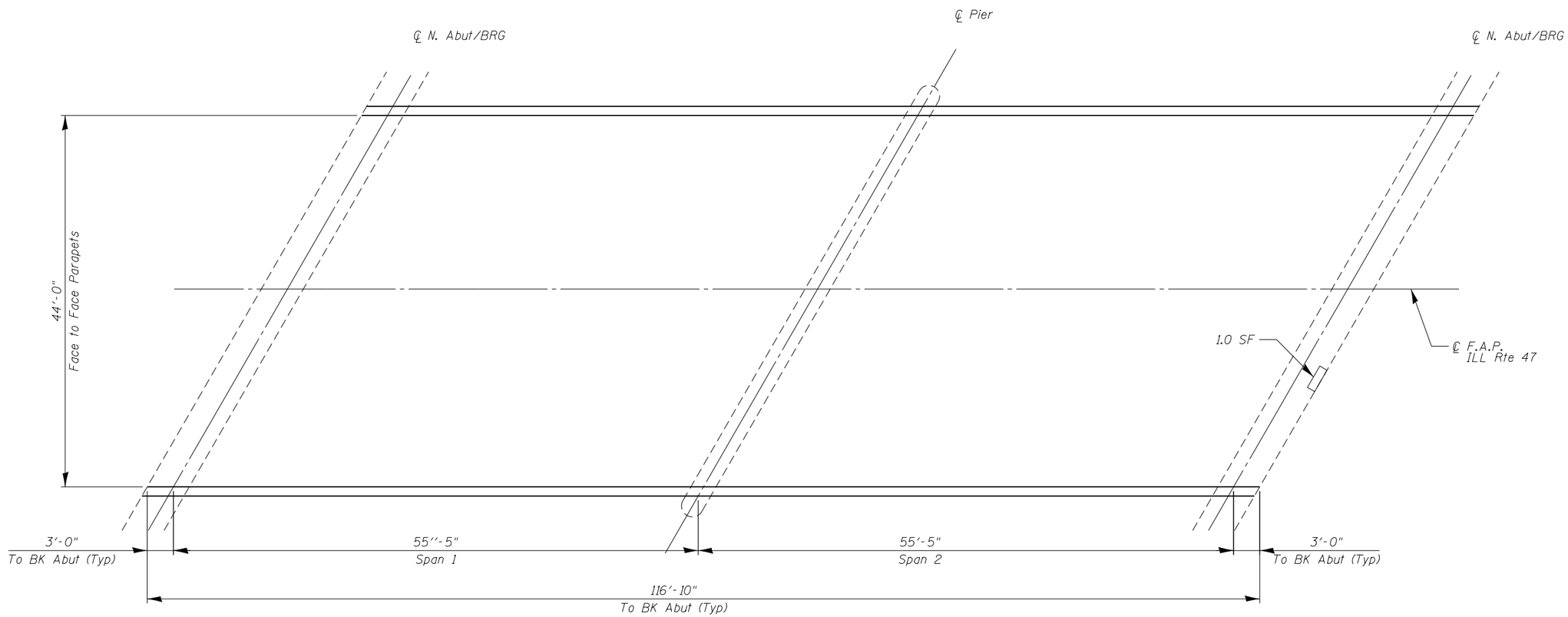
Remarks:

Download Date: 03/08/2016

Attachment C

ATTACHMENT D

Top and Bottom of Deck Condition Surveys



TOP OF DECK PLAN

2-#6 bars — spaced as shown

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

N

OBSERVED DEFICIENCES

ITEM	UNIT	TOTAL
DC	SQ. FT.	0.0
SC	SQ. FT.	1.0
SCEB	SQ. FT.	0.0
SCM	SQ. FT.	0.0
PR	SQ. FT.	0.0
HA	SQ. FT.	0.0
CRACK	FOOT	0.0

Estimated Deck Surface Area= 5,141 SF

Note:
Infrequent HL Cracking Was Present On The Top Of Deck Surface, But It Was Considered To Be Minor, And Not Structurally Significant, Thus Not Mapped For This Exhibit.

3/22/2017
3:42:58 PM
H:\Jobs2015\2015300D\CAD\Structural\dgn\refs\045-0024_TOP OF DECK PLAN.dgn

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

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	CHECKED - RDN	REVISED -	
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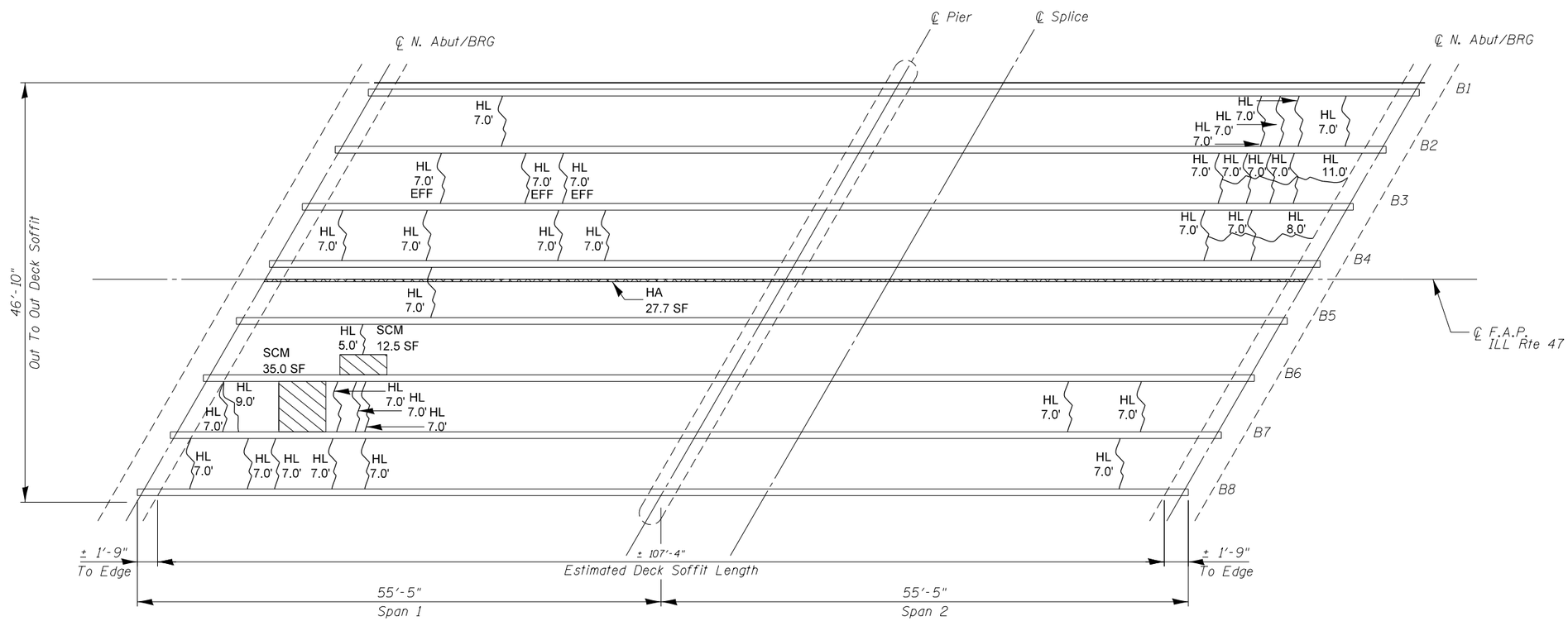
PLOT DATE = 3:42:58 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0024
TOP OF DECK SURVEY
ATTACHMENT D

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



BOTTOM OF DECK PLAN

Estimated Deck Surface Area= 5,075 SF

N

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

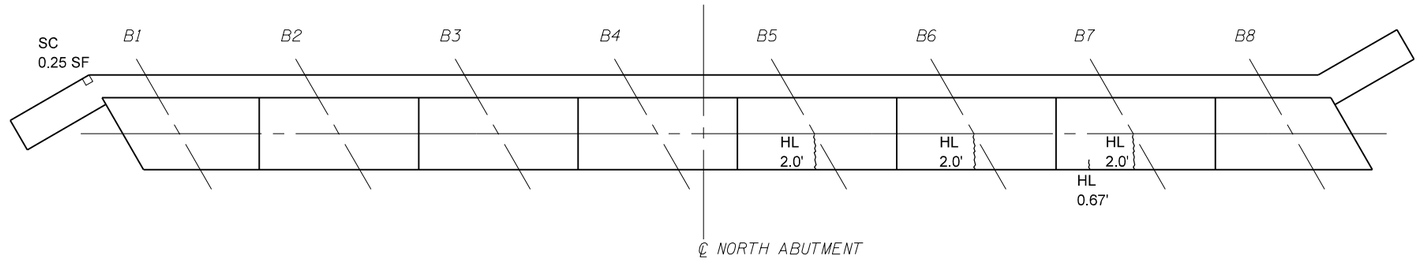
CRACK LENGTH

OBSERVED DEFICIENCES

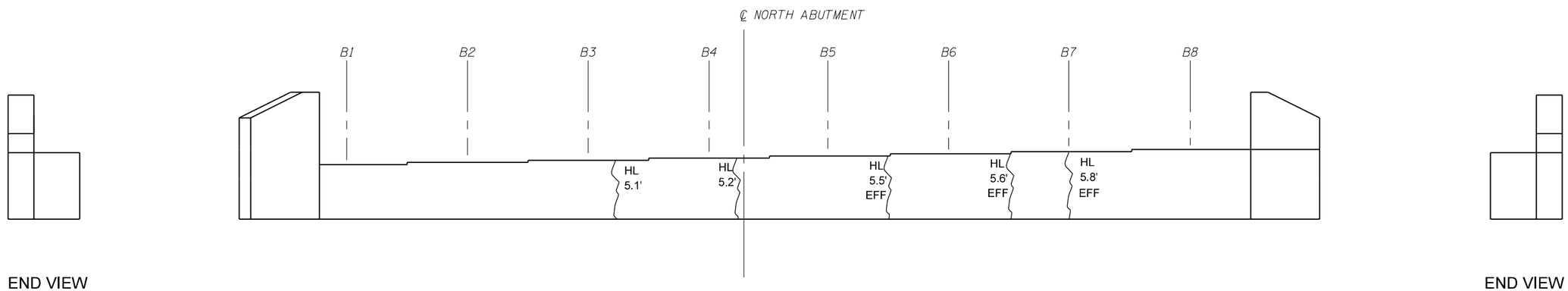
ITEM	UNIT	TOTAL
DC	SQ. FT.	0.0
SC	SQ. FT.	0.0
SCEB	SQ. FT.	0.0
SCM	SQ. FT.	47.5
PR	SQ. FT.	0.0
HA	SQ. FT.	27.7
CRACK	FOOT	0.0

ATTACHMENT E

Substructure Condition Surveys



NORTH ABUTMENT
PLAN



END VIEW

END VIEW

NORTH ABUTMENT
ELEVATION
(LOOKING NORTH)

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

Note:
Substructure Has Been Converted To A Semi-Integral Abutment. Only Minor Cracking Was Observed At Time Of Inspection.

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME = 1908	DESIGNED -	REVISED -	
	CHECKED - RDN	REVISED -	
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PLOT DATE = 3:19:25 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0024
NORTH ABUTMENT
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

3/22/2017
3:19:25 PM
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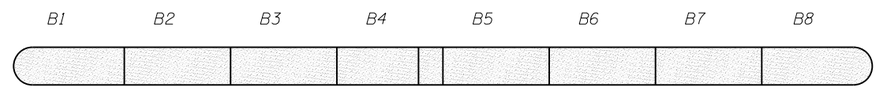
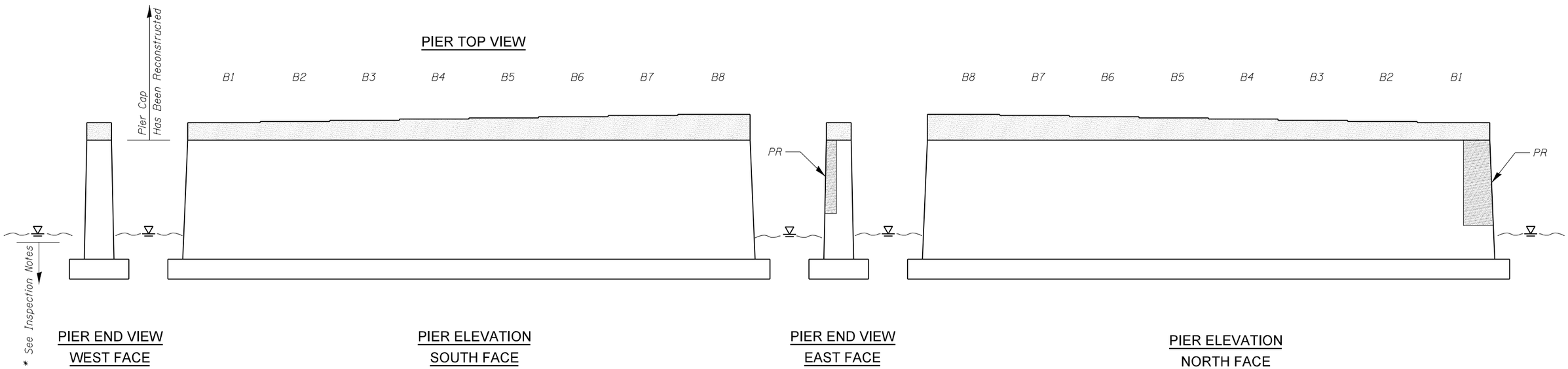


PIER TOP VIEW



LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)

CRACK LENGTH

Inspection Notes:

The Pier Wall Was Heavily Stained From The Cap Reconstruction, Making The Identification Of Cracks Difficult. Due To Access Limitations, Only The Lower Portion Of The Wall Was Sounded With No Defects Observed. The Previous Repairs Appear To Be Intact.

** Pier Structure that was Underwater At The Time Of Inspection Was Not Evaluated.*

GRAEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME = 1908	DESIGNED -	REVISED -	
	CHECKED - RDN	REVISED -	
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PLOT DATE = 3:28:57 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0024
PIER ELEVATIONS
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

3/22/2017
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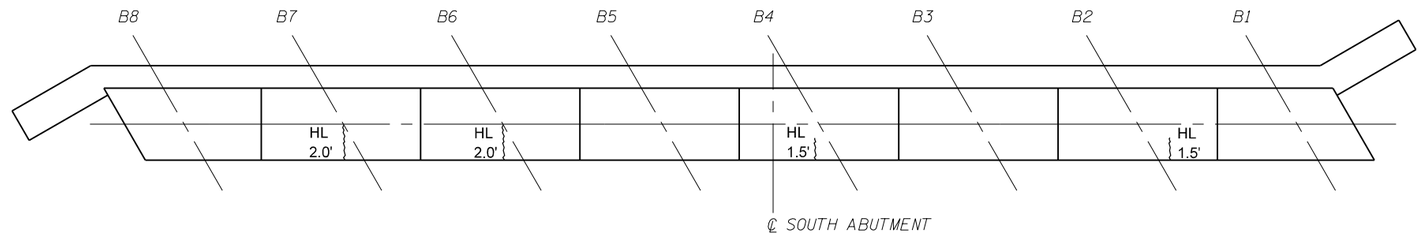
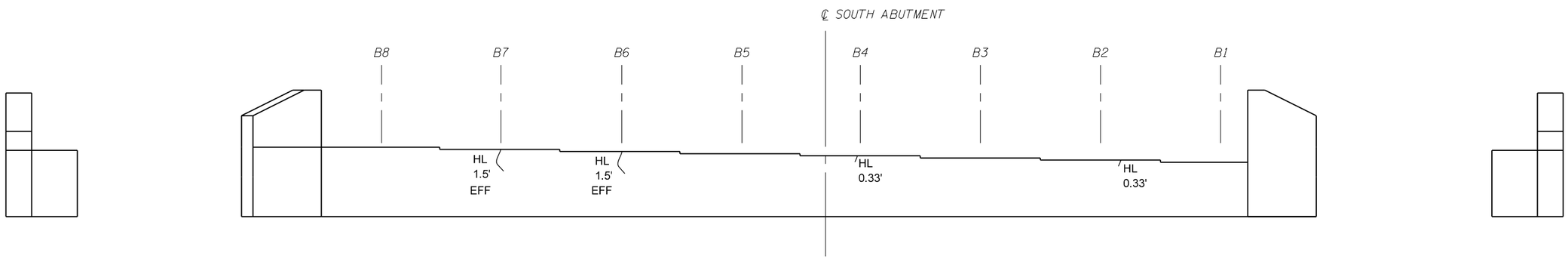


SOUTH ABUTMENT
PLAN



END VIEW

SOUTH ABUTMENT
ELEVATION
(LOOKING SOUTH)

END VIEW

LEGEND

DC	DELAMINATED CONCRETE	
SC	SPALLED CONCRETE	
SCEB	SPALLED CONCRETE WITH EXPOSED BARS	
SCM	SOUND CONCRETE WITH MAPCRACKING	
PR	PREVIOUSLY REPAIRED	
HA	HONEYCOMB AREA	
EFF	EFFLORESCENCE	
RS	RUST STAIN	
HL	HAIRLINE (HL)	< 1/16" (0.0625")
N	NARROW (N)	1/16" TO 1/8" (0.0625" TO 0.125")
M	MEDIUM (M)	1/8" TO 3/16" (0.125" TO 0.1875")
W	WIDE (W)	> 3/16" (0.1875")

DELAMINATED CONCRETE (DC)

SPALLED CONCRETE (SC)

SPALLED CONCRETE WITH EXPOSED BARS (SCEB)

SOUND CONCRETE WITH MAP CRACKING (SCM)

PREVIOUSLY REPAIRED (PR)

HONEYCOMB AREA (HA)

CRACK TYPE (WIDTH)
CRACK LENGTH

Note:
Substructure Has Been Converted To A Semi-Integral Abutment. Only Minor Cracking Was Observed At Time Of Inspection.

GRāEF
8501 W. Higgins Road; Suite 280
Chicago, Illinois 60631; (773) 399-0112

USER NAME = 1908	DESIGNED -	REVISED -	
	CHECKED - RDN	REVISED -	
PLOT SCALE = 10:0 9/64 ':" / in.	DRAWN - TCK	REVISED -	
PLOT DATE = 3:18:15 PM	CHECKED -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURE NO. 045-0024
SOUTH ABUTMENT
ATTACHMENT E

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		

3/22/2017
3:18:15 PM
H:\Jobs2015\20153000\CAD\Structural\dgn\refs\045-0024_SOUTH ABUTMENT.dgn

ATTACHMENT F

Cost Estimate

IL 47 over Blackberry Creek

CONSTRUCTION COST ESTIMATE
ALTERNATIVE 1
WIDEN THE EXISTING BRIDGE

ITEM NUMBER	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
28100107	STONE RIPRAP, CLASS A4	SQ YD	650	$66.00	$42,900
50102400	CONCRETE REMOVAL	CU YD	59	$900.00	$53,100
50200100	STRUCTURE EXCAVATION	CU YD	364	$40.00	$14,560
50200300	COFFERDAM EXCAVATION	CU YD	160	$50.00	$8,000
50201101	COFFERDAM TYPE 1	EACH	2	$38,000.00	$76,000
50300225	CONCRETE STRUCTURES	CU YD	210	$819.00	$171,990
50300255	CONCRETE SUPERSTRUCTURES	CU YD	364	$943.00	$343,252
50300260	BRIDGE DECK GROOVING	SQ YD	1,094	$10.75	$11,761
50301350	CONCRETE SUPER (APPROACH SLAB)	CU YD	279	$881.00	$245,799
505	FURN & ERECTING STRUCTURAL STEEL	POUND	171,023	$1.90	$324,944
50500505	STUD SHEAR CONNECTORS	EACH	5,742	$4.25	$24,404
50800205	REINF BARS, EPOXY CTD	POUND	166,900	$1.36	$226,984
50901720	BICYCLE RAILING	FOOT	354	$160.00	$56,640
50901750	PARAPET RAILING	FOOT	354	$90.00	$31,860
512009xx	FURNISH METAL SHELL PILE	FOOT	1,640	$92.00	$150,880
51202305	DRIVING PILES	FOOT	1,640	$1.00	$1,640
58700300	CONCRETE SEALER	SQ FT	2,638	$2.00	$5,276
Z0016200	DECK SLAB REPAIR (PARTIAL)	SQ YD	0.1	$5,000.00	$500
	STAGED CONSTRUCTION (10%)	L SUM	1	$179,000.00	$179,000

SUBTOTAL:	$1,969,000
CONTINGENCY (10%):	$197,000
TOTAL:	**$2,166,000**

NOTES:
1. Roadway and embankment pay items and costs are not included.
2. Costs are in 2017 dollars.

IL 47 over Blackberry Creek

CONSTRUCTION COST ESTIMATE
ALTERNATIVE 2
COMPLETE REPLACEMENT OF THE EXISTING BRIDGE

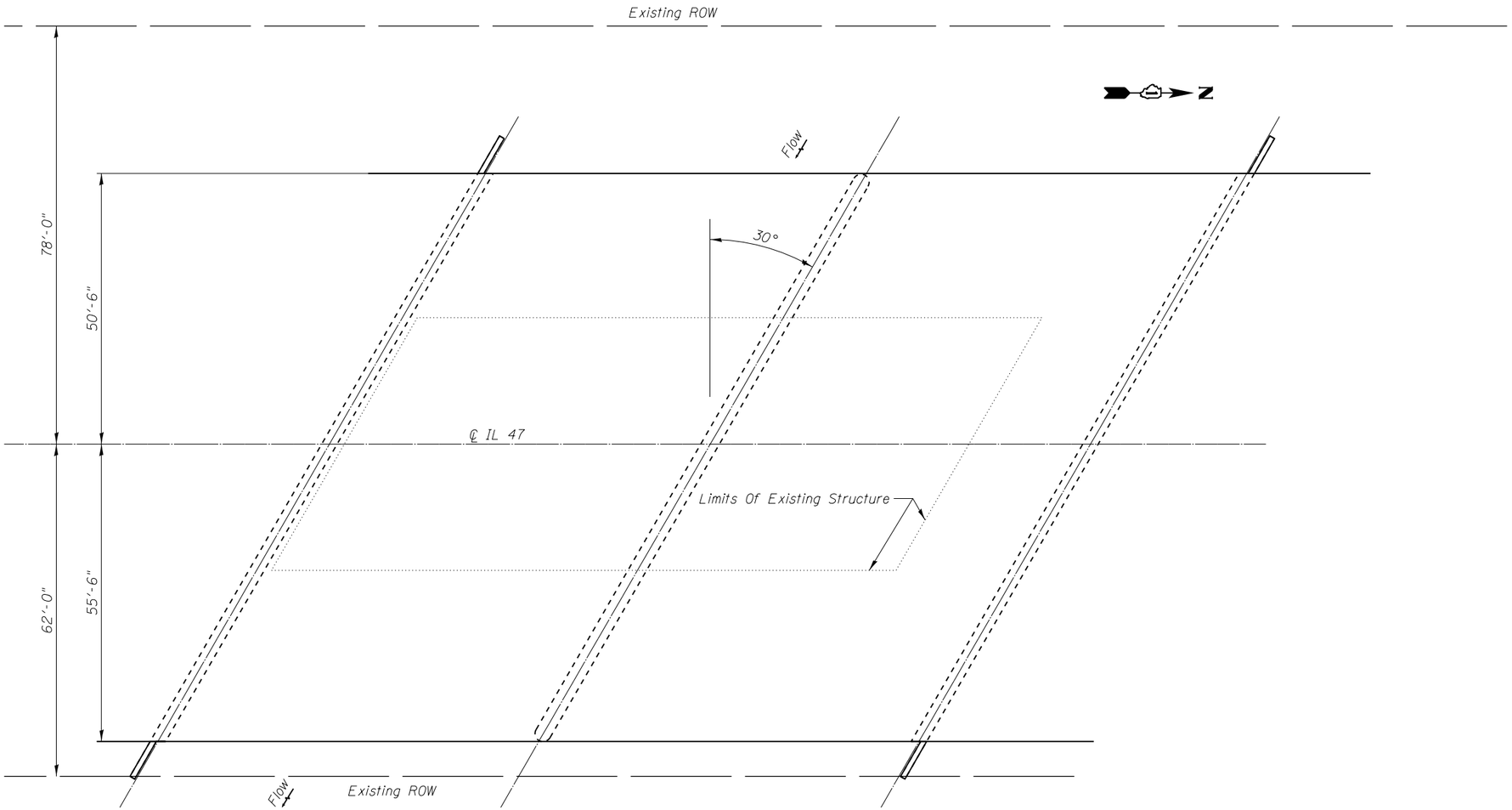
ITEM NUMBER	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
28100107	STONE RIPRAP, CLASS A4	SQ YD	1,204	$66.00	$79,464
501	REMOVAL OF EXIST STRUCTURES	SQ FT	5,518	$15.00	$82,770
50200100	STRUCTURE EXCAVATION	CU YD	616	$40.00	$24,640
50200300	COFFERDAM EXCAVATION	CU YD	280	$50.00	$14,000
50201101	COFFERDAM TYPE 1	EACH	1	$100,000.00	$100,000
50300225	CONCRETE STRUCTURES	CU YD	375	$780.00	$292,500
50300255	CONCRETE SUPERSTRUCTURES	CU YD	571	$898.00	$512,758
50300260	BRIDGE DECK GROOVING	SQ YD	1,526	$10.75	$16,405
50301350	CONCRETE SUPER (APPROACH SLAB)	CU YD	369	$839.00	$309,591
505	FURN & ERECTING STRUCTURAL STEEL	POUND	398,400	$1.80	$717,120
50500505	STUD SHEAR CONNECTORS	EACH	10,000	$4.25	$42,500
50800205	REINF BARS, EPOXY CTD	POUND	251,600	$1.30	$327,080
50901720	BICYCLE RAILING	FOOT	404	$160.00	$64,640
50901750	PARAPET RAILING	FOOT	404	$90.00	$36,360
512009xx	FURNISH METAL SHELL PILE	FOOT	3,100	$88.00	$272,800
51202305	DRIVING PILES	FOOT	3,100	$1.00	$3,100
52200010	TEMPORARY SHEET PILING	SQ FT	400	$25.00	$10,000
	STAGED CONSTRUCTION (10%)	L SUM	1	$291,000.00	$291,000

SUBTOTAL:	$3,197,000
CONTINGENCY (10%):	$320,000
TOTAL:	**$3,517,000**

NOTES:
1. Roadway and embankment pay items and costs are not included.
2. Costs are in 2017 dollars.

ATTACHMENT G

Proposed Structure



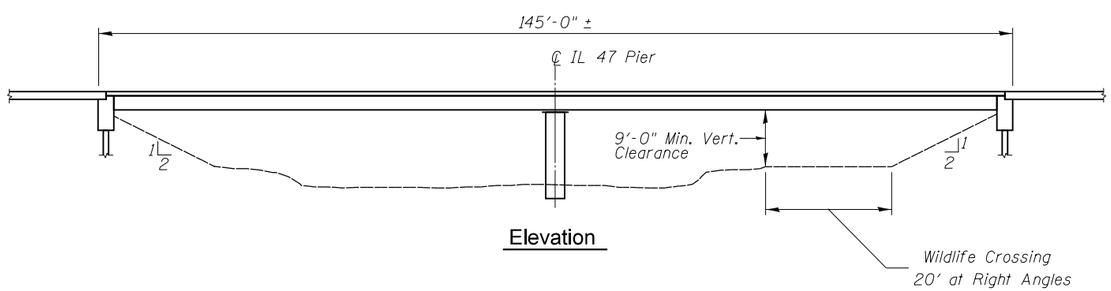
Plan

Note:

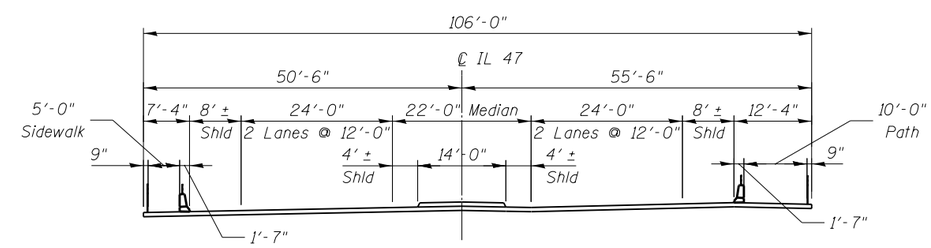
1 The number and location of piers, the profile grade and bridge length are subject to refinement in the TSL phase.

2. Superstructure type, beam spacing and rail type to be determined during the TSL phase.

3. The shoulder widths vary to account for the roadway horizontal curve.



Elevation



Cross Section
(LOOKING NORTH)

ATTACHMENT H

Structure Photos

Photo Number: 1

Structure Number:
045-0024

Photo File Name:
DSCF5858.JPG

Date of Photo:
4/1/2016

View: NW

Feature / Location:
Cover Photo

Misc: Site View -

Photo Description: Elevation view of IL 47 over Blackberry Creek, from downstream side of channel.

Photo Number: 2

Structure Number:
045-0024

Photo File Name:
DSCF5870.JPG

Date of Photo:
4/1/2016

View: E

Feature / Location:

Misc: Name Plate

-

Photo Description: View of original and reconstructed Name Plates on Parapet, Southeast corner of Bridge.

Photo Number: 3

Structure Number:
045-0024

Photo File Name:

DSCF5877.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

72 - Approach Rdwy
Align: Approach

Misc: Bridge Approach -

Photo Description: View of roadway approach to bridge, taken from north of bridge at approach pavement.

Photo Number: 4

Structure Number:
045-0024

Photo File Name:

DSCF5876.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

72 - Approach Rdwy
Align: Approach Slab

Misc: Bridge Departure -

Photo Description: View of roadway cross section at North Abutment, looking off of structure.

Photo Number: 5

Structure Number:
045-0024

Photo File Name:
DSCF5875.JPG

Date of Photo:
4/1/2016

View: N

Feature / Location:
58 - Deck Condition: Deck Slab

Roadway: Typical Section -

Photo Description: View of roadway cross section through structure, taken at South Abutment looking onto structure.

Photo Number: 6

Structure Number:
045-0024

Photo File Name:
DSCF5874.JPG

Date of Photo:
4/1/2016

View: N

Feature / Location:
72 - Approach Rdwy Align: Approach Slab

Misc: Bridge Approach -

Photo Description: View of roadway cross section at South Approach pavement, looking onto structure.

Photo Number: 7

Structure Number:
045-0024

Photo File Name:
DSCF5873.JPG

Date of Photo:
4/1/2016

View: S

Feature / Location:
72 - Approach Rdwy
Align: Approach

Misc: Bridge Approach -

Photo Description: View of Northbound Approach to Bridge taken from south approach slab.

Photo Number: 8

Structure Number:
045-0024

Photo File Name:
DSCF5864.JPG

Date of Photo:
4/1/2016

View: E

Feature / Location:
72 - Approach Rdwy
Align: Transition Slab

Roadway: -

Photo Description: View of North Approach Slab joint with pavement transition slab, minor deterioration noted.

Photo Number: 9

Structure Number:
045-0024

Photo File Name:

DSCF5865.JPG

Date of Photo:

4/1/2016

View: E

Feature / Location:

58 - Deck Condition: Deck Slab

Bridge Deck: Span 2 - Typical Condition

Photo Description: View of Construction joint between deck and approach pavement over North Abutment. Minor spall is present.

Photo Number: 10

Structure Number:
045-0024

Photo File Name:

DSCF5872.JPG

Date of Photo:

4/1/2016

View: W

Feature / Location:

72 - Approach Rdwy Align: Approach Slab

-

Photo Description: View of Construction joint between deck and approach pavement over South Abutment.

Photo Number: 11

Structure Number:
045-0024

Photo File Name:

DSCF5871.JPG

Date of Photo:

4/1/2016

View: W

Feature / Location:

72 - Approach Rdwy Align: Transition Slab

-

Photo Description: View of approach slab transition at South Approach, PJF is partially visible through debris in joint.

Photo Number: 12

Structure Number:
045-0024

Photo File Name:

DSCF5866.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

58 - Deck Condition: Deck Slab

Bridge Deck: Span 2 - Typical Condition

Photo Description: View of Southbound Shoulder over Blackberry Creek, minor debris accumulation noted.

Photo Number: 13

Structure Number:
045-0024

Photo File Name:

DSCF5867.JPG

Date of Photo:

4/1/2016

View: Downw

Feature / Location:

Misc: Deck Drain

Bridge Deck: Span 2 - Typical Condition

Photo Description: View of typical deck drain from bridge deck.

Photo Number: 14

Structure Number:
045-0024

Photo File Name:

DSCF5832.JPG

Date of Photo:

4/1/2016

View: SE

Feature / Location:

Misc: Deck Drain

Span 1 - Detail Photo

Photo Description: View of Deck Drain along Beam 1 Fascia, Span 1.

Photo Number: 15

Structure Number:
045-0024

Photo File Name:

DSCF5863.JPG

Date of Photo:

4/1/2016

View: SW

Feature / Location:

72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Traffic Barrier Terminal Type 6 -

Photo Description: View At Southbound approach, showing guardrail transition and Approach Pavement Joint with transition slab.

Photo Number: 16

Structure Number:
045-0024

Photo File Name:

DSCF5869.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Traffic Barrier Terminal Type 5 -

Photo Description: View of transition to three beam section at bridge parapet, Northbound Approach.

Photo Number: 17

Structure Number:
045-0024

Photo File Name:

DSCF5848.JPG

Date of Photo:

4/1/2016

View: W

Feature / Location:

58 - Deck Condition: Barrier

Span 1 - East Fascia

Photo Description: View of map cracking to exterior of deck parapet near guardrail attachment.

Photo Number: 18

Structure Number:
045-0024

Photo File Name:

DSCF5842.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

58 - Deck Condition: Deck Soffit

Bay 6 - Typical Condition

Photo Description: Typical condition of deck soffit within Bay 6, Span 2.

Photo Number: 19

Structure Number:
045-0024

Photo File Name:

DSCF5827.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

58 - Deck Condition:
Deck Soffit

Bay 3 - Typical Condition

Photo Description: Typical condition of deck. (Note: Low frequency of transverse cracks with sound concrete)

Photo Number: 20

Structure Number:
045-0024

Photo File Name:

DSCF5826.JPG

Date of Photo:

4/1/2016

View: Upward

Feature / Location:

58 - Deck Condition:
Deck Soffit

Bay 3 - Typical Condition

Photo Description: Deck soffit in Bay 3, Span 1. (Note: Efflorescent longitudinal and transverse crack present)

Photo Number: 21

Structure Number:
045-0024

Photo File Name:

DSCF5825.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

58 - Deck Condition: Deck Soffit

Bay 4 - Typical Condition

Photo Description: View of typical condition of stage construction joint. (Note: honeycombed area at stage const. joint)

Photo Number: 22

Structure Number:
045-0024

Photo File Name:

DSCF5817.JPG

Date of Photo:

4/1/2016

View: E

Feature / Location:

59 - Superstructure Cond: Paint

Beam 1 -

Photo Description: Painting information located on fascia.

Photo Number: 23

Structure Number:
045-0024

Photo File Name:
DSCF5831.JPG

Date of Photo:
4/1/2016

View: N

Feature / Location:
59 - Superstructure Cond: Paint

Beam 3 - Typical Condition

Photo Description: View of typical condition of paint system for Beam 3, Span 1. condition is typical for all beams.

Photo Number: 24

Structure Number:
045-0024

Photo File Name:
DSCF5845.JPG

Date of Photo:
4/1/2016

View: S

Feature / Location:
59 - Superstructure Cond: Paint

Beam 6 - Typical Condition

Photo Description: View along Beam 6, showing typical condition of paint system in Span 2.

Photo Number: 25

Structure Number:
045-0024

Photo File Name:

DSCF5818.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

59 - Superstructure Cond: Beam

Beam 1 - Typical Condition

Photo Description: View of Beam 1 Fascia in Span 1, West side of Blackberry Creek bridge.

Photo Number: 26

Structure Number:
045-0024

Photo File Name:

DSCF5841.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

59 - Superstructure Cond: Beam

Beam 8 - Typical Condition

Photo Description: View of Beam 1, Span 2 Fascia showing typical condition of paint system.

Photo Number: 27

Structure Number:
045-0024

Photo File Name:

DSCF5844.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

59 - Superstructure
Cond: Interior

Bay 6 - Typical Condition

Photo Description: Span 2 showing typical condition of interior diaphragm, Bay 6.

Photo Number: 28

Structure Number:
045-0024

Photo File Name:

DSCF5821.JPG

Date of Photo:

4/1/2016

View: SW

Feature / Location:

59 - Superstructure
Cond: Bearing

Beam 7 - Typical Condition

Photo Description: View of Bearing tilt towards South Abutment. (Ambient Temperature Approximately 50°)

Photo Number: 29

Structure Number:
045-0024

Photo File Name:

DSCF5830.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

59 - Superstructure
Cond: Interior

Bay 2 - Typical Condition

Photo Description: Typical condition of interior diaphragm, Span 1, Bay 2.

Photo Number: 30

Structure Number:
045-0024

Photo File Name:

DSCF5823.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

59 - Superstructure
Cond: Beam

Beam 8 - Typical
Condition

Photo Description: View of Beam 8 Fascia in Span 1, from East side of Blackberry Creek bridge.

Photo Number: 31

Structure Number:
045-0024

Photo File Name:

DSCF5853.JPG

Date of Photo:

4/1/2016

View: E

Feature / Location:

59 - Superstructure Cond: Bearing

Beam 7 - Typical Condition

Photo Description: Side view of Beam 7 Bearing at North Abutment.

Photo Number: 32

Structure Number:
045-0024

Photo File Name:

DSCF5846.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

59 - Superstructure Cond: Bearing

Bearings: Expansion Bearing - Typical

Photo Description: Elevation view of Beam 7 Bearing at North Abutment.

Photo Number: 33

Structure Number:
045-0024

Photo File Name:

DSCF5854.JPG

Date of Photo:

4/1/2016

View: E

Feature / Location:

59 - Superstructure
Cond: Bearing

Bearings: Expansion
Bearing - Alignment

Photo Description: Side view of Beam Bearing at North Abutment.

Photo Number: 34

Structure Number:
045-0024

Photo File Name:

DSCF5828.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

59 - Superstructure
Cond: Bearing

Bearings: Expansion
Bearing - Typical

Photo Description: Elevation view of Beam 3 Bearing at South Abutment.

Photo Number: 35

Structure Number:
045-0024

Photo File Name:

DSCF5847.JPG

Date of Photo:

4/1/2016

View: E

Feature / Location:

59 - Superstructure Cond: Bearing

Bearings: Expansion Bearing - Typical

Photo Description: Side view of Beam 7 Bearing at North Abutment.

Photo Number: 36

Structure Number:
045-0024

Photo File Name:

DSCF5834.JPG

Date of Photo:

4/1/2016

View: W

Feature / Location:

61 - Channel Condition: Upstream

Misc: Site View -

Photo Description: Upstream channel condition view. (Note: Channel meander to South)

Photo Number: 37

Structure Number:
045-0024

Photo File Name:
DSCF5835.JPG

Date of Photo:
4/1/2016

View: E

Feature / Location:
61 - Channel
Condition: Thru

Span 2 - Site View

Photo Description: View of Channel through Span 1, Upstream of Bridge over Blackberry Creek

Photo Number: 38

Structure Number:
045-0024

Photo File Name:
DSCF5857.JPG

Date of Photo:
4/1/2016

View: W

Feature / Location:
61 - Channel
Condition: Thru

Misc: Site View -

Photo Description: View through Span 2, showing channelization of Blackberry Creek from Downstream end.

Photo Number: 39

Structure Number:
045-0024

Photo File Name:

DSCF5833.JPG

Date of Photo:

4/1/2016

View: SE

Feature / Location:

61 - Channel Condition: Thru

Span 1 - Detail Photo

Photo Description: View of Channel through Span 1, Upstream of Bridge over Blackberry Creek

Photo Number: 40

Structure Number:
045-0024

Photo File Name:

DSCF5856.JPG

Date of Photo:

4/1/2016

View: Downst

Feature / Location:

61 - Channel Condition:

Misc: Site View -

Photo Description: View of Blackberry Creek, downstream of Bridge near Span 2.

Photo Number: 41

Structure Number:
045-0024

Photo File Name:

DSCF5836.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wing Wall - Typical Condition

Photo Description: Elevation view of West Wing Wall, showing typical condition.

Photo Number: 42

Structure Number:
045-0024

Photo File Name:

DSCF5852.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Pile Bent - Hairline Cracking

Photo Description: Hairline crack with efflorescence and water passing through rebuilt abutment seat.

Photo Number: 43

Structure Number:
045-0024

Photo File Name:

DSCF5851.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Pile Bent - Hairline Cracking

Photo Description: Hairline crack with efflorescence and water passing through rebuilt abutment seat.

Photo Number: 44

Structure Number:
045-0024

Photo File Name:

DSCF5849.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Back Wall -

Photo Description: View of water passing thru PJF filler between semi-integral diaphragm and reconstructed beam seat.

Photo Number: 45

Structure Number:
045-0024

Photo File Name:

DSCF5840.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Wing Wall - Typical Condition

Photo Description: Typical condition of Wing Wall and dumped rip-rap slope protection.

Photo Number: 46

Structure Number:
045-0024

Photo File Name:

DSCF5839.JPG

Date of Photo:

4/1/2016

View: NE

Feature / Location:

60 - Substructure Cond: Abutment

North Abutment: Pile Bent - Typical Condition

Photo Description: Elevation view of Beam Seat at North Abutment, showing typical condition.

Photo Number: 47

Structure Number:
045-0024

Photo File Name:
DSCF5819.JPG

Date of Photo:
4/1/2016

View: NE

Feature / Location:
60 - Substructure Cond: Pier

Pier 1: Wall - Typical Condition

Photo Description: View of Pier Elevation.

Photo Number: 48

Structure Number:
045-0024

Photo File Name:
DSCF5838.JPG

Date of Photo:
4/1/2016

View: SE

Feature / Location:
60 - Substructure Cond: Pier

Pier 1: Wall - Typical Condition

Photo Description: View of North face of Wall Pier showing typical condition.

Photo Number: 49

Structure Number:
045-0024

Photo File Name:

DSCF5822.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wing Wall - Typical Condition

Photo Description: South Abutment: Wing Wall - Typical Condition of East Wing.

Photo Number: 50

Structure Number:
045-0024

Photo File Name:

DSCF5820.JPG

Date of Photo:

4/1/2016

View: SE

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Pile Bent - Typical Condition

Photo Description: Pile Bent - Typical Condition with rip-rap slope protection.

Photo Number: 51

Structure Number:
045-0024

Photo File Name:

DSCF5816.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

60 - Substructure Cond: Abutment

South Abutment: Wing Wall - Typical Condition

Photo Description: South Abutment: Wing Wall - Typical Condition

Photo Number: 52

Structure Number:
045-0024

Photo File Name:

DSCF5862.JPG

Date of Photo:

4/1/2016

View: S

Feature / Location:

Facility Carried Guardrail terminals

Traffic Barriers: Impact Attenuator -

Photo Description: Impact attenuator at Southbound approach along IL 47, North of Blackberry Creek.

Photo Number: 53

Structure Number:
045-0024

Photo File Name:

DSCF5868.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

Facility Carried
Guardrail terminals

Traffic Barriers: Impact Attenuator -

Photo Description: Impact attenuator at Northbound approach along IL 47, South of Blackberry Creek.

Photo Number: 54

Structure Number:
045-0024

Photo File Name:

DSCF5860.JPG

Date of Photo:

4/1/2016

View: N

Feature / Location:

72 - Approach Rdwy Align: Guardrail

Traffic Barriers: Steel Plate Beam Guardrail -

Photo Description: View of guardrail that is not in contact with blocking, Northbound departure along IL 47.

ATTACHMENT I

Hydraulic Analysis Summary

Included in this attachment is the most currently available Waterway Information Table (WWIT) based on the existing conditions for Structure Number 045-0024, IL Route 47 over Blackberry Creek. At this time, a proposed channel cross section for any replacement options has not been provided and is considered beyond the scope of this report.

Illinois Department of Transportation

Table 1.1 (DESIGN)

Bridge Waterway Information Table

Route:	F.A.P 326 (IL. Rte. 47)	Existing SN:	045-0024		
Waterway:	Blackberry Creek	Proposed SN:	T.B.D		
Section:	107 B-1-R-1	Prepared by:	KU	Date:	12/8/2016
County:	Kane	Checked by:	SGL	Date:	12/8/2016

Existing Overtopping Elev. = 706.29 at Sta. 108+10

Drainage Area = 22.1 square miles

Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	1040	382		701.0	0.2		701.2	
Design	50	1764	457		701.9	0.5		702.4	
Base	100	2133	492		702.3	0.6		702.9	
Scour Design Check	200	2585	525		702.7	0.9		703.6	
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	3155	572		703.2	1.0		704.2	

Datum:

All-Time H.W.E. & Date: 703.00, 1954 ft

Surveyed Normal Water Level: 685.72 ft

10-Year Velocity through Existing Structure = 2.85 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 449 ft^3/s

EXISTING STRUCTURE

Type:	Steel Girder Bridge
Length/Width:	93' perpendicular to flow (fc-fc abut.)
# Spans/Cells:	2, 46.5' - 46.5' (fc abut. - cl pier - fc abut.))
Low Chord:	704.50
Skew:	30 (relative to road)
Clearance:	2.59
Bridge Flow Line:	694.74 (u/s) 694.88 (d/s)
Low E.O.P:	706.29
Freeboard:	3.92
Culvert Inverts:	(u/s) (d/s)

PROPOSED STRUCTURE

Type:	
Length Of Span:	
# Spans:	
Low Chord:	
Skew:	(relative to road)
Clearance:	
Bridge Flow Line:	(u/s) (d/s)
Low E.O.P:	
Freeboard:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

Attachment I

Route: IL. Rte. 47 | Computed: KU | Date: 12/7/2016
Waterway: Blackberry Creek | Checked: SGL | Date: 12/8/2016

CALCULATE CREATED HEAD

Frequency	Natural H.W.E. (ft)			Exist. Headwater Elev. (ft)		Prop. Headwater Elev. (ft)		Created Head (ft) @ Approach Section	
	Approach Sect. (63' U/S) 1204+66	Depart Sect. (195' D/S) 1202+60	U/S Face of Structure	U/S Face of Structure	Approach Sect. (63' U/S) 1204+66	U/S Face of Structure	Approach Sect.	Existing	Proposed
10-Year	701.05	700.90	701.00	701.21	701.26	N/A	N/A	0.21	N/A
50-Year	701.95	701.82	701.91	702.37	702.41	N/A	N/A	0.46	N/A
100-Year	702.35	702.23	702.31	702.90	702.94	N/A	N/A	0.59	N/A
500-Year	703.27	703.16	703.24	704.19	704.22	N/A	N/A	0.95	N/A

Upstream Face of Structure taken at 1204+03.00

All opening areas were measured in Microstation using Natural H.W.E.

CALCULATE FREEBOARD

Low Edge of Pavement Elevation (ft)			
Existing	**Station**	**Proposed**	**Station**
706.29	108+10	N/A	N/A
Existing Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
5.08	3.92	3.39	2.10
Proposed Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

CALCULATE CLEARANCE

Low Beam Elevation (ft)			
Existing:	704.50	**Proposed:**	N/A
Existing Clearance (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
3.50	2.59	2.19	1.26
Proposed Clearance (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

EFFECTIVE WATERWAY OPENING

Frequency	Area (sq ft)
10-Year	382
50-Year	457
100-Year	492
500-Year	572

Attachment I

Route: IL. Route 47 Computed: KU Date: 12/8/2016
Waterway: Blackberry Creek Checked: SGL Date: 12/8/2016

10-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head	
1213+15.30	701.78	701.86		0.08		
1210+72.50	701.61	701.71		0.10		
1208+85.90	701.44	701.57		0.13		
1207+82.50	701.32	701.47		0.15		
1206+12.40	701.16	701.34		0.18		
1204+66.60	701.05	701.26		0.21		
1204+28.00	701.02	701.11		0.09		interpolated

50-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head	
1213+15.30	702.65	702.90		0.25		
1210+72.50	702.49	702.78		0.29		
1208+85.90	702.33	702.66		0.33		
1207+82.50	702.22	702.59		0.37		
1206+12.40	702.07	702.48		0.41		
1204+66.60	701.95	702.41		0.46		
1204+28.00	701.92	702.15		0.23		interpolated

100-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head	
1213+15.30	703.04	703.39		0.35		
1210+72.50	702.87	703.28		0.41		
1208+85.90	702.72	703.18		0.46		
1207+82.50	702.62	703.11		0.49		
1206+12.40	702.46	703.01		0.55		
1204+66.60	702.35	702.94		0.59		
1204+28.00	702.33	702.63		0.30		interpolated

500-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head	
1213+15.30	703.95	704.59		0.64		
1210+72.50	703.79	704.49		0.70		
1208+85.90	703.64	704.40		0.76		
1207+82.50	703.54	704.34		0.80		
1206+12.40	703.38	704.27		0.89		
1204+66.60	703.27	704.22		0.95		
1204+28.00	703.25	703.76		0.51		interpolated

Illinois Department of Transportation

Table 1.4 (PERMIT)

Bridge Waterway Information Table

Route:	F.A.P 326 (IL. Rte. 47)	Existing SN:	045-0024		
Waterway:	Blackberry Creek	Proposed SN:	T.B.D		
Section:	107 B-1-R-1	Prepared by:	KU	Date:	12/8/2016
County:	Kane	Checked by:	SGL	Date:	12/8/2016

Existing Overtopping Elev. = 706.29 at Sta. 108+10

Drainage Area = 22.1 square miles

Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	1041	665		700.8	0.2		701.0	
Design	50	1765	759		701.8	0.5		702.3	
Base	100	2134	800		702.2	0.6		702.8	
Scour Design Check									
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	3157	895		703.2	0.9		704.1	

Datum:

All-Time H.W.E. & Date: 703.00, 1954 ft

Surveyed Normal Water Level: 685.72 ft

10-Year Velocity through Existing Structure = 2.45 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 449 ft^3/s

EXISTING STRUCTURE

Type:	Steel Girder Bridge
Length/Width:	93' perpendicular to flow (fc-fc abut.)
# Spans/Cells:	2 , 46.5' - 46.5' (fc abut. - cl pier - fc abut.)
Low Chord:	704.50
Skew:	30 (relative to road)
Clearance:	2.72
Bridge Flow Line:	690.35 (u/s) 692.69 (d/s)
Low E.O.P:	706.29
Freeboard:	4.02
Culvert Inverts:	(u/s) (d/s)

PROPOSED STRUCTURE

Type:	
Length Of Span:	
# Spans:	
Low Chord:	
Skew:	(relative to road)
Clearance:	
Bridge Flow Line:	(u/s) (d/s)
Low E.O.P:	
Freeboard:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

Attachment I

Route: IL. Rte. 47 | Computed: KU | Date: 12/8/2016
Waterway: Blackberry Creek | Checked: SGL | Date: 12/8/2016

CALCULATE CREATED HEAD

Frequency	Natural H.W.E. (ft)			Exist. Headwater Elev. (ft)		Prop. Headwater Elev. (ft)		Created Head (ft) @ Approach Section	
	Approach Sect. (128' U/S) 1205+64	Depart Sect. (382' D/S) 1199+20	U/S Face of Structure	U/S Face of Structure	Approach Sect. (128' U/S) 1205+64	U/S Face of Structure	Approach Sect. (128' U/S) 1204+37	Existing	Proposed
10-Year	700.90	700.59	700.82	701.05	701.13	N/A	N/A	0.23	N/A
50-Year	701.86	701.55	701.78	702.27	702.35	N/A	N/A	0.49	N/A
100-Year	702.27	701.97	702.20	702.82	702.89	N/A	N/A	0.62	N/A
500-Year	703.25	702.94	703.17	704.10	704.18	N/A	N/A	0.93	N/A

Upstream Face of Structure taken at 1204+03.00

All opening areas were measured in Microstation using Natural H.W.E.

CALCULATE FREEBOARD

Low Edge of Pavement Elevation (ft)			
Existing	**Station**	**Proposed**	**Station**
706.29	108+10	N/A	N/A
Existing Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
5.24	4.02	3.48	2.19
Proposed Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

CALCULATE CLEARANCE

Low Beam Elevation (ft)			
Existing:	704.50	**Proposed:**	N/A
Existing Clearance (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
3.68	2.72	2.31	1.33
Proposed Clearance (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

EFFECTIVE WATERWAY OPENING

Frequency	Area (sq ft)
10-Year	665
50-Year	759
100-Year	800
500-Year	895

Attachment I

Route: IL. Route 47 Computed: KU Date: 12/8/2016
Waterway: Blackberry Creek Checked: SGL Date: 12/8/2016

10-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*	
1215+56.00	701.48	701.60		0.12		
1205+64.00	700.90	701.13		0.23		
1204+37.00	700.84	701.03		0.19		Interpolated

50-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*	
1215+56.00	702.43	702.75		0.32		
1205+64.00	701.86	702.35		0.49		
1204+37.00	701.80	702.19		0.39		Interpolated

100-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*	
1215+56.00	702.84	703.26		0.42		
1205+64.00	702.27	702.89		0.62		
1204+37.00	702.21	702.70		0.49		Interpolated

500-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*	
1215+56.00	703.82	704.52		0.70		
1205+64.00	703.25	704.18		0.93		
1204+37.00	703.19	703.89		0.70		Interpolated

ATTACHMENT J

Proposed Plan & Profile

This attachment will include the proposed plan and profile for a replacement bridge, should the recommendation for major reconstruction be selected as the preferred alternative. This information is currently unavailable, as the Phase 1 report is under development.

ATTACHMENT K

Existing & Proposed Roadway Cross Sections

This attachment will include existing and proposed cross section for the approach roadway, should the recommendation for major reconstruction be selected as the preferred alternative. This information is currently unavailable, as the Phase 1 report is under development.

ATTACHMENT L

Abbreviated Existing Plans

Included in this attachment are the General Plan and Elevation and superstructure cross section sheets for SN 045-0024, IL Route 47 over Blackberry Creek.

Library
62031
54
Library
Library
Library
Library
Library
SEP 20 2002

Attachment L

P.N.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	107 B-1-R-1	KANE	37	1
	ROAD DIST. NO. _	ILLINOIS	FED. AID PROJECT	

ACBHF-326 (47)

FOR INDEX OF SHEETS, SEE SHEET NO. 2

PROJECT LOCATED IN SUGAR GROVE TOWNSHIP

DESIGN DESIGNATION

PRINCIPAL, ARTERIAL

TRAFFIC DATA

1999 ADT = 10000
SPEED LIMIT = 55 MPH

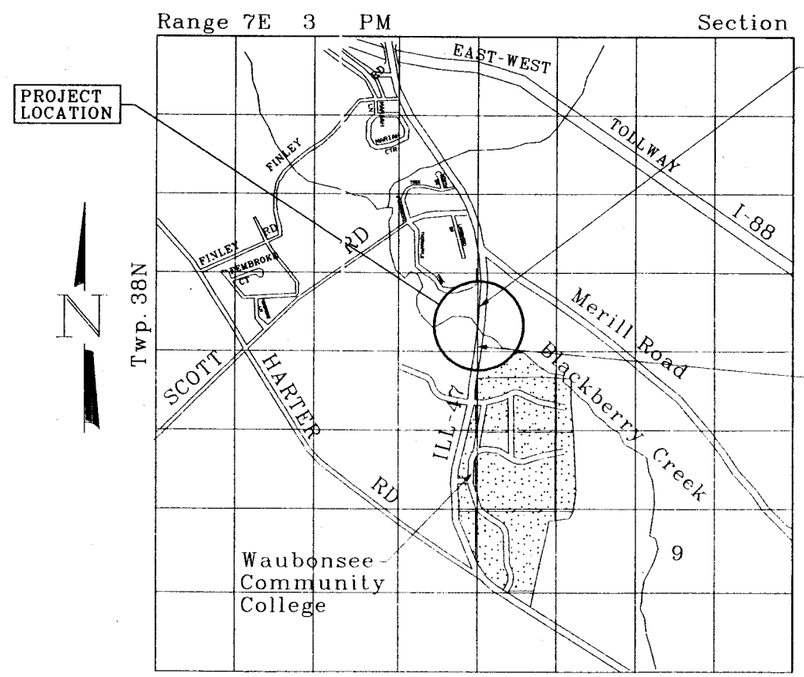
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PLANS FOR PROPOSED HIGHWAY

FAP 326 ILLINOIS ROUTE 47
SECTION 107 B-1-R-1
PROJECT NO. ACBHF-326(47)
OVER BLACKBERRY CREEK
BRIDGE SUPERSTRUCTURE REPLACEMENT
KANE COUNTY
C-91-432-00

D-91-432-00

LOCATION OF SECTION INDICATED THUS:-



PROJECT BEGINS STATION 351+00

PROJECT ENDS STATION 356+00

SUGAR GROVE TOWNSHIP

MAP SCALE
0 5000' 10000'

GROSS AND NET LENGTH OF PROJECT = 500 FEET = 0.09 MILE

IL 47 OVER BLACKBERRY CREEK

STRUCTURE NO. 045-0024, STA. 353+60. REMOVE EXISTING TWO SPAN PPC DECK BEAM SUPERSTRUCTURE AND CONSTRUCT A NEW TWO SPAN WIDE FLANGE BEAM STRUCTURE ON SEMI-INTEGRAL OPEN ABUTMENTS. ONE PIER WITHIN THE STREAM. APPROACH ROADWAY PAVEMENT WILL BE WIDENED AND RAISED.

0 100' 200' 300' 1" = 100'
0 10' 20' 30' 1" = 10'
0 50' 100' 1" = 50'
0 50' 100' 1" = 40'
0 50' 100' 1" = 30'
0 50' 100' 1" = 20'

FULL SIZE PLANS HAVE BEEN PREPARED USING STANDARD ENGINEERING SCALES, REDUCED SIZED PLANS WILL NOT CONFORM TO STANDARD SCALES, IN MAKING MEASUREMENTS ON REDUCED PLANS, THE ABOVE SCALES MAY BE USED.

J.U.L.I.E.
JOINT UTILITY LOCATION INFORMATION FOR EXCAVATION
1-800-892-0123

STATE OF ILLINOIS
TERESA MESIA RUBINOS
62-41321
REGISTERED PROFESSIONAL ENGINEER

Teresa Mesia Rubinos

Teresa Mesia Rubinos
Licensed Professional Engineer
State of Illinois
Lic. No. 62-41321
Expires 11-30-2003

STATE OF ILLINOIS
TERESA MESIA RUBINOS
81-3210
REGISTERED STRUCTURAL ENGINEER

Teresa Mesia Rubinos

Teresa Mesia Rubinos
Licensed Structural Engineer
State of Illinois
Lic. No. 81-3210
Expires 11-30-2002

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SUBMITTED July 9 20 02
DISTRICT ENGINEER
August 16, 20 02
ENGINEER OF DESIGN AND ENVIRONMENT
August 16, 20 02
DIRECTOR, DIVISION OF HIGHWAYS

RUBINOS & MESIA ENGINEERS, INC.
200 South Michigan Ave. Chicago, Illinois 60604 Phone (312) 663-5672 Fax (312) 663-9473

PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

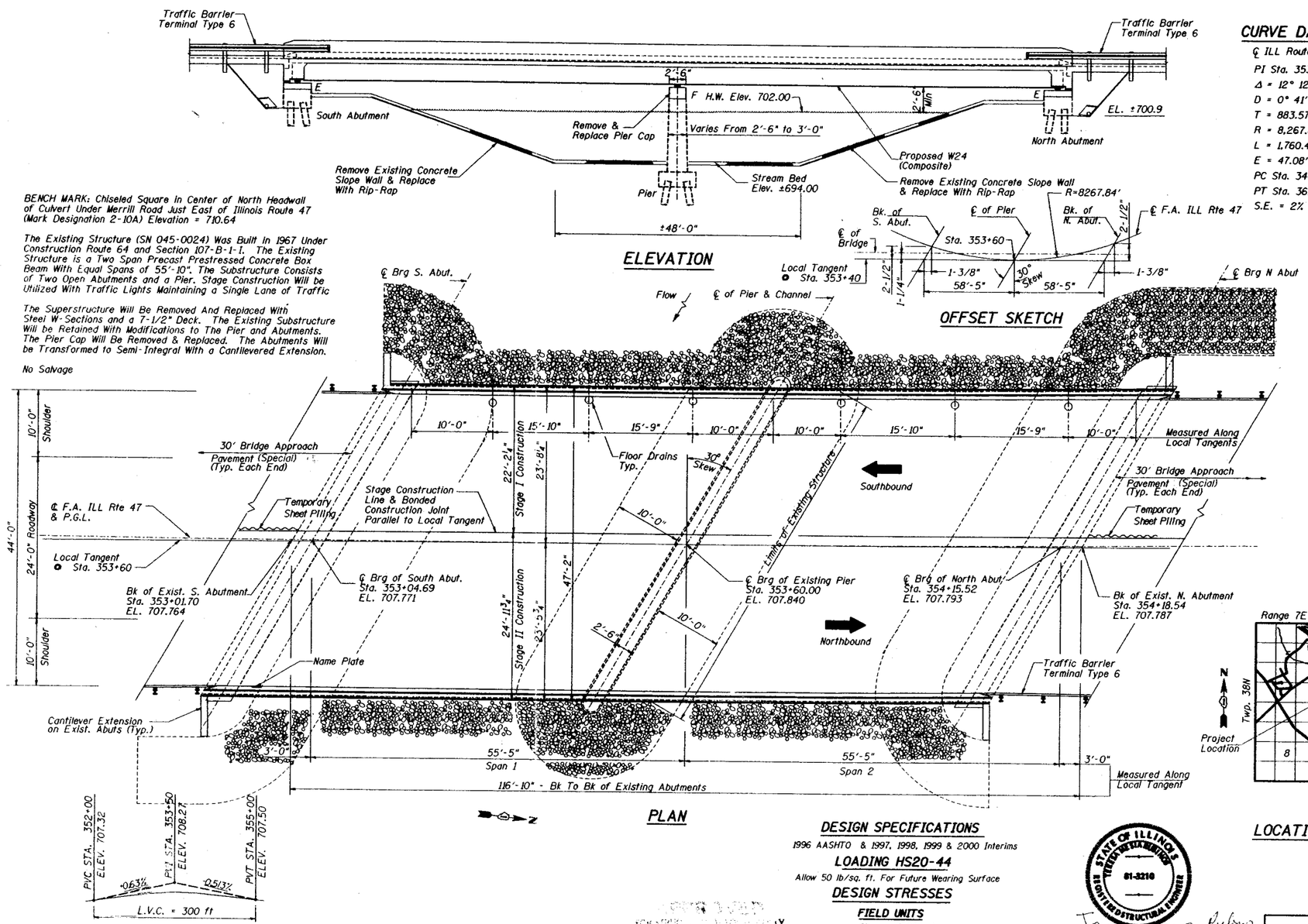
IDOT DESIGN-CONSULTANT PROJECT MANAGER: ART ABBAS (847) 705-4431

CONTRACT NO. 62031

Attachment L

F.A. RTE	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	107-B-1-R-1	KANE	37	10
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT-		

Sheet 1 of 19



BENCH MARK: Chiseled Square In Center of North Headwall of Culvert Under Merrill Road Just East of Illinois Route 47 (Mark Designation 2-10A) Elevation = 710.64

The Existing Structure (SN 045-0024) Was Built In 1967 Under Construction Route 64 and Section 107-B-1-1. The Existing Structure is a Two Span Precast Prestressed Concrete Box Beam With Equal Spans of 55'-10". The Substructure Consists of Two Open Abutments and a Pier. Stage Construction Will be Utilized With Traffic Lights Maintaining a Single Lane of Traffic

The Superstructure Will Be Removed And Replaced With Steel W-Sections and a 7-1/2" Deck. The Existing Substructure Will be Retained With Modifications to The Pier and Abutments. The Pier Cap Will Be Removed & Replaced. The Abutments Will be Transformed to Semi-Integral With a Cantilevered Extension.

No Salvage

CURVE DATA

℄ ILL Route 47
PI Sta. 353+15.61
Δ = 12° 12' 00" (LT)
D = 0° 41' 35"
T = 883.57'
R = 8,267.84'
L = 1,760.46'
E = 47.08'
PC Sta. 344+32.04
PT Sta. 361+92.50
S.E. = 2%

TOTAL BILL OF MATERIAL

ITEMS	UNITS	SUPER	SUB	TOTAL
Porous Granular Embankment	Cu. Yd.		190	190
Stone Riprap, Class A4	Sq. Yd.		1350	1350
Filter Fabric For Use With Riprap	Sq. Yd.		1350	1350
Removal of Existing Superstructure	EACH	1		1
Concrete Removal	Cu. Yd.		48	48
Structure Excavation	Cu. Yd.		230	230
Concrete Superstructure	Cu. Yd.	190		190
Floor Drains	EACH	6		6
Elastomeric Bearing Assembly, Type 1	EACH	16		16
Concrete Structures	Cu. Yd.		40	40
Bridge Deck Grooving	Sq. Yd.	540		540
Protective Coat	Sq. Yd.	670		670
Stud Shear Connectors	EACH	4176		4176
Furnishing and Erecting Structural Steel	L SUM	1		1
Reinforcement Bars, Epoxy Coated	Pound	41500	4700	46200
Temporary Sheet Piling	Sq. Ft.		320	320
Name Plates	EACH	1		1
Bar Splicers	EACH	461	30	491
Mechanical Splice	EACH		212	212
Formed Concrete Repair	Sq. Ft.		63	63
Slope Wall Removal	Sq. Yd.		820	820

PROFILE GRADE

Along ℄ Route 47

WATERWAY INFORMATION

Drainage Area = 21.0 Sq. Mi. Low Grade Elev. = 707.1 ft. ○ Sta 352+75

Flood	Freq yr.	Q cfs	Opening ft² Exist.	Opening ft² Prop	Nat. H.W.E.	Head (ft) Exist.	Head (ft) Prop.	Headwater EL. Exist.	Headwater EL. Prop.
	10	1450	423	423	701.1	0.5	0.5	701.6	701.6
Design	50	2320	493	493	702.0	0.9	0.9	702.9	702.9
Base	100	2900	525	525	702.4	1.2	1.2	703.6	703.6
Max Calc	500	4002	585	585	703.1	1.6	1.6	704.7	704.7

DESIGN SPECIFICATIONS

1996 AASHTO & 1997, 1998, 1999 & 2000 Interims

LOADING HS20-44

Allow 50 lb/sq. ft. For Future Wearing Surface

DESIGN STRESSES

FIELD UNITS

f'c = 3500 psi
fy = 50,000 psi (M270 Grade 50)
fy = 60,000 psi (Reinf.)
fc = 1400 psi (Existing Substructure)
fs = 20,000 psi (Existing Substructure)

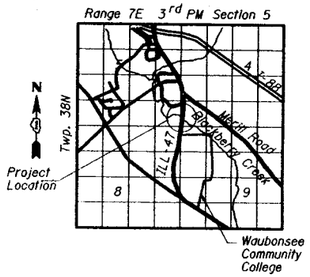
SEISMIC DATA

Seismic Permformance Category(SPC) = A
Bedrock Acceleration Coefficient (A) 0.04 g
Site Coefficient (S) = 1.0

STATE OF ILLINOIS TERESA MESIA RUBINOS 81-3210 REGISTERED STRUCTURAL ENGINEER

Teresa Mesia Rubinos

Teresa Mesia Rubinos
Licensed Structural Engineer
State of Illinois
Lic. No. 81-3210
Expires: 11-30-2002



LOCATION SKETCH

STATION 353+60.00
BUILT 20__ BY
STATE OF ILLINOIS
F.A.P. ROUTE 326 SEC. 107-B-1-R-1
F.A.P. PROJECT C-91-432-00
LOADING HS20
STRUCTURE NO. 045-0024

NAME PLATE

See Std. 515001.
Existing Name Plate Shall be Cleaned & Relocated Next to New Name Plate. Cost Included With "Name Plates"

REVISIONS	
NAME	DATE

ILLINOIS DEPARTMENT OF TRANSPORTATION

GENERAL PLAN & TOTAL BILL OF MATERIAL

ILLINOIS ROUTE 47 OVER
BLACKBERRY CREEK
F.A.P. ROUTE 326 SECTION 107-B-1-R-1
STA. 353+60.00
KANE COUNTY
STRUCTURE NUMBER 045-0024

SCALE: NOT TO SCALE — DRAWN BY: TH
DATE: JULY 11, 2002 — CHECKED BY: MF

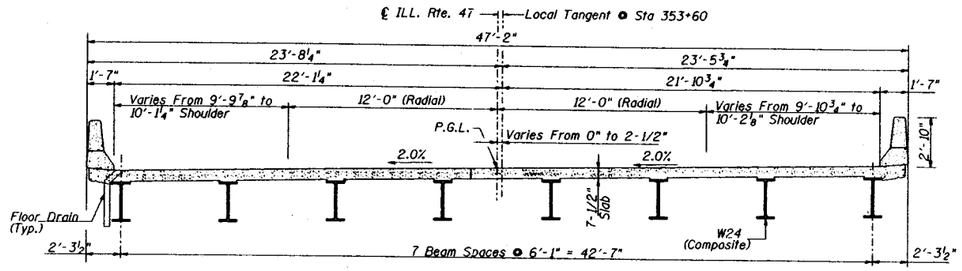
RUBINOS & MESIA ENGINEERS, INC.
200 South Michigan Ave Chicago, Illinois 60604 Phone (312) 663-5678 Fax (312) 663-1473

Attachment L

Library

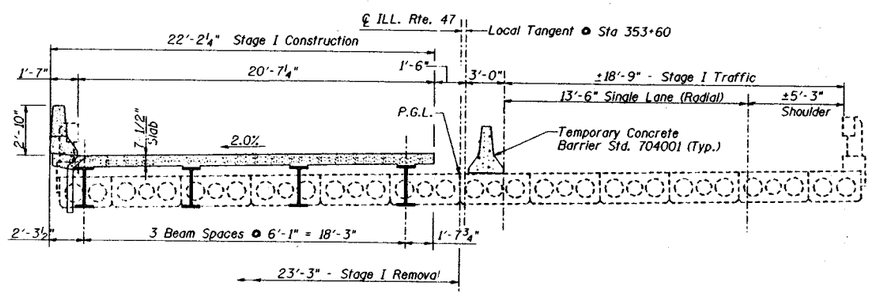
F.A.P.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	107-B-1-R-1	KANE	37	11
FED. ROAD DIST. NO.		ILLINOIS	FED. AID PROJECT-	

Sheet 2 of 19



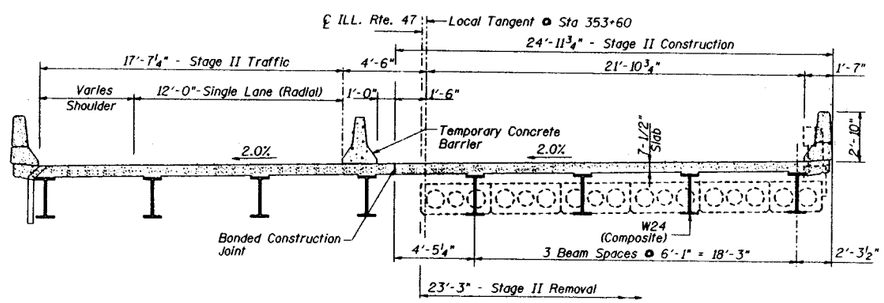
PROPOSED TYPICAL BRIDGE SECTION

Looking North
(Dimensions At Right Angles Unless Noted)



PROPOSED STAGE I CONSTRUCTION

Looking North



PRCPOSED STAGE II CONSTRUCTION

Looking North

GENERAL NOTES

1. Fasteners shall be high strength Bolts ⅞" ϕ. open holes 15/16". unless otherwise noted.
2. Calculated weight of structural steel = 99000 M270 Grade 50
   15500 M270 Grade 36
3. Field welding of construction accessories will not be permitted to the bottom flange of beams nor to the top flange for a distance equal to one-fourth the span length each way from the pier supports. Field welding in other areas will be permitted only when approved by the engineer.
4. Anchor bolts shall be set before bolting diaphragms over piers.
5. The structural steel bearing plates of the elastomeric bearing assembly shall conform to the requirements of AASHTO M270 Grade 50.
6. The main load carrying member components subject to tensile stress shall conform to the supplemental requirements for notch toughness zone 2. These components are the wide flange beams and all splice plate material except fill plates.
7. Reinforcement bars shall conform to the requirements of AASHTO M 31, M42 or M53 Grade 60.
8. Layout of slope protection system may be varied in the field to suit ground conditions as directed by the engineer.
9. Bearing seat surfaces shall be constructed or adjusted to the designated elevations within a tolerance of ⅛ inch. Adjustment shall be made either by grinding the surface or by shimming the bearing. Two ⅛ inch adjusting shims, of the dimensions of the bottom bearing plate, shall be provided for each bearing in addition to all other plates or shims. (For Type I elastomeric bearings, two ⅛ inch adjusting shims shall be provided for each bearing and placed as detailed).
10. The inorganic zinc rich primer / Acrylic / Acrylic Paint System shall be used for shop and field painting of new structural steel except where otherwise noted. The color of the final finish coat for all steel surfaces shall be gray. Munsell No. 5b 7/1. See special provisions for "Cleaning and Painting New Metal Structures".
11. Plan dimensions and details relative to existing structure have been taken from existing plans and are subject to nominal construction variations. It shall be the contractor's responsibility to verify such dimensions and details in the field and make necessary approved adjustments prior to construction or ordering of materials. Such variations shall not be cause for additional compensation for a change in the scope of work; however, the contractor will be paid for the quantity actually furnished at the unit price bid for the work.

REVISIONS	
NAME	DATE

RUBINOS & MESIA ENGINEERS, INC.
200 South Michigan Ave Chicago, Illinois 60604 Phone (312) 863-5878 Fax (312) 863-9473

ILLINOIS DEPARTMENT OF TRANSPORTATION

CROSS-SECTION & GENERAL NOTES

ILLINOIS ROUTE 47 OVER
BLACKBERRY CREEK
F.A.P. ROUTE 326 SECTION 107-B-1-R-1
STA. 353+60.00
KANE COUNTY
STRUCTURE NUMBER 045-0024

SCALE: NOT TO SCALE — DRAWN BY: TH

DATE: JULY 11, 2002 — CHECKED BY: MF

ATTACHMENT M

Additional Testing Results

This section will not be used as no additional testing appears to be warranted.

HYDRAULIC REPORT

ROUTE:	F.A.P. Route 326/Illinois Route 47 over Blackberry Creek
COUNTY:	Kane County
STRUCTURE NUMBER:	Existing: 045-0024, Proposed: TBD
PROJECT LIMITS:	TBD
JOB NO.:	P-91-015-14

Prepared for:

Illinois Department of Transportation
Division of Highways – District 1
Bureau of Programming
Hydraulic Section

Prepared By:

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May, 2017

HYDRAULIC REPORT

IL. RTE. OVER BLACKBERRY CREEK

JOB NO. P-91-015-14

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- PDF of USGS Scientific Investigations Report 2005-5270: 2005
- PDF of Blackberry Creek Watershed Management Plan: September, 1999

I. NARRATIVE

HYDRAULIC REPORT
EX S.N. 045-0024

PROJECT DESCRIPTION

This hydraulic report has been prepared for the Illinois Department of Transportation (IDOT) in order to evaluate the hydraulic performance of the existing structure (S.N. 045-0024) on Illinois Route 47 over Blackberry Creek, 1.0 mile south of I-88 in Kane County, Illinois.

The proposed work is expected to include widening of IL 47 from one lane in each direction to two lanes in each direction. In addition, a median will be added in the center, a multi-use path accommodation will be added on the east side and a sidewalk accommodation will be added on the west side. Primarily due to the large increase in bridge width, complete replacement of the bridge is anticipated. The new bridge is expected to provide a 20 foot wide path area below the bridge to serve as a wildlife crossing. The project location map is shown in **EXHIBIT A.**

DESCRIPTION OF EXISTING STRUCTURE AND FLOODPLAIN

The existing structure (S.N. 045-0024) over Blackberry Creek was built as F.A Route 64 in 1968, and was reconstructed in 2003 as F.A.P Route 326. The subject structure is located in low-urban area within the Blackberry Creek watershed. The abutments and pier of the existing bridge run parallel to the flow of Blackberry Creek, which is skewed 30 degrees ahead left centerline of IL 47. The existing bridge superstructure consists of two spans with steel girders and a bridge opening width of 93' from face of abutment to face of abutment, measured perpendicular to the channel flow. See the attachment in **EXHIBIT F** for the existing roadway plan and profile.

Blackberry Creek is a tributary to the Fox River that flows from north to south. FEMA has designated floodplains and floodways along Blackberry Creek as illustrated on the Flood Insurance Rate Map in **EXHIBIT C**. The observed water surface elevation at the bridge location is approximately 695.72 as recorded in August of 2014. This elevation was obtained from the survey performed for the purposes of this hydraulic analysis.

The hydraulic analysis on the existing subject structure has indicated that the 2' clearance (between the low beam of the structure and the 50-year natural high water elevation) requirement, and the 3' freeboard (between the lowest edge of pavement within the floodplain boundary and the 50-year high water elevation) requirement have both been met. The existing low beam elevation is 704.50 and is detailed in the survey notes provided in **EXHIBIT H** and in the bridge opening plots in **EXHIBIT G**. The low roadway elevation in the floodplain is located at approximately roadway station (Illinois Route 47) 108+10 at elevation 706.29 as taken at the upstream edge of pavement.
The existing roadway consists of two 12' asphalt lanes, a 10' asphalt shoulder on each side of the roadway, and guardrails which eventually tie into the structure's concrete barriers

at both ends of the bridge. The subject structure is located at the crest of a vertical curve, and the roadway is super elevated within the study limits, which is illustrated in **EXHIBIT F**.

The Blackberry Creek upstream drainage basin equals to 22.1 square miles at the Illinois Route 47 crossing according to StreamStats, which correlates with the Flood Insurance Study (see FIS excerpts in **EXHIBIT C**). Land within the floodplain tributary to the watershed consists of cropland, forests, and grass land. Residential subdivision is located north-west of the subject bridge structure, and a community college to the south-east. Past IDOT structure reports have not indicated the presence of scour at the bridge, and there are no indications of aggradation or degradation. See photographs in **EXHIBIT B** for a visual description of the project site.

The nearest upstream structure is the Scott Road bridge, located approximately 3900 feet away from subject structure S.N. 045-0024. The nearest downstream structure is a pedestrian bridge of the Virgil Gilman Nature Trail approximately 10,700 feet downstream of the subject structure.

FIELD OBSERVATIONS

The edges of the Blackberry Creek bank are well vegetated with tall grasses, shrubs, and lined with trees at many locations. The streambed itself is muddy with minimal vegetation. At the time of the field observation, the bridge structure was free of debris and no scour holes could be detected from a visual inspection. A hydraulic survey was performed in August of 2014, and an additional field visit took place in August of 2015. The photographs included in **EXHIBIT B** have been taken during the August 2015 field inspection.

HISTORICAL OBSERVATIONS/RECORDS

There are no records of water overtopping the existing bridge or roadway pavement. A flood of October 1954 has been documented in the Hydrologic Investigations Atlas HA-229 (**EXHIBIT A**). No high water marks have been observed at the Illinois Route 47 crossing according to this study. Also, neither IDOT nor Kane County Division of Transportation have records of any past flooding issues or overtopping at subject structure S.N. 045-0024. Based on Figure 5 of HA-229 the water elevation of Blackberry Creek at Illinois Route 47 was approximately 703.00, making it the all-time H.W.E recorded for this subject crossing.

Another storm event was recorded in July 1996 that caused widespread flooding in Aurora and Montgomery, approximately 6 miles downstream of the subject structure. This event has been documented in the USGS Scientific Investigations Report 2005-5270 (**EXHIBIT M**). The overflow of Jericho Lake is the cause of the flooding of the Montgomery Overflow and the US-30 pavement. The Jericho Lake Overflow does not impact Blackberry Creek upstream; therefore, it should not be a concern at this location.

Any improvements to the subject structure should not exacerbate the flooding issues along Blackberry Creek in Aurora or Montgomery. See **EXHIBIT L** for the correspondence in regards to historical flooding data.

OTHER STUDIES AND AFFECTED AGENCIES

The development of the studies related to Blackberry Creek is described in the most recent flood insurance studies published for Kane County in 2009. Studies that predate the FEMA county wide studies include the FIS reports dated March 1, 1982, March 4, 1988, and June 4, 1996 prepared by the USACE. The latest FEMA FIRM maps for this location of the subject structure were released in 2012. The FIS Regulatory Model used to perform the hydraulic analysis for this report was obtained from FEMA.

In 2005, Scientific Investigation Report 2005-5270: Continuous Hydrologic Simulation and Flood-Frequency, Hydraulic, and Flood-Hazard Analysis of the Blackberry Creek Watershed was developed by USGS. This report was developed in coordination with IDNR-OWR, FEMA, and all affected villages and counties based on recommendations of the Blackberry Creek Watershed Management Plan.

The Blackberry Creek Watershed Management Plan was drafted by the Blackberry Creek Watershed Resource Planning Committee in coordination with the Kane-DuPage Soil and Water Conservation District in 1999.

The pdfs of these previous studies are on the CD / flash drive attached in **EXHIBIT M**.

Background Data:

The following documents were utilized in developing this report:

- Flood Insurance Rate Map, Kane County, Illinois and Incorporated Areas, Map No. 17089C0315J, Panel 315 of 410; Map Revised: July 17, 2012. (**EXHIBIT C**).
- Flood Insurance Rate Map, Kane County, Illinois and Incorporated Areas, Map No. 17089C0305J, Panel 305 of 410; Map Revised: July 17, 2012. (**EXHIBIT C**).
- Hydrologic Investigations Atlas HA-229: 1966. (**EXHIBIT A**).
- Federal Emergency Management Agency – Flood Insurance Study for Kane County, Illinois and Incorporated Areas, Flood Insurance Study Number 17089CV001C, Revised: August 3, 2009. (excerpts in **EXHIBIT C** and full volume in **EXHIBIT M**).
- USGS Scientific Investigations Report 2005-5270, created in cooperation with the Kane County Department of Environmental Management, Illinois Department of Natural Resources-Office of Water Resources, and the Federal Emergency Management Agency: 2005. (**EXHIBIT M**).
- Blackberry Creek Watershed Management Plan: September 1999. (**EXHIBIT M**).

DATUM CORRELATION

Hydraulic surveys of the stream profiles and floodplain cross sections were performed in August of 2014. The topographic and hydraulic survey elevations are correlated with the North American Vertical Datum of 1988 (NAVD88). Previous cross section information included in the USGS and FEMA hydraulic models also reference the NAVD 88 datum.

SENSITIVE FLOOD RECEPTORS

Based on a review of available aerial photography, site photos, and survey notes, there is one sensitive flood receptor within the FEMA defined floodplain. A shed located just upstream of the FIS section 1215+56 (on the left bank, looking downstream), is located within the FEMA 100-year floodplain and the HEC-RAS/calculated 100-year floodplain boundaries (see Cross Section Plan **EXHIBIT D**). Based on the existing contours the floor elevation of this shed is approximately 702.00. All other residential buildings or structures upstream of S.N. 045-0024 are located outside of the floodplain. Waubonsee Community College, located downstream of S.N. 045-0024 is outside of the FEMA defined floodplain. There are no residential buildings immediately downstream of the subject structure.

HYDROLOGIC METHODOLOGY

The FEMA FIS study for Kane County and the USGS SIR 2005-5270 describe the methods used to compute the peak discharges along the Blackberry Creek watershed. Both reports reference a Hydrologic Simulation Program – FORTRAN (HSPF) model being used to compute the peak discharges along the Blackberry Creek. The FORTRAN (HSPF) model uses a 71.16 square mile drainage area of the Blackberry Creek watershed that is divided into 49 sub basins. Both studies (FEMA and USGS) seem to reference/use the same FORTRAN model. Peak flow rates for the 10, 50, 100, and 500 year storms were computed at various crossings along the Blackberry Creek Watershed. It should be noted that the FEMA FIS study shows hydrologic and hydraulic analysis of every watershed in Kane County while the USGS SIR 2005-5270 focuses only on the Blackberry Creek watershed.

All of the hydrologic data used for this report has been taken directly from the FEMA FIS Regulatory HEC-RAS model that was purchased from the FEMA Library. Excerpts from the Flood Insurance Study for Kane County are shown in **EXHIBIT C**. Also, **EXHIBIT C** shows a comparison of the FIS peak flow rates to the peak flow rates generated by USGS StreamStats Version 3.

HYDRAULIC METHODOLOGY

All hydraulic analyses were performed using HEC-RAS Version 4.1.0 hydraulic modeling software. As mentioned in the preceding section, the FEMA Regulatory model produced for the Flood Insurance Study for Kane County, 2009 (**EXHIBIT M**) was purchased from the FEMA Engineering Library. This FIS model included hydraulic data and river reaches for the entire Blackberry Creek watershed.

Since the model was created in HEC-RAS, it was easy to get the model to run and recreate the regulatory flood profiles. Also, there wasn't any need to recreate the regulatory model from different software such as HEC-2 or WSPRO.

The first step was to truncate the FIS model to the within the study limits as the original FIS model included the entire Blackberry Creek watershed. The known water surface elevations (regulatory flood profiles) at station 118239 were used as the starting water surface elevations for the 10, 50, 100, and 500 year events. The next step was to insert the current survey data into the FIS model. This includes updating the IL 47 crossing. The goal was to match the water surface elevations between the original FIS model and the updated model at every cross section and in every profile to within 0.1'. The results of the comparison are presented in Table 1.

TABLE 1

Cross Sections	Profile	FIS Model W.S. Elev.	Design Model W.S. Elev.	Difference
121556	10-yr	701.61	701.94	-0.33
121556	50-yr	702.76	702.99	-0.23
121556	100-yr	703.28	703.48	-0.20
121556	500-yr	704.58	704.68	-0.10
120564	10-yr	701.15	701.31	-0.16
120564	50-yr	702.37	702.46	-0.09
120564	100-yr	702.92	702.98	-0.06
120564	500-yr	704.26	704.26	0.00
120437	10-yr	701.06	701.14	-0.08
120437	50-yr	702.22	702.2	0.02
120437	100-yr	702.74	702.69	0.05
120437	500-yr	704.01	703.88	0.13
120302	10-yr	700.79	700.93	-0.14
120302	50-yr	701.72	701.84	-0.12
120302	100-yr	702.12	702.24	-0.12
120302	500-yr	703.05	703.16	-0.11

TABLE 1				
Cross Sections	Profile	FIS Model W.S. Elev.	Design Model W.S. Elev.	Difference
119920	10-yr	700.62	700.65	-0.03
119920	50-yr	701.58	701.6	-0.02
119920	100-yr	702.00	702.01	-0.01
119920	500-yr	702.97	702.97	0.00
119239	10-yr	700.41	700.38	0.03
119239	50-yr	701.35	701.32	0.03
119239	100-yr	701.76	701.73	0.03
119239	500-yr	702.7	702.67	0.03
118239	10-yr	700.01	700.01	0.00
118239	50-yr	700.89	700.89	0.00
118239	100-yr	701.28	701.28	0.00
118239	500-yr	702.17	702.17	0.00

Table 1: Permit Model Profiles Vs. Design Model Profiles

Since a match between the models to within 0.1' was not achievable, two separate model conditions and two separate waterway information tables have been developed as required under Section 2-601.01(4a) for permitting and design purposes. The two model conditions and waterway information tables have been named 'Design' and 'Permit'. The Design HEC-RAS model will be the based on the up-to-date surveyed data with bounding FIS sections on the upstream and downstream ends at Sta. 121556 and Sta. 118239, respectively. The 'Permit' model will be based on the FIS regulatory model data with the surveyed structure (profile and openings) inserted in place of the FIS structure. The 'Design' waterway information table shall be used to determine compliance of IDOT design criteria. The 'Permit WIT allows the project to be consistent with the regulatory results since only regulatory geometry is used with the exception of the IL 47 bridge.

One major difference between the 'Permit'/regulatory geometry and the surveyed geometry is in the use of skew. Blackberry Creek approaches the IL 47 Bridge at a 30 degree angle. The existing bridge substructure (pier and abutments) are aligned with the flow. The surveyed bridge and internal face cross-sections shown in the 'Design' model account for the 30 degree skew, giving the existing bridge opening a face of abutment to

face of abutment width of 93'. The bridge in the regulatory model had an opening width of around 107', which is the same face of abutment to face of abutment dimension, only measured along the centerline of IL 47. Also, the next upstream and next downstream surveyed sections, station 1204+28 and 1203+39, respectively, were measured parallel to the bridge faces, rather than perpendicular to the channel and floodplain. As a result, stations 1204+28 and 1203+39 were adjusted to account for skew in the 'Design' model. This adjustment was not made to the next upstream (1204+37) and next downstream (1203+02) sections in the 'Permit' model because only the surveyed elements of the structure are to be changed in the 'Permit' model.

Manning's Roughness Coefficient

The analysis of the roughness coefficients followed the procedures outlined in the IDOT Drainage Manual; Chapter 5 on Open Channel Flow.

The photographs (**EXHIBIT B**) of Blackberry Creek taken in August of 2015 were referenced for general channel and floodplain descriptions. Additional visual resources used in the analysis included aerial photography and previous USGS SI Report 2005-5270 (**EXHIBIT M**).

Blackberry Creek is a well-defined channel with highly vegetated banks. The creek and surrounding area is flat with stream waters that are not visibly flowing when there has not been a recent storm event. Majority of the land use within the project limits, adjacent to the channel can be classified as grassland and forested area, as well as some residential upstream of Illinois Route 47. The following is the Manning's "n" Roughness Coefficient computation for Blackberry Creek:

Channel Roughness Coefficient

-Using Modified Channel Method

$n_{fp} = (n_b + n_1 + n_2 + n_3 + n_4)m$

n_b = Base Value = firm muddy soil (range .025-.032) use 0.032

n_1 = Degree of channel irregularity – Minor; generally water is contained within a well-defined channel with clear bank locations. The sides of the channel do not appear to be eroded and the banks are stabilized with vegetation. (Range 0.001 to 0.005) use 0.005

n_2 = Alternating occasionally; the size and shape of channel cross-sections is mostly consistent although sections do occasionally shift from side to side, (Range 0.001-0.005) use 0.005

n_3 = Effect of obstruction – Negligible; the creek does not contain boulders or trees and debris within the channel section. (Range 0.000 – 0.004) use 0.004

n_4 = Amount of vegetation = Small; the creek bed and flow area is generally muddy with no vegetation. The depth of flow is generally high when compared to minor vegetation that may be occasionally present at the bottom of the creek. The banks are well vegetated; however the majority of the flow area is contained within the channel. (range 0.002 – 0.010) use 0.010

m = Degree of meandering = Severe, use 1.3

$n = (n_b + n_1 + n_2 + n_3 + n_4)m$
$n_{fb} = (0.032 + 0.005 + 0.005 + 0.004 + 0.010)1.3 =$ **0.0728**

Floodplain Roughness Coefficient
-Using Modified Channel Method

$n_{fp} = (n_b + n_1 + n_2 + n_3 + n_4)m$

n_b = Base Value = firm soil (range .025-.032) use 0.032
n_1 = Degree of floodplain irregularity – Minor; the banks are stabilized with vegetation although there are minor rises and dips. (Range 0.001 to 0.005) use 0.005
n_2 = Not applicable
n_3 = Effect of obstruction – Appreciable; trees line large areas within the floodplain. (Range 0.020 – 0.030) use 0.030
n_4 = Amount of vegetation = Large; the channel banks are well vegetated with tall grasses, shrubs, and brush. (Range 0.025 – 0.050) use 0.050
m = Degree of meandering = Not applicable, use 1.00

$n = (n_b + n_1 + n_2 + n_3 + n_4)m$
$n_{fb} = (0.032 + 0.005 + 0.000 + 0.030 + 0.050)1.00 =$ **0.117**

FEMA regulatory model used 0.07 and 0.12 for the channel and floodplain roughness coefficients for the Blackberry Creek watershed within the project limits. Ranges of Manning's 'n' Coefficients varied from .070 to .075 and 0.12-0.13 for the channel and overbank roughness coefficients for the remainder FIS study beyond Illinois Route 47.

SUMMARY OF NATURAL AND EXISTING HYDRAULIC ANALYSES

The hydraulic analysis for the existing conditions measures the effect (created head) of the existing bridge on the upstream cross sections within the study. This is done by comparing the existing model to the natural conditions. The natural condition geometry excludes the existing bridge and roadway embankment and measures the water surface elevations through the reach without the effect of the bridge. The natural conditions geometry was created by deleting the subject bridge structure and removing the effects of any roadway embankment. The ineffective area offsets on cross sections adjacent to the Illinois Route 47 structure were removed from both the 'Permit' and 'Design' models. Cross sections 1204+28.0 and 1203+39.5 were deleted from 'Design' model's existing conditions in order to remove the effects of roadway embankment and create the natural conditions geometry. Similarly in the 'Permit' model, cross sections 1204+37 and 1203+02 were deleted from the existing conditions model to create the natural conditions geometry.

Using the natural and existing condition geometry files and the FIS flow rates, the 'Design' WIT and 'Permit' WIT were completed in accordance with IDOT Drainage Manual Section

2-601.01(4). The natural water surface elevations were computed at the upstream face of the existing structure by interpolating the natural water surface elevations between the next upstream and next downstream cross section in HEC-RAS. This interpolation was done for each flood profile. River station 1204+03 was used as the upstream face of the existing bridge in both models (see WIT Back-up Calcs, Tables 1.2, 1.3 for Design and Tables 1.5 and 1.6 for Permit).

Created head values for the 'Design' model were calculated as 0.2', 0.5', 0.6', 0.8', and 1.0' for the 10-, 50-, 100-, 200-, and 500-year flood events respectively. Similarly, created head values for the 'Permit' model were calculated as 0.3', 0.5', 0.7', and 1.0' for the 10-, 50-, 100-, and 500-year flood events respectively. Created head values were taken as the largest change in computed water surface elevations, comparing the computed water surface elevations from the existing condition to the natural condition at each cross section upstream of the bridge. The largest change in computed water surface elevation occurs at Section 1204+66.60 in the 'Design' model, and at Section 1205+64.00 in the 'Permit' model as shown in the back up calculations for each waterway information table. The created head values were added to the natural high water elevations in order to determine the headwater elevations at the upstream face of the structure. The upstream face of structure was taken at Stream Station 1204+03.00 for the 'Design' and the 'Permit' model. See **EXHIBIT I** for the HEC-RAS input and output for the natural and existing models for the Permit WIT. See **EXHIBIT J** for the HEC-RAS input and output for the natural and existing models for the Design WIT.

The HEC-RAS models contained several common warnings and notes. These warnings indicate that in some cases the cross sections may be spaced too far apart, divided flow may be present, or multiple solutions may existing for critical depth. The models contain no errors and the hydraulic results appear to be reasonable, so no action was taken to eliminate the warning messages.

SCOUR ANALYSIS

The Hydraulic Design Bridge Scour tool in HEC-RAS was used to compute Contraction, Pier, and Abutment Scour. Scour Analysis was performed for a 10, 50, 100, 200 and 500-year floods. No past scour problems are reported in the detailed structure summary report available from IDOT's Bridge Information website. In addition, there is no indication that long-term aggradation or degradation is occurring at this location.

The computation of scour at the bridge is based on methods outlined in IDOT Drainage Manual Chapter 10, and Hydraulic Engineering Circular No. 18 (FHWA, 2001). The IDOT Drainage Manual defines the approach section as a section located sufficiently upstream from the opening that flow is not affected by the structures but is fully expanded to the natural floodplain width. Section 1206+12.4 was selected as the approach section as it does not contain any area of ineffective flow created by the structure. Section 1204+03

BR U was selected as the contracted section directly upstream of the bridge, and Section 1204+28.0 is the section at the upstream face of the structure.

The stream channel sediment near the bridge was assumed to have a D50 size of 0.001 ft, which is classified as clay loam. No quantitative sediment size information is available but this size has been estimated based on NRCS soil data and field observations. Live-Bed Contraction Scour equation governed the results for the 10, 50, 100 and 200-year flood calculations.

Pier scour was calculated using the Local Pier Scour Equation. The existing pier was modeled as a round nose in shape to match existing conditions (K1=1.0). The angle of attack flow was determined to be 0 degrees (K2=1.0), and bed conditions were classified as medium dunes based on field observations (K3=1.2). IDOT conservative constant K4=1.0 was used as the correction factor for armoring by bed material size.

The abutment scour was calculated using the Froelich and HIRE Abutment Scour Equations. The scour values calculated are indicated in the tables within the following sections and **EXHIBIT K**. It is recommended that routine inspections be performed after major storm events to ensure no significant scour has occurred.

Existing Bridge Scour:

Contraction and Pier Scour				
		Contraction Scour	**Pier Scour**	**Combined Scour (Pier + Contraction)**
Results Ys (ft):	10 year	4.13	3.95	8.08
	50 year	8.83	4.69	13.52
	100 year	10.94	4.97	15.91
	200 year	15.11	5.27	20.38
	500 year	19.68	5.59	25.27

Contraction and Abutment Scour (Left)				
		Contraction Scour	**Abutment Scour**	**Combined Scour (Abutment + Contraction)**
Results Ys (ft):	10 year	4.13	5.32	9.45
	50 year	8.83	7.22	16.05
	100 year	10.94	10.54	21.48
	200 year	15.11	11.71	26.82
	500 year	19.68	13.05	32.73

Contraction and Abutment Scour (Right)				
		Contraction Scour	**Abutment Scour**	**Combined Scour (Abutment + Contraction)**
Results Ys (ft):	10 year	4.13	6.62	10.75
	50 year	8.83	9.11	17.94
	100 year	10.94	10.22	21.16
	200 year	15.11	11.41	26.52
	500 year	19.68	12.96	32.64

COMPENSATORY STORAGE

Proposed geometry and scope of work has not been finalized. Compensatory storage calculations and exhibit to be provided if determined to be necessary.

PERMIT REQUIREMENTS

Proposed geometry and scope of work has not been finalized. Any construction within Regulatory Floodways of Cook, DuPage, Kane, Lake, McHenry, and Will Counties will require a Floodway Part 3708 permit. The permit criteria for bridge construction include:

A. Backwater increase limited to 0.1 ft. over existing 100 year flood profile.
B. If damages occur for existing conditions backwater must be reduced to point of non-damage or to 0.1 ft. over natural conditions.
C. Compensatory storage must be provided for fill placed between the normal water and the 10 year and between the 10 year and 100 year flood profile.

FREEBOARD / CLEARANCE

It is required that a minimum of two feet be established between the design natural high-water (50-year natural water surface elevation) and the low beam elevation of the bridge structure. The computed design natural high-water elevation of 701.9 does provide the minimum two foot clearance to the low beam elevation and therefore the existing structure does meet IDOT's design criteria.

IDOT design requirements also state that a minimum freeboard of three feet be established between the design 50-year headwater elevation and the low grade of the roadway within the floodplain. The existing low edge of roadway pavement elevation does not occur within the bridge structure itself but is instead located approximately 315' south of the structure's centerline. The computed design headwater elevation does meet the minimum three foot freeboard requirement for the existing structure. The 'Design'

model results satisfy both clearance and freeboard requirements set by IDOT. Table 2 shows the freeboard and clearance requirement results from the 'Design' model.

Design 50-year N.H.W.E.	Low Beam Elevation	Clearance Required	Clearance Provided
701.9'	704.5'	2'	2.6'
Design 50-year H.W.E.	**Existing Pavement Elevation**	**Freeboard Required**	**Freeboard Provided**
702.4'	706.3'	3'	3.9'

Table 2: Existing Structure Clearance and Freeboard Requirements (Design Model Results)

CONCLUSIONS

The results from the hydraulic analysis indicate that existing condition subject structure (S.N. 045-0024) does meet IDOT's freeboard criteria for a 50-year storm, and the low beam criteria for a design 50-year storm. Considerations for scour shall be included in the proposed structure analysis. In addition, it is recommended to perform underwater inspections after high water storm events to monitor the presence or progression of scour as part of the bridge structure's routine maintenance.

II. WATERWAY INFORMATION TABLES

Illinois Department of Transportation

TABLE 1.1 (DESIGN)

Bridge Waterway Information Table

Route:	F.A.P 326 (IL. Rte. 47)	Existing SN:	045-0024		
Waterway:	Blackberry Creek	Proposed SN:	T.B.D		
Section:	107 B-1-R-1	Prepared by:	KU	Date:	5/9/2017
County:	Kane	Checked by:	SGL	Date:	5/9/2017

Existing Overtopping Elev. = 706.29 at Sta. 108+10

Drainage Area = 22.1 square miles

Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	1041	368		701.0	0.2		701.2	
Design	50	1765	442		701.9	0.5		702.4	
Base	100	2134	476		702.3	0.6		702.9	
Scour Design Check	200	2586	512		702.7	0.8		703.5	
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	3157	558		703.3	1.0		704.3	

Datum:

All-Time H.W.E. & Date: 703.00, 1954 ft

Surveyed Normal Water Level: 685.72 ft

10-Year Velocity through Existing Structure = 2.86 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 449 ft^3/s

EXISTING STRUCTURE

Type:	Steel Girder Bridge
Length/Width:	93' perpendicular to flow (fc-fc abut.)
# Spans/Cells:	2, 46.5' - 46.5' (fc abut. - cl pier - fc abut.))
Low Chord:	704.50
Skew:	30 (relative to road)
Clearance:	2.58
Bridge Flow Line:	694.74 (u/s) 694.88 (d/s)
Low E.O.P:	706.29
Freeboard:	3.92
Culvert Inverts:	(u/s) (d/s)

PROPOSED STRUCTURE

Type:	
Length Of Span:	
# Spans:	
Low Chord:	
Skew:	(relative to road)
Clearance:	
Bridge Flow Line:	(u/s) (d/s)
Low E.O.P:	
Freeboard:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

BACK-UP CALCULATIONS FOR WIT - Table 1.2 (DESIGN)

Route: IL. Rte. 47 | Computed: KU | Date: 5/9/2017
Waterway: Blackberry Creek | Checked: SGL | Date: 5/9/2017

CALCULATE CREATED HEAD

Frequency	Natural H.W.E. (ft)			Exist. Headwater Elev. (ft)		Prop. Headwater Elev. (ft)		Created Head (ft) @ Approach Section	
	Approach Sect. (63' U/S) 1204+66	Depart Sect. (90' D/S) 1202+60	U/S Face of Structure	U/S Face of Structure	Approach Sect. (63' U/S) 1204+66	U/S Face of Structure	Approach Sect.	Existing	Proposed
10-Year	701.05	700.89	701.00	701.20	701.25	N/A	N/A	0.20	N/A
50-Year	701.96	701.82	701.92	702.37	702.41	N/A	N/A	0.45	N/A
100-Year	702.36	702.23	702.32	702.90	702.94	N/A	N/A	0.58	N/A
200-Year	702.77	702.65	702.73	703.48	703.52	N/A	N/A	0.75	N/A
500-Year	703.28	703.17	703.25	704.20	704.23	N/A	N/A	0.95	N/A

*Upstream Face of Structure taken at 1204+03.00

All opening areas were measured in Microstation using Natural H.W.E.

CALCULATE FREEBOARD

Low Edge of Pavement Elevation (ft)				
Existing	Station	Proposed	Station	
706.29	108+10	N/A	N/A	
Existing Freeboard (ft)				
10-Year	50-Year	100-Year	200-Year	500-Year
5.09	3.92	3.39	2.81	2.09
Proposed Freeboard (ft)				
10-Year	50-Year	100-Year	200-Year	500-Year
N/A	N/A	N/A	N/A	N/A

CALCULATE CLEARANCE

Low Beam Elevation (ft)				
Existing:	704.50	Proposed:	N/A	
Existing Clearance (ft)				
10-Year	50-Year	100-Year	200-Year	500-Year
3.50	2.58	2.18	1.77	1.25
Proposed Clearance (ft)				
10-Year	50-Year	100-Year	200-Year	500-Year
N/A	N/A	N/A	N/A	N/A

EFFECTIVE WATERWAY OPENING

Frequency	Area (sq ft)
10-Year	368
50-Year	442
100-Year	476
200-Year	512
500-Year	558

Route: IL. Route 47 Computed: KU Date: 5/9/2017
Waterway: Blackberry Creek Checked: SGL Date: 5/9/2017

10-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head
1215+56.00	701.87	701.94		0.07	
1210+72.50	701.61	701.71		0.10	
1208+85.90	701.44	701.57		0.13	
1207+82.50	701.32	701.47		0.15	
1206+12.40	701.16	701.34		0.18	
1204+66.60	701.05	701.25		0.20	

50-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head
1215+56.00	702.76	702.99		0.23	
1210+72.50	702.49	702.78		0.29	
1208+85.90	702.33	702.66		0.33	
1207+82.50	702.23	702.59		0.36	
1206+12.40	702.07	702.48		0.41	
1204+66.60	701.96	702.41		0.45	

100-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head
1215+56.00	703.15	703.48		0.33	
1210+72.50	702.88	703.28		0.40	
1208+85.90	702.73	703.18		0.45	
1207+82.50	702.62	703.11		0.49	
1206+12.40	702.46	703.00		0.54	
1204+66.60	702.36	702.94		0.58	

200-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head
1215+56.00	703.58	704.01		0.43	
1210+72.50	703.31	703.82		0.51	
1208+85.90	703.15	703.72		0.57	
1207+82.50	703.05	703.66		0.61	
1206+12.40	702.88	703.57		0.69	
1204+66.60	702.77	703.52		0.75	

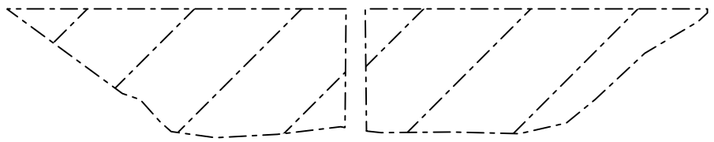
500-Year Frequency

River Sta.	Natural WSE	Existing WSE	Proposed WSE	Existing Created Head	Proposed Created Head
1215+56.00	704.09	704.68		0.59	
1210+72.50	703.80	704.50		0.70	
1208+85.90	703.65	704.41		0.76	
1207+82.50	703.55	704.35		0.80	
1206+12.40	703.38	704.28		0.90	
1204+66.60	703.28	704.23		0.95	

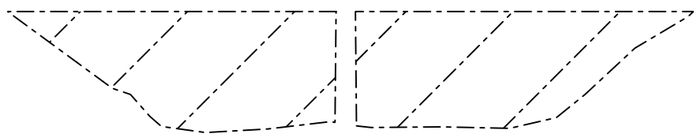
EFFECTIVE WATERWAY OPENING EXHIBIT - DESIGN MODEL

DESIGN

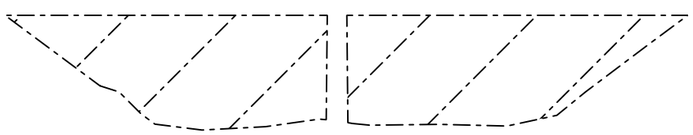
500-YEAR MEASURED AREA= 558 SF



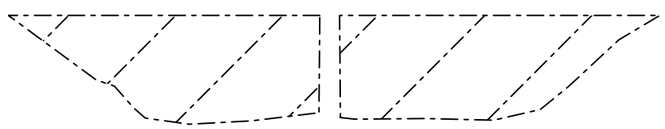
200-YEAR MEASURED AREA= 512 SF



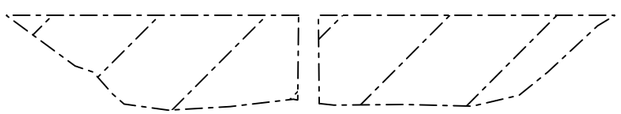
100-YEAR MEASURED AREA= 476 SF



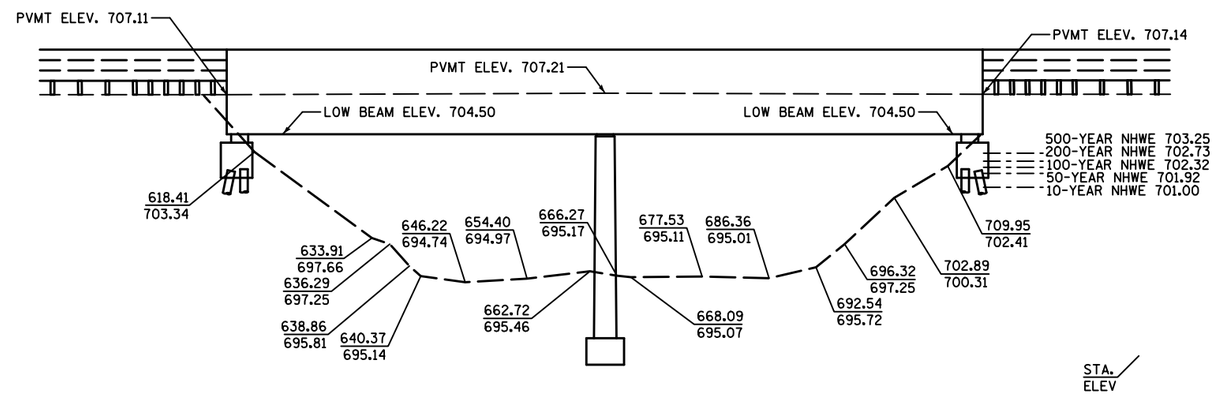
50-YEAR MEASURED AREA= 442 SF



10-YEAR MEASURED AREA= 368 SF



EXISTING BRIDGE STRUCTURE (SN 045-0024)



UPSTREAM FACE (LOOKING DOWNSTREAM)

FILE NAME =	USER NAME = $USER$	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS / SHEET NO.
$FILEL$		DRAWN -	REVISED -						
	PLOT SCALE = $SCALE$	CHECKED -	REVISED -					CONTRACT NO.	
$MODELNAME$	PLOT DATE = $DATE$	DATE -	REVISED -		SCALE: H=20 V=10 SHEET OF SHEETS STA. TO STA.		ILLINOIS	FED. AID PROJECT	

Illinois Department of Transportation

TABLE 1.4 (PERMIT)

Bridge Waterway Information Table

Route:	F.A.P 326 (IL. Rte. 47)	Existing SN:	045-0024		
Waterway:	Blackberry Creek	Proposed SN:	T.B.D		
Section:	107 B-1-R-1	Prepared by:	KU	Date:	5/9/2017
County:	Kane	Checked by:	SGL	Date:	5/9/2017

Existing Overtopping Elev. = 706.29 at Sta. 108+10

Drainage Area = 22.1 square miles

Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	1041	355		700.8	0.3		701.1	
Design	50	1765	431		701.8	0.5		702.3	
Base	100	2134	466		702.2	0.7		702.9	
Scour Design Check									
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	3157	551		703.2	1.0		704.2	

Datum:

All-Time H.W.E. & Date: 703.00, 1954 ft

Surveyed Normal Water Level: 685.72 ft

10-Year Velocity through Existing Structure = 2 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 449 ft^3/s

EXISTING STRUCTURE

Type:	Steel Girder Bridge
Length/Width:	93' perpendicular to flow (fc-fc abut.)
# Spans/Cells:	2 , 46.5' - 46.5' (fc abut. - cl pier - fc abut.)
Low Chord:	704.50
Skew:	30 (relative to road)
Clearance:	2.72
Bridge Flow Line:	694.74 (u/s) 694.88 (d/s)
Low E.O.P:	706.29
Freeboard:	4.03
Culvert Inverts:	(u/s) (d/s)

PROPOSED STRUCTURE

Type:	
Length Of Span:	
# Spans:	
Low Chord:	
Skew:	(relative to road)
Clearance:	
Bridge Flow Line:	(u/s) (d/s)
Low E.O.P:	
Freeboard:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

BACK-UP CALCULATIONS FOR WIT - Table 1.5 (PERMIT)

Route: IL. Rte. 47 | Computed: KU | Date: 5/9/2017
Waterway: Blackberry Creek | Checked: SGL | Date: 5/9/2017

CALCULATE CREATED HEAD

Frequency	Natural H.W.E. (ft)			Exist. Headwater Elev. (ft)		Prop. Headwater Elev. (ft)		Created Head (ft) @ Approach Section	
	Approach Sect. (161' U/S) 1205+64	Depart Sect. (430' D/S) 1199+20	U/S Face of Structure	U/S Face of Structure	Approach Sect. (161' U/S) 1205+64	U/S Face of Structure	Approach Sect.	Existing	Proposed
10-Year	700.90	700.62	700.83	701.04	701.11	N/A	N/A	0.21	N/A
50-Year	701.85	701.58	701.78	702.26	702.33	N/A	N/A	0.48	N/A
100-Year	702.26	702.00	702.20	702.82	702.88	N/A	N/A	0.62	N/A
500-Year	703.24	702.97	703.17	704.15	704.22	N/A	N/A	0.98	N/A

*Upstream Face of Structure taken at 1204+03.00

All opening areas were measured in Microstation using Natural H.W.E.

CALCULATE FREEBOARD

Low Edge of Pavement Elevation (ft)			
Existing	**Station**	**Proposed**	**Station**
706.29	108+10	N/A	N/A
Existing Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
5.25	4.03	3.48	2.14
Proposed Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

CALCULATE CLEARANCE

Low Beam Elevation (ft)			
Existing:	704.50	**Proposed:**	N/A
Existing Clearance (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
3.67	2.72	2.30	1.33
Proposed Clearance (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

EFFECTIVE WATERWAY OPENING

Frequency	Area (sq ft)
10-Year	355
50-Year	431
100-Year	466
500-Year	551

F.A.P. 326 / IL. Rte. 47 over Blackberry Creek
Kane County

S.N. 045-0024

Route: IL. Route 47 Computed: KU Date: 5/9/2017
Waterway: Blackberry Creek Checked: SGL Date: 5/9/2017

10-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
1215+56.00	701.48	701.59		0.11	
1205+64.00	700.90	701.11		0.21	

50-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
1215+56.00	702.43	702.73		0.30	
1205+64.00	701.85	702.33		0.48	

100-Year Frequency

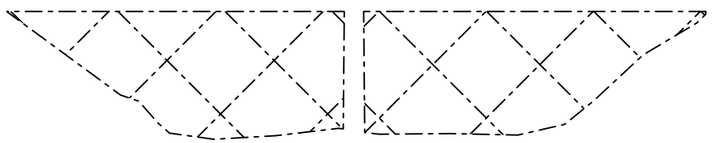
River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
1215+56.00	702.84	703.25		0.41	
1205+64.00	702.26	702.88		0.62	

500-Year Frequency

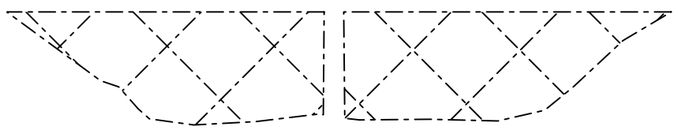
River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
1215+56.00	703.81	704.55		0.74	
1205+64.00	703.24	704.22		0.98	

EFFECTIVE WATERWAY OPENING EXHIBIT - PERMIT MODEL

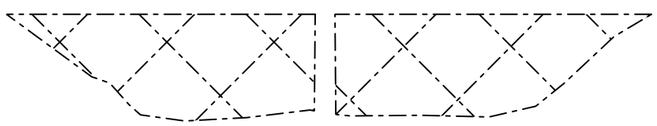
PERMIT



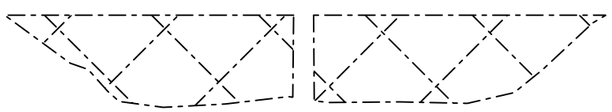
500-YEAR MEASURED AREA= 551 SF



100-YEAR MEASURED AREA= 466 SF

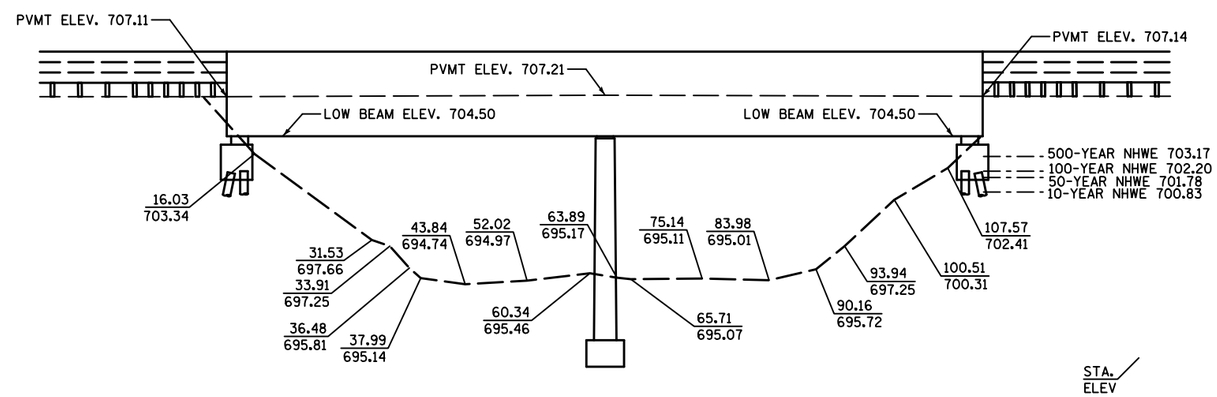


50-YEAR MEASURED AREA= 431 SF



10-YEAR MEASURED AREA= 355 SF

EXISTING BRIDGE STRUCTURE (SN 045-0024)



UPSTREAM FACE (LOOKING DOWNSTREAM)

FILE NAME = $FILEL$	USER NAME = $USER$	DESIGNED - _____	REVISED - _____
		DRAWN - _____	REVISED - _____
	PLOT SCALE = $SCALE$	CHECKED - _____	REVISED - _____
$MODELNAME$	PLOT DATE = $DATE$	DATE - _____	REVISED - _____

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SCALE: H=20 V=10 | SHEET ___ OF ___ SHEETS | STA. _____ TO STA. _____

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO. _____

ILLINOIS FED. AID PROJECT

III. HYDRAULIC REPORT DATA SHEETS (BBS 2800)

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route	F.A.P. 326/Illinois Route 47	P or D #	P-91-015-14
Section	107	PTB #	
County	Kane		
Exist SN	045-0024		
Prop SN	T.B.D		

General Information

1. Stream name: Blackberry Creek

2. Structure location: NW ¼ of the NE ¼ of Section 5, Township 38N, Range 7E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant ☐ District — Lin Engineering — ☐ Prime ☒ Sub

4. Hydraulic Report Approval Authority:
   ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
   ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

Site Design Data

5. Drainage Area (sq. mi.): 22.1 sq. miles

6. Highway Classification:
   ☐ Rural ☒ Urban ☐ Other
   ☒ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 2
   If more than one, explain:
   Permit WIT - from FIS study
   Design WIT - from survey data

Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☒ USGS/Stream Stats ☒ FIS ☐ Gage Data ☐ Other

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined per IDOT Drainage Manual Chap. 5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: Known Water Surface Elevations and FEMA base flood
    d. Non- IDOT encroachments in Survey? ☐ Yes ☒ No
       If yes, are they accounted for? ☐ Yes ☐ No
    e. Does a Tailwater Control exist? ☐ Yes ☒ No
       If yes, list:
    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 2 (X:1)
Contraction 1 (X:1)

IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No (Rural)

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources & dates of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☒ No ☐ Yes. OWR 3704 Rules apply.

15. Required IDNR - OWR Permit type:
☐ Individual 3700 ☐ SWP #2 ☐ SWP #12 ☒ Floodway 3708
☐ None ☐ Other

Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert ☐ Three-sided Bridge
e. ☐ New Alignment
f. Work Planned Below Q_{100} HWE? ☐ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft): Abutment type:
Preliminary low beam elevation (ft): Skew (degrees):
Width of deck (ft): Number of spans:
Total length from face to face of abutment (ft)

18. If a culvert is proposed, supply:
Type and size: Length (ft):
Upstream invert elevation (ft): Entrance type:
Downstream invert elevation (ft): Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the standard 3" drop (or other embedment) is applied

19. If a three-sided structure is proposed, supply:
U/S Flow line elevation (ft): Skew (degrees):
Span (ft): Length (ft):
Height (ft): Number of spans:

20. a. Is the IDOT Clearance Policy met? ☐ Yes ☐ No ☐ NA Value (ft):
b. Is the IDOT Freeboard Policy met? ☐ Yes ☐ No ☐ NA Value (ft):

21. Type of streambed soil : ☒ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Proposed or Identified Countermeasures:

Existing Structure Data

		Structure U/S	Subject Structure	Structure D/S
23.	Distance from proposed (subject) structure: (ft.)	2300	N\A	10700
24.	Type of structure:	3 span bridge	2 span bridge	Pedestrian bridge
25.	Low beam elevation:	704.93	704.50	N/A
26.	Flow line elevation:	N/A	695.72	N/A
27.	Maximum known high water elevation:	708.48	703.00	N/A
28.	Date of maximum high water:	July 1996	10/1954	N/A
29.	Cause (backwater, headwater, etc.):	N/A	N/A	N/A
30.	Does structure carry entire design flood flow?	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
	If not, state area of additional waterway opening: (ft^2)			
31.	Type and size of existing overflow structures:			
32.	Has adverse scour occurred under or adjacent to the structure?	N/A	No	N/A
33.	Classify type of scour and/or aggradation / degradation:	N/A	None	N/A

Required Additional Data

34. Deviations from the General Procedures presented in IDOT Drainage Manual CH. 2, CH.6, and CH.7:
No deviations

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:
Scientific Investigations Report 2005-5270

36. Site Inspection made by: Krystian Ustupski Date: 8/7/2015
Remarks:

37. Prepared by: Krystian Ustupski Date 12/8/2015

Signed (QA/QC): _____ Date _____

Hydraulic Report Checklist

The District or Consultant should complete the following checklist before submitting the Hydraulic Report for approval.

1. ☒ Title Page
2. ☒ Table of Contents
3. ☒ Narrative - (as outlined in Section 2-601.01 Item #3)
4. ☒ Waterway Information Table (WIT) - (as outlined in Section 2-601.01 Item #4)
5. ☒ Hydraulic Report Data Sheets
6. ☒ Location Map - should show the subject structure along with nearby location defining landmarks (cities, roads, highways, nearby structures over same stream, etc.)
7. ☒ USGS Hydrologic Atlas (historical data available on selected streams- District 1 only)
8. ☒ Photographs - (Minimum: U/S & D/S structure faces, U/S & D/S channel, U/S & D/S roadway across structure)
9. ☒ Hydrology (map, calculations and related exhibits)
10. ☒ Streambed Profile
11. ☒ Roadway Profile (existing and proposed)
12. ☒ Cross Section Plots - with plan layout preferably overlayed upon an aerial photo with the contours
13. ☒ Bridge Opening Plots
14. ☒ Natural Condition Analysis
15. ☒ Existing Condition Analysis
16. ☐ Proposed Condition Analysis

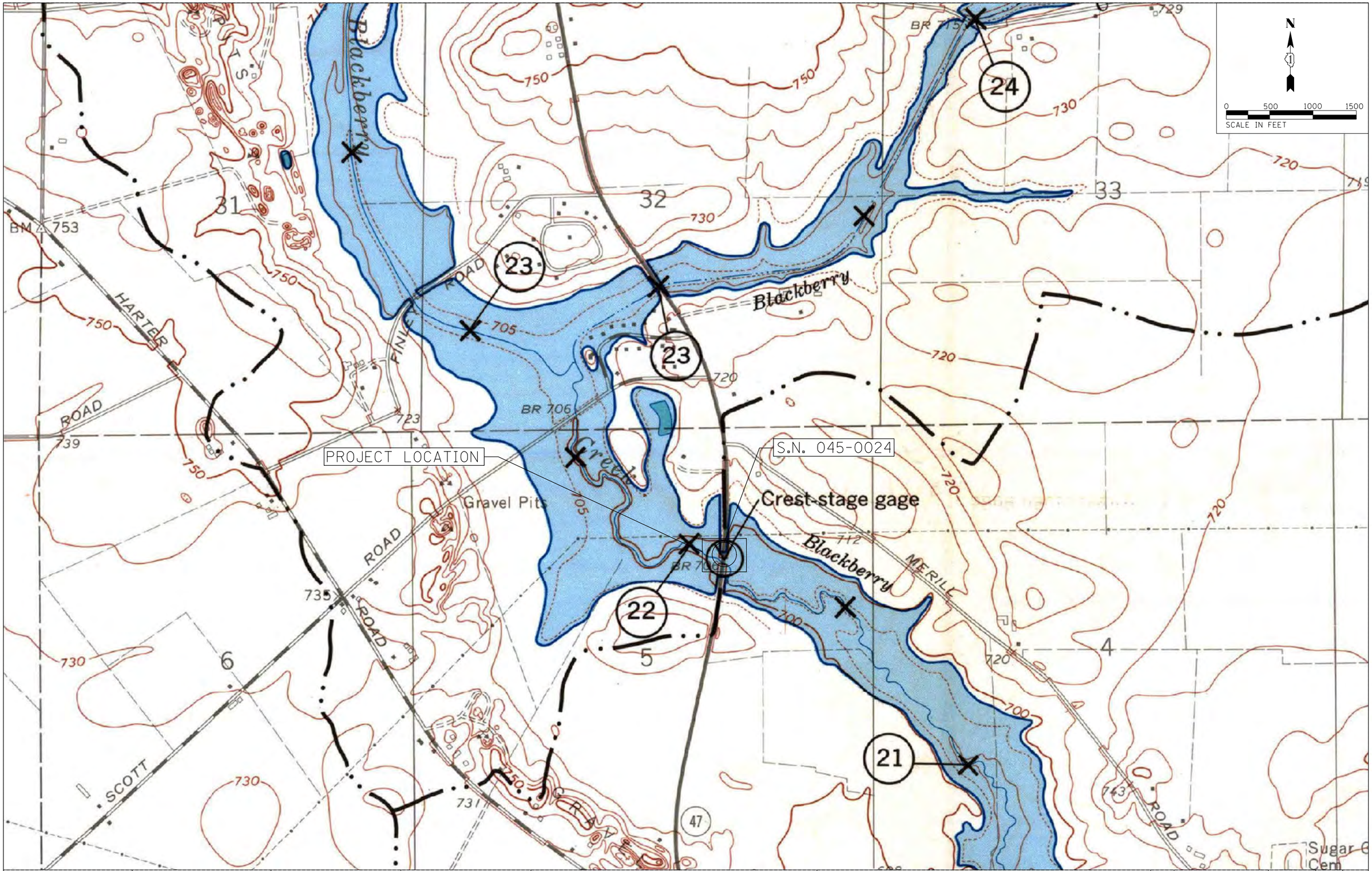
When HEC-RAS modeling is being used, ALL Plans (Natural, Existing, & Proposed) shall be included in ONE Project File.

17. ☒ Scour Analysis – Existing and Proposed Conditions
18. ☐ Compensatory Storage Calculations (if required- District 1 only. Include permit summary form and related attachments.)
19. ☒ Survey Notes (if available, CADD plot of survey points. No Electronic Point Files)
20. ☐ EWSE Data - (per Section 2-402.06)
21. ☒ Correspondence Notes
22. ☒ CD with Project Files (Include pdf copy of the Hydraulic Report and working files for the hydrology and hydraulic analyses.)

IV. EXHIBITS

EXHIBIT A

LOCATION MAP



LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED - KU	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EXHIBIT A – PROJECT LOCATION MAP HYDROLOGIC INVESTIGATION ATLAS 227	F.A.P. RTE. 326	SECTION	COUNTY KANE	TOTAL SHEETS / SHEET NO.
		DRAWN - KU	REVISED -						
	PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -					JOB NO. P-91-015-14	
	PLOT DATE = $DATE$	DATE - 11/2015	REVISED -		SCALE: 1"=500'	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT	

EXHIBIT B

PHOTOGRAPHS

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

1) 1500’ D/S OF S.N. 045-0024 LOOKING U/S

2) 1500’ D/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

3) 1500’ D/S OF S.N. 045-0024 LOOKING NORTH

4) 1500’ D/S OF S.N. 045-0024 LOOKING SOUTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

5) 1000’ D/S OF S.N. 045-0024 LOOKING U/S

6) 1000’ D/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

7) 1000’ D/S OF S.N. 045-0024 LOOKING SOUTH

8) 1000’ D/S OF S.N. 045-0024 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

9) 750’ D/S OF S.N. 045-0024 LOOKING D/S, WASHED OUT BEAVER DAM

10) 750’ D/S OF S.N. 045-0024 LOOKING SOUTH, WASHED OUT BEAVER DAM

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

11) 500’ D/S OF S.N. 045-0024 LOOKING U/S

12) 500’ D/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

13) 500’ D/S OF S.N. 045-0024 LOOKING SOUTH

14) 500’ D/S OF S.N. 045-0024 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

15) 300’ D/S OF S.N. 045-0024 LOOKING U/S

16) 300’ D/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

17) 300’ D/S OF S.N. 045-0024 LOOKING SOUTHWEST

18) 200’ D/S OF S.N. 045-0024 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

19) 200’ D/S OF S.N. 045-0024 LOOKING D/S

20) D/S FACE OF S.N. 045-0024 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

21) D/S FACE OF S.N. 045-0024 LOOKING NORTH

22) D/S FACE OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

23) D/S FACE OF S.N. 045-0024 LOOKING D/S

24) D/S FACE OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

25) D/S FACE OF S.N. 045-0024 LOOKING U/S

26) D/S FACE OF S.N. 045-0024 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

27) D/S FACE OF S.N. 045-0024 LOOKING D/S

28) STANDING ON ILLINOIS ROUTE 47 LOOKING SOUTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

29) STANDING ON ILLINOIS ROUTE 47 LOOKING NORTH

30) U/S FACE OF S.N. 045-0024 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

31) U/S FACE OF S.N. 045-0024 LOOKING NORTH

32) U/S FACE OF S.N. 045-0024 LOOKING SOUTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

33) U/S FACE OF S.N. 045-0024 LOOKING U/S

34) U/S FACE OF S.N. 045-0024 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

35) 300’ U/S OF S.N. 045-0024 LOOKING U/S

36) 300’ U/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

37) 300’ U/S OF S.N. 045-0024 LOOKING SOUTH

38) 300’ U/S OF S.N. 045-0024 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

39) 500’ U/S OF S.N. 045-0024 LOOKING U/S

40) 500’ U/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

41) 500’ U/S OF S.N. 045-0024 LOOKING SOUTH

42) 500’ U/S OF S.N. 045-0024 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

43) 800’ U/S OF S.N. 045-0024 LOOKING U/S

44) 800’ U/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

45) 1000’ U/S OF S.N. 045-0024 LOOKING U/S

46) 1000’ U/S OF S.N. 045-0024 LOOKING D/S

EXHIBIT B

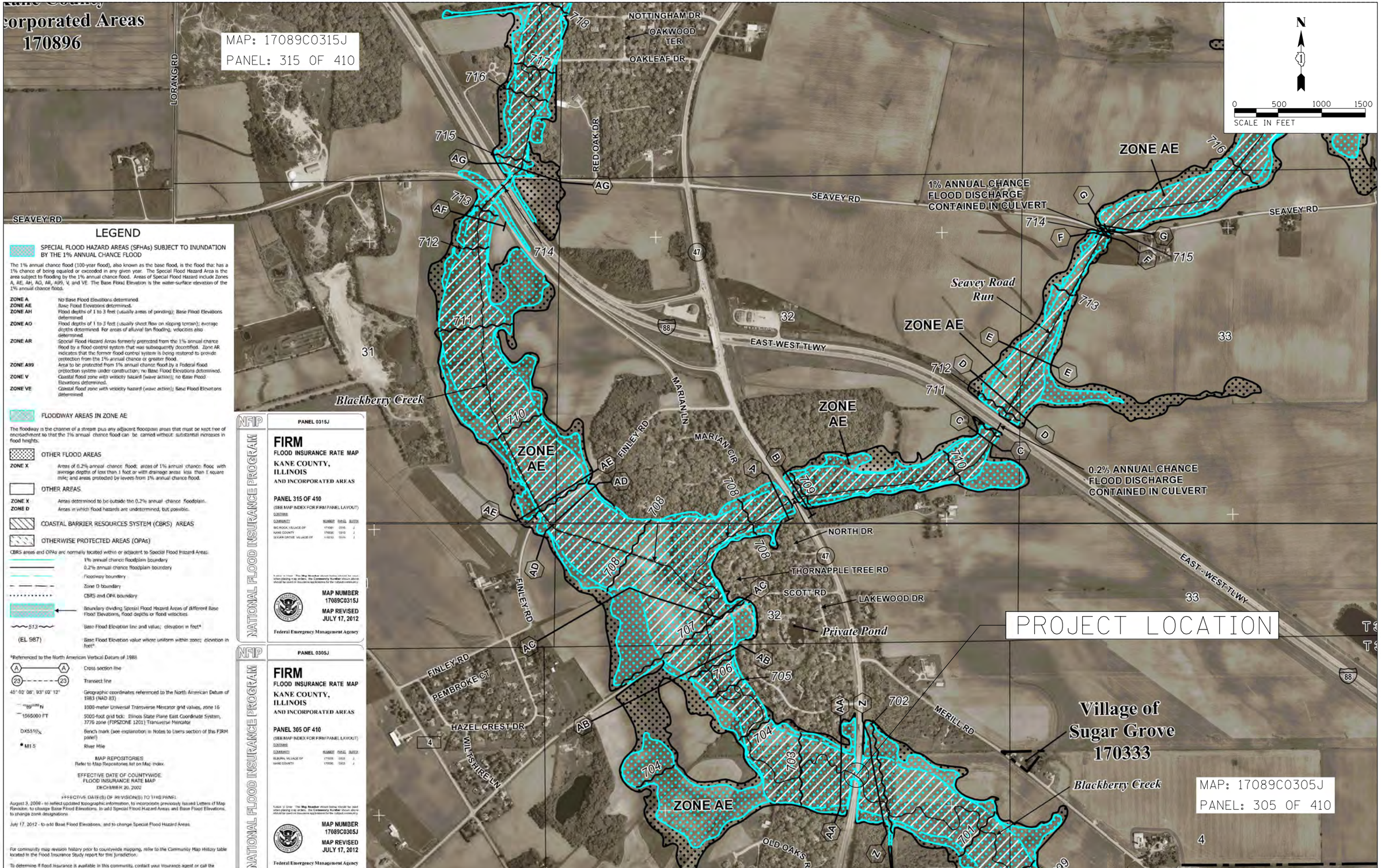
PHOTOGRAPHY LOG
IL ROUTE 47
OVER BLACKBERRY CREEK
S.N. 045-0024

47) 1000’ U/S OF S.N. 045-0024 LOOKING SOUTH

48) 1000’ U/S OF S.N. 045-0024 LOOKING NORTH

EXHIBIT C

HYDROLOGY



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~~513~~~ Base Flood Elevation line and value; elevation in feet*
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)——(A) Cross section line
(23)- - - - -(23) Transect line
45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
9660000 N 1000-meter Universal Transverse Mercator grid values, zone 16
1565000 FT 5000-foot grid tick: Illinois State Plane East Coordinate System, 3776 zone (FIPSZONE 1201) Transverse Mercator
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 20, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 3, 2009 - to reflect updated topographic information, to incorporate previously issued Letters of Map Revision, to change Base Flood Elevations, to add Special Flood Hazard Areas and Base Flood Elevations, to change zone designations.
July 17, 2012 - to add Base Flood Elevations, and to change Special Flood Hazard Areas.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0315J

FIRM
FLOOD INSURANCE RATE MAP
KANE COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 315 OF 410
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
BIG ROCK, VILLAGE OF	170861	0315	J
KANE COUNTY	170896	0315	J
SUGAR GROVE, VILLAGE OF	170333	0315	J

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
17089C0315J
MAP REVISED
JULY 17, 2012
Federal Emergency Management Agency

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0305J

FIRM
FLOOD INSURANCE RATE MAP
KANE COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 305 OF 410
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
ELBURN, VILLAGE OF	170508	0305	J
KANE COUNTY	170896	0305	J

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
17089C0305J
MAP REVISED
JULY 17, 2012
Federal Emergency Management Agency

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -
	DRAWN - KU	REVISED -
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT C – FLOOD INSURANCE RATE MAP
IL. RTE. 47 OVER BLACKBERRY CREEK

SCALE: 1"=500' | SHEET NO. 1 OF 1 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326		KANE		
		JOB NO. P-91-015-14		

FED. ROAD DIST. NO. 1 | ILLINOIS | FED. AID PROJECT
~~~

FLOOD INSURANCE STUDY

KANE COUNTY, ILLINOIS
AND INCORPORATED AREAS

Volume 1 of 3

COMMUNITY NAME	COMMUNITY NUMBER
ALGONQUIN, VILLAGE OF	170474
AURORA, CITY OF	170320
BARRINGTON HILLS, VILLAGE OF	170058
BARTLETT, VILLAGE OF	170059
BATAVIA, CITY OF	170321
BIG ROCK, VILLAGE OF	171081
* BURLINGTON, VILLAGE OF	171077
CAMPTON HILLS, VILLAGE OF	171396
CARPENTERSVILLE, VILLAGE OF	170322
EAST DUNDEE, VILLAGE OF	170323
ELBURN, VILLAGE OF	171026
ELGIN, CITY OF	170087
GENEVA, CITY OF	170325
GILBERTS, VILLAGE OF	170326
HAMPSHIRE, VILLAGE OF	170327
* HOFFMAN ESTATES, VILLAGE OF	170107
HUNTLEY, VILLAGE OF	170480
KANE COUNTY (UNINCORPORATED AREAS)	170896
* KANEVILLE, VILLAGE OF	171388
LILY LAKE, VILLAGE OF	171023
MAPLE PARK, VILLAGE OF	171018
MONTGOMERY, VILLAGE OF	170328
NORTH AURORA, VILLAGE OF	170329
PINGREE GROVE, VILLAGE OF	171078
SLEEPY HOLLOW, VILLAGE OF	170331
SOUTH ELGIN, VILLAGE OF	170332
ST. CHARLES, CITY OF	170330
SUGAR GROVE, VILLAGE OF	170333
VIRGIL, VILLAGE OF	171024
WAYNE, VILLAGE OF	170865
WEST DUNDEE, VILLAGE OF	170335

* NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED IN KANE COUNTY

Revised August 3, 2009

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

17089CV001C

December 20, 2002
Countywide FIS

The hydrology for Tyler Creek, Pingree Creek, and a portion of Sandy Creek was revised to define the peak flows in the area being studied. The revisions consisted of subdividing the watershed into smaller areas, adding channel and reservoir routings, using the State of Illinois Bulletin 70 precipitation amounts, and incorporating interbasin flow between Tyler Creek and Eakin Creek. The USACE HEC-1 computer program was used in the hydrologic modeling. The SCS Curve Number and Unit Hydrograph methods were used.

A HEC-1 model was used to compute discharges on Eakin Creek (Reference 64).

November 16, 2006
Revised Countywide FIS

No new or revised hydrologic studies were incorporated into the Kane County and unincorporated areas FIS dated November 16, 2006.

August 3, 2009
Revised Countywide FIS

Information on the methods used to determine peak discharge-frequency relationships for the streams restudied as part of this countywide FIS is shown below.

The hydrologic analysis for the streams located within the Blackberry Creek watershed (Aurora Chain of Lakes, Aurora Chain of Lakes Cherry Hills Diversion, Blackberry Creek, East Run, East Run North Branch, East Run North Loop, Elburn Run, Lake Run, Lake Run Main Street Branch, Lake Run Nelson Lake Branch, Lake Run North of I-88 Overflow, Lake Run North of I-88 Overflow East Branch, Lake Run South of I-88 Diversion, Prestbury Branch, Route 38 Branch, Seavey Road Run, Seavey Road Run Green Road Branch, Seavey Road Run Main Street Branch) was revised by the USGS (Reference 44) to define peak flows. The 71.16 square mile drainage area of the Blackberry Creek watershed was divided into 49 subbasins. Flood-hazard analyses were performed for only the Kane County portion of the watershed.

The Hydrological Simulation Program - FORTRAN (HSPF) (Reference 65) was used to perform the hydrologic modeling for the Blackberry Creek watershed. Streamflow data was available at two locations in the watershed: the USGS streamflow-gaging station at Blackberry Creek near Yorkville (station 0551700), located close to the downstream end of the watershed; and the USGS streamflow gaging station at Blackberry Creek near Montgomery (station 05551675), located at the Jericho Road Bridge crossing. Utilizing the annual maximum series (AMS) determined from simulated streamflow records at various locations in the watershed from the hydrologic model, flood-frequency analysis was used to

Table 8 - Summary of Discharges (Continued)

Flooding Source and Location	*Drainage Area (square miles)*	*Peak Discharges (cubic feet per second)*			
		10-Percent-Annual-Chance	*2-Percent-Annual-Chance*	*1-Percent-Annual-Chance*	*0.2-Percent-Annual-Chance*
BLACKBERRY CREEK					
At intersection with US Highway 30	57.1	1,325	2,302	2,808	4,218
At confluence with Aurora Chain of Lakes (approximately 190 feet upstream of Jericho Road)	52.4	1,347	2,373	2,910	4,421
Approximately 80 feet downstream of Burlington Railroad	51.4	1,497	2,465	2,952	4,286
At upstream of confluence with East Run and approximately 300 feet upstream of Galena Road	45.9	1,401	2,286	2,742	3,984
At confluence with Lake Run (approximately 1800 feet downstream of Illinois Route 56)	31.9	1,037	1,681	2,003	2,875
At confluence with Prestbury Branch (approximately 2740 feet upstream of Illinois Route 56)	27.8	995	1,637	1,961	2,847
Approximately 140 feet upstream of Ke-De-Ka Road	25.5	1,003	1,675	2,018	2,961
Approximately 4140 feet downstream from Illinois Route 47	23.5	992	1,670	2,017	2,976
Approximately 550 feet upstream of Scott Road (90 feet upstream of junction with Seavey Road Run)	15.0	719	1,221	1,477	2,189
Approximately 240 feet upstream of Interstate 88	13.4	717	1,261	1,545	2,348
Approximately 50 feet upstream of Illinois Route 47	11.2	634	1,120	1,376	2,097
At confluence with Elburn Run (approximately 3200 feet upstream of Smith Road)	7.0	316	537	651	966
Approximately 125 feet upstream of Hughes Road	6.0	303	523	637	956

November 16, 2006
Revised Countywide FIS

No new or revised hydraulic studies were incorporated into the Kane County and unincorporated areas revised FIS dated November 16, 2006.

August 3, 2009
Revised Countywide FIS

The hydraulic analysis for the streams located within the Blackberry Creek watershed (Aurora Chain of Lakes, Aurora Chain of Lakes Cherry Hills Diversion, Blackberry Creek, East Run, East Run North Branch, East Run North Loop, Elburn Run, Lake Run, Lake Run Main Street Branch, Lake Run Nelson Lake Branch, Lake Run North of I-88 Overflow, Lake Run North of I-88 Overflow East Branch, Lake Run South of I-88 Diversion, Prestbury Branch, Route 38 Branch, Seavey Road Run, Seavey Road Run Green Road Branch, Seavey Road Run Main Street Branch) were prepared using the HEC-RAS hydraulic model (Reference 82). The HEC-RAS analysis was used to route the flood-peak discharge and determine the flood elevations throughout Blackberry Creek watershed.

The two-dimensional, finite-element, surface-water-modeling system (FESWMS) (Reference 83) was used for analyzing the flow diversion at Jericho Lake near Montgomery, Illinois. Results from the FESWMS model have been applied to determine the amount of discharge being diverted out of Blackberry Creek watershed through the lake. These results were used in the routing functions of the hydrologic model (Reference 44).

Cross sections from the WSP-2 hydraulic routing model developed by the U.S. Department of Agriculture, Soil Conservation Service study in 1985 (Reference 84) were used for the analysis of Blackberry Creek. Data for bridges and culverts constructed since the 1985 study were surveyed by the IDNR-OWR, Smith Engineering Consultants, Inc., and the USGS. The hydraulic model was calibrated and verified using high water marks and observed inundation maps for the July 17-18, 1996, flood event (Reference 44).

The hydraulic analysis for the Indian Creek watershed (Indian Creek, Indian Creek Prairie Path Run, Selmarten Creek, South Tributary, and Tollway Tributary) was modeled in two separate sections. For the northern portion of the watershed, the FEQ unsteady flow program was used. For the southern portion, the steady-state processor within HEC-RAS was used.

For hydrologic information for Sugar Grove Branch North, please refer to LOMR 07-05-0178P.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Locations of selected cross sections used in the hydraulic analyses are shown on the flood profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM (Exhibit 2).

Effective flow areas of the floodplain, cross sections, loss coefficients, and overbank roughness coefficients (Manning's "n") were assigned to each cross section based on field inspection. The range of the Manning's "n" coefficients for each stream is shown in Table 10, "Roughness Coefficients (Manning's 'n' Values)."

Table 10 - Roughness Coefficients (Manning's "n" Values)

Stream	Channel "n"	Overbank "n"
7th Avenue Creek	0.025-0.10	0.05-0.08
7th Avenue Creek Tributary	0.05-0.06	0.08
Anderson Road Run	*	*
Anderson Road Run North Branch	*	*
Aurora Chain of Lakes	0.015-0.055	0.02-0.10
Aurora Chain of Lakes Cherry Hills Diversion	0.015-0.055	0.045-0.10
Blackberry Creek	0.040-0.070	0.06-0.13
Bowes Creek	0.035-0.072	0.065-0.100
Bowes Creek South	0.045	0.070
Brewster Creek	0.060	0.140
Carpenter Creek	0.10	0.12
Eakin Creek	0.05	0.06
East Run	0.040-0.080	0.045-0.115
East Run North Branch	0.045	0.105
East Run North Loop	0.045	0.105
Elburn Run	0.04-0.055	0.065-0.115
Ferson Creek	0.030-0.08	0.070-0.100
Fitchie Creek	0.035-0.104	0.070-0.100
Four Winds Way Creek	0.10	0.12
Fox River	0.025-0.10	0.035-0.10
Fox River East Channel	0.025-0.040	0.060-0.070

*Data not available

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Blackberry Creek (Continued)								
S	95,548[1]	969	3,443	1.7	677.3	677.3	677.4	0.0
T	96,310[1]	1912	6,742	1.0	677.8	677.8	677.9	0.1
U	104,948[1]	460	1,832	2.4	686.6	686.6	686.7	0.0
V	105,379[1]	482	2,757	1.6	688.3	688.3	688.3	0.0
W	108,915[1]	365	1,930	2.1	690.9	690.9	690.9	0.0
X	109,285[1]	412	2,292	1.5	691.5	691.5	691.5	0.0
Y	114,088[1]	467	2,331	2.0	694.6	694.6	694.6	0.0
Z	120,569[1]	683	3,884	1.4	702.0	702.0	702.0	0.0
AA	121,210[1]	615	2,724	1.6	702.7	702.7	702.7	0.0
AB	124,477[1]	621	1,952	2.6	706.0	706.0	706.1	0.0
AC	125,096[1]	1103	3,377	2.2	707.2	707.2	707.1	0.0
AD	127,367[1]	665	1,864	2.5	708.4	708.4	708.4	0.0
AE	127,697[1]	650	2,586	1.7	709.4	709.4	709.4	0.0
AF	131,215[1]	237	738	2.8	712.9	712.9	713.0	0.1
AG	131,857[1]	216	767	3.4	714.8	714.8	714.9	0.1
AH	136,407[1]	340	792	2.7	721.1	721.1	721.1	0.0
AI	139,767[1]	186	827	2.2	727.6	727.6	727.6	0.0
AJ	139,956[1]	348	1,788	1.6	728.4	728.4	728.4	0.0
AK	145,220[1]	208	849	2.5	735.4	735.4	735.4	0.0
AL	145,472[1]	240	994	2.3	736.1	736.1	736.1	0.0
AM	150,442[1]	624	538	2.8	741.1	741.1	741.1	0.0
AN	152,644[1]	343	762	2.1	744.6	744.6	744.6	0.0
AO	153,016[1]	268	623	2.4	745.4	745.4	745.5	0.1
AP	158,428[1]	247	527	1.3	753.6	753.6	753.6	0.0
AQ	161,120[1]	358	863	1.8	759.6	759.6	759.6	0.0

[1]Feet above confluence with Fox River

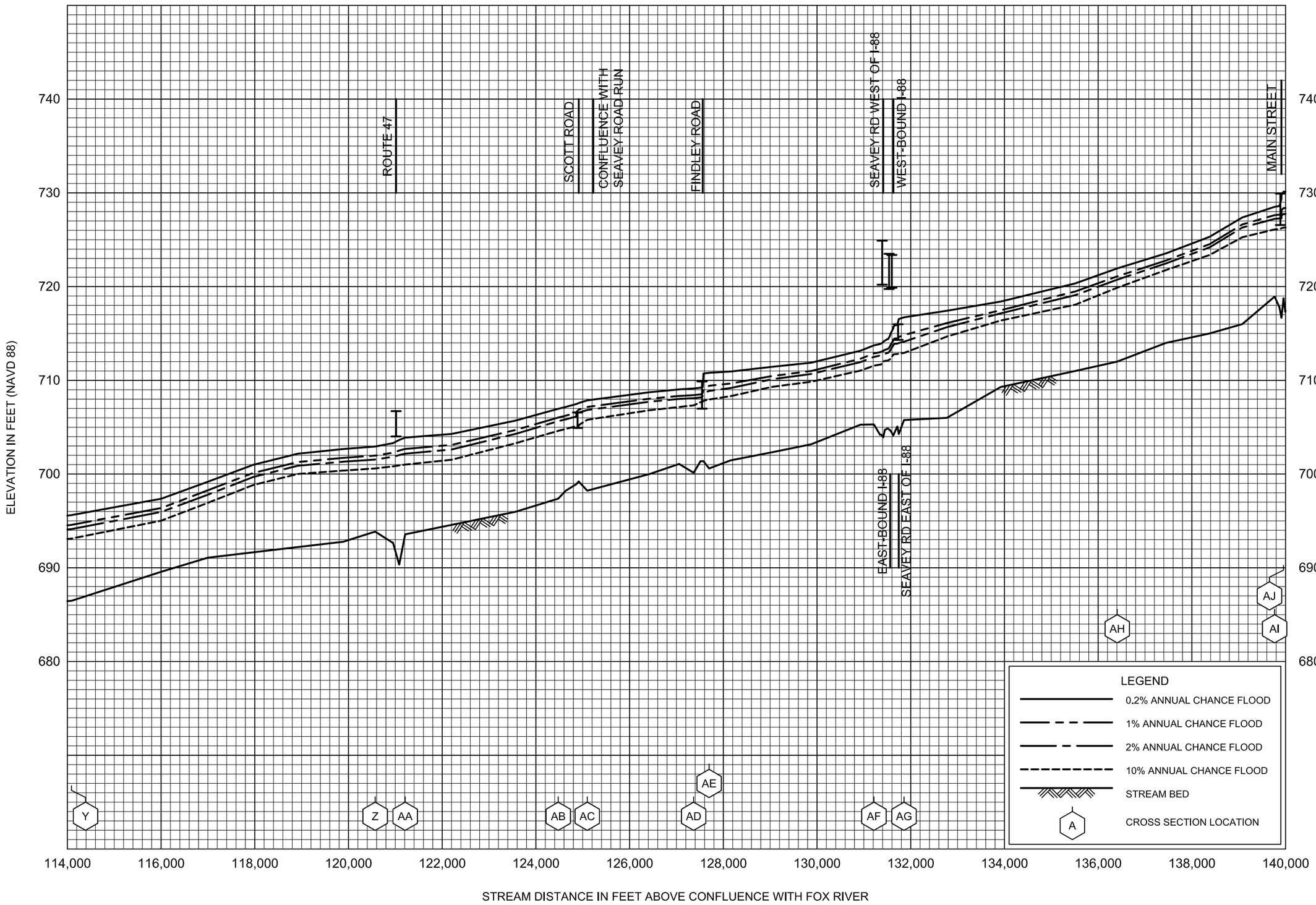
TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

KANE COUNTY, IL AND INCORPORATED AREAS

FLOODWAY DATA

BLACKBERRY CREEK



FLOOD PROFILES

BLACKBERRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KANE COUNTY, IL

AND INCORPORATED AREAS

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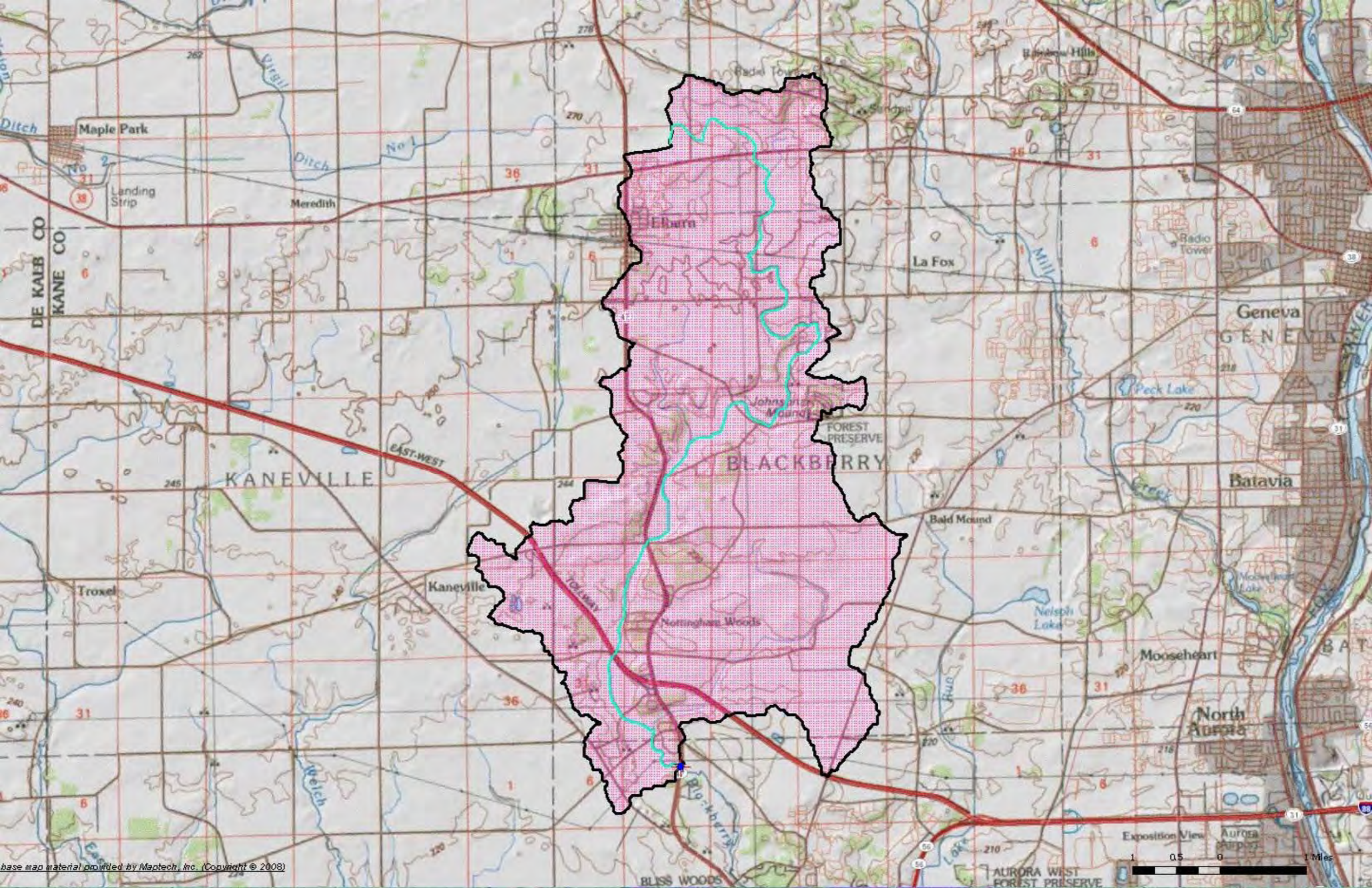

Maple Park
Ditch
No 1
Virgil
Landing Strip
Meredith
Elburn
La Fox
Radio Tower
Geneva
DE KALB CO
KANE CO
Peck Lake
Johnson Mound
FOREST PRESERVE
BLACKBERRY
EAST-WEST
KANEVILLE
Batavia
Bald Mound
Troxel
Kaneville
Nottingham Woods
Nelson Lake
Mooseheart
North Aurora
Welch
Big Mary
BLISS WOODS
Exposition View
Aurora Airport
AURORA WEST FOREST PRESERVE
1 0.5 0 1 Miles
base map material provided by Maptech, Inc. (Copyright © 2008)

Flow Statistics Ungaged Site Report

Date: Fri Aug 28, 2015 8:32:02 AM GMT-5
Site Location: Illinois
NAD 1983 Latitude: 41.8046 (41 48 16)
NAD 1983 Longitude: -88.4605 (-88 27 38)
Drainage Area: 22.09 mi2

Peak Flow Basin Characteristics			
100% Region 2 AMS (22.1 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	22.1	0.03	9554
Stream Slope 10 and 85 Method (feet per mi)	11.720	0.81	317
Percent Open Water AND Herb Wetland (percent)	0.437	0	8

Peak Flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	544	ft3/s	40	2.6	288	1030
PK5	901	ft3/s	41	3.1	476	1710
PK10	1150	ft3/s	42	3.8	594	2220
PK25	1450	ft3/s	45	4.6	723	2910
PK50	1680	ft3/s	47	5.2	814	3480
PK100	1890	ft3/s	49	5.6	887	4040
PK500	2400	ft3/s	55	6.2	1040	5530

http://il.water.usgs.gov/pubs/sir2004-5103.pdf (http://il.water.usgs.gov/pubs/sir2004-5103.pdf)
Soong_ D.T._ Ishii_ A.L._ Sharpe_ J.B._ and Avery_ C.F._ 2004_ Estimating Flood-Peak Discharge Magnitudes and Frequencies for Rural Streams in Illinois_ U.S. Geological Survey Scientific Investigations Report 2004-5103. 147 p.

Route: IL. Rte. 47
Waterway: Blackberry Creek

Peak Flow Comparison: FIS Study vs StreamStats

Flow (cfs)	FIS Study	StreamStats
Q10	1041	1150
Q50	1765	1680
Q100	2134	1890
Q500	3157	2400

* Flows used in HEC RAS-Model

* FIS Study Flow taken at upstream section 120437

Steady Flow Distribution data from HEC-RAS Model

HEC-RAS Plan: FIS PERMIT EX Locations: User Defined

River	Reach	River Sta	Profile	Q Total
				(cfs)
Blackberry Creek	Blackberry Creek	120437	Q10	1041.00
Blackberry Creek	Blackberry Creek	120437	Q50	1765.00
Blackberry Creek	Blackberry Creek	120437	Q100	2134.00
Blackberry Creek	Blackberry Creek	120437	Q500	3157.00

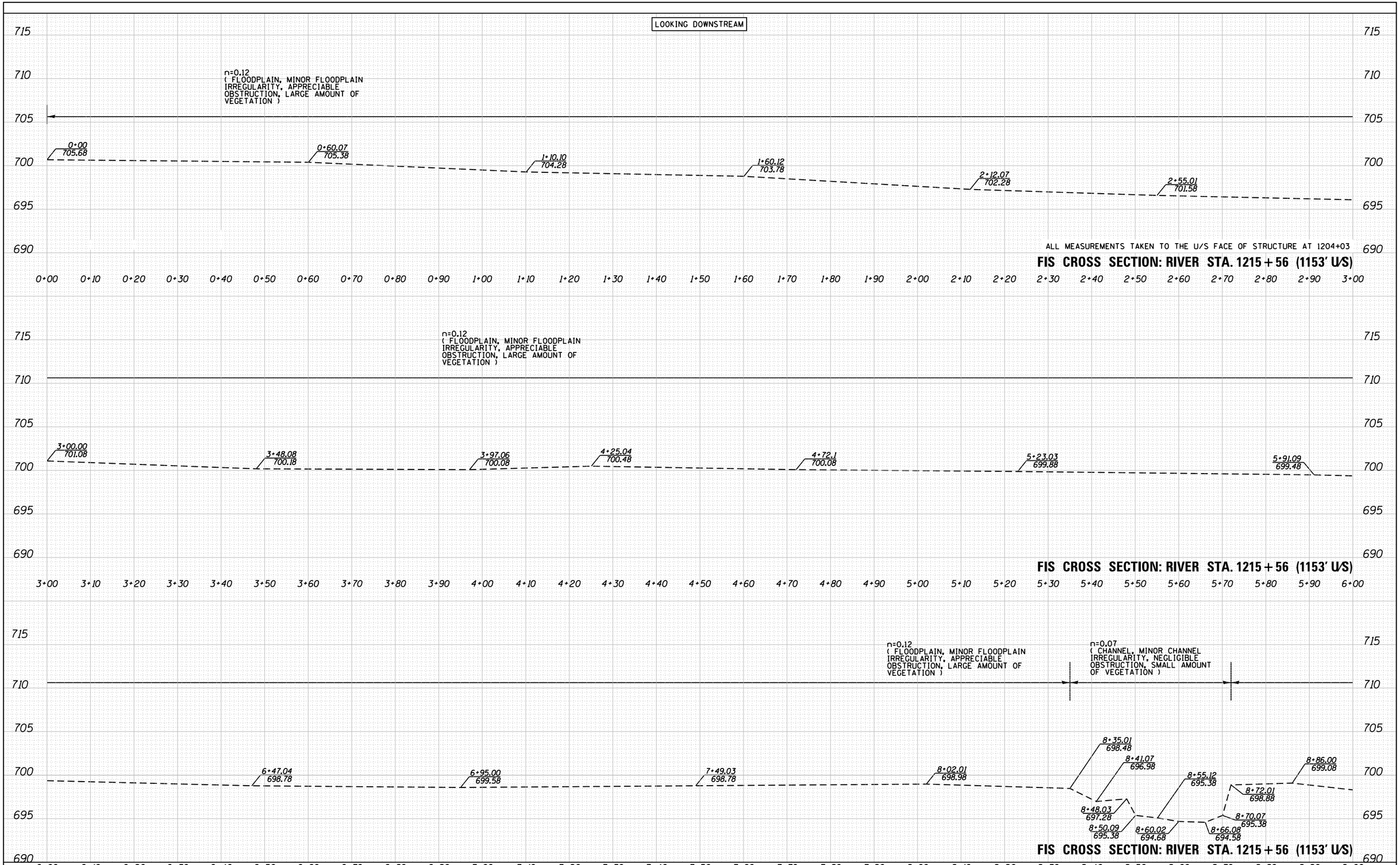
EXHIBIT D

CROSS SECTIONS

EXHIBIT D

PLAN VIEW/SURVEYED CROSS SECTION LOCATIONS IL. RTE. 47 OVER BLACKBERRY CREEK S.N. 045–0024

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = Lin42	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EXHIBIT D – SURVEYED CROSS SECTION LOCATIONS IL. RTE. 47	F.A.P. RTE.	SECTION	COUNTY / TOTAL SHEETS / SHEET NO.
		DRAWN -	REVISED -					KANE
	PLOT SCALE = 300.0000 ' / in.	CHECKED -	REVISED -					JOB NO. P-91-015-14
	PLOT DATE = 5/12/2017	DATE -	REVISED -		SCALE: 1"=150'	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT



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	AREAS		
NO.	AREAS CHECKED		

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NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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Westmont, Illinois

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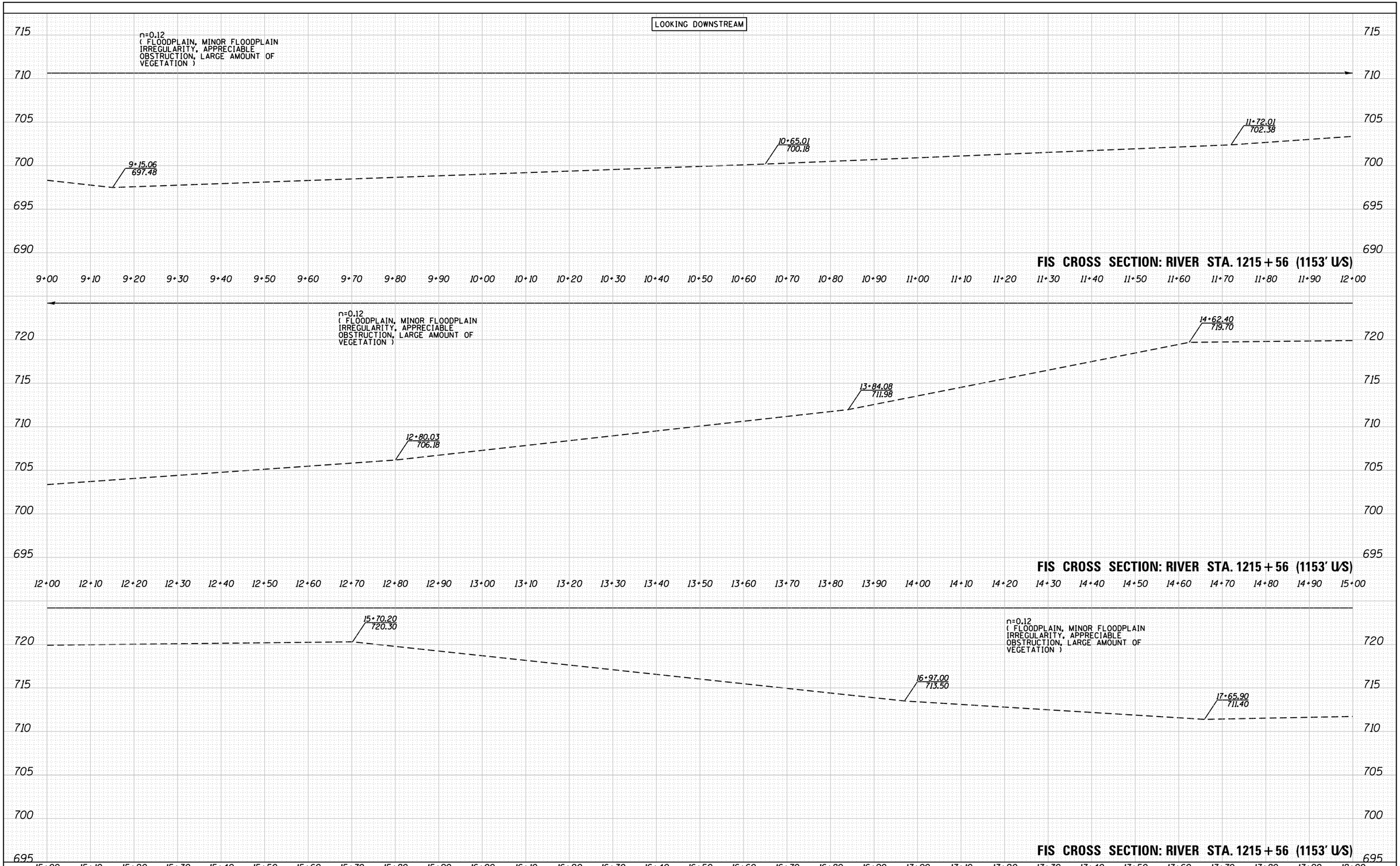
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 1 OF 31 SHEETS | STA. 1213+15 TO STA. 1213+15

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	1
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



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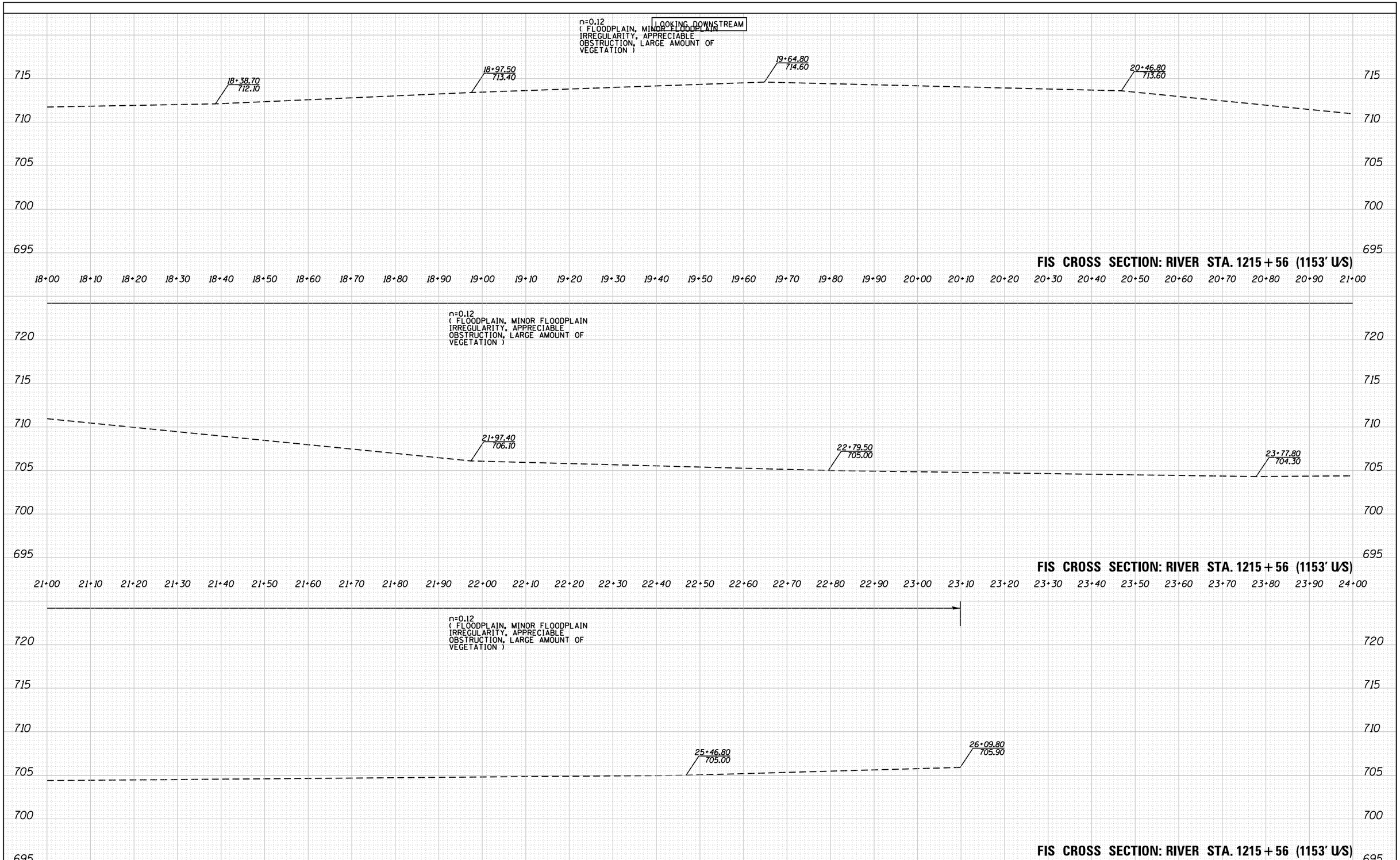
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 2 OF 31 SHEETS | STA. 1213+15 TO STA. 1213+15

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	2
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



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DEPARTMENT OF TRANSPORTATION

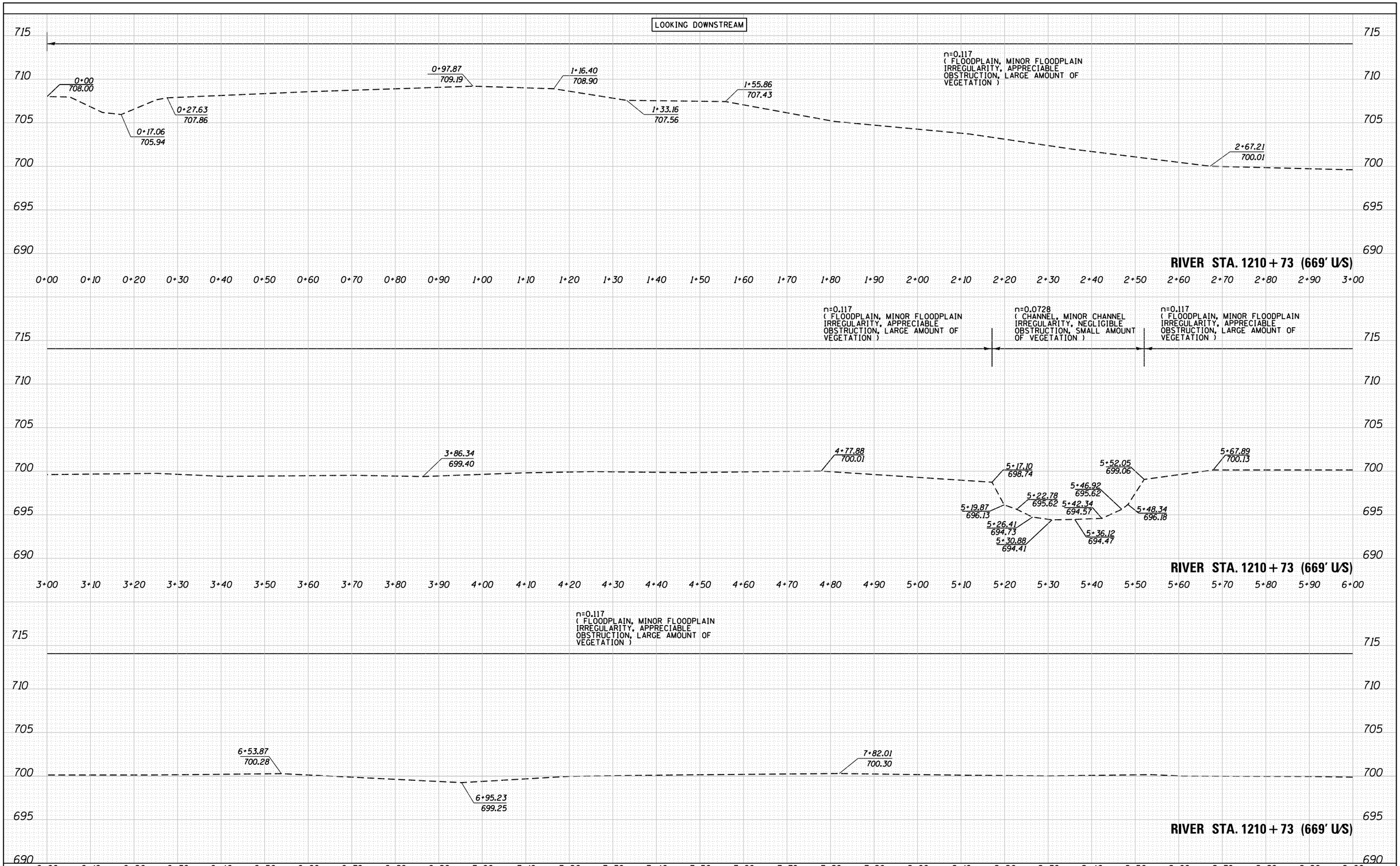
EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 3 OF 31 SHEETS | STA. 1213+15 TO STA. 1213+15

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	3

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



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PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 4 OF 31 SHEETS | STA. 1210+73 TO STA. 1210+73

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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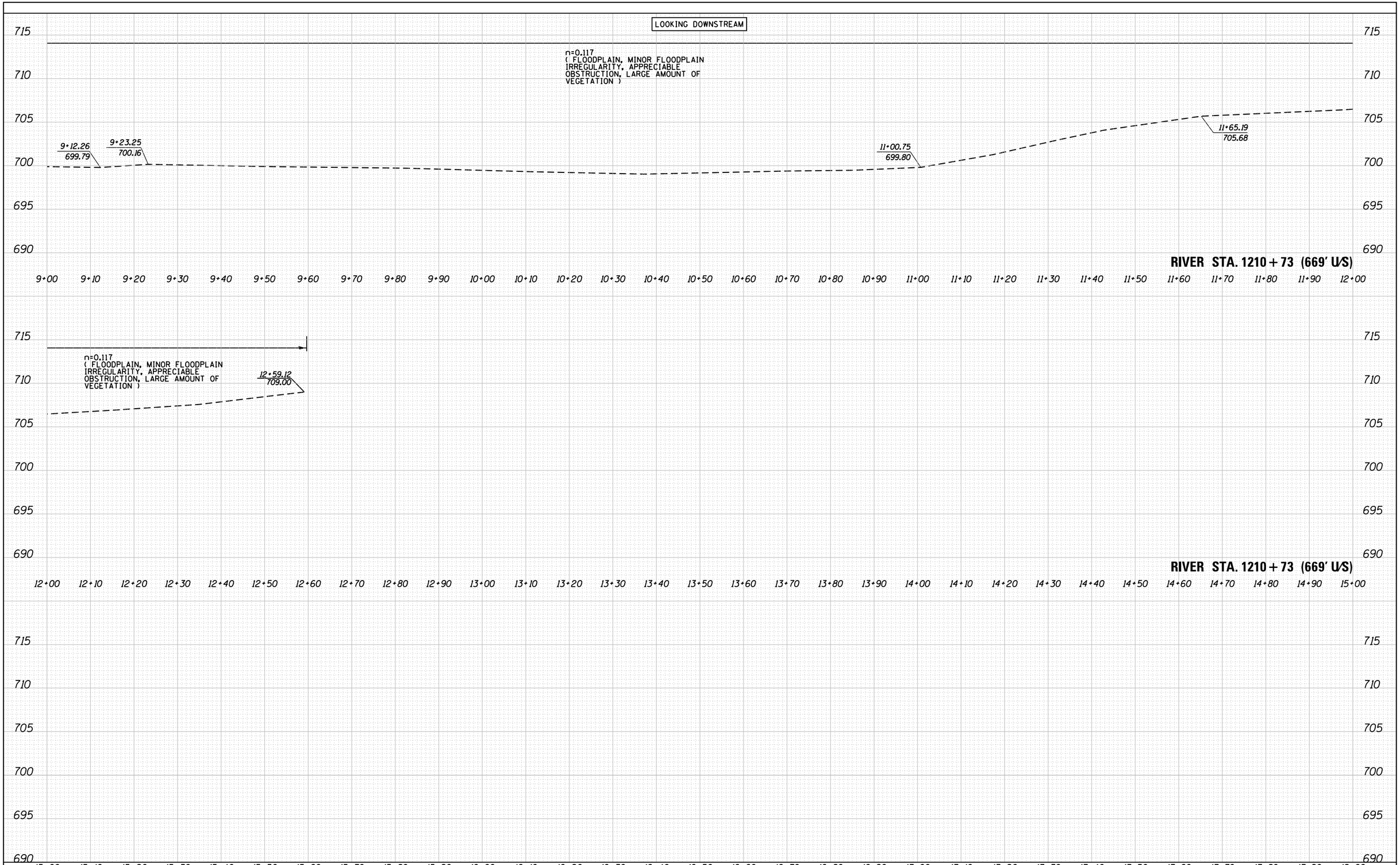
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 5 OF 31 SHEETS | STA. 1210+73 TO STA. 1210+73

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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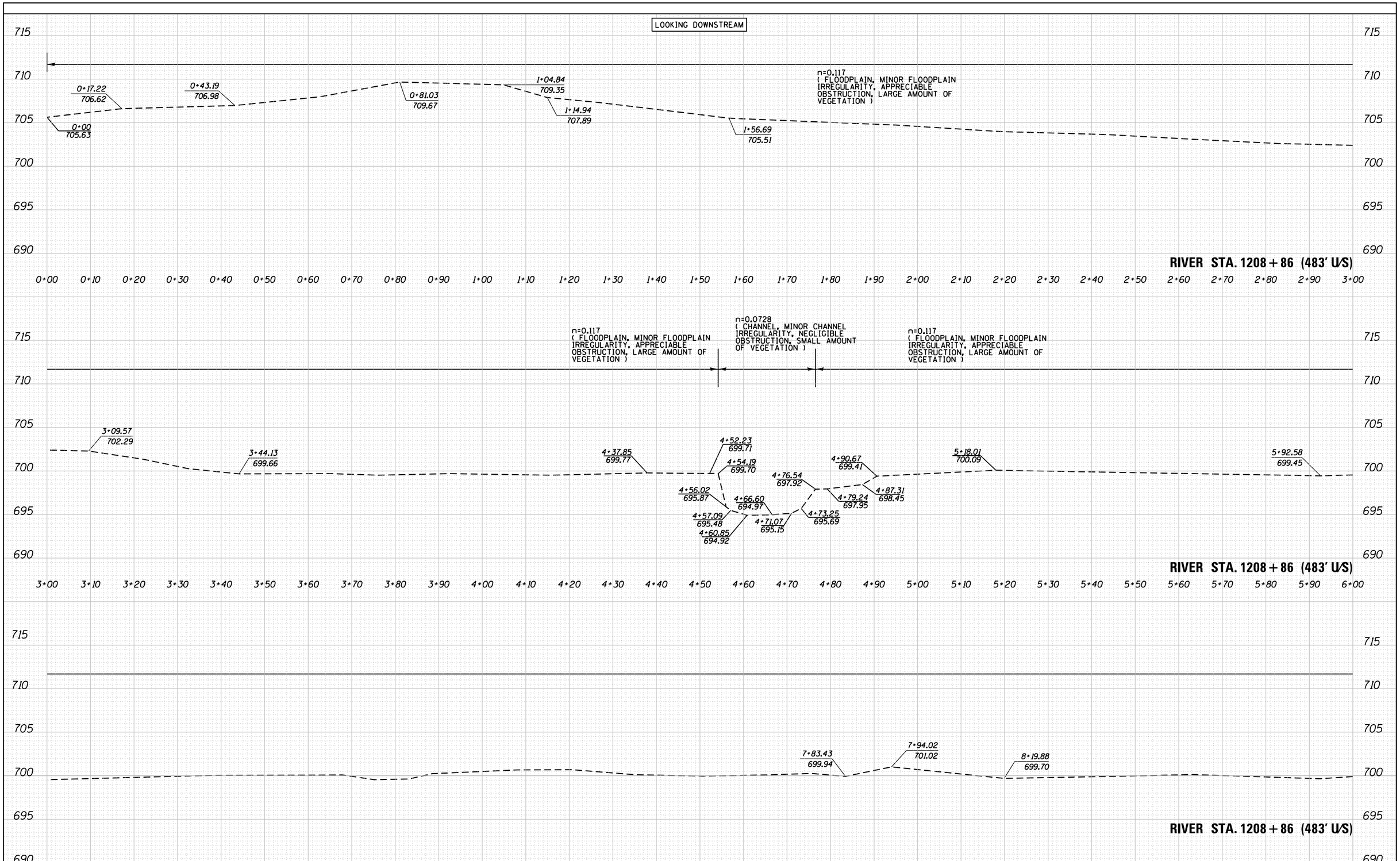
JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 6 OF 31 SHEETS | STA. 1208+86 TO STA. 1208+86

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	6
		JOB NO. P-91-015-14		
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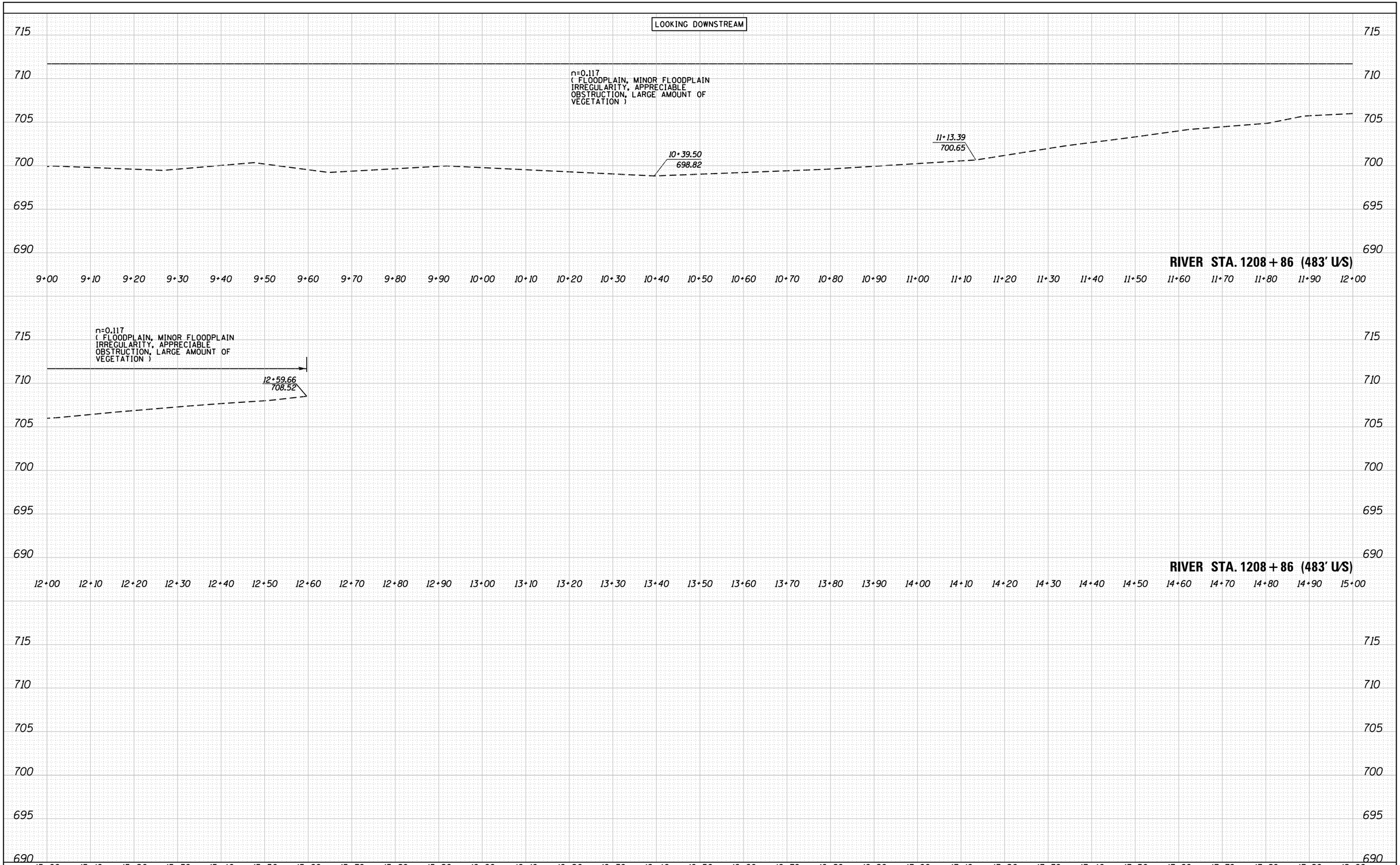

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USER NAME = Lin42	DESIGNED - KU	REVISED -	
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PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

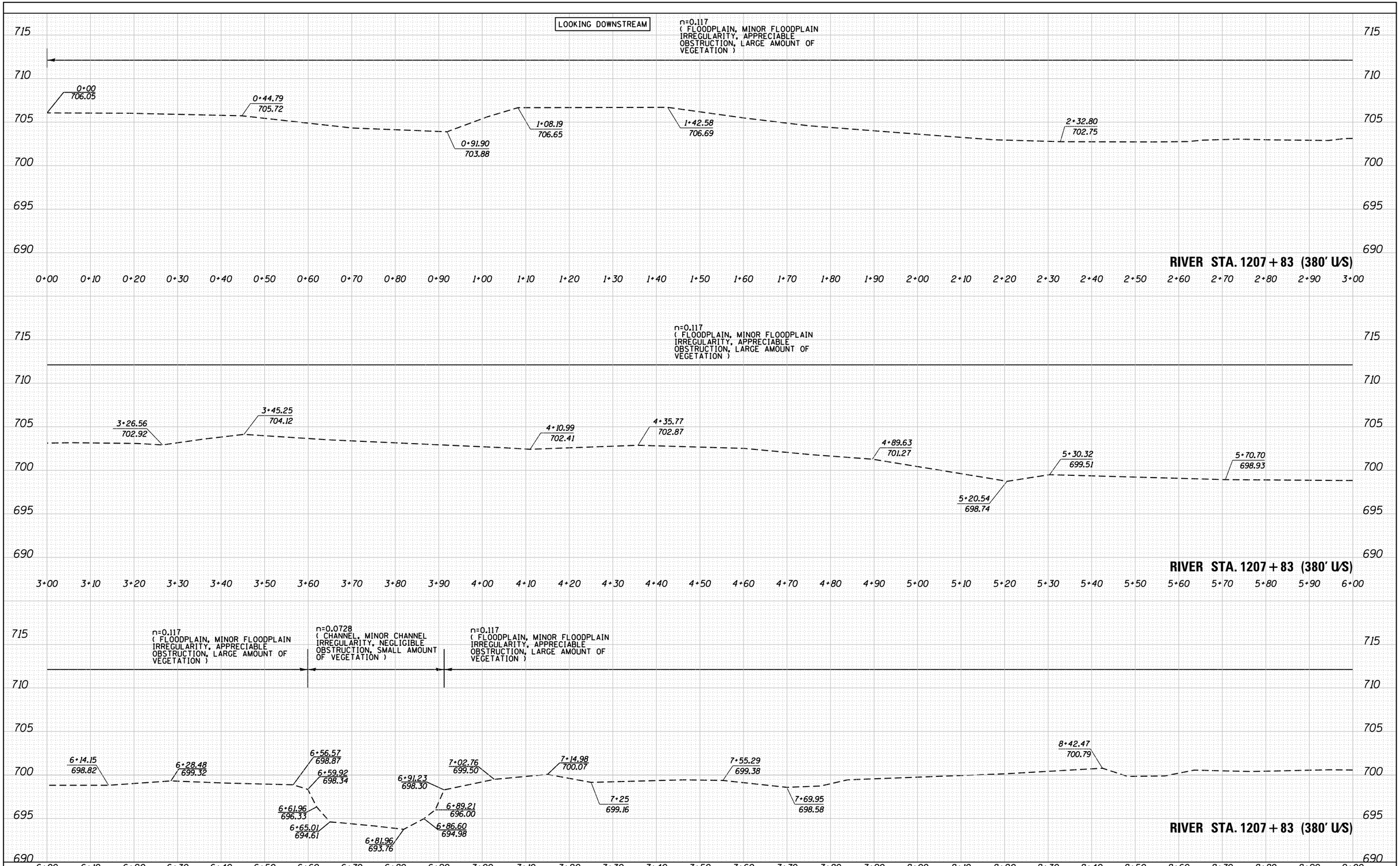
EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 7 OF 31 SHEETS | STA. 1208+86 TO STA. 1208+86

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	7

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	AREAS		
NO.	AREAS CHECKED		

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Westmont, Illinois

USER NAME = Lin42	DESIGNED - KU	REVISED -	
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PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -	
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

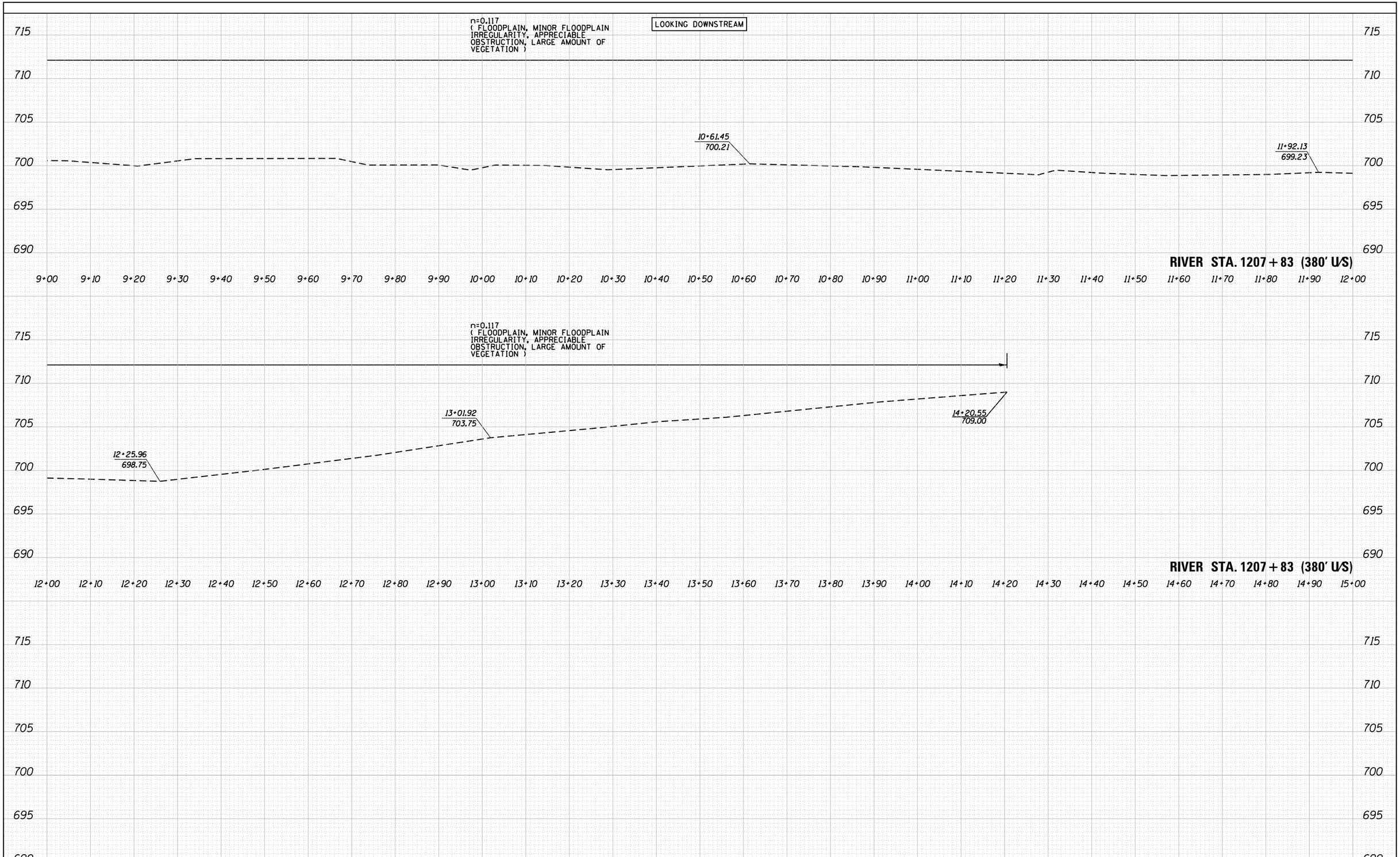
EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 8 OF 31 SHEETS | STA. 1207+83 TO STA. 1207+83

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	8

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
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	DRAWN - KU	REVISED -	
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -	
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

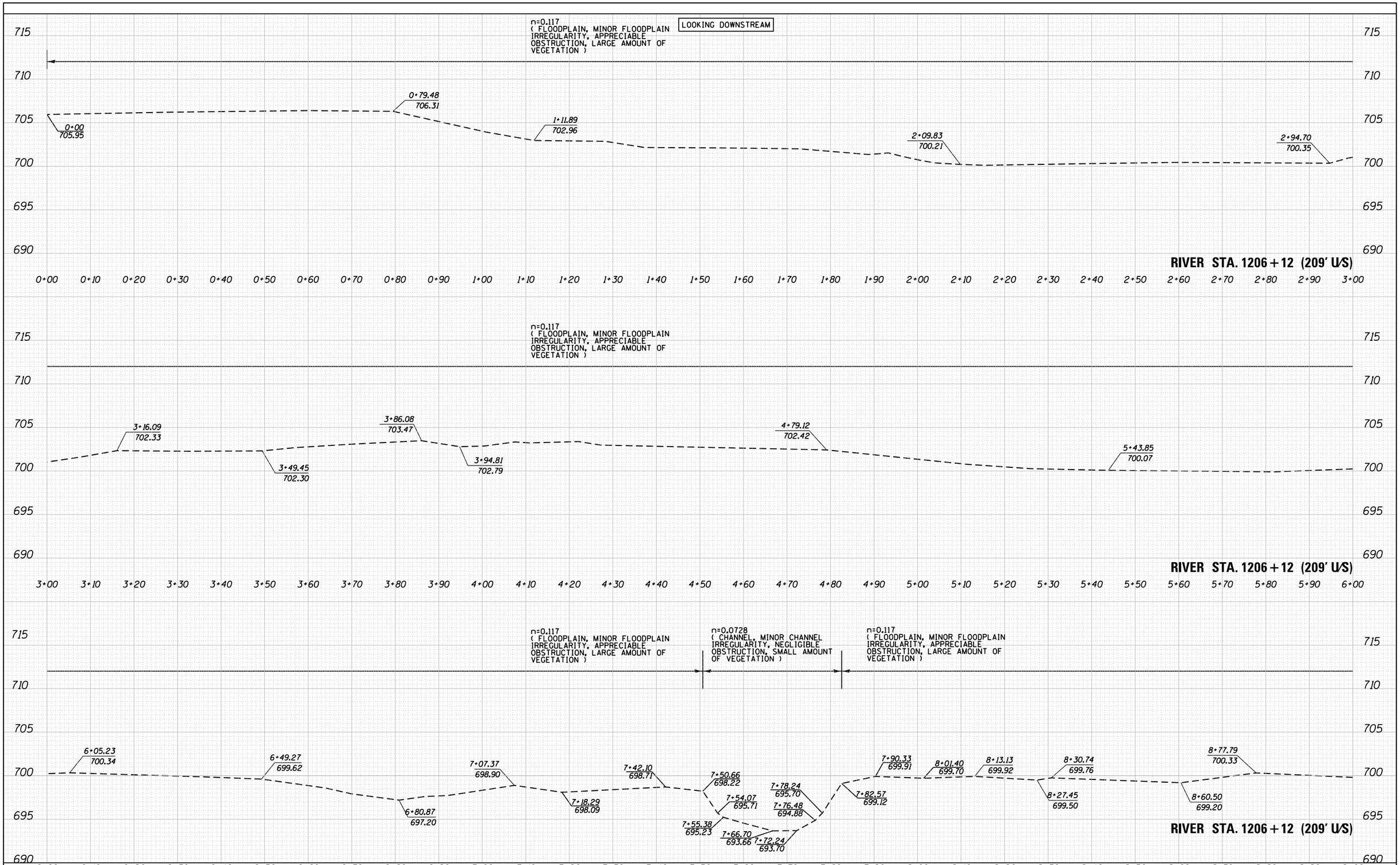
EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 9 OF 31 SHEETS | STA. 1207+83 TO STA. 1207+83

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	9

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

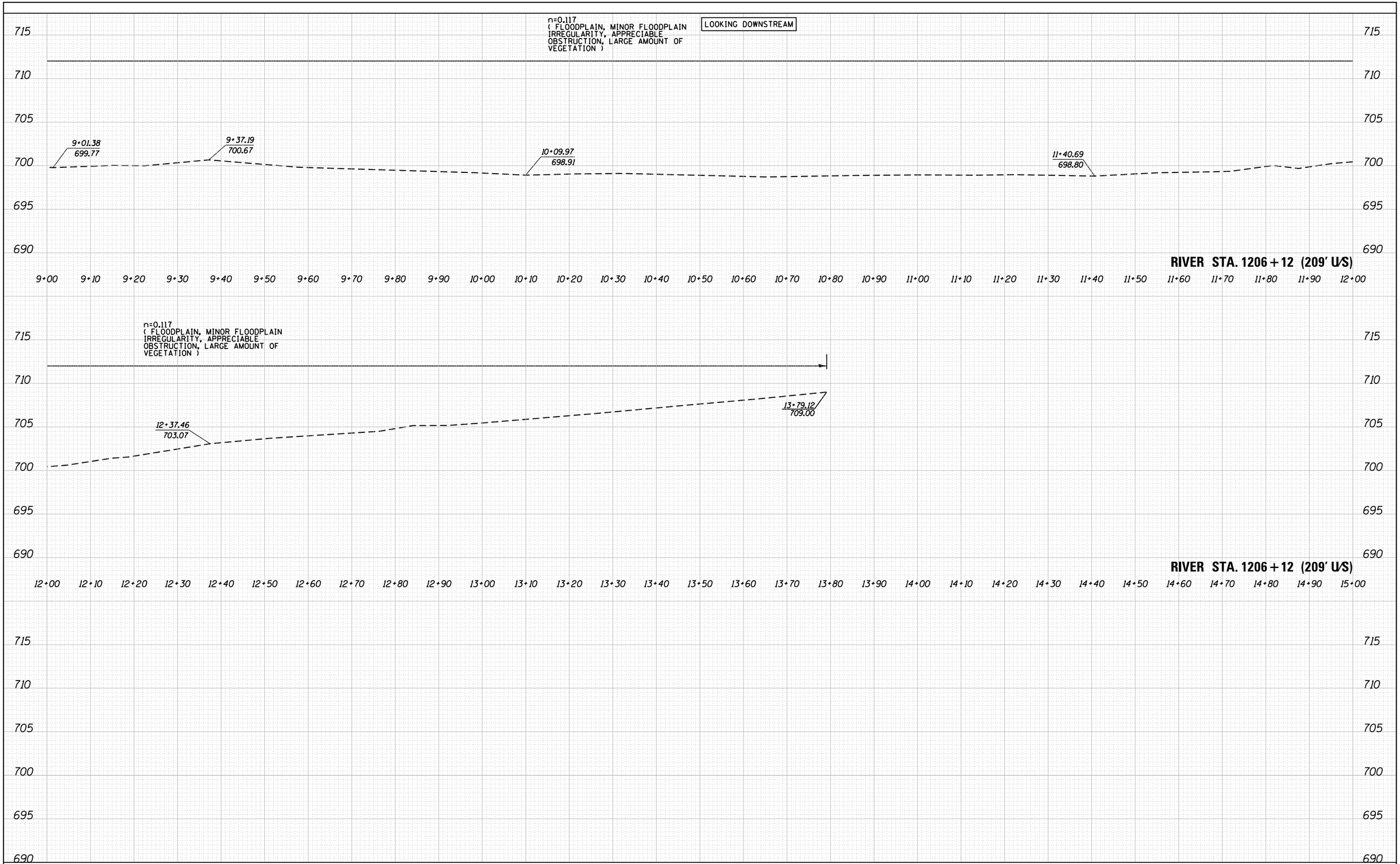
EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 10 OF 31 SHEETS | STA. 1206+12 TO STA. 1206+12

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	10

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 11 OF 31 SHEETS | STA. 1206+12 TO STA. 1206+12

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	11

JOB NO. P-91-015-14

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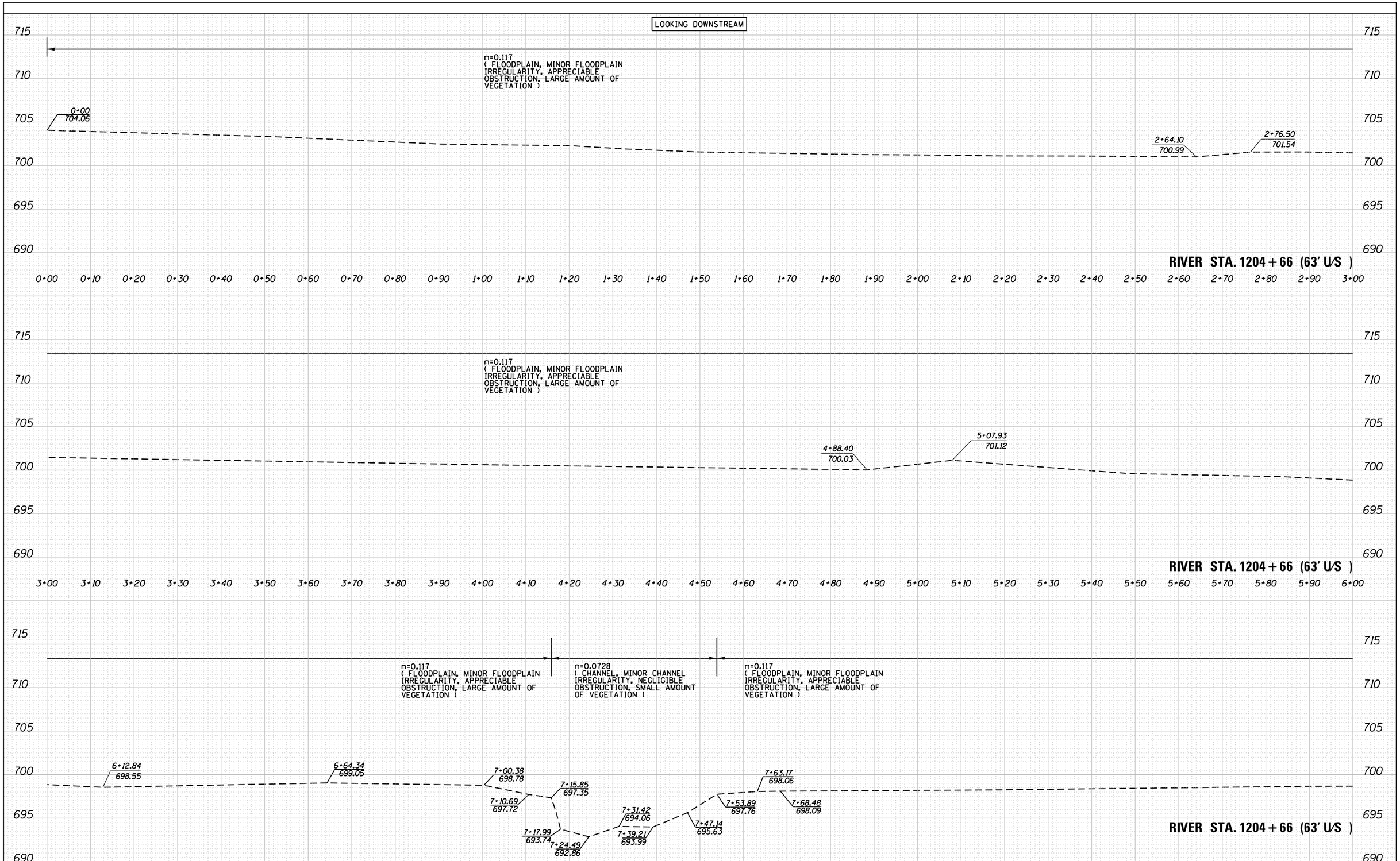

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NOTE BOOK	SURVEYED		
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	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 12 OF 31 SHEETS | STA. 1204+66 TO STA. 1204+67

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	12
		JOB NO. P-91-015-14		

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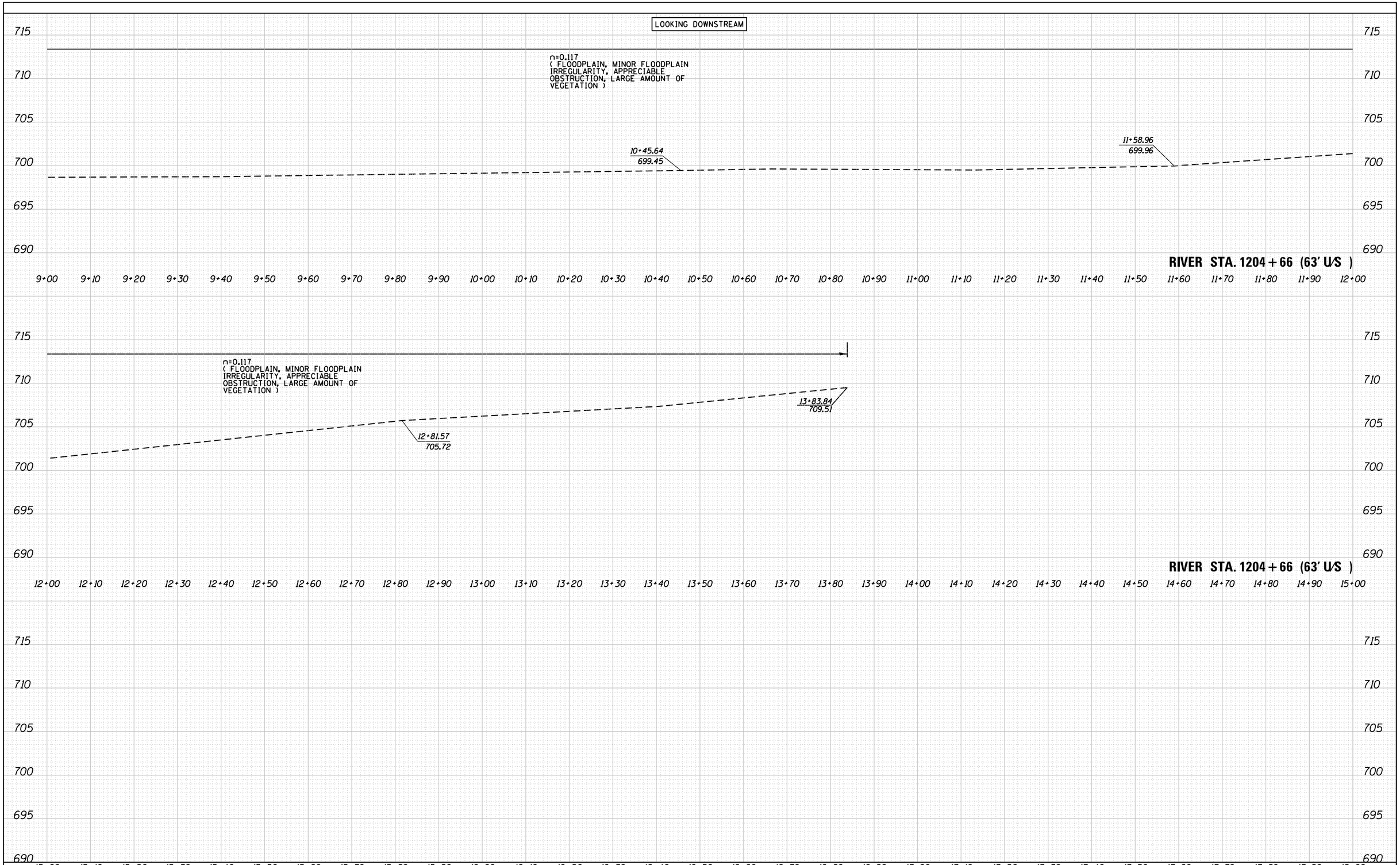

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NOTE BOOK	SURVEYED		
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NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 13 OF 31 SHEETS | STA. 1204+66 TO STA. 1204+67

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	13

JOB NO. P-91-015-14

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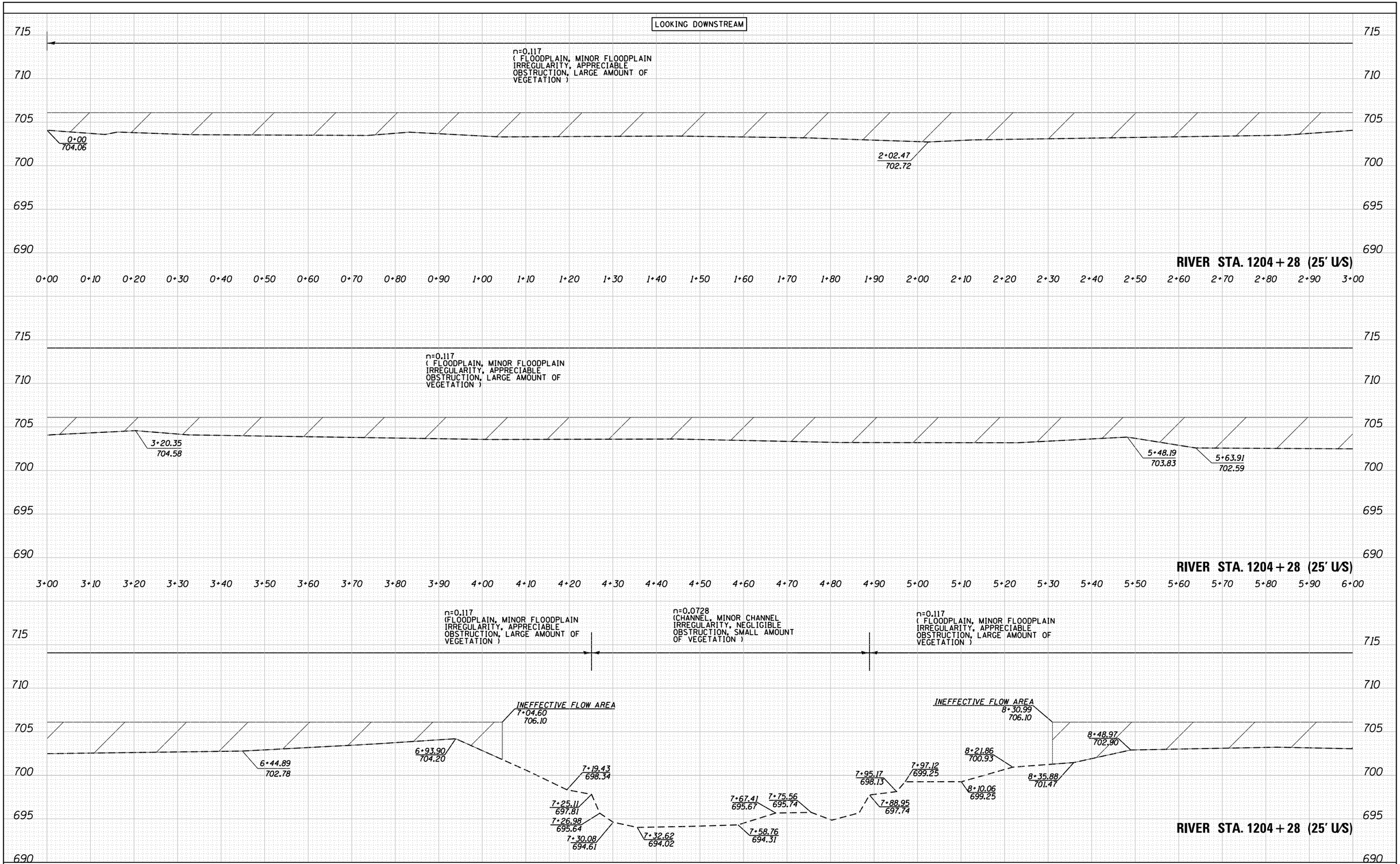

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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
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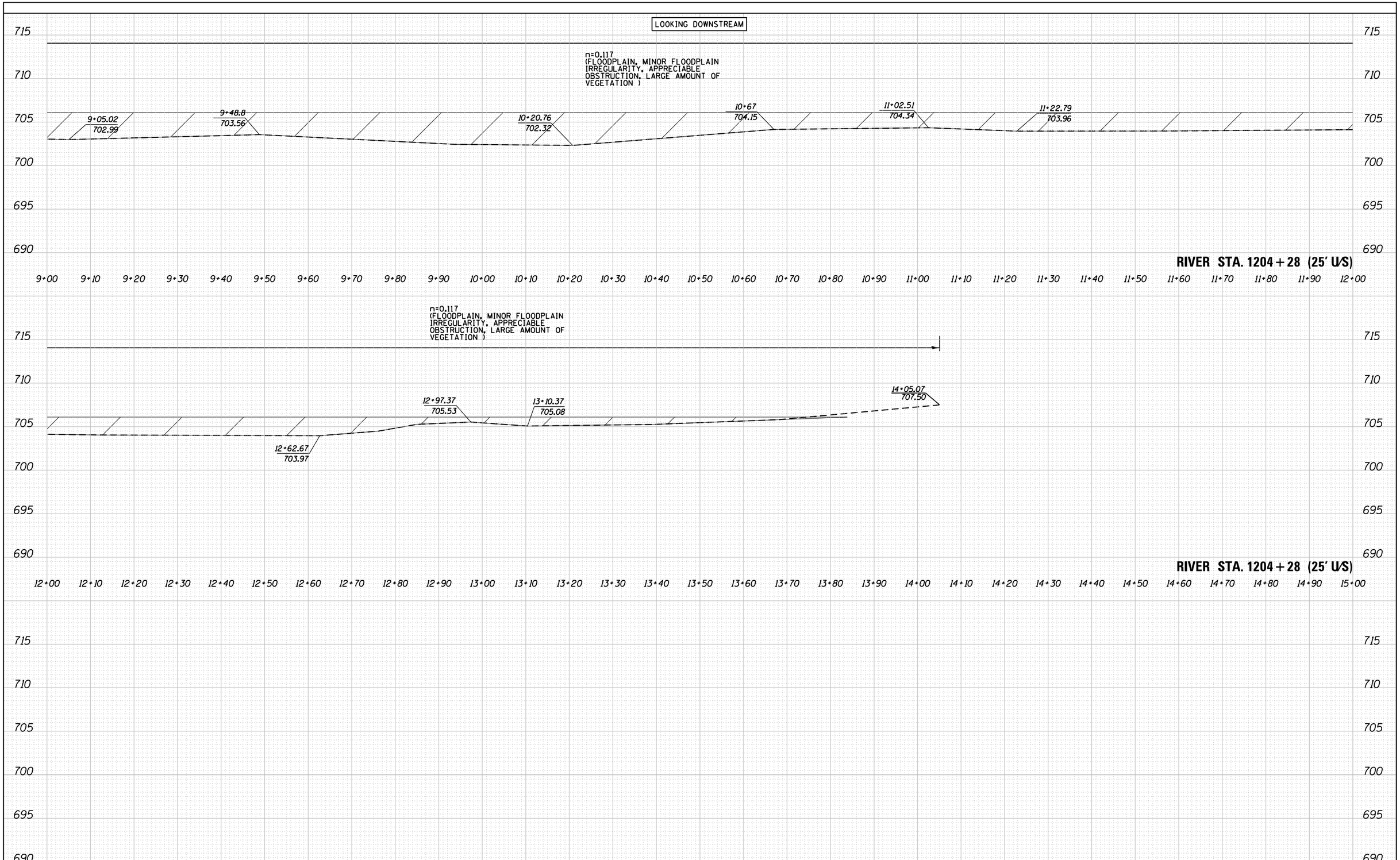
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 14 OF 31 SHEETS | STA. 1204+28 TO STA. 1204+28

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	14
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



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NOTE BOOK	SURVEYED		
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NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 15 OF 31 SHEETS | STA. 1204+28 TO STA. 1204+28

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	15
		JOB NO. P-91-015-14		

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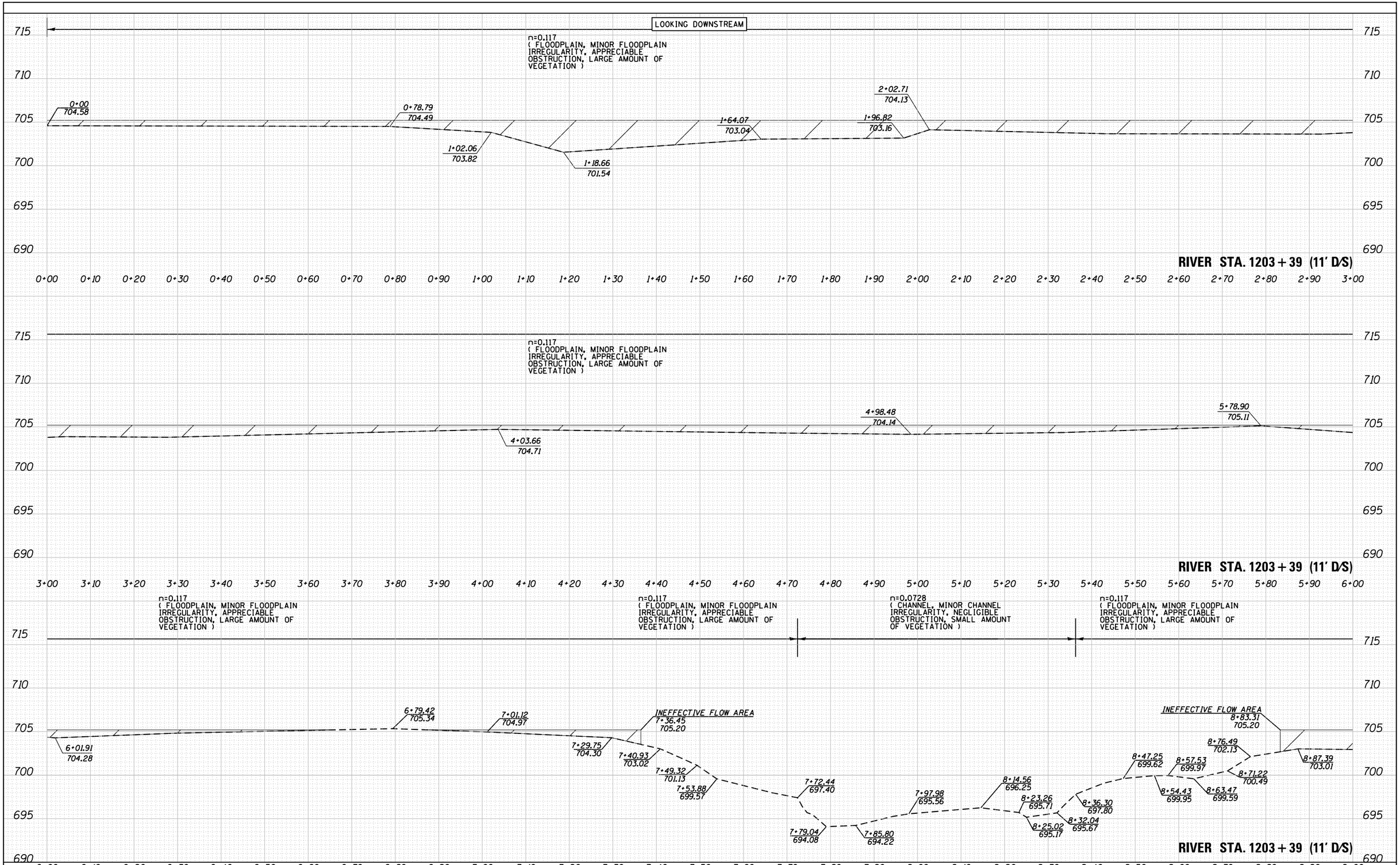

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NOTE BOOK	AREAS		
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ORIGINAL SURVEY		BY	DATE
	SURVEYED		
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NOTE BOOK	AREAS		
	AREAS CHECKED		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 16 OF 31 SHEETS | STA. 1203+39 TO STA. 1203+39

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	16
		JOB NO. P-91-015-14		

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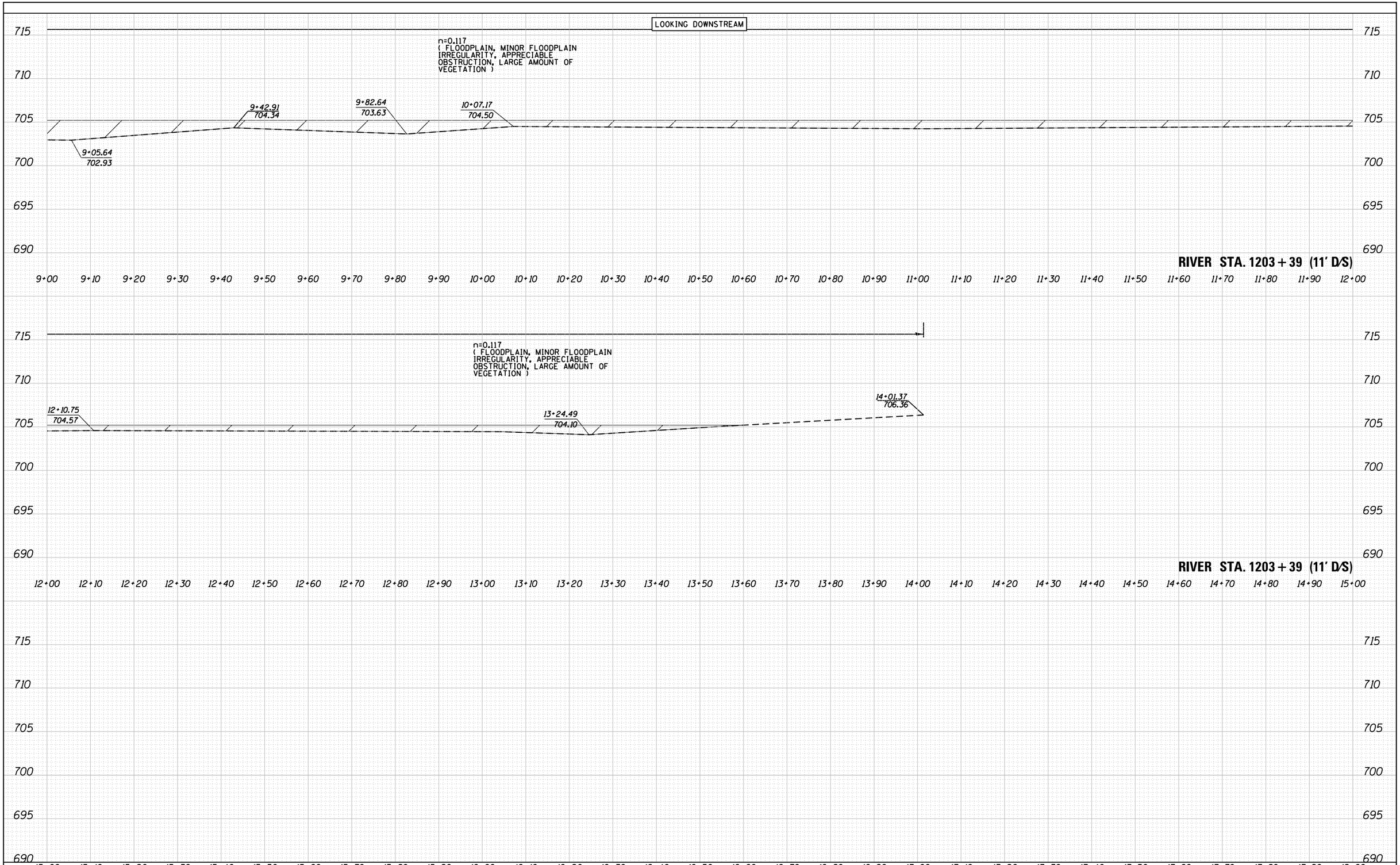

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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	AREAS		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 17 OF 31 SHEETS | STA. 1203+39 TO STA. 1203+39

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	17

JOB NO. P-91-015-14

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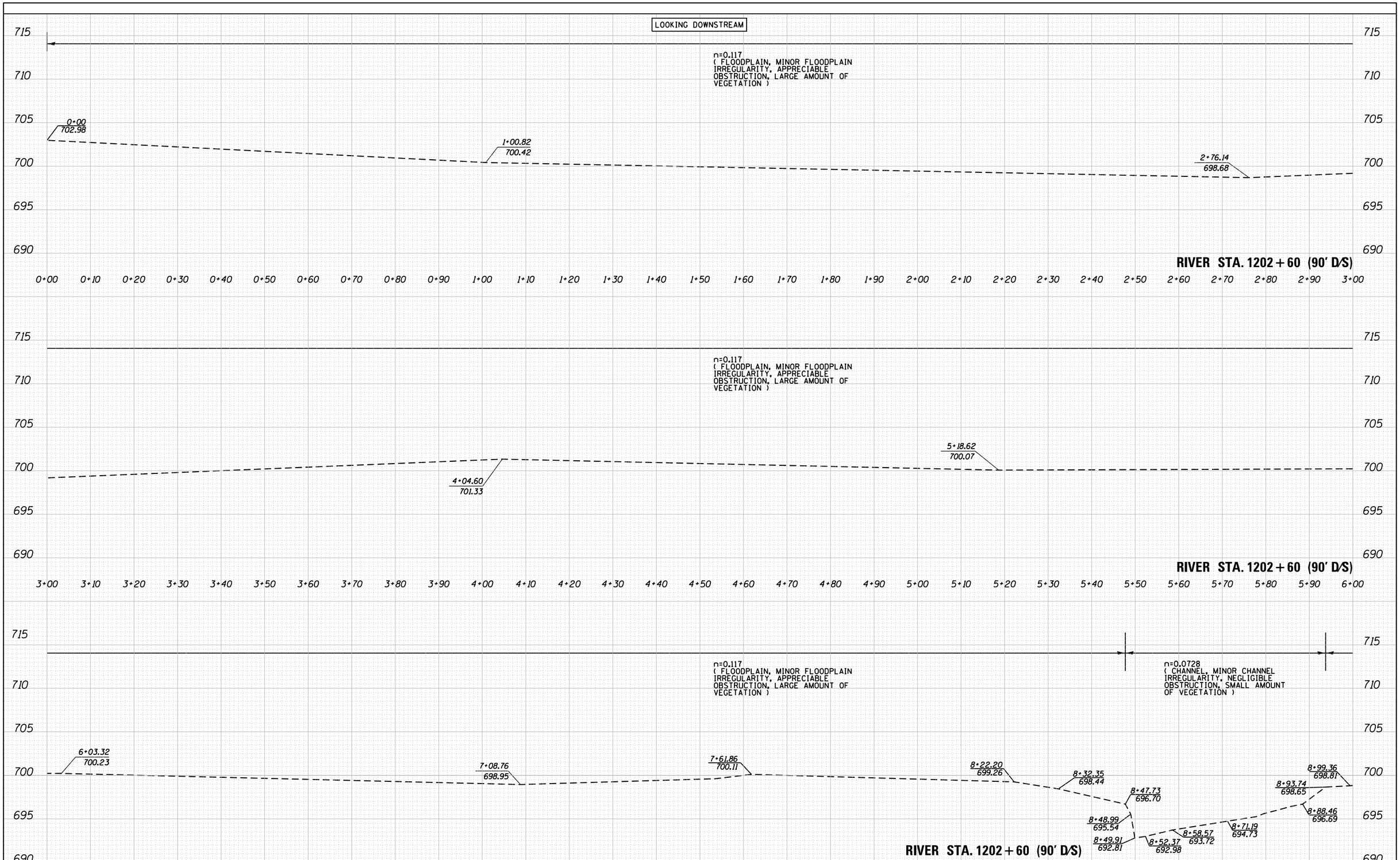

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NOTE BOOK	SURVEYED		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 18 OF 31 SHEETS | STA. 1202+60 TO STA. 1202+60

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	18

JOB NO. P-91-015-14

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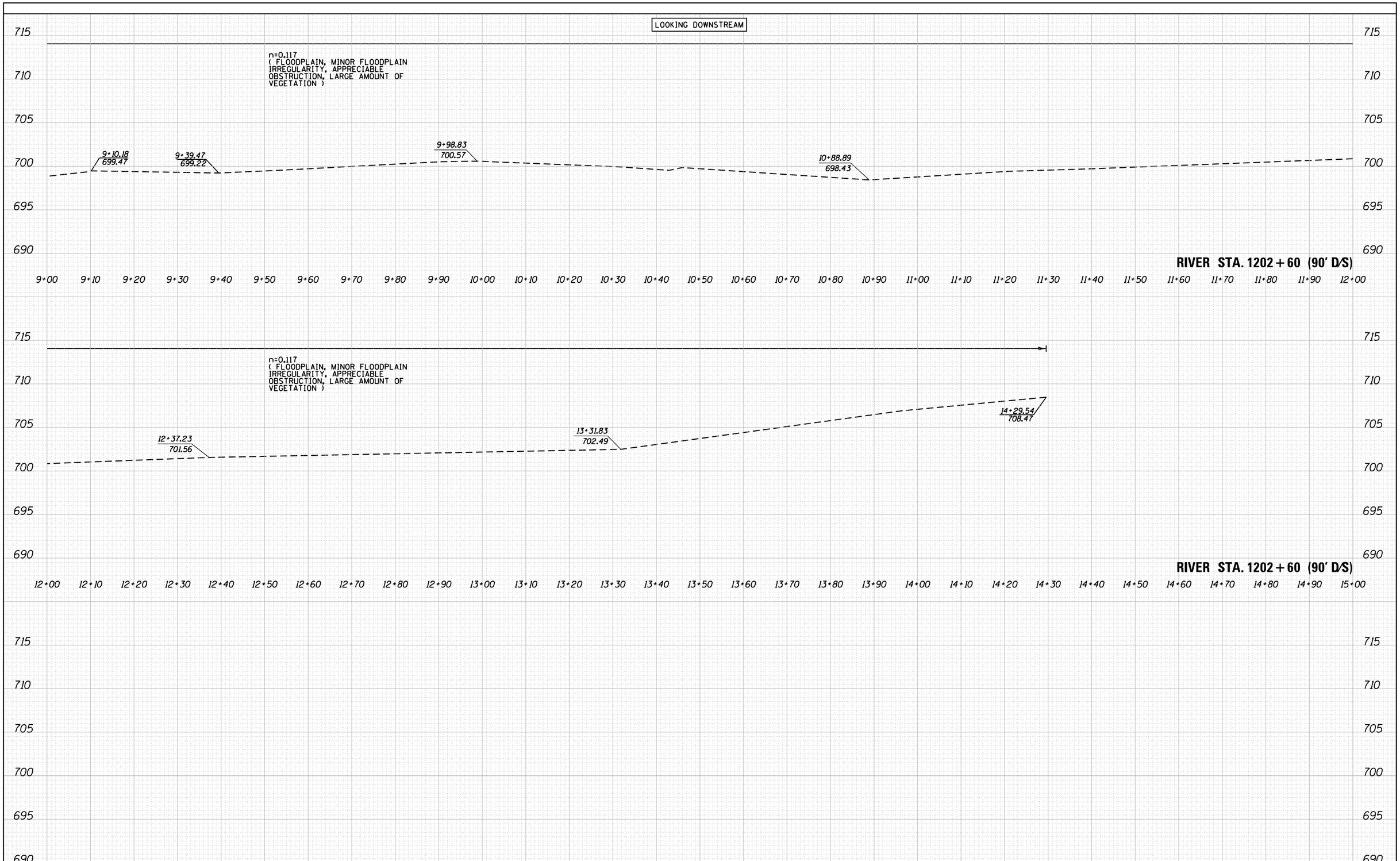

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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 19 OF 31 SHEETS | STA. 1202+60 TO STA. 1202+60

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	19

JOB NO. P-91-015-14

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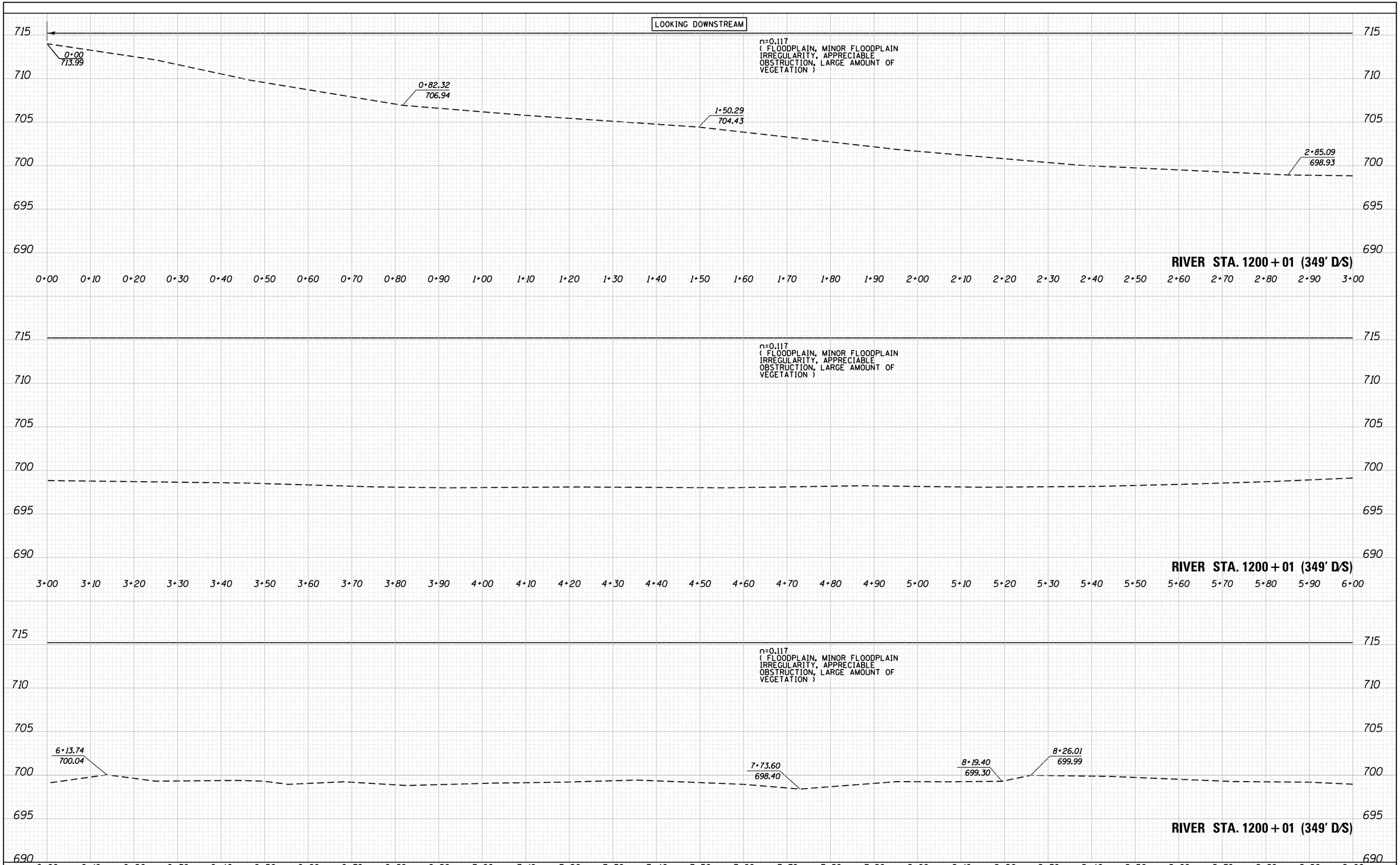

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 20 OF 31 SHEETS | STA. 1200+00 TO STA. 1200+00

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	20
		JOB NO. P-91-015-14		

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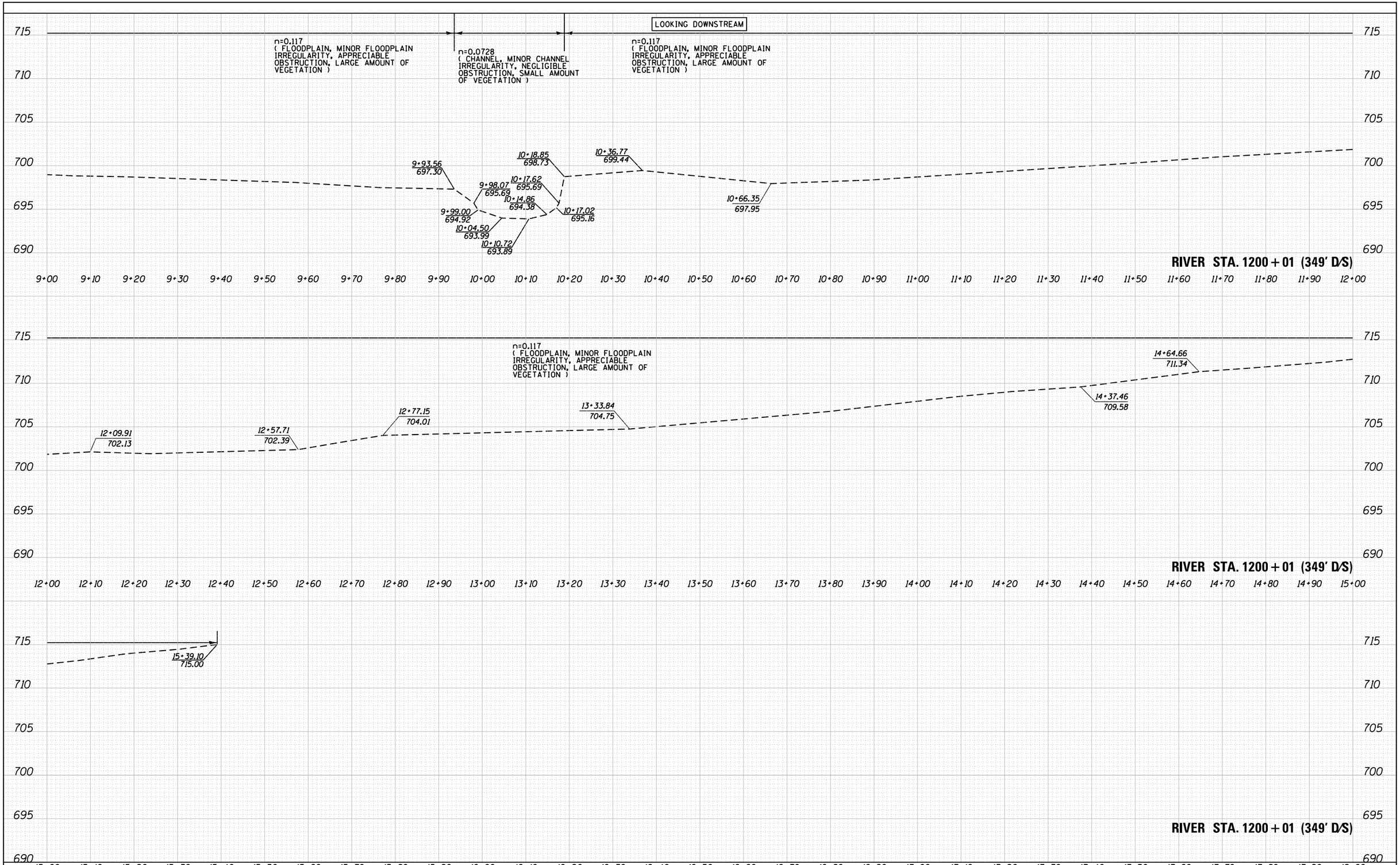

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NOTE BOOK	SURVEYED		
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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 21 OF 31 SHEETS | STA. 1200+01 TO STA. 1200+01

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	21

JOB NO. P-91-015-14

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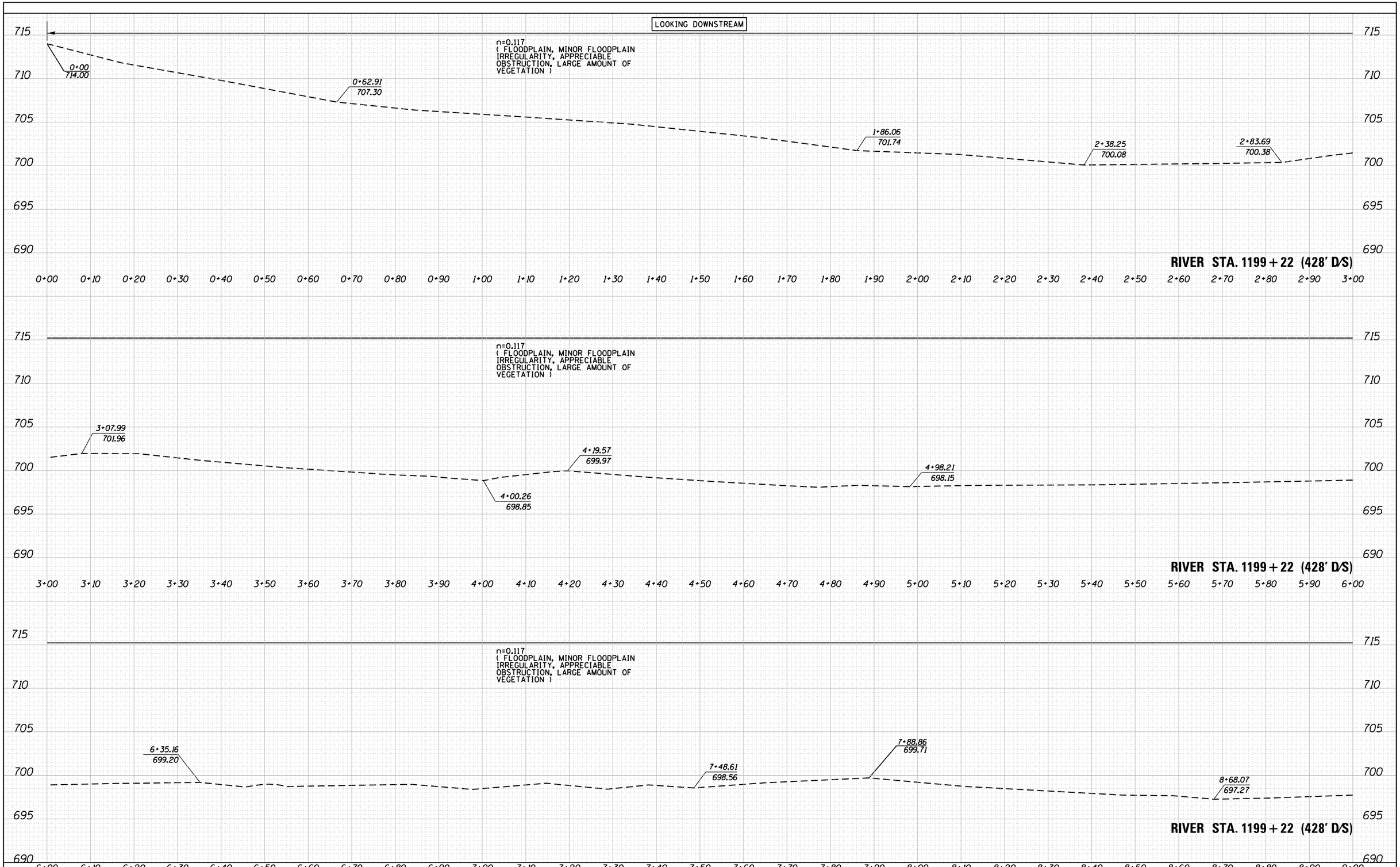

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 22 OF 31 SHEETS | STA. 1199+22 TO STA. 1199+22

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	22

JOB NO. P-91-015-14

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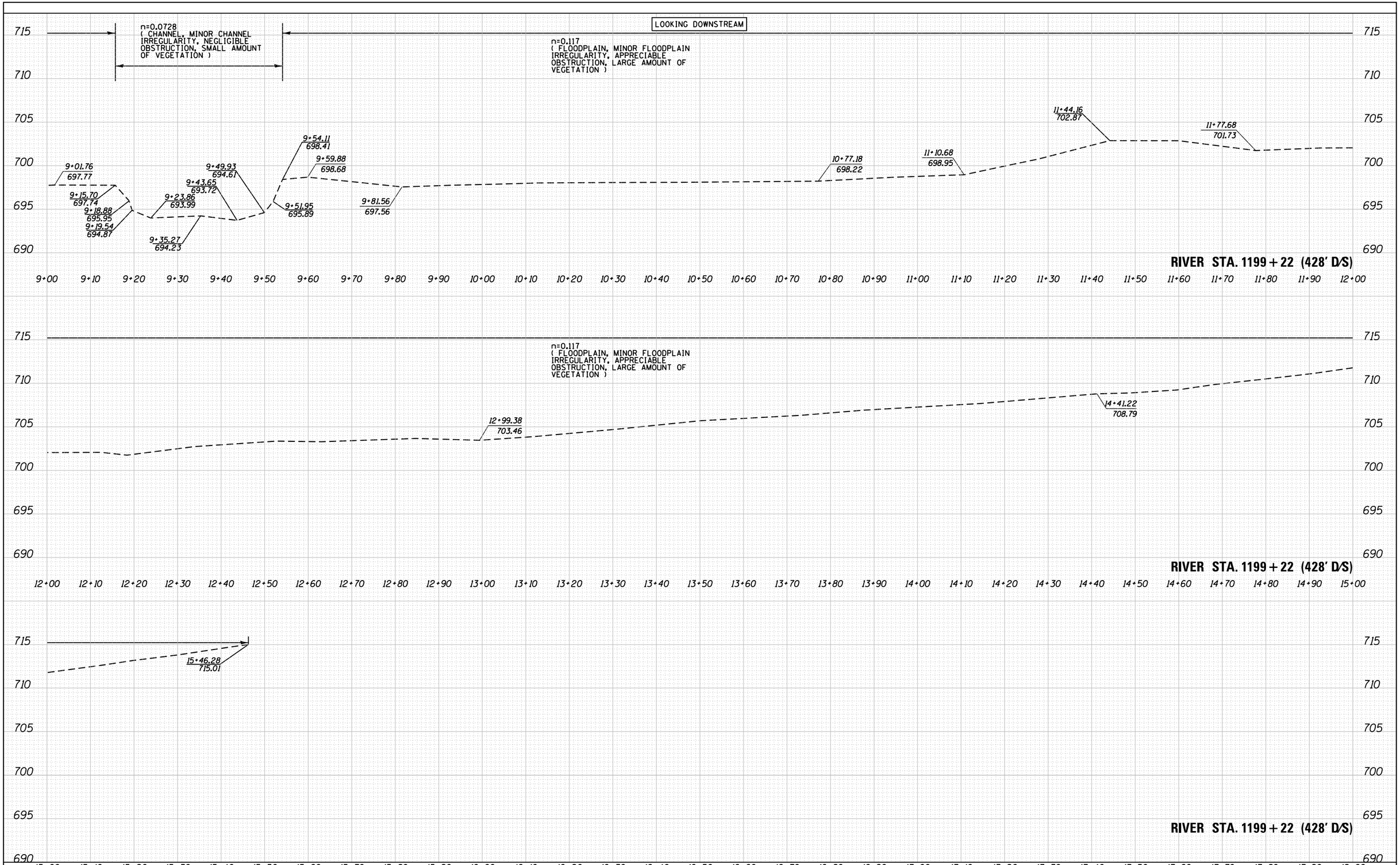

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 23 OF 31 SHEETS | STA. 1199+22 TO STA. 1199+22

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	23
		JOB NO. P-91-015-14		

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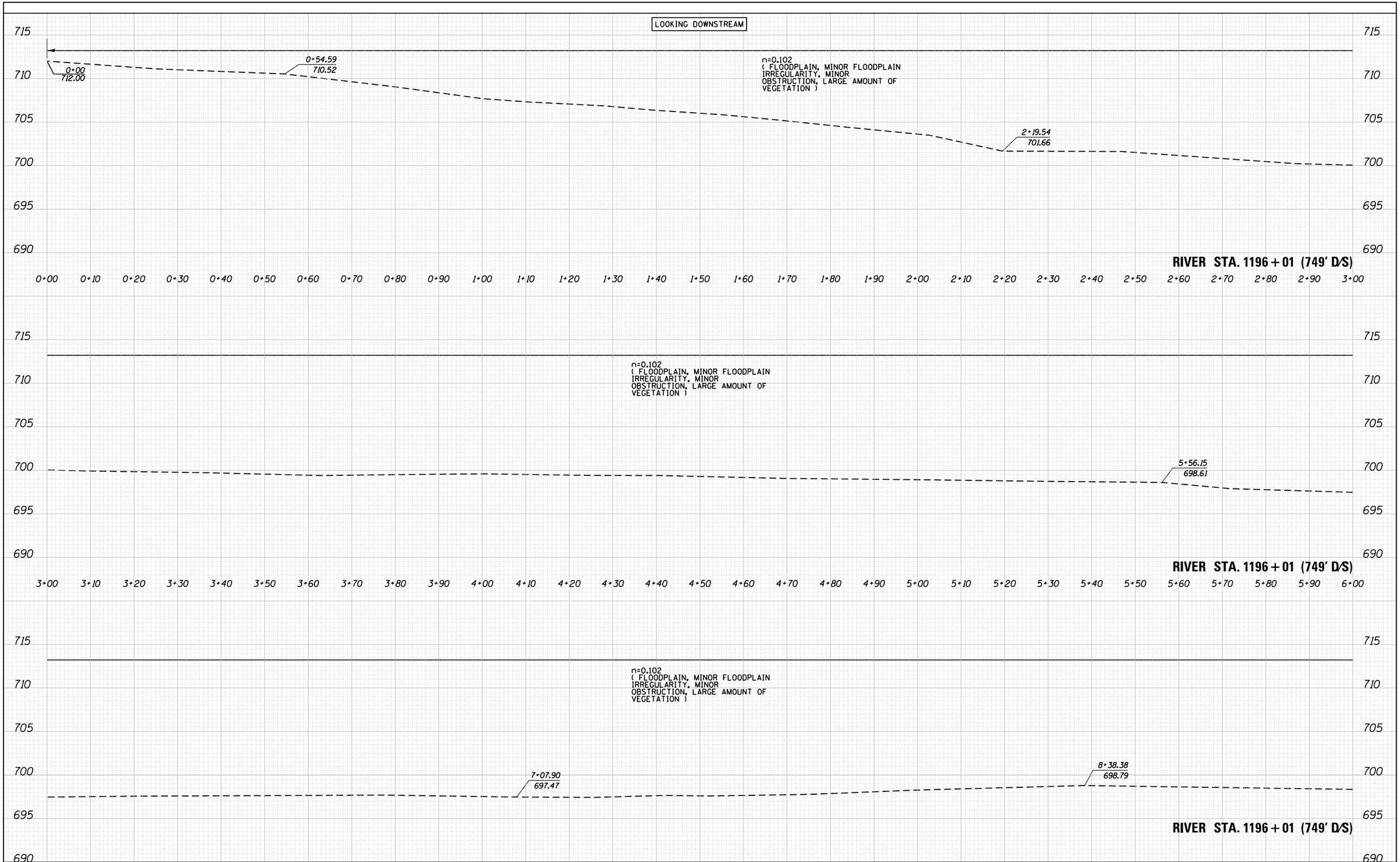

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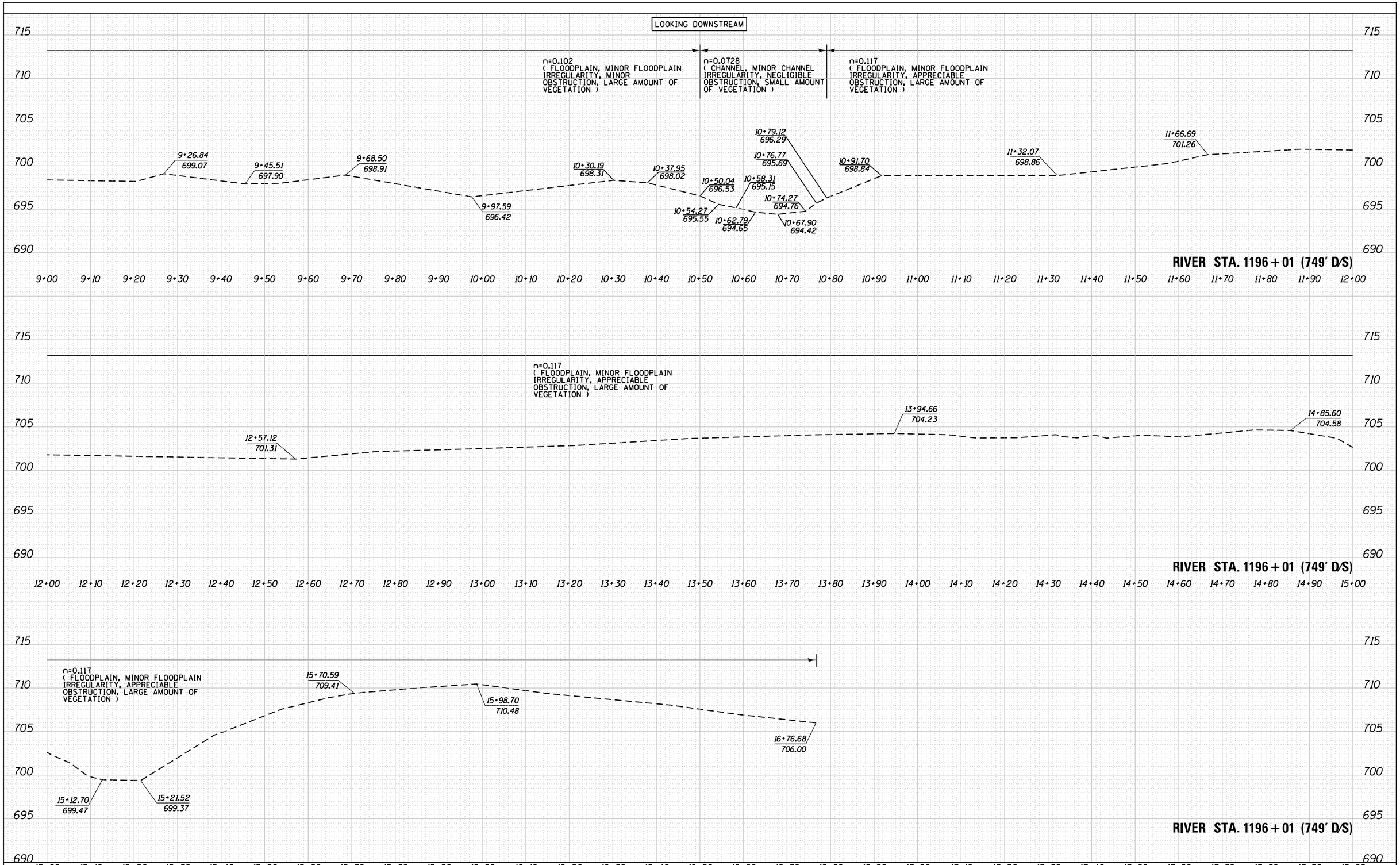
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 24 OF 31 SHEETS | STA. 1193+13 TO STA. 1193+13

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	24
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



FINAL SURVEY		BY	DATE
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AREAS			
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NOTE BOOK			
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ORIGINAL SURVEY		BY	DATE
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PLOTTED			
TEMPLATE			
AREAS			
AREAS CHECKED			
NOTE BOOK			
NO.			

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

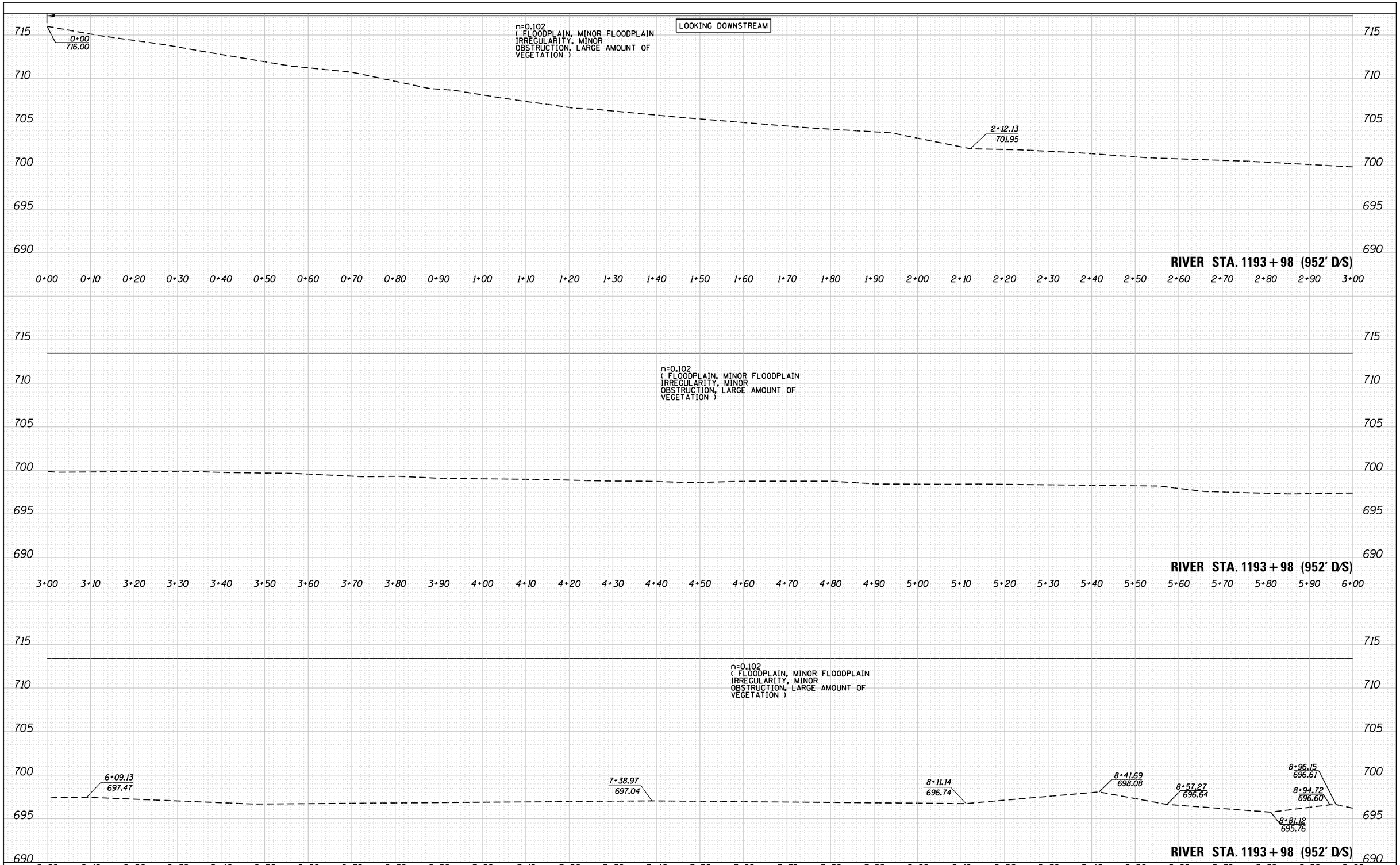
EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 25 OF 31 SHEETS | STA. 1196+01 TO STA. 1196+01

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	25

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = Lin42	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -	
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -	

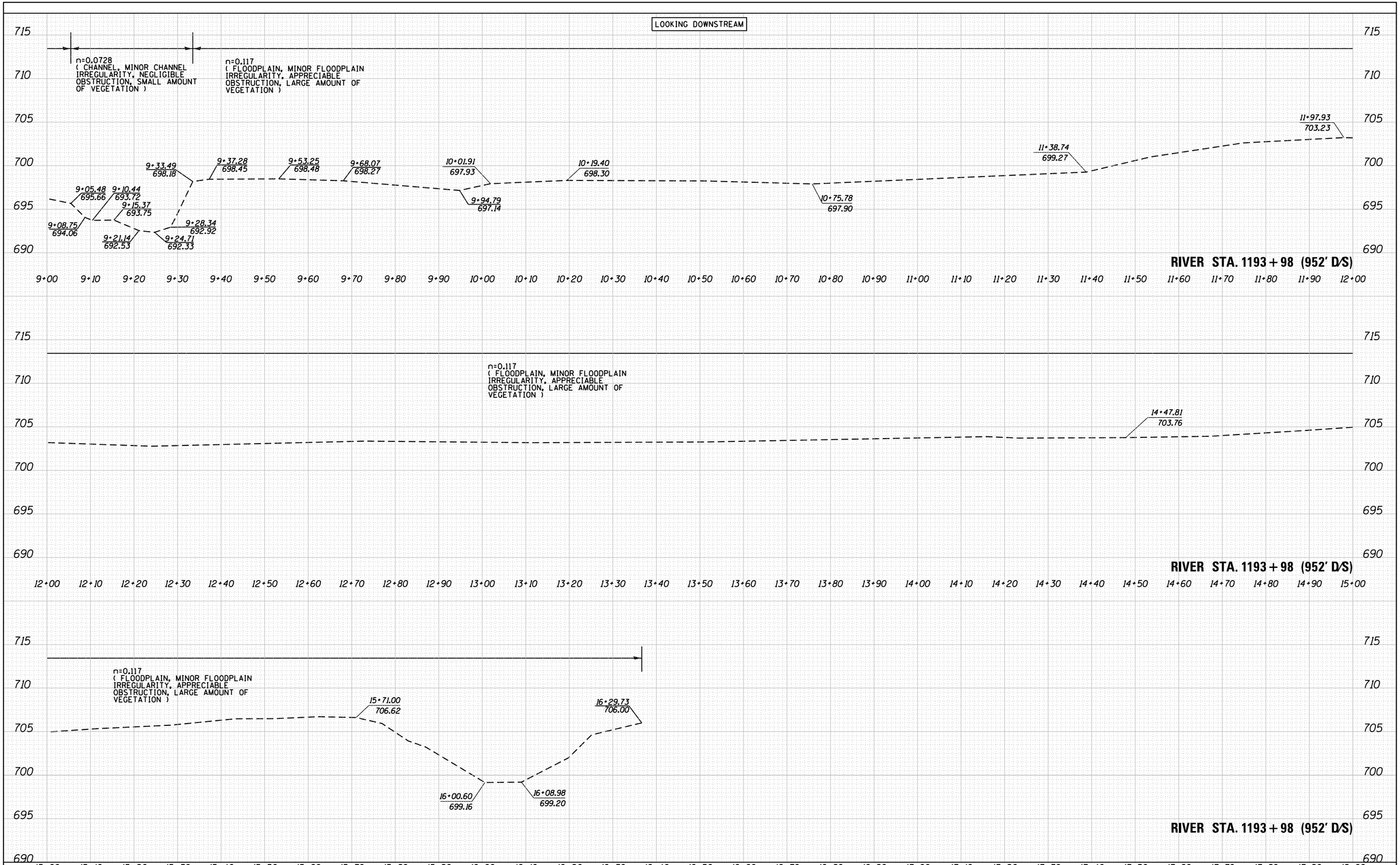
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 26 OF 31 SHEETS | STA. 1193+98 TO STA. 1193+98

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	26
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = Lin42	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -	
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -	

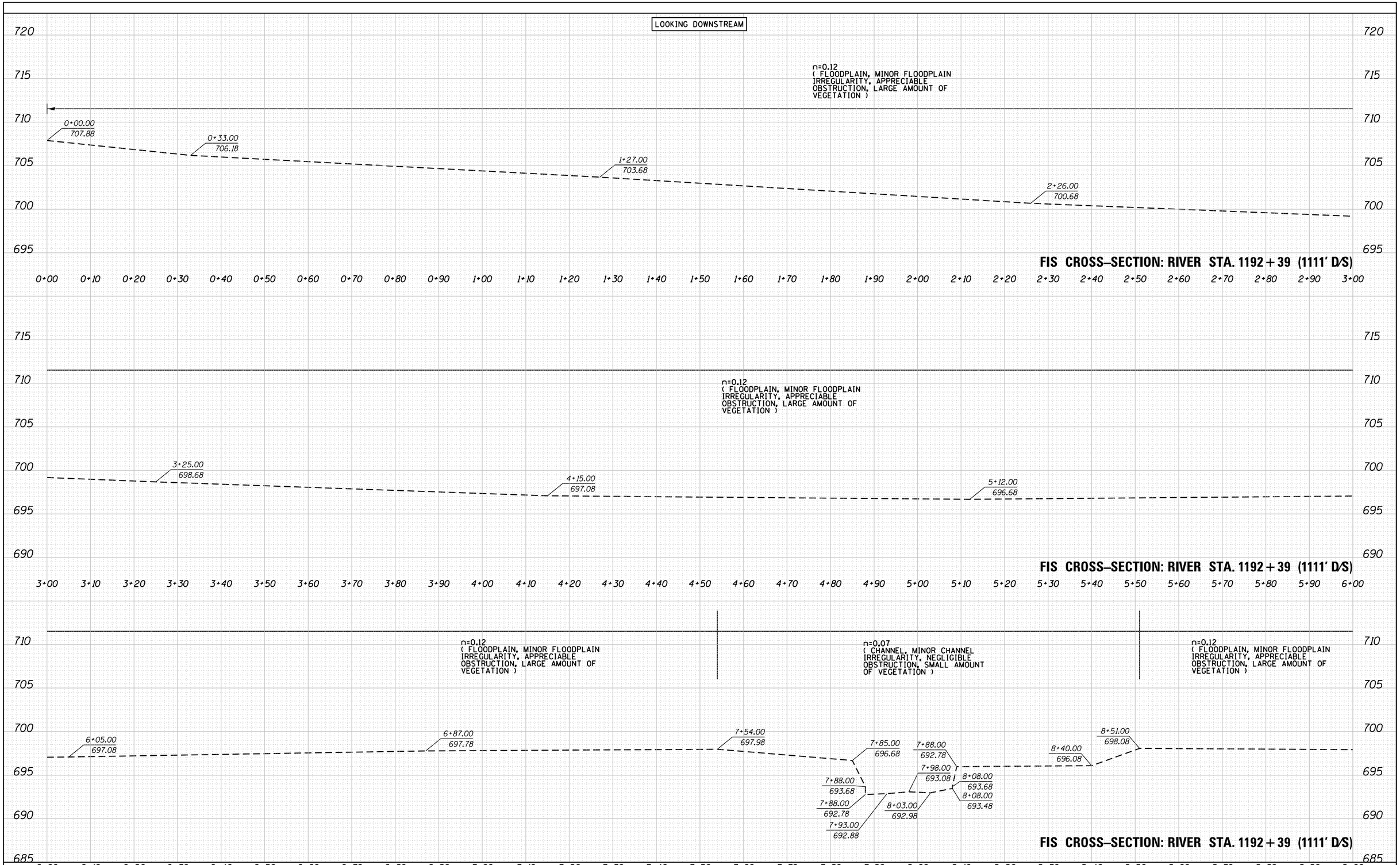
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 27 OF 31 SHEETS | STA. 1193+98 TO STA. 1193+98

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	27
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = Lin42	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -	
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -	

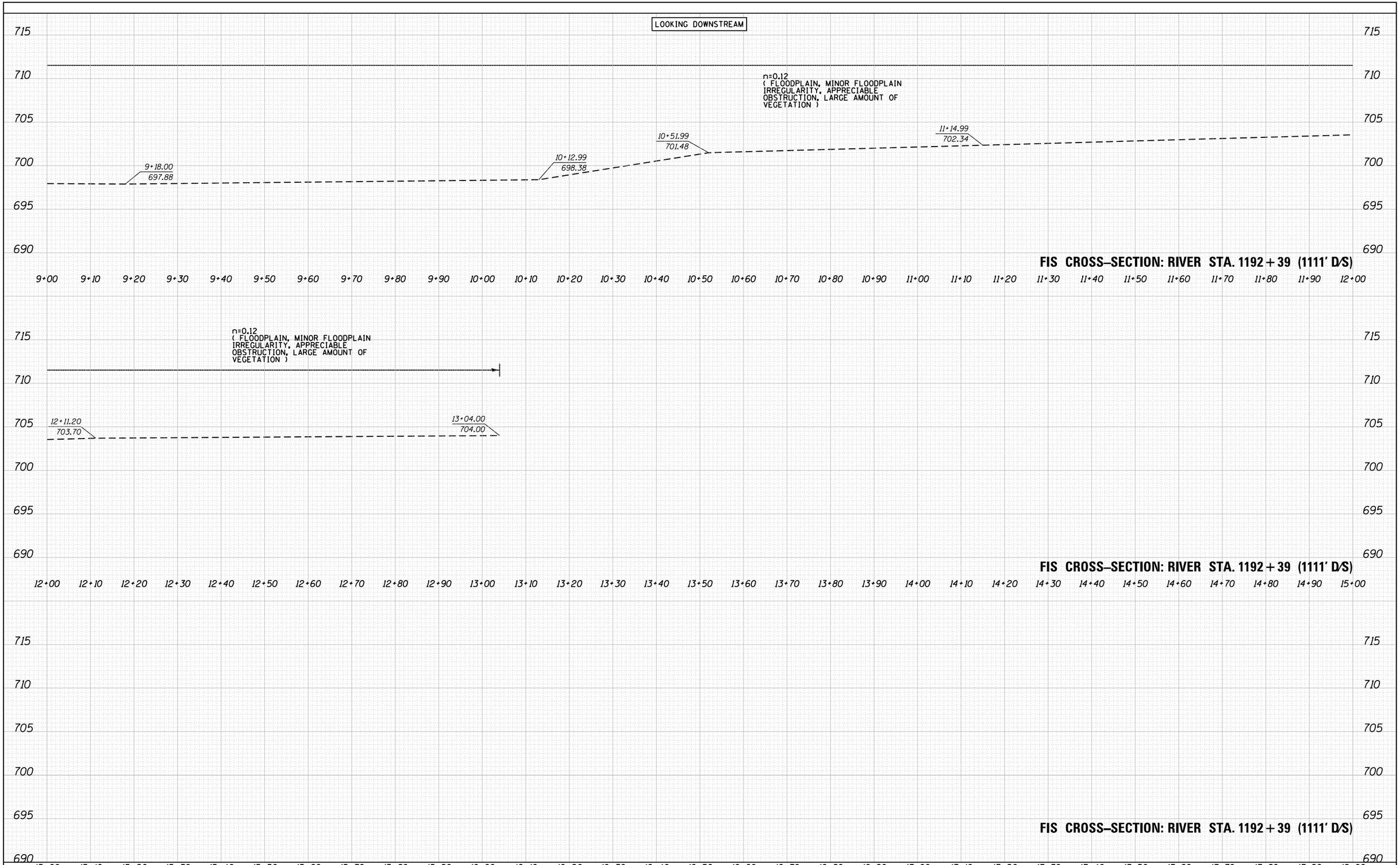
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 28 OF 31 SHEETS | STA. 1192+39 TO STA. 1192+39

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	28
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = Lin42	DESIGNED - KU	REVISED -
	DRAWN - KU	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

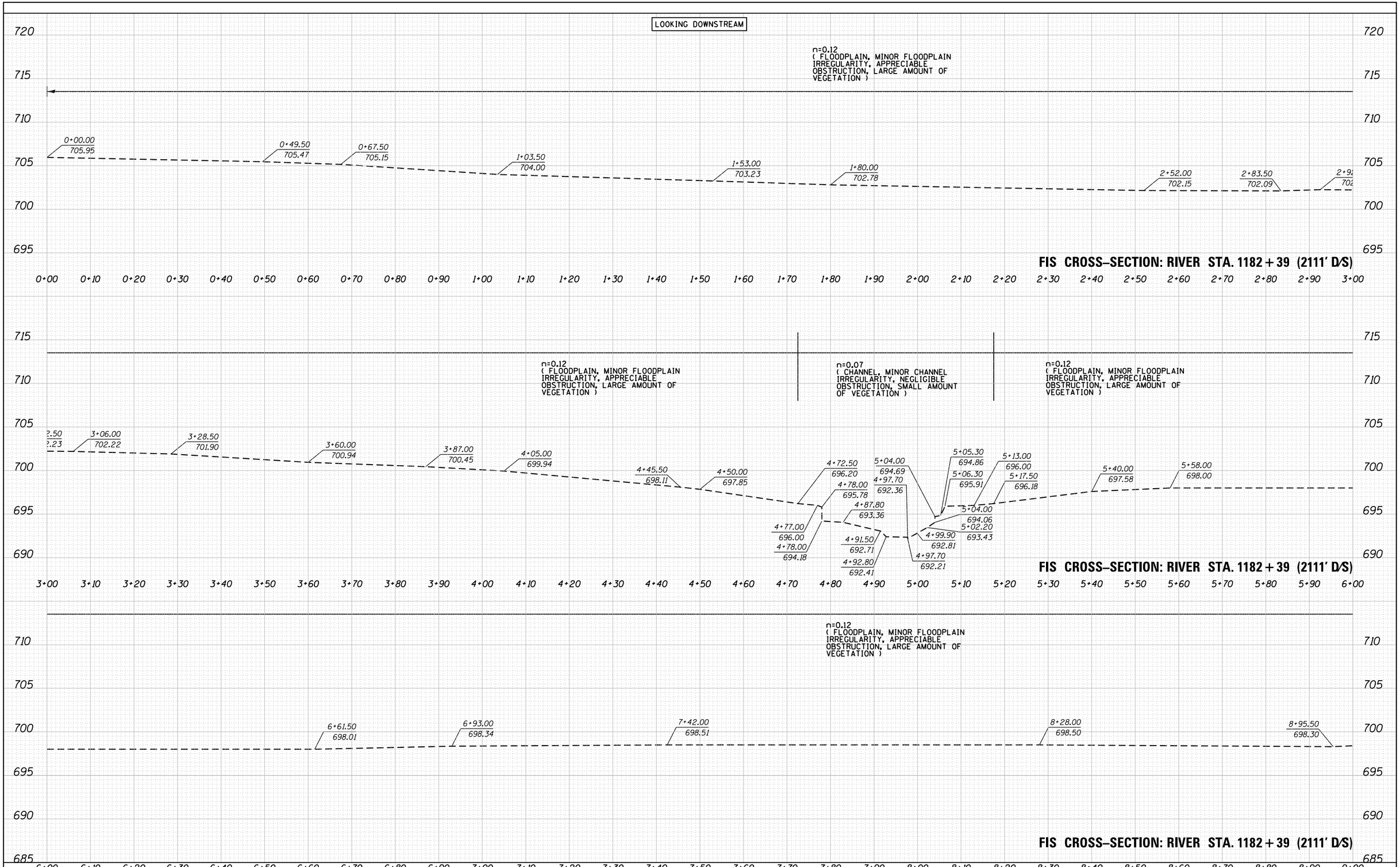
EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 29 OF 31 SHEETS | STA. 1192+39 TO STA. 1192+39

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	29

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

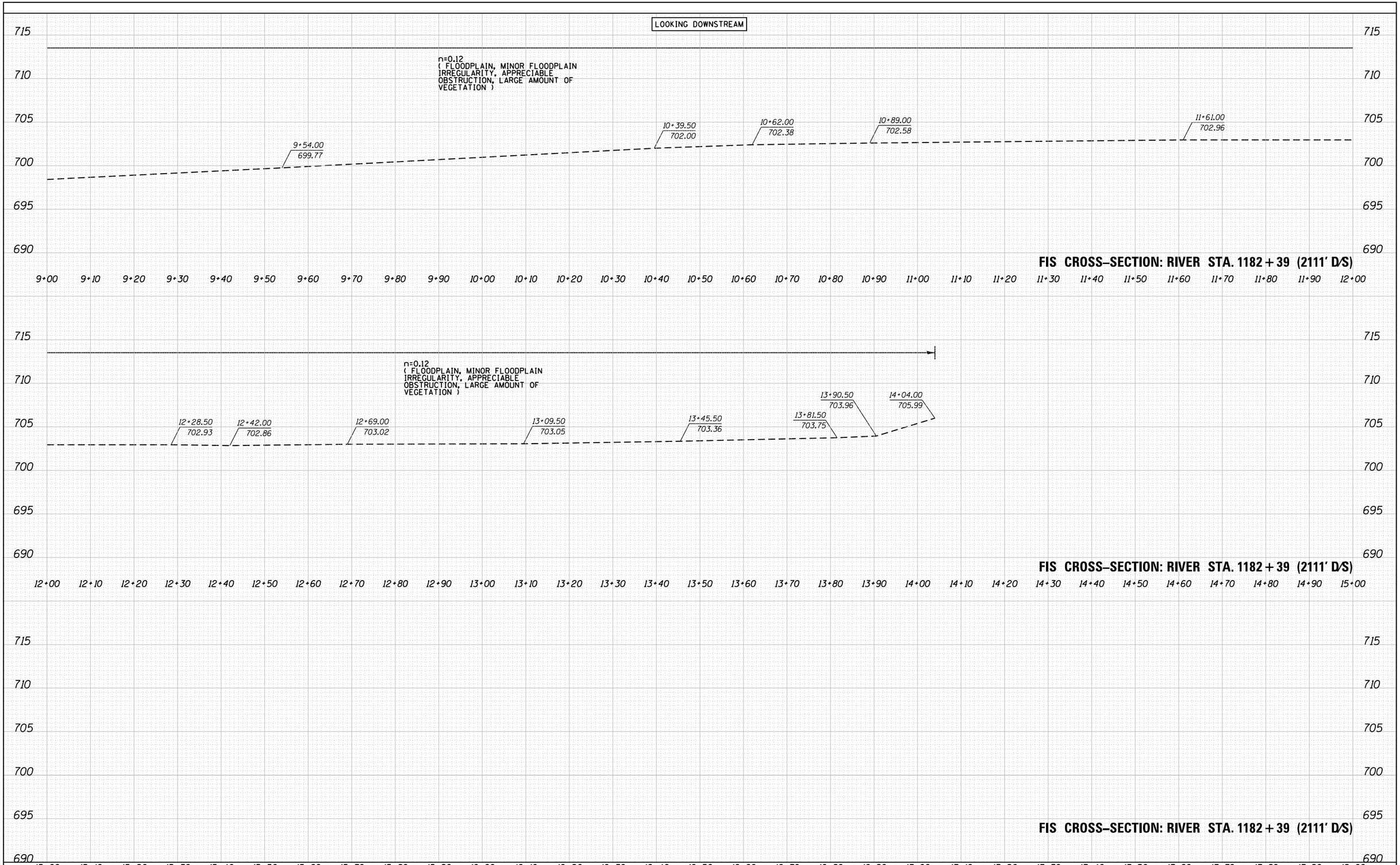
USER NAME = Lin42	DESIGNED - KU	REVISED -
	DRAWN - KU	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 30 OF 31 SHEETS | STA. 1182+39 TO STA. 1182+39

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	30
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = Lin42	DESIGNED - KU	REVISED -
	DRAWN - KU	REVISED -
PLOT SCALE = 20.0000 ' / in.	CHECKED - FML	REVISED -
PLOT DATE = 5/11/2017	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 31 OF 31 SHEETS | STA. 1182+39 TO STA. 1182+39

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	31	31

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT

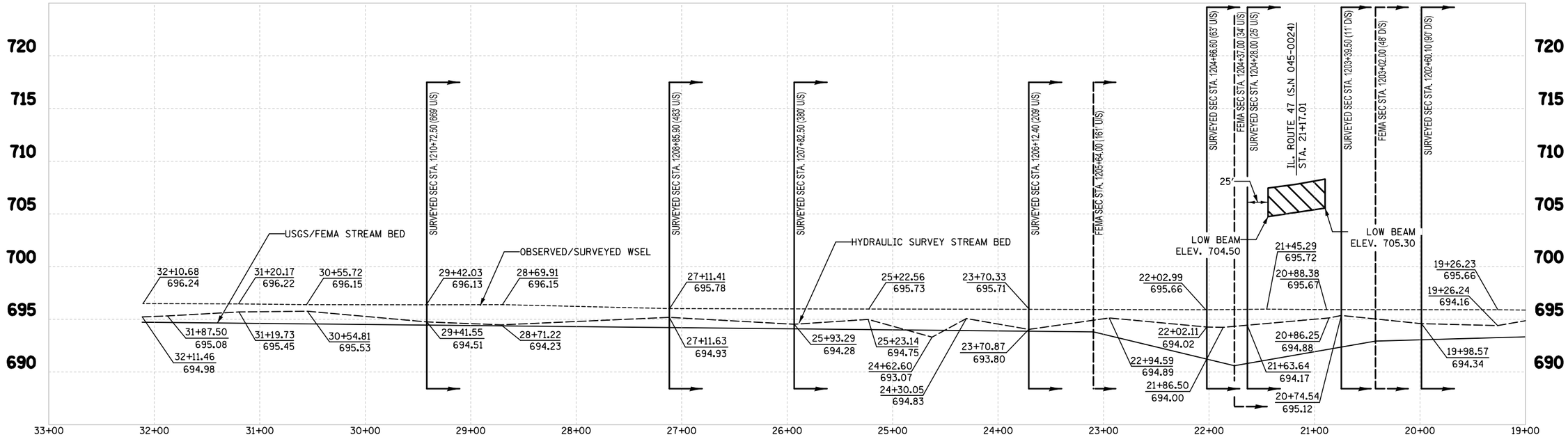
EXHIBIT E

STREAMBED PROFILE

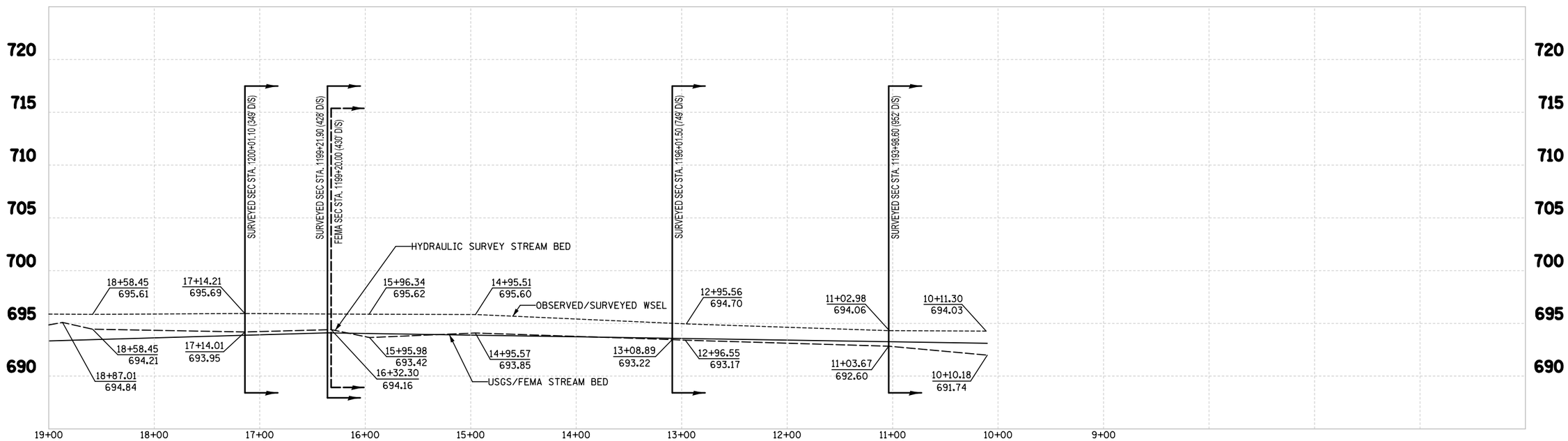
EXHIBIT E

SURVEYED CREEK ALIGNMENT
IL. RTE. 47 OVER
BLACKBERRY CREEK
S.N. 045–0024

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EXHIBIT E – SURVEYED CREEK ALIGNMENT IL. RTE. 47	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		DRAWN -	REVISED -					KANE		
	PLOT SCALE = $SCALE$	CHECKED -	REVISED -					JOB NO. P-91-015-14		
	PLOT DATE = $DATE$	DATE -	REVISED -		SCALE: 1"=150'	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		



RIVER STATION (SURVEY ALIGNMENT)



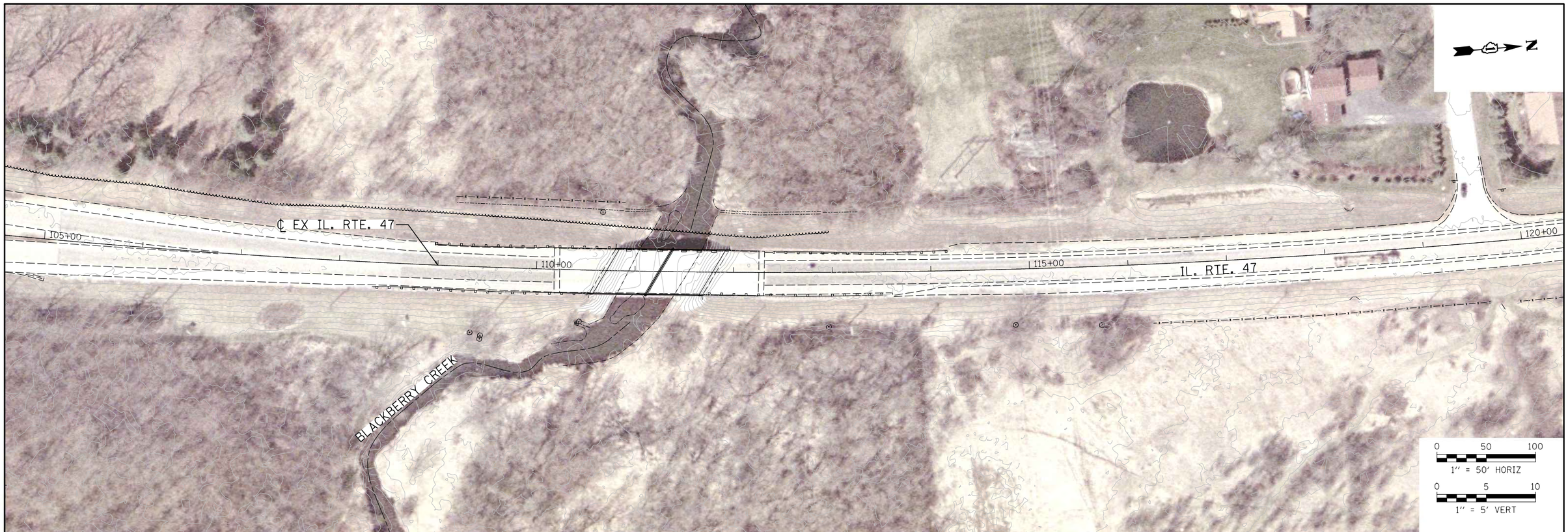
RIVER STATION (SURVEY ALIGNMENT)

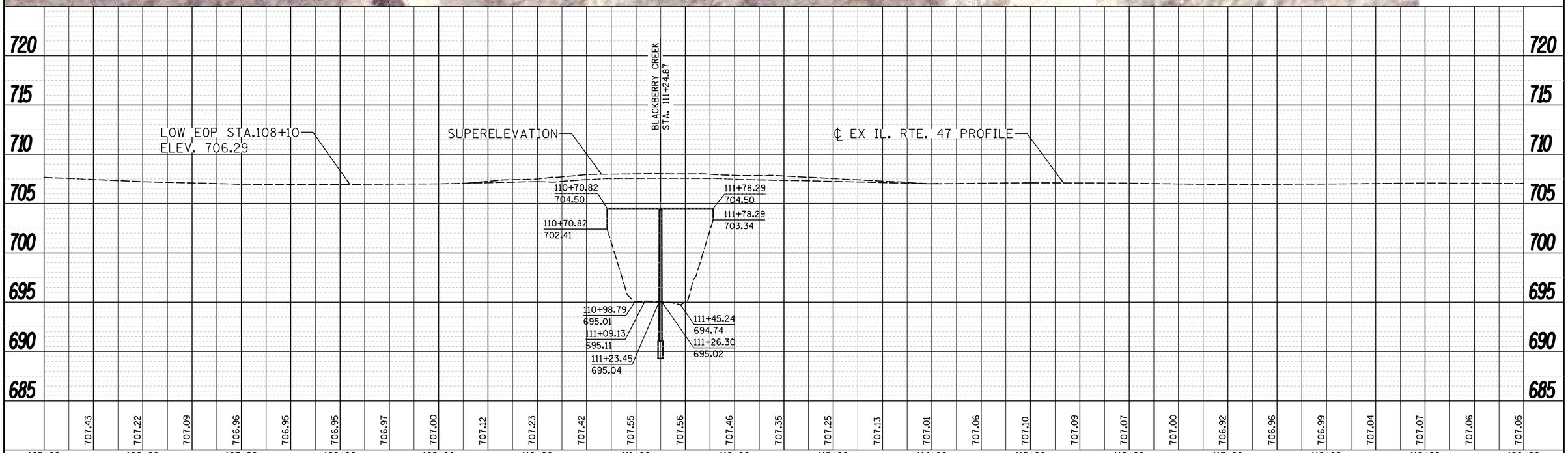
STREAM PROFILE IL ROUTE 47 OVER BLACKBERRY CREEK, S.N. 045-0024

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED - KU	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EXHIBIT E – STREAMBED PROFILE IL. RTE. 47 OVER BLACKBERRY CREEK	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS / SHEET NO.
		DRAWN - KU	REVISED -					KANE	
	PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -					JOB NO. P-91-015-14	
	PLOT DATE = $DATE$	DATE - 11/2015	REVISED -			FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT	

EXHIBIT F

ROADWAY PLAN AND PROFILE





PLAN	BY	DATE
SURVEYED		
PLOTTED		
ALIGNMENT CHECKED		
RT. OF WAY CHECKED		
CADD FILE NAME		
NOTE BOOK NO.		

PROFILE	BY	DATE
SURVEYED		
PLOTTED		
GRADES CHECKED		
BM. NOTES		
STRUCTURE NOTAT'NS CHK'D		
NOTE BOOK NO.		

FILE NAME =	USER NAME = Lin42	DESIGNED - KU	REVISED -
E:\1407\CADD_Sheets\Exhibit F - EX Roadway Profile - South.dgn		DRAWN - KU	REVISED -
	PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -
Default	PLOT DATE = 5/8/2017	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT F
ROADWAY PLAN AND PROFILE

SCALE: 1"=50' | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

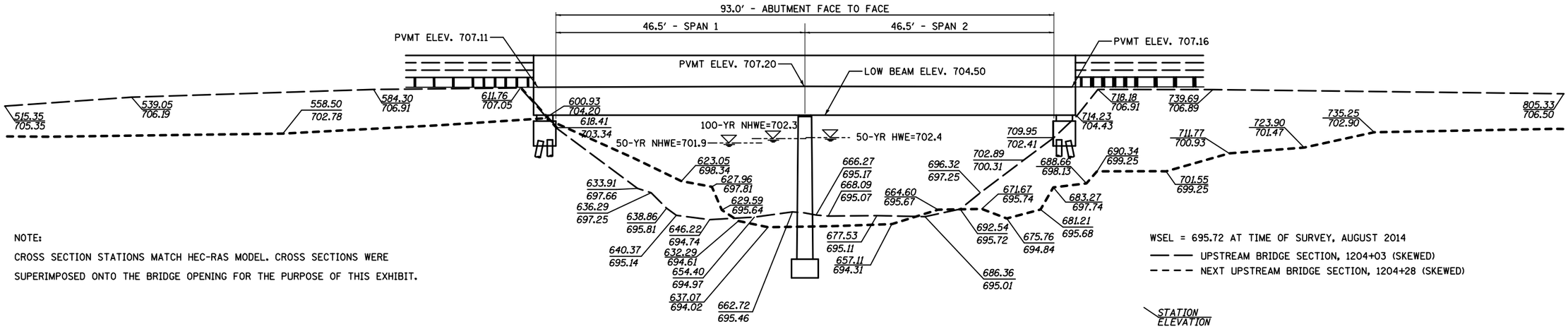
CONTRACT NO.

ILLINOIS FED. AID PROJECT

EXHIBIT G

BRIDGE OPENING PLOT

EXISTING BRIDGE STRUCTURE (SN 045-0024)
(30° SKEW)



NOTE:

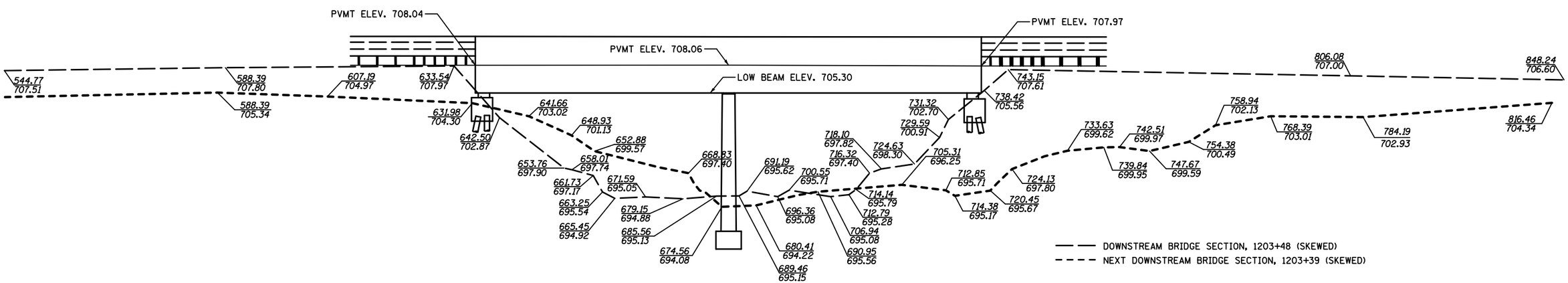
CROSS SECTION STATIONS MATCH HEC-RAS MODEL. CROSS SECTIONS WERE SUPERIMPOSED ONTO THE BRIDGE OPENING FOR THE PURPOSE OF THIS EXHIBIT.

WSEL = 695.72 AT TIME OF SURVEY, AUGUST 2014

—— —— UPSTREAM BRIDGE SECTION, 1204+03 (SKEWED)

- - - - NEXT UPSTREAM BRIDGE SECTION, 1204+28 (SKEWED)

UPSTREAM FACE (LOOKING DOWNSTREAM)



—— —— DOWNSTREAM BRIDGE SECTION, 1203+48 (SKEWED)

- - - - NEXT DOWNSTREAM BRIDGE SECTION, 1203+39 (SKEWED)

DOWNSTREAM FACE (LOOKING DOWNSTREAM)

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED - KU	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	IL. RTE. 47 OVER BLACKBERRY CREEK EXHIBIT G – BRIDGE OPENING PLOTS	F.A.P. RTE. 326	SECTION	COUNTY KANE	TOTAL SHEETS / SHEET NO.
		DRAWN - KU	REVISED -					JOB NO. P-91-015-14	
	PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -						
	PLOT DATE = $DATE$	DATE - 11/2015	REVISED -		SCALE: N.T.S	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT	

EXHIBIT H

SURVEY NOTES

6151 IDOT / IL 47 @
BLACKBERRY CREEK

LEVEL RUN

BM 180 (I-88) - 736.567

+	HI	-	ELEV	T/P
			736.567	
0.352	736.919			
		3.578	733.341	1
11.424	744.765			
		1.292	743.473	2
7.653	751.127			
		7.003	744.124	3
0.369	744.494			
		9.071	735.422	4
1.253	736.676			
		7.780	728.895	5
0.820	729.715			
		10.449	719.265	6
1.238	720.504			
		6.106	714.397	7
5.532	719.930			
		9.607	710.322	8
9.396	719.718			

JH
MS

8/6/14
+/- 75°

516/1

DESC
BM 180 (I-88)

TOP SPIKE

TOP SPIKE

TURTLE

TURTLE

FOUND MAG NAIL IDOT CP # 60

TURTLE

FOUND REBAR W/ CAP IDOT CP # 59

BM: CUT "□" IN S.E. WINGWALL @ RT 47 AND CREEK SITE 1 +/- 700' NORTH OF THORNAPPLE TREE RD.

+	HI	-	ELEV	T/P
	719.718			
		9.494	710.224	9
10.222	720.446			
		2.839	717.607	10
7.017	724.625			
		4.657	719.967	11
4.457	724.425			
		6.480	717.944	12
1.755	719.700			
		8.443	711.256	13
2.150	713.406			
		6.640	706.766	14
4.816	711.583			
		6.178	705.405	15
6.679	712.084			
		4.529	707.555	16
4.504	712.059			
		4.736	707.323	17
4.469	711.793			
		3.774	708.018	18
4.911	712.930			
		4.879	708.050	19
4.817	712.868			

DESC

- BM: CUT □ IN SW WINGWALL @ CREEK + RT 47 SITE 1, +/- 700' NORTH OF THORNAPPLE TREE RD.
- FOUND REBAR W/CAP IDOT CP# 58

FOUND REBAR W/CAP IDOT CP# 57

FOUND MAG NAIL IDOT CP# 56

FOUND REBAR W/CAP IDOT CP# 55

TURTLE

FOUND REBAR W/CAP IDOT CP# 54

FOUND MAG NAIL IDOT CP# 53

- CUT □ IN NW WINGWALL @ CREEK + RT 47 1/4 MILE NORTH OF COLLEGE DR.
- FOUND CUT □ IN SE WINGWALL @ CREEK + RT 47 (SAME BRIDGE)
- FOUND MAG NAIL IDOT CP# 52

+	HI	-	ELEV	T/P	DESC
	712.868				
		6.584	706.284	20	TURTLE
5.193	711.477				
		4.723	706.754	21	TURTLE
9.573	716.327				
		2.422	713.904	22	TURTLE
8.602	722.506				
		2.476	720.030	23	TURTLE
4.522	724.552				
		6.466	718.086	24	TURTLE
3.038	721.124				
		6.304	714.820	25	TURTLE
6.310	721.131				
		0.751	720.379	26	TURTLE
11.448	731.827				
		2.042	729.785	27	TURTLE
11.242	741.027				
		1.178	739.848	28	TURTLE
9.176	749.025				
		1.146	747.878	29	BOLT ON LIGHT POLE FOUNDATION
3.035	750.913				
		10.721	740.192	30	TOP SPIKE
1.756	741.948				

+	HI	-	ELEV	T/P
	741.948			
		10.435	731.513	31
6.997	738.511			
		1.949	736.561	✓

DESC

TOP SPIKE

BM 180 (I.88) 736.567

6151 IDOT / RT 47 @ BLACKBERRY CREEK

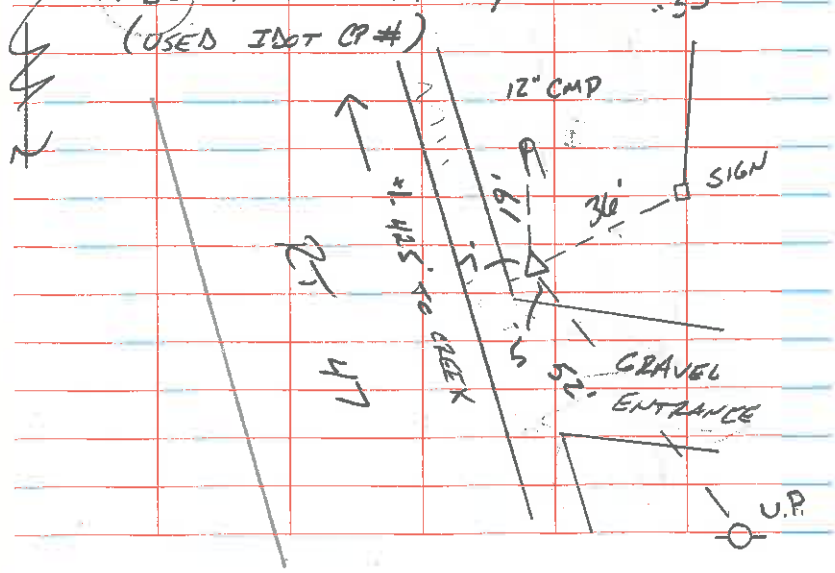
VRS CONTROL

*1 - KAN 47 2B (AJ2789)
HI: 5.46 5 MIN. OBS.

*2 - KAN 47 2A (AJ2787)
HI: 5.33 5 MIN. OBS.

*3 - IL KANE 20 39 7 (AJ3010)
HI: 4.94 5 MIN. OBS.

#58 FOUND REBAR W/CAP
(USED IDOT CP #)

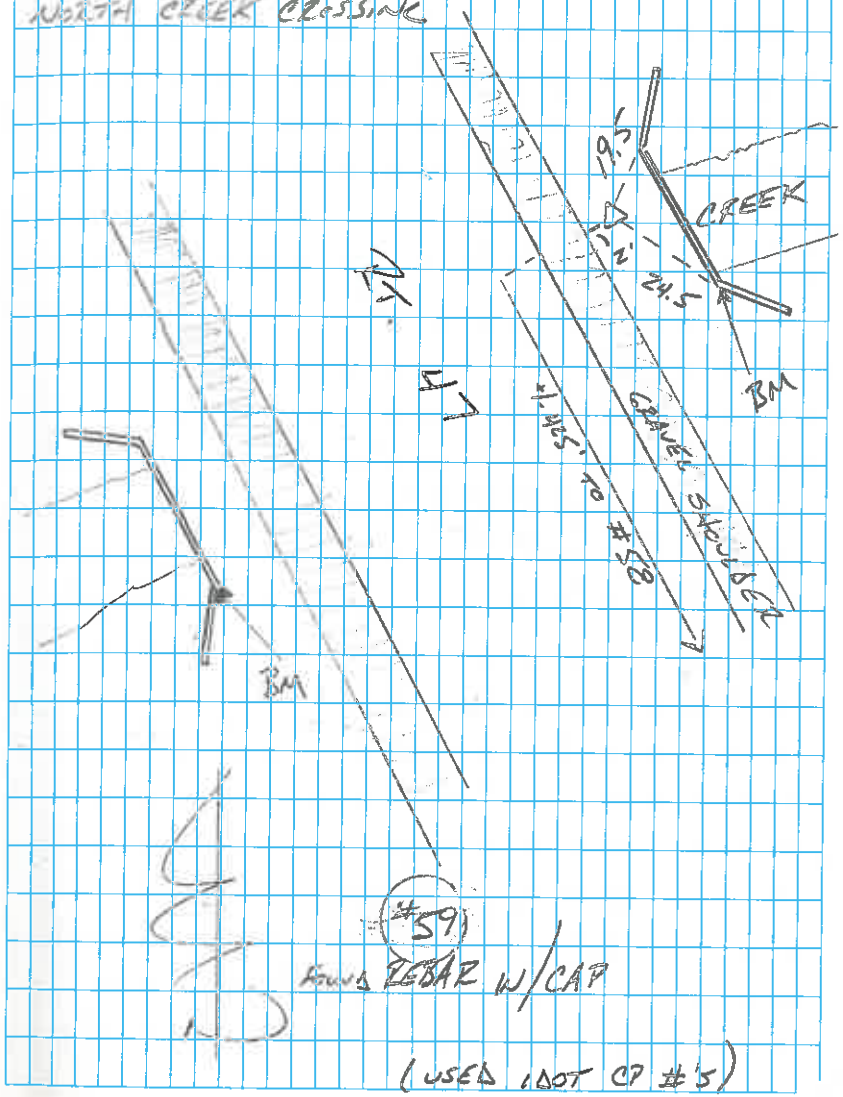


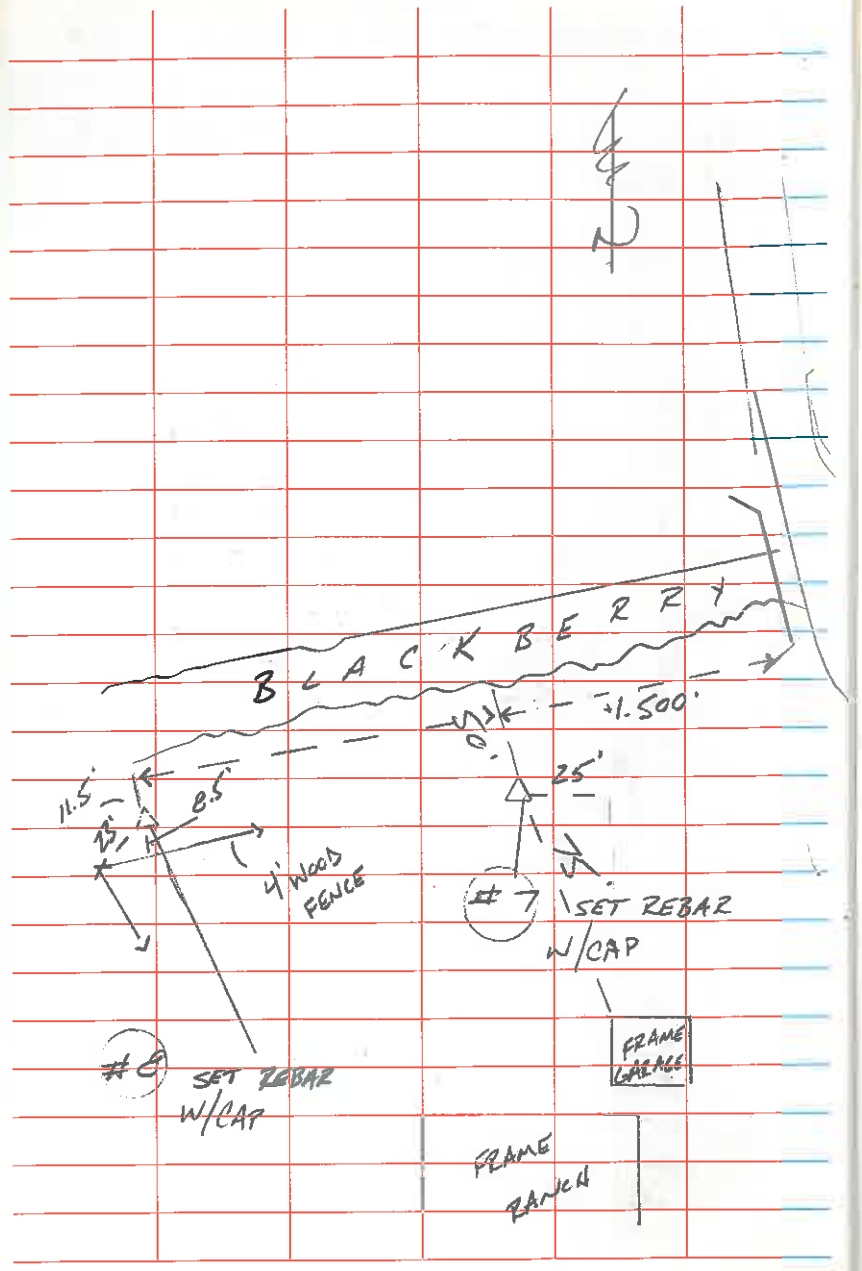
JH
MS

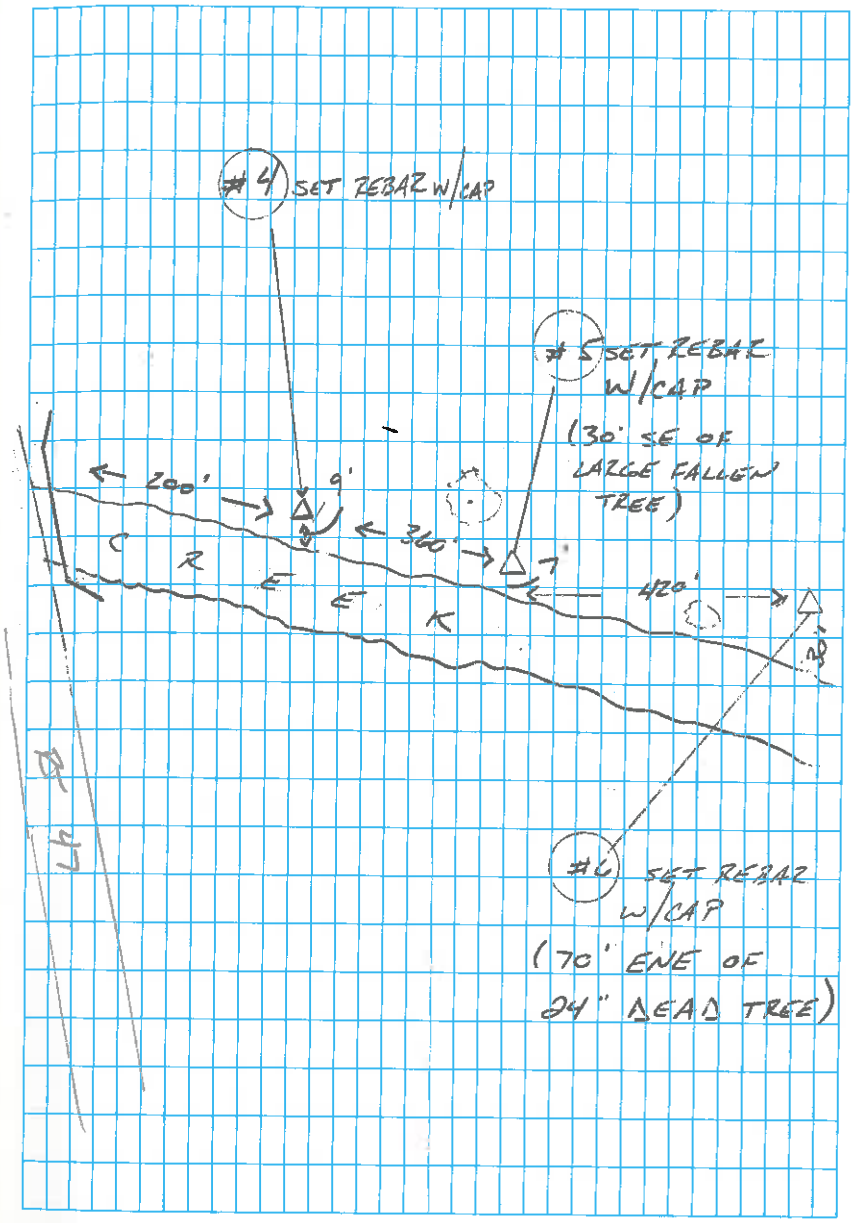
8/7/14
+/- 75°

516/5

SITE A
NORTH CREEK CROSSING



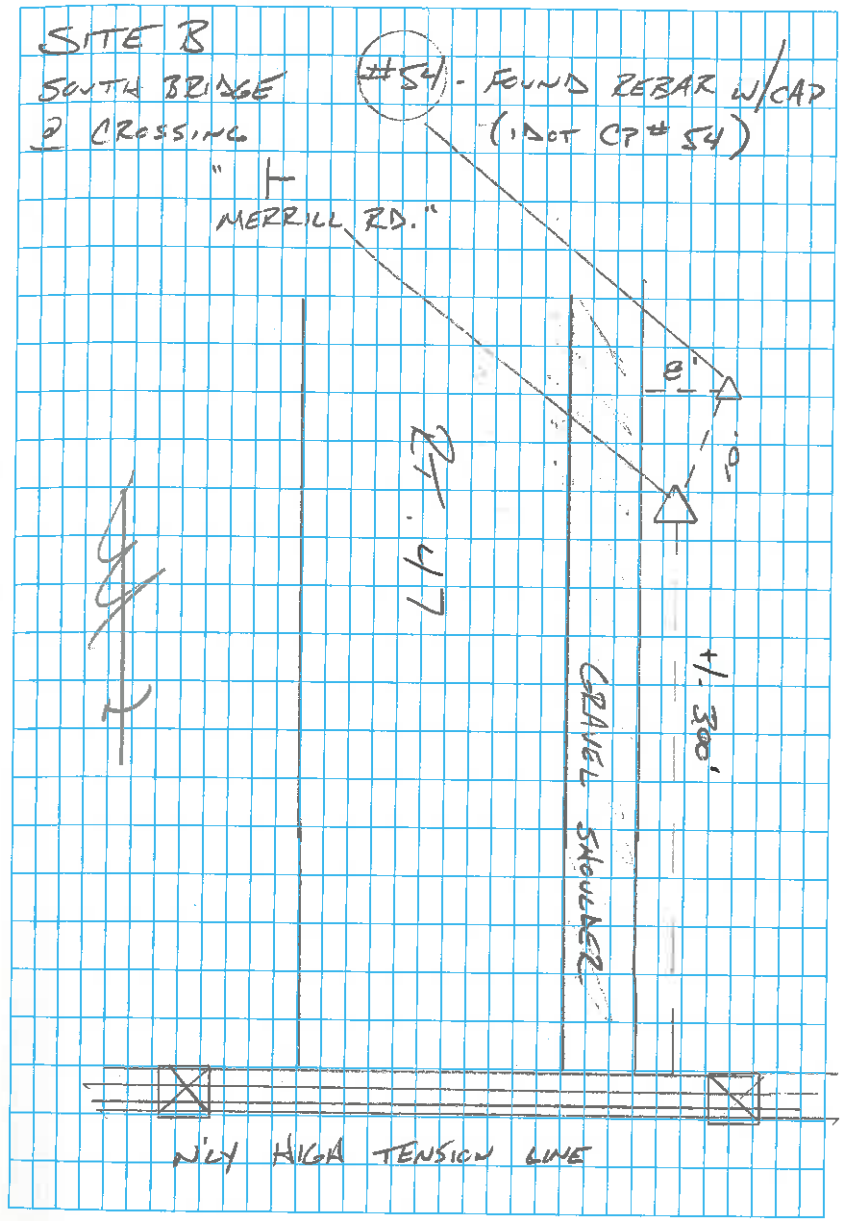

BLACKBERRY
1.500'
11.5'
8.5'
4' WOOD FENCE
25'
#7 SET REBAR W/CAP
#8 SET REBAR W/CAP
FRAME GARAGE
FRAME RANCH

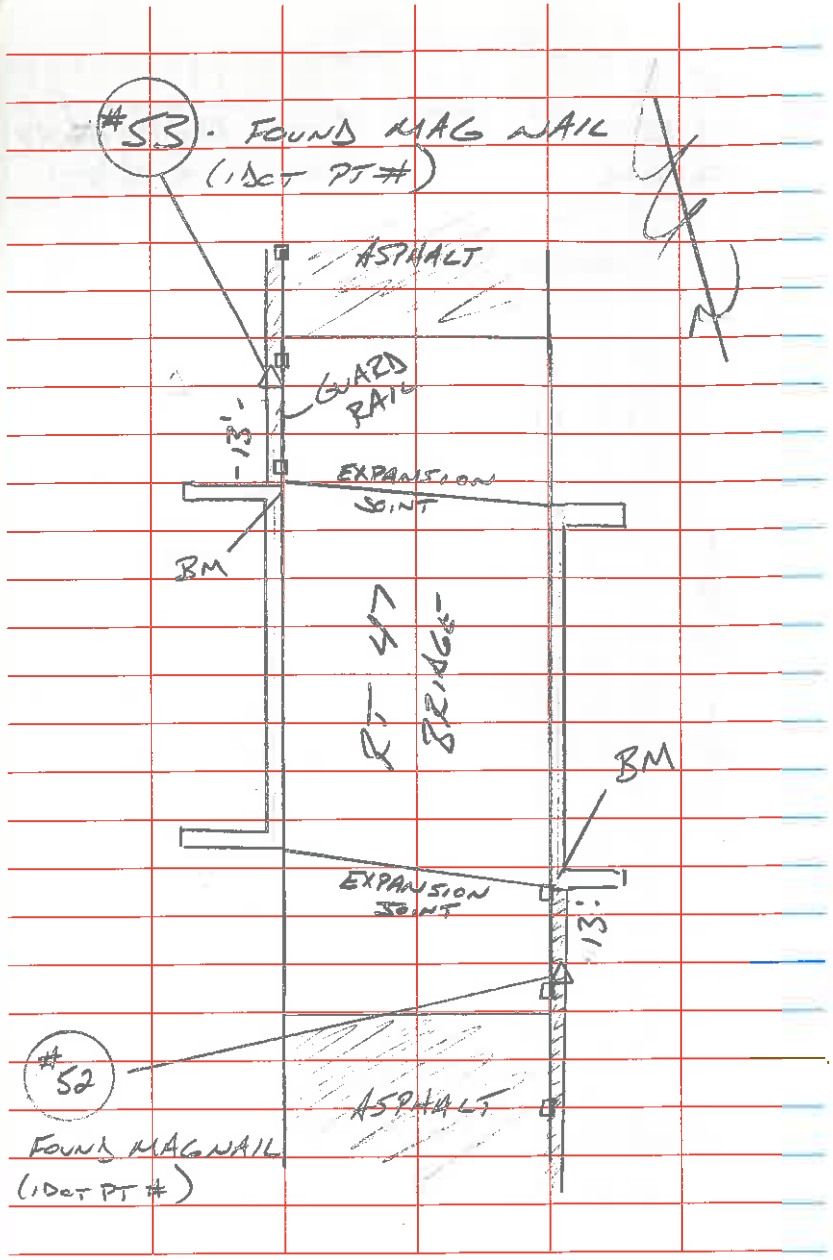

#4 SET REBAR W/CAP
#5 SET REBAR W/CAP
(30' SE OF LARGE FALLEN TREE)
200'
360'
420'
CREEK
#6 SET REBAR W/CAP
(70' ENE OF 24" DEAD TREE)

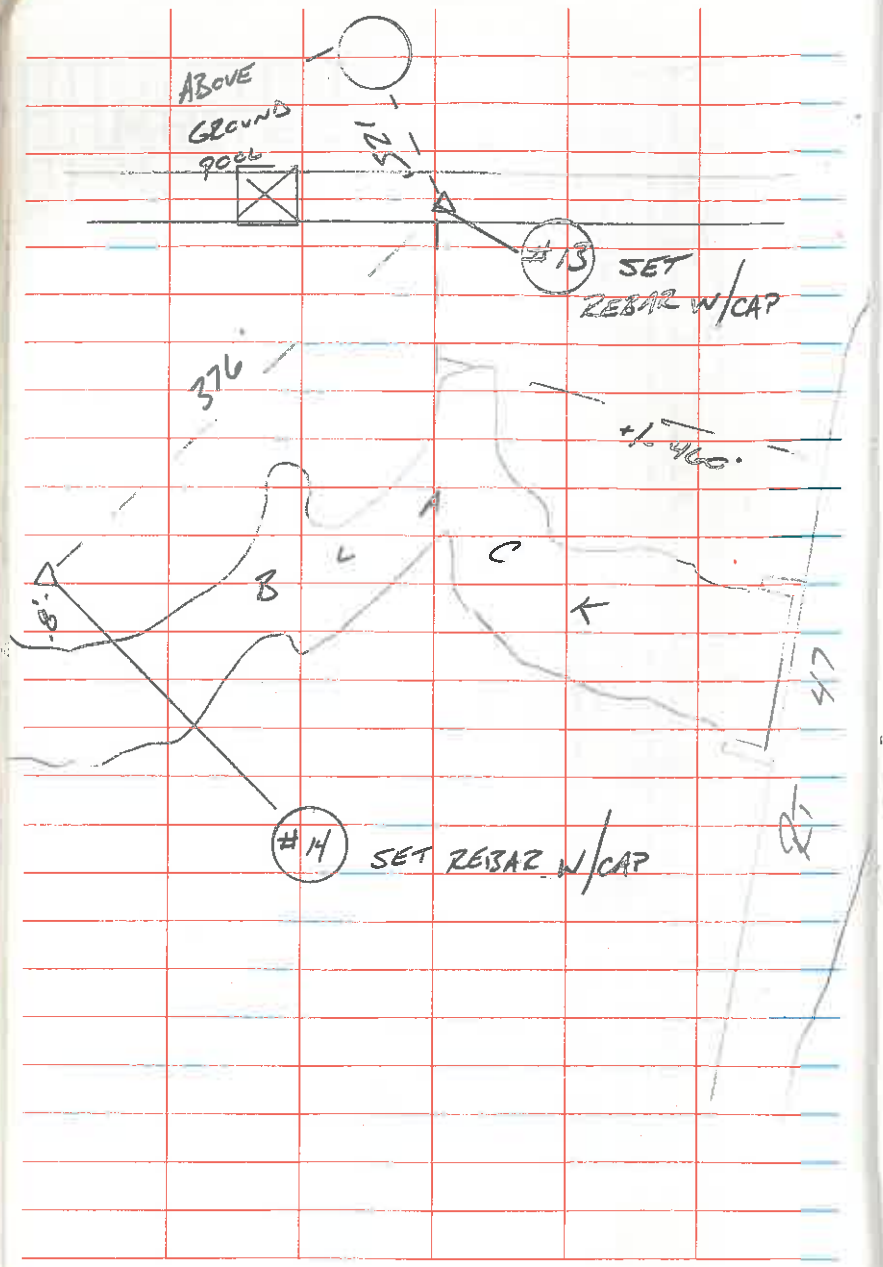
5 MIN OBS

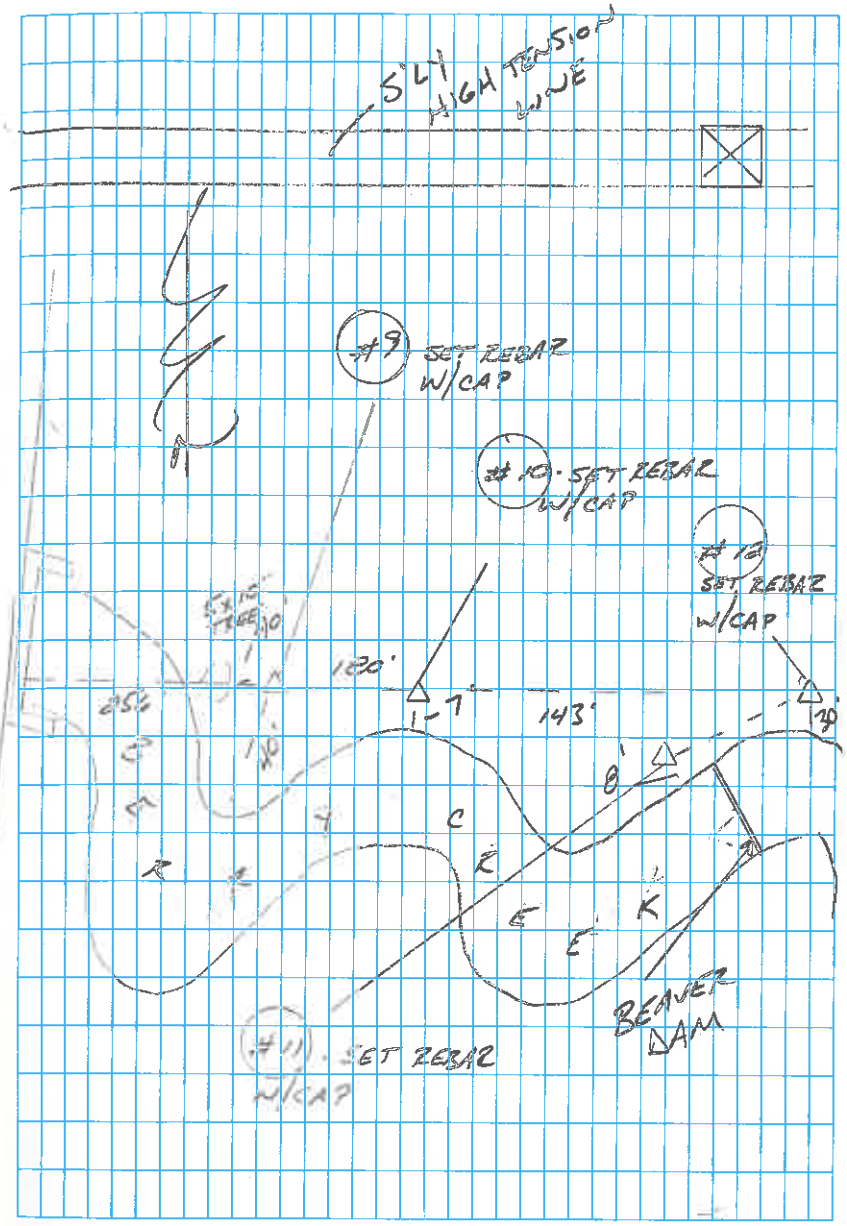
58 - HI : 5.18
59 - HI : 4.87
4 - HI : 4.365
5 - HI : 3.90
6 - HI : 4.59
7 - HI : 4.92
8 - HI : 4.99
54 - HI : 4.88
53 - HI : 5.18
52 - HI : 4.56
9 - HI : 4.03
10 - HI : 4.46
11 - HI : 4.55
12 - HI : 4.52
13 - HI : 4.55
14 - HI : 4.10

SITE B
SOUTH BRIDGE
@ CROSSING




#53 · FOUND MAG NAIL
(1DOT PT #)
ASPHALT
GUARD RAIL
13'
EXPANSION JOINT
BM
BRIDGE
BM
EXPANSION JOINT
13'
#52
ASPHALT
FOUND MAGNAIL
(1DOT PT #)


ABOVE GROUND POOL
#13 SET REBAR W/CAP
376
+/- 460'
#14 SET REBAR W/CAP


5'+/- HIGH TENSION WIRE
#9 SET REBAR W/CAP
#10 SET REBAR W/CAP
#12 SET REBAR W/CAP
120'
143'
BEAVER DAM
#11 SET REBAR W/CAP

JOB NO. 6151 I.D.O.T.
FINAL G.P.S. CONTROL

NAD83(2011) GPS Control Points

1	1866670.187	949543.821	(721.65)	118/NGS
2	1865215.307	951478.018	(694.82)	118/NGS
3	1884844.206	947360.660	(727.32)	118/NGS
4	1874625.138	949068.378	(706.56)	112/CWA REBAR
5	1874670.502	949425.083	(706.57)	112/CWA REBAR
6	1874754.672	949835.923	(706.43)	112/CWA REBAR
7	1874250.686	948427.530	(705.06)	112/CWA REBAR
8	1874115.391	948081.117	(703.32)	112/CWA REBAR
9	1871158.372	949787.601	(698.35)	112/CWA REBAR
10	1871058.327	949936.619	(698.83)	112/CWA REBAR
11	1870951.208	950032.256	(698.27)	112/CWA REBAR
12	1871035.367	950218.016	(696.82)	112/CWA REBAR
13	1871694.741	949139.978	(699.48)	112/CWA REBAR
14	1871406.155	948898.043	(699.91)	112/CWA REBAR
52	1871318.809	949587.449	**708.050**	112/IDOT MAG NL
53	1871494.445	949555.324	**707.555**	112/IDOT MAG NL
54	1872067.186	949644.328	**705.405**	112/IDOT REBAR
58	1874230.922	949097.261	**717.607**	112/IDOT REBAR
59	1874584.084	948852.534	**714.397**	112/IDOT REBAR

XXX.XX = LEVELED ELEVATION (HOLD)
(XXX.XX) = GPS DERIVED ELEVATION

NOTE: ALL ELEVATIONS IN BLUE NEED HARD LEVELED BEFORE USE IN SURVEY.

K. GREGORY 8-8-14 516/10

ALL HORIZONTAL COORDINATES ARE ILLINOIS STATE PLANE, EAST ZONE, NAD83(2011) GRID VALUES BASED ON RTK GPS OCCUPATIONS HOLDING NGS PUBLISHED VALUES ON AJ2789, AJ2737 & AJ3010.

ALL VERTICAL DATUM IS NAVD88 BASED ON DIFFERENTIAL LEVELING METHODS HOLDING NGS 2nd ORDER BENCHMARKS Q50 AND KAN 31 IB.

JOB # 6151 ODOT / BLACKBERRY CREEK

LEVEL CONTROL - SITE B EAST

+	HI	-	ELEV	T/P
			708.02	(708.018)
3.04	711.06			
		3.00	708.06 ⊙	(708.05)
3.17	711.23			
		7.97	703.26	2
1.12	704.38			
		5.09	699.29	3
4.365	703.655			
		3.67	699.985	4
5.00	704.985			
		7.00	697.985	5
4.635	702.62			
		4.215	698.405	6
5.86	704.265			
		5.205	[illegible]	7
4.265	703.325			
		5.025	[illegible]	8
4.65	702.95			
		6.14	[illegible]	9
5.96	702.77			
		4.465	698.305	10

JH
SN
MS

8/11/14
+/- 70° WET

516/11

DESC

BM @ SE WINGWALL ZJ47 BRIDGE SITE B

CP# 52

T/PIN

T/PIN

T/PIN

T/PIN

CP# 9

CP# 10

CP# 11

CP# 12

T/REBAR #11

+	HI	-	ELEV	T/P	DESC
			698.305		
4.87	703.175				
		4.105	699.07	11	T/REBAR #10
4.43	703.50				
		4.81	698.69	12	T/PIN
4.73	703.42				
		3.165	700.255	13	T/PIN
4.31	704.565				
		4.81	699.755	14	T/PIN
4.185	703.94				
		4.34	699.60	15	T/PIN
7.20	706.80				
		1.67	705.15	16	T/PIN
7.06	712.19				
		4.165	708.025	(708.02) ✓	
SITE	B	WEST			
			707.325	(707.323)	BM @ NWX RT. 47 BRIDGE
4.16	711.485				
		3.92	707.565	@ (707.555)	CP 53
3.61	711.175				
		8.025	703.15	2	T/PIN
1.79	704.94				
		5.24	699.70	3	

CT # 13

5/6/13

+	HI	-	ELEV		T/P	DESC
4.605	704.305					
		4.52	699.785		4	T/PIN
3.43	703.215					
		3.39	699.895		5	CP#14
3.305	703.13					
		3.345	699.785		6	T/PIN
4.705	704.49					
		4.79	699.70		7	T/REBAR #3
5.88	705.58					
		2.015	703.565		8	T/PIN
7.655	711.22					
		3.90	707.32	✓	(707.325)	BM
SITE A WEST						
			710.225		(710.224)	BM @ SW WINGWALL SITE A
7.445	717.67					
		7.345	710.325	✓	(710.322)	BM @ SE WINGWALL SITE A
6.68	717.005					
		8.31	708.695		2	T/PIN
2.315	711.01					
		6.01	[illegible]		3	CP#1
4.83	709.83					
		6.45	703.38		4	CP#2

+	HI	-	ELEV	T/P	DESC
			703.38		
6.325	709.705				
		4.705	705.00	5	REBAR #7
6.165	711.165				
		2.38	708.785	6	T/PIN
8.395	717.18				
		6.84	710.34	G. (710.322)	SE BM
8.55	718.89				
		8.645	710.245	(710.225)	SW BM
SITE	A	EAST			
			710.325 (710.322)		BM @ SE WINGWALL
6.47	716.795				
		2.395	714.400 (714.397) ✓		CP # 59
1.23	715.63				
		6.05	709.58	2	T/POST
1.035	710.615				
		4.13	706.485	3	CP # 4
4.795	711.28				
		4.63	706.65	4	T/PIN
4.675	711.325				
		4.76	706.565	5	CP # 5

+	HI	-	ELEV	T/P
			706.565	
5.075	711.64			
		5.00	706.64	6
5.195	711.835			
		5.275	706.56	7
5.125	711.685			
		5.055	706.63	8
4.80	711.43			
		5.30	706.13	9
4.005	710.135			
		0.72	709.415	10
7.325	716.74			
		6.43	710.31 ✓	(710.325)

5/16/15

DESC

CP #6

REBAR #5

T/PIN

T/PIN

T/POST

SE BM

JOB # 6151 IDOT
RT 47 @ BLACKBERRY CREEK

TOPO SITE A (NORTH CROSSING)
W/ TRIMBLE S-6

TO 59 HI = 5.26 BS @ 58 (4.98)
PT #'S 100-379

197 - 4' WIRE WOVEN FENCE
378 - SET NAIL

* ALL 359 SHOTS ARE SUSPECTED CONCRETE DITCH FLOWLINE ℄ +/-. CONCRETE DITCH IS PARTIALLY VISIBLE AT SOME SITE LOCATIONS BUT IS UNDERWATER AND BURIED IN MUD AT MOST.

TO 378 HI = 5.31 BS @ 59
PT #'S 380 - 423

403 - 18" RCP

418 - 15" CMP
-2.67

18" RCP
2.67

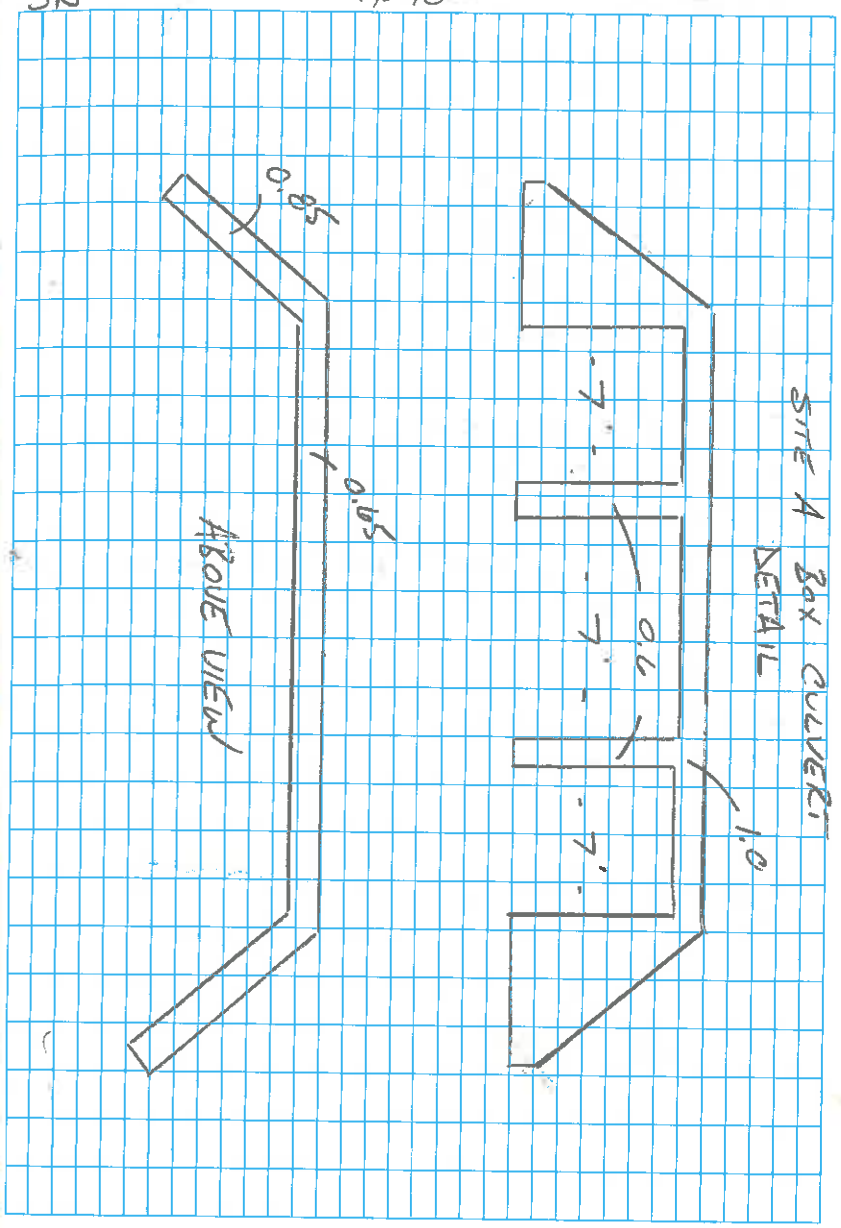
15" RCP
2.67

TOP DEBRIS -2.85
BEEHIVE

SH
SN

8/12/14
+/- 70°

516/16



JOB # 6151 IDOT / BLACKDOG CREEK

TOPO NORTH CROSSING (SITE A)

TP 59 HI = 5.375 BS @ SP = (5.13)
PT #'S 424 - 455

453 - SET NAIL

TP 453 HI = 5.05 BS @ 59 (5.00)
PT #'S 456 - 471

TP 7 HI = 5.34 BS @ 59 (5.10)
PT #'S 472 - 491

475 - SET NAIL
490 - SET NAIL

TP 475 HI = 5.07 BS @ 7 (5.00)
PT #'S 492 - 500

493 - WOOD FRAME AND METAL FOOTBRIDGE

JH
SN

8/13/14
+/- 75°

516/17

TP 490 HI = 5.12 BS @ 7 (6.00)
PT #'S 501 - 550

523 - WOODEN FRAME FOOTBRIDGE

TP 8 HI = 5.29 BS @ 7 (5.00)
PT #'S 551 - 560

557 - SET NAIL

TP 557 HI = 5.20 BS @ 8 (5.00)
PT #'S 561 - 594

581 - WOODEN FRAME FOOTBRIDGE
593 - TOP OF WATER @ POND
* TOPO'ING POND IS A DAY LONG PROJECT AT LEAST. CONSULT IDOT FOR INSTRUCTIONS.

TP 6 HI = 4.89 BS @ 5 (8.00)
PT #'S 595 - 612

TP 5 HI = 5.005 BS @ 6 (7.50)
PT # 613 - 642

JOB # 6151 IDOT
BLACKBERRY CREEK @ RT 47

TO70 SOUTH CROSSING (SITE B)

T@ 52 AI= 5.015 BS@ 54 (4.90)
PT #'S 643-831

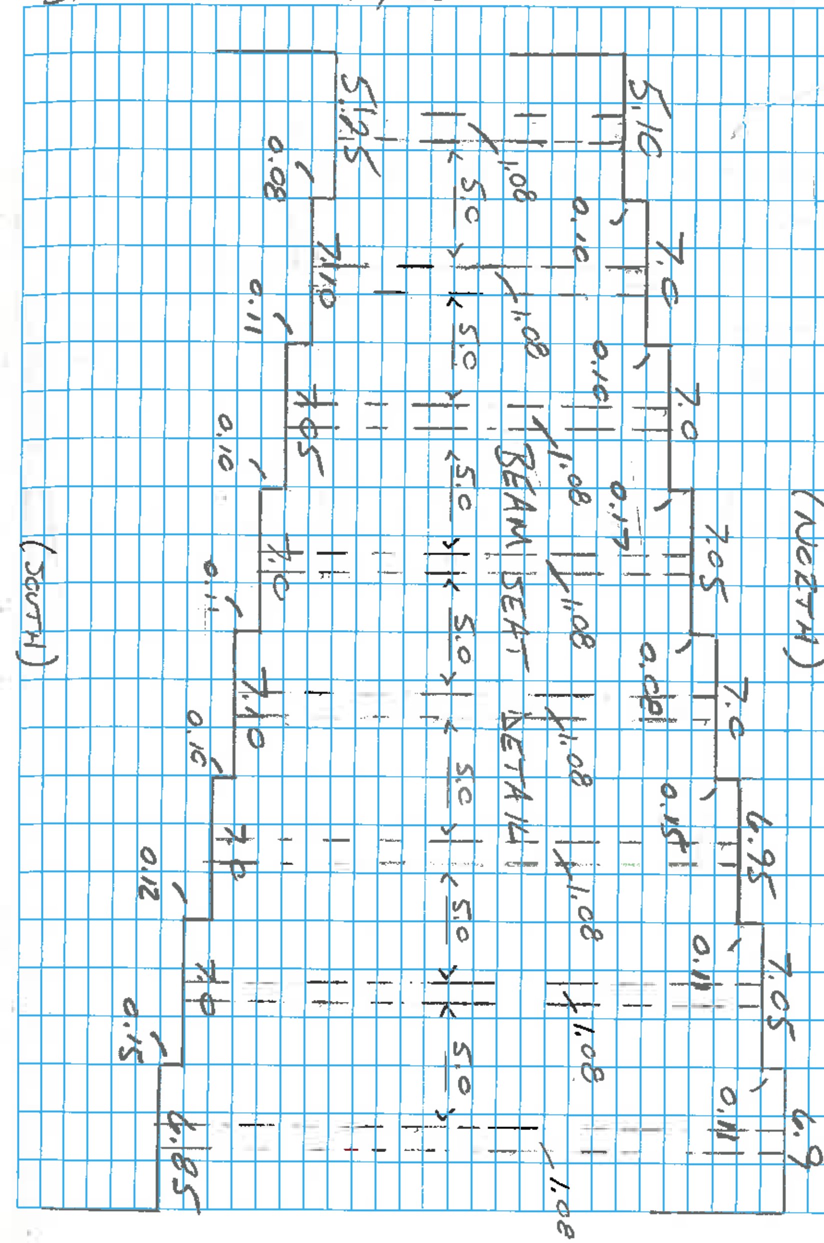
639-744 6' DIAMETER BRIDGE DRAIN

T@ 53 AI= 5.30 BS@ 54 (4.90)
PT #'S 832-870

SH
SN

8/14/14
+/-75°

516/18



6151 IDOT / BLACKBERRY CREEK @ RT 47

TI @ 52 HI = 4.89 BS @ 54 = (5.12)
PT #'S 871 - 1033

875. SET NAIL
916. 30" RCP
937. SET NAIL

TI @ 937 HI = 5.07 BS @ 54 (5.12)
PT #'S 1034 - 1044

TI @ 875 HI = 5.35 BS @ 52 (5.00)
PT #'S 1045 - 1051

TI @ 53 HI = 5.115 BS @ 54 (5.12)
PT #'S 1052 - 1133

1056 - SET NAIL

SN

8/15/14
+/- 80°

516/19

6151 IDOT / BLACKBERRY CREEK @ RT 47

TA@ 53 HI= 5.215 BS@ 54 (4.72)
PT #'S 1134 - 1168

1135 - SET NAIL 100' NORTH OF 53
1136 - SET NAIL 200' SOUTH OF 53
1137 - SET NAIL 300' SOUTH OF 53
* NORTH END OF CONCRETE DITCH
B + C IS BURIED CREW LOCATED
TO BEST OF THEIR ABILITY
1166 - 4' WIRE WOVEN + BARBED WIRE
FENCE

TA@ 1136 HI= 5.065 BS@ 54 (4.72)
PT #'S 1169 - 1175

TA@ 1137 HI= 5.225 BS@ 54 (4.72)
PT #'S 1176 - 1183

TA@ 1135 HI= 5.11 BS@ 54 (4.72)
PT #'S 1184 - 1196

* NEED TO SHOOT CENTER OF WEST BEAM

JH
SN

8/18/14
+/- 80°

516/20

TA@ 9 HI= 4.81 BS@ 10 (6.00)
PT #'S 1197 - 1215

TA@ 10 HI= 4.92 BS@ 9 (6.00)
PT #'S 1216 - 1225

TA@ 11 HI= 4.62 BS@ 12 (6.00)
PT #'S 1226 - 1252

1254 - BEAVER DAM

TA@ 12 HI= 4.88 BS@ 11 (6.00)
PT #'S 1253 - 1275

6151 IDOT / BLACKBERRY CREEK
@ RT 47

TA @ 1135 HI = 5.03 BS @ 54 (6.00)
PT #'S 1276 - 1278

1277 - SET NAIL

TA @ 13 HI = 5.305 BS @ 1277 (4.83)
PT #'S 1279 - 1307

1280 - SET NAIL
1281 - SET NAIL

TA @ 1280 HI = 5.485 BS @ 13 (5.20)
PT #'S 1308 - 1353

TA @ 1281 HI = 4.99 BS @ 13 (5.00)
PT #'S 1354 - 1373

TA @ 14 HI = 4.89 BS @ 1281 (5.60)
PT # 1374 - 1405

SA
SN

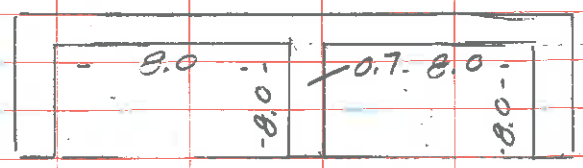
8/19/14
+/- 80°

TA @ 1056 HI = 4.85 BS @ 53 (5.00)
PTS # 1405 - 1406

6151 IDOT / BLACKBERRY CREEK

MEASURE UPSTREAM AND DOWNSTREAM STRUCTURES

I-88



CONCRETE BOTTOM

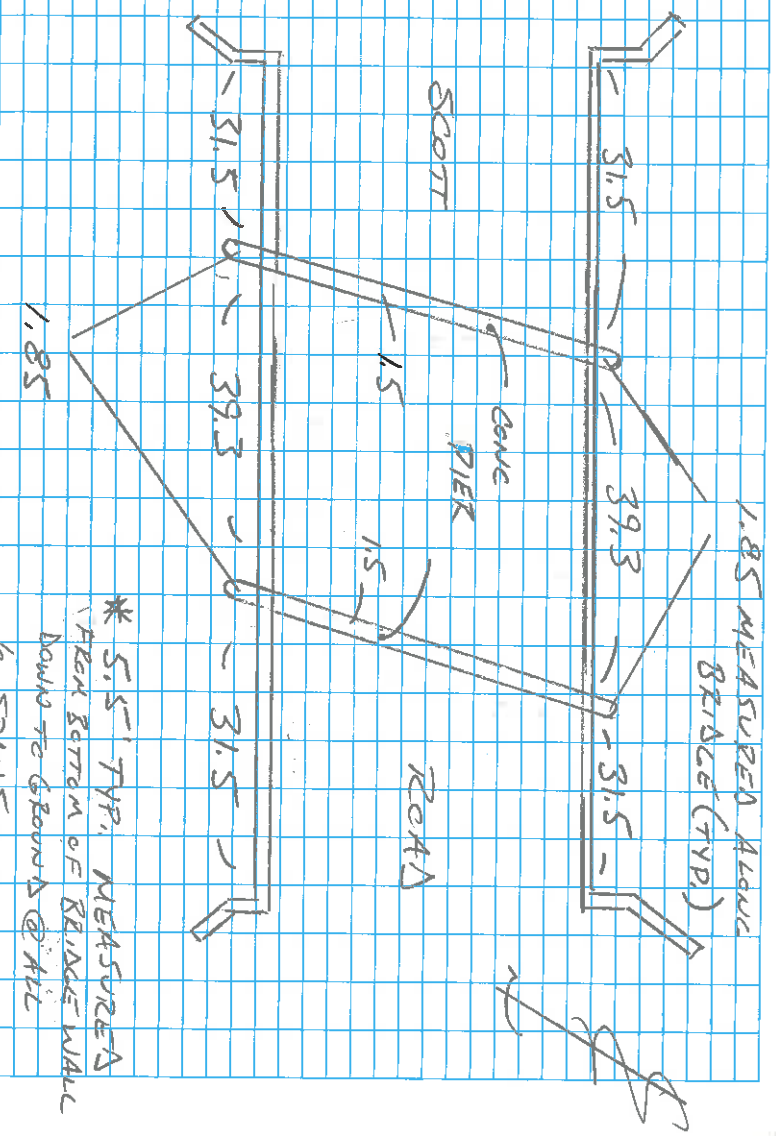
STRUCTURE "A" (PIC 3059)

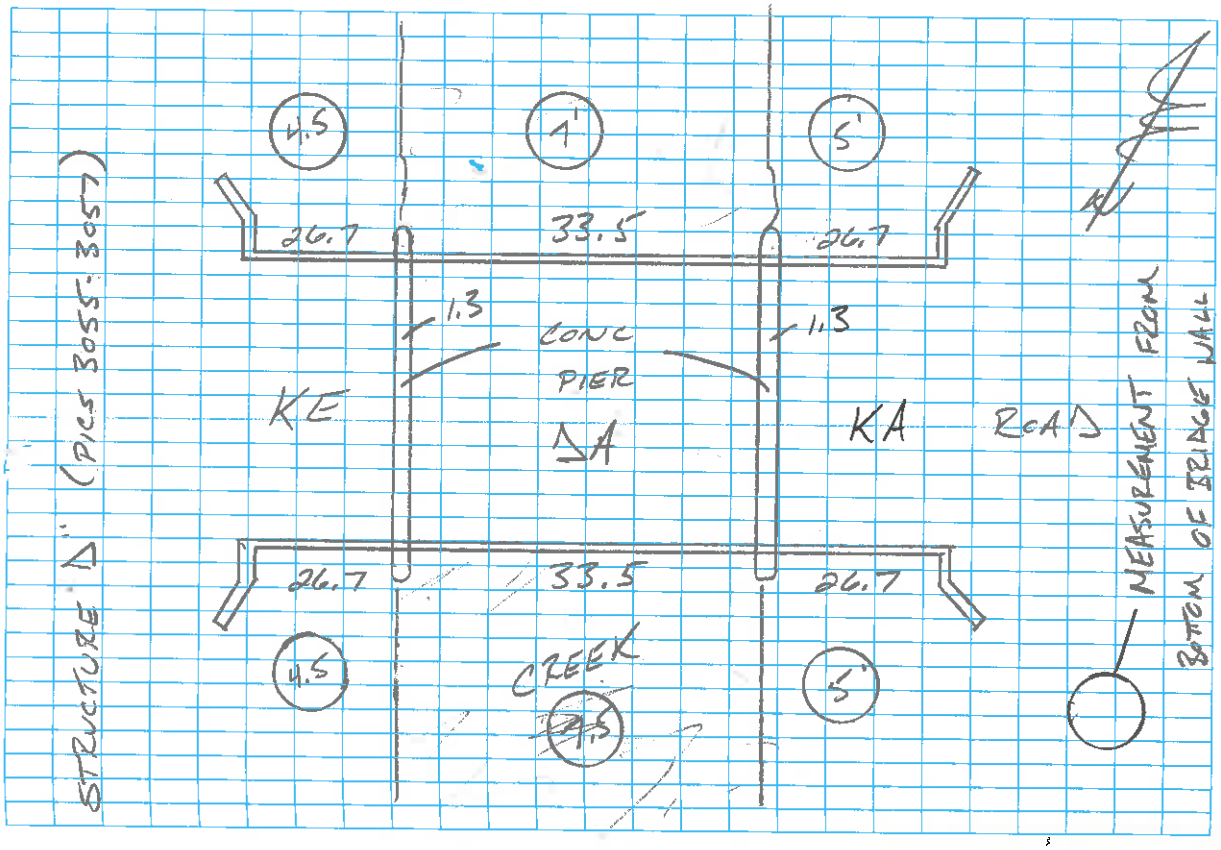
SH
MS

8/25/14
+/- 90°

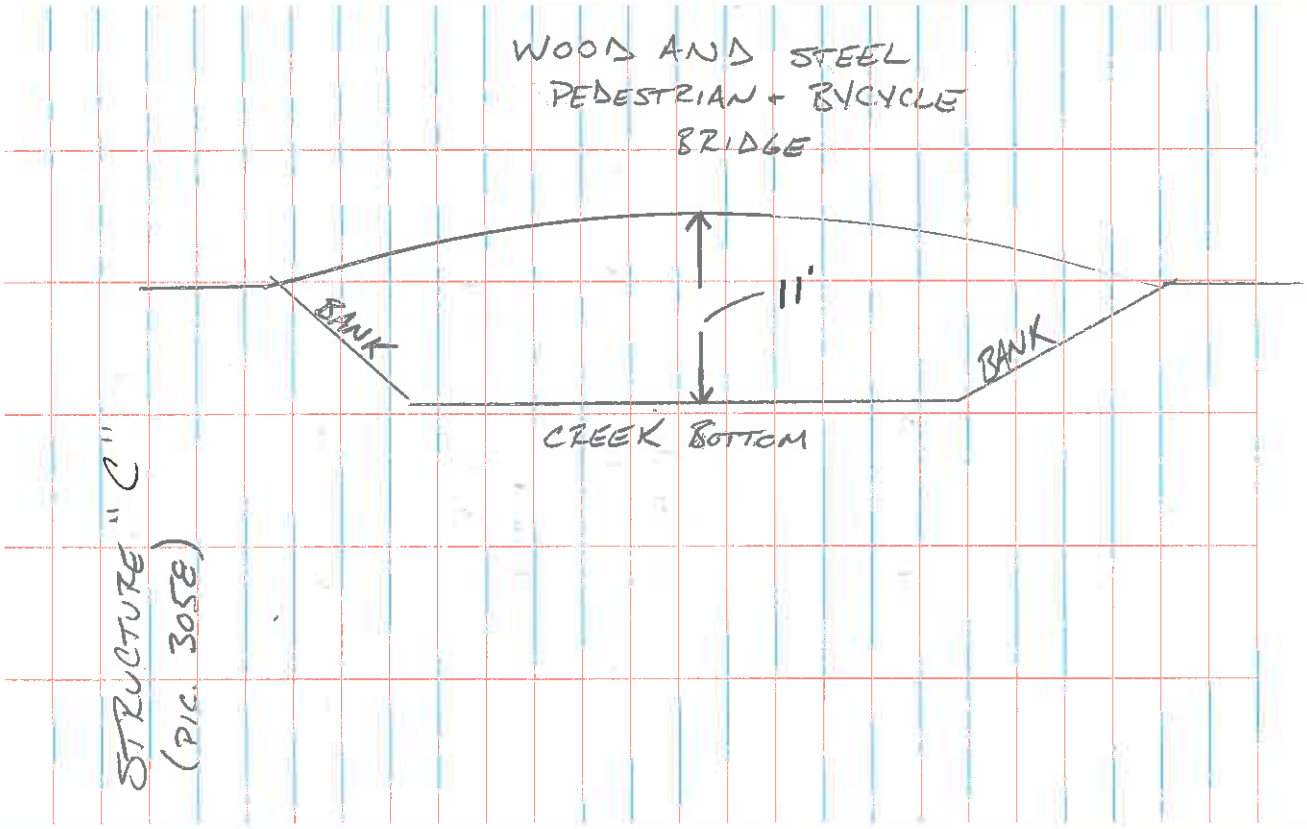
516/22

STRUCTURE "B" (PICS 3051-3054)





STRUCTURE "A" (PICS 3055-3057)



STRUCTURE "C" (PIC. 3058)

IDOT / BLACKBERRY CREEK

6151

F.S. C 52 (5.05) B.S. C 53 (5.20)

Pt # 1407 → 1420

" 1420 BM ✓

1421, 1422 calc'd Pt.

F.S. C 9 (4.80) B.S. C 10 (6.00) ~~(5.20)~~

Pt # " 1423 → 1436

F.S. C 13 (5.23) B.S. C 1280

Pt # " 1437 → 1440

1440 cp

F.S. C 1440 (5.06) B.S. C 13 (5.60)

Pt # 1441 → 1456

1456 ✓ cp 1277

J.H.
M.S.

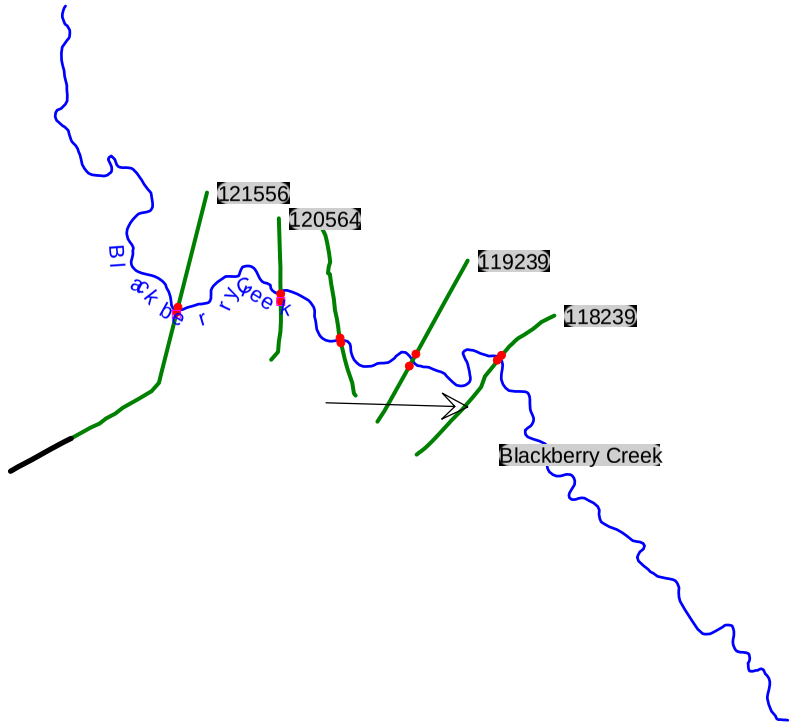
8/26/14

5/6/24

EXHIBIT I

HEC-RAS MODEL REPORT (PERMIT)

NATURAL CONDITIONS
(PERMIT MODEL)


121556
120564
119239
118239
Blackberry Creek
Blackberry Creek

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:43:32 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.
```

****

PLAN DATA

Plan Title: FIS PERMIT SN045-0024 (NATURAL)
Plan File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.p05

Geometry Title: FIS PERMIT SN045-0024 (NATURAL)
Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g07

Flow Title : FIS PERMIT SN045-0024
Flow File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f08

Plan Description:
PERMIT FIS Model with Surveyed Bridge

Plan Summary Information:

Number of:	Cross Sections	= 5	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

****

FLOW DATA

Flow Title: FIS PERMIT SN045-0024
Flow File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f08

Flow Data (cfs)

River	Reach	RS	Q2	Q10	Q50	Q100	Q200	Q500
Blackberry Creek	Blackberry Creek	121556	457	1071	1824	2207	2677	3269
Blackberry Creek	Blackberry Creek	120564	449	1041	1765	2134	2586	3157
Blackberry Creek	Blackberry Creek	119920	448	1038	1759	2126	2576	3144
Blackberry Creek	Blackberry Creek	118239	447	1034	1751	2116	2564	3129

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blackberry Creek	Blackberry Creek	Q2		Known WS = 698.84
Blackberry Creek	Blackberry Creek	Q10		Known WS = 700.01
Blackberry Creek	Blackberry Creek	Q50		Known WS = 700.89
Blackberry Creek	Blackberry Creek	Q100		Known WS = 701.28
Blackberry Creek	Blackberry Creek	Q200		Known WS = 701.66
Blackberry Creek	Blackberry Creek	Q500		Known WS = 702.17

****

GEOMETRY DATA

Geometry Title: FIS PERMIT SN045-0024 (NATURAL)
Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g07

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 121556

INPUT
Description: IDNR 1985. B11424 Reach Lengths Not Including RT 47

XS extended
by DS; new XY data from 2004 TIN added Jan. 2005 by BW; shcematic
updated 2-11-05 by BW to include xs endpoints
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.68	60.07	705.38	110.1	704.28	160.12	703.78	212.07	702.28
255.01	701.58	300	701.08	348.08	700.18	397.06	700.08	425.04	700.48
472.1	700.08	523.03	699.88	591.09	699.48	647.04	698.78	695	699.58
749.03	698.78	802.01	698.98	835.01	698.48	841.07	696.98	848.03	697.28
850.09	695.38	855.12	695.08	860.02	694.68	866.08	694.58	870.07	695.38
872.01	698.88	886.06	699.08	915.06	697.48	961.99	698.38	1015.11	699.28
1065.01	700.18	1115.02	701.18	1172.01	702.38	1224.08	704.28	1280.03	706.18
1330.05	708.68	1384.08	711.98	1462.4	719.7	1570.2	720.3	1697	713.5
1765.9	711.4	1838.7	712.1	1897.5	713.4	1964.8	714.6	2046.8	713.6
2123.9	708.8	2197.4	706.1	2279.5	705	2377.8	704.3	2466.9	704.6
2546.8	705	2609.8	705.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	835.01	.07	872.01	.12

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
835.01 872.01 716 992 864 .1 .3
Right Levee Station= 886 Elevation= 699.08
Blocked Obstructions num= 1

Sta L	Sta R	Elev
2123	2609.8	707.5

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120564

INPUT
Description: Smith Engrg 2001. Approach RT47-XS1. 3 extend pts on LHS, 2
extend pts on RHS elevations from bb_tinascii
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-580	708	-400	706	-214	703.9	-150.71	702.56	-114.8	700.81
-82.02	699.55	-36.46	698.6	0	698.46	38.76	698.62	52.08	698.65
54.07	697.19	77.02	698.14	105.29	696.88	115.18	696.85	115.87	696.1
118.21	695.19	125.26	694.62	135.96	693.57	141.44	696.28	141.5	699.05
175.97	698.37	222.09	698.32	262.92	699.25	324.25	699.27	389.05	698.65
460.82	698.76	530.46	700.19	594.85	702.56	622	704	670	706.1

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-580	.12	77.02	.07	141.5	.12

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
77.02 141.5 580 641 573 .1 .3
Right Levee Station= 141.5 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119920

INPUT
Description: Smith Engrg 2001. Departure RT47-XS4
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-794.32	705.97	-750.82	699.7	-706.28	699.78	-650.62	699.91	-596.69	699.48
-521.2	698.57	-459.76	699.03	-430.55	699.09	-430.55	699.15	-387	698.29
-376.39	698.89	-309.99	698.85	-264.97	698.75	-198.45	699.26	-120.19	697.7
-58.06	697.96	0	697.86	41.16	697.17	84.67	696.84	86.16	695.5
89.14	693.98	100.8	694.39	113.68	693.86	117.02	695.44	118.16	697.5
164.48	697.37	226.77	698.19	277.74	698.61	305.5	699.14	407.14	701.99
479.39	702.64	489.5	702.72	494.25	704.34	499.58	704.56		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-794.32	.12	84.67	.07	118.16	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
84.67	118.16	831	681	453	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

INPUT
Description: IDNR 1985. B11211

2 points added to the RHS which are
intrpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	707.88	33	706.18	127	703.68	226	700.68	325	698.68
415	697.08	512	696.68	605	697.08	687	697.78	754	697.98
785	696.68	788	693.68	788	692.78	793	692.88	798	693.08
803	692.98	808	693.48	808	693.68	809	695.98	840	696.08
851	698.08	918	697.88	1012.99	698.38	1051.99	701.48	1114.99	702.34
1211.2	703.7	1304	704						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	754	.07	851	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
754	851	550	970	800	.1	.3

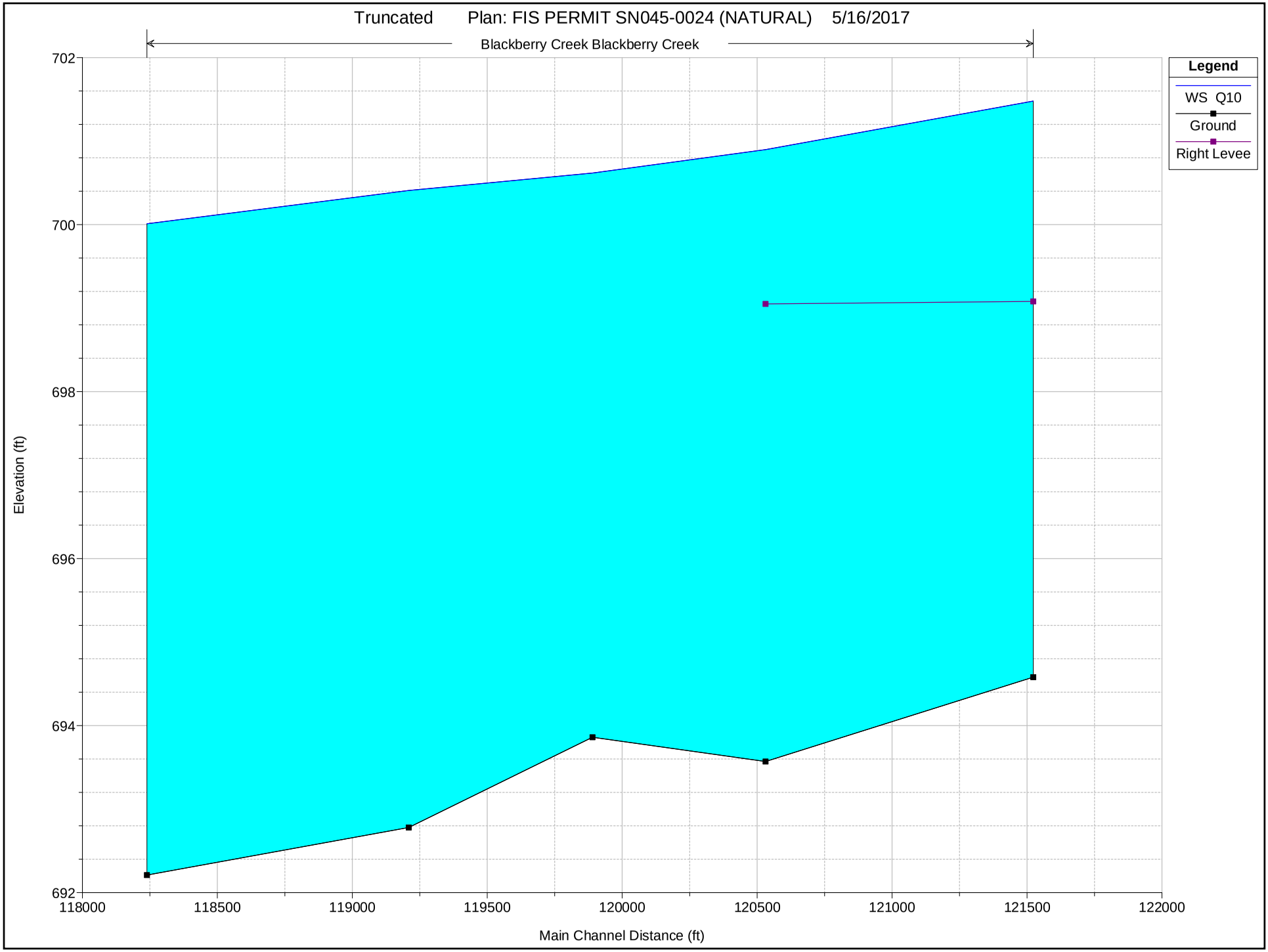
CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

INPUT
Description: Interpolated crossection. Channel data from interpolated xs 118256
between xs 119239 and xs 116290; floodplain data interpolated from
TIN 2004 by MJ and added to Hec-ras by BW
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.95	49.5	705.47	67.5	705.15	103.5	704	153	703.23
180	702.78	252	702.15	283.5	702.09	292.5	702.23	306	702.22
328.5	701.9	360	700.94	387	700.45	405	699.94	445.5	698.11
450	697.85	472.5	696.2	477	696	478	695.78	478	694.18
482.9	694.04	487.8	693.36	491.5	693.07	491.5	692.71	492.8	692.41
497.7	692.36	497.7	692.21	499.9	692.81	502.2	693.43	504	694.06
504	694.69	505.3	694.86	506.3	695.91	513	696	517.5	696.18
540	697.58	558	698	661.5	698.01	693	698.34	742.5	698.51
828	698.5	895.5	698.3	954	699.77	1039.5	702	1062	702.38

```
    1089  702.58    1161  702.96  1228.5  702.93    1242  702.86    1269  703.02
  1309.5  703.05  1345.5  703.36  1381.5  703.75  1390.5  703.96    1404  705.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0     .12   472.5     .07   517.5     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         472.5   517.5             4591    6020    4722             .1       .3

*******************************************************************************

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek
*****************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *
*****************************************************************
*Blackberry Creek*    121556      *      .12*      .07*      .12*
*Blackberry Creek*    120564      *      .12*      .07*      .12*
*Blackberry Creek*    119920      *      .12*      .07*      .12*
*Blackberry Creek*    119239      *      .12*      .07*      .12*
*Blackberry Creek*    118239      *      .12*      .07*      .12*
*****************************************************************

*******************************************************************************

SUMMARY OF REACH LENGTHS

River: Blackberry Creek
*****************************************************************
*     Reach      *   River Sta.   *  Left   * Channel *  Right  *
*****************************************************************
*Blackberry Creek*    121556      *      716*      992*      864*
*Blackberry Creek*    120564      *      580*      641*      573*
*Blackberry Creek*    119920      *      831*      681*      453*
*Blackberry Creek*    119239      *      550*      970*      800*
*Blackberry Creek*    118239      *     4591*     6020*     4722*
*****************************************************************

*******************************************************************************

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

*******************************************************
*     Reach      *   River Sta.   * Contr.  * Expan.  *
*******************************************************
*Blackberry Creek*    121556  *       .1*       .3*
*Blackberry Creek*    120564  *       .1*       .3*
*Blackberry Creek*    119920  *       .1*       .3*
*Blackberry Creek*    119239  *       .1*       .3*
*Blackberry Creek*    118239  *       .1*       .3*
*******************************************************
```


Truncated Plan: FIS PERMIT SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q10
Ground
Right Levee
Elevation (ft)
702
700
698
696
694
692
118000
118500
119000
119500
120000
120500
121000
121500
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:43:32 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.49  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.            *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.48  * Reach Len. (ft)       *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  699.27  * Flow Area (sq ft)     *  997.20  *  203.24  *  564.54  *
* E.G. Slope (ft/ft)     *0.000637  * Area (sq ft)          *  997.20  *  203.24  *  564.54  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)            *  451.90  *  321.24  *  297.86  *
* Top Width (ft)         *  865.14  * Top Width (ft)        *  570.92  *   37.00  *  257.22  *
* Vel Total (ft/s)       *    0.61  * Avg. Vel. (ft/s)      *    0.45  *    1.58  *    0.53  *
* Max Chl Dpth (ft)      *    6.90  * Hydr. Depth (ft)      *    1.75  *    5.49  *    2.19  *
* Conv. Total (cfs)      * 42441.2  * Conv. (cfs)           * 17907.9  * 12729.9  * 11803.5  *
* Length Wtd. (ft)       *  864.46  * Wetted Per. (ft)      *  570.96  *   40.10  *  257.30  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)      *    0.07  *    0.20  *    0.09  *
* Alpha                  *    2.48  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.58  * Cum Volume (acre-ft)  *   62.75  *   22.17  *   37.17  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   29.81  *    4.48  *   18.90  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  700.92  * Element               *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  700.90  * Reach Len. (ft)        *  580.00  *  641.00  *  573.00  *
* Crit W.S. (ft)         *  698.31  * Flow Area (sq ft)      *  394.76  *  299.01  *  768.95  *
* E.G. Slope (ft/ft)     *0.000701  * Area (sq ft)           *  394.76  *  299.01  *  768.95  *
* Q Total (cfs)          * 1041.00  * Flow (cfs)             *  207.63  *  449.01  *  384.36  *
* Top Width (ft)         *  666.32  * Top Width (ft)         *  193.63  *   64.48  *  408.21  *
* Vel Total (ft/s)       *    0.71  * Avg. Vel. (ft/s)       *    0.53  *    1.50  *    0.50  *
* Max Chl Dpth (ft)      *    7.33  * Hydr. Depth (ft)       *    2.04  *    4.64  *    1.88  *
* Conv. Total (cfs)      * 39331.4  * Conv. (cfs)            *  7844.7  * 16964.7  * 14522.0  *
* Length Wtd. (ft)       *  598.95  * Wetted Per. (ft)       *  194.17  *   68.43  *  408.26  *
* Min Ch El (ft)         *  693.57  * Shear (lb/sq ft)       *    0.09  *    0.19  *    0.08  *
* Alpha                  *    2.21  * Stream Power (lb/ft s) *  670.00  *    0.00  *  141.50  *
* Frctn Loss (ft)        *    0.29  * Cum Volume (acre-ft)   *   51.31  *   16.45  *   23.95  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   23.52  *    3.32  *   12.30  *
**********************************************************************************************

Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119920


CROSS SECTION OUTPUT  Profile #Q10
**********************************************************************************************
* E.G. Elev (ft)         *  700.63  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  700.62  * Reach Len. (ft)        *  831.00  *  681.00  *  453.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1604.35  *  207.44  *  524.60  *
* E.G. Slope (ft/ft)     *0.000348  * Area (sq ft)           * 1604.35  *  207.44  *  524.60  *
* Q Total (cfs)          * 1038.00  * Flow (cfs)             *  569.64  *  264.28  *  204.08  *
* Top Width (ft)         * 1115.40  * Top Width (ft)         *  841.86  *   33.49  *  240.05  *
* Vel Total (ft/s)       *    0.44  * Avg. Vel. (ft/s)       *    0.36  *    1.27  *    0.39  *
* Max Chl Dpth (ft)      *    6.76  * Hydr. Depth (ft)       *    1.91  *    6.19  *    2.19  *
* Conv. Total (cfs)      * 55635.3  * Conv. (cfs)            * 30532.0  * 14164.9  * 10938.4  *
* Length Wtd. (ft)       *  722.94  * Wetted Per. (ft)       *  842.04  *   35.96  *  240.08  *
* Min Ch El (ft)         *  693.86  * Shear (lb/sq ft)       *    0.04  *    0.13  *    0.05  *
* Alpha                  *    2.59  * Stream Power (lb/ft s) *  499.58  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.21  * Cum Volume (acre-ft)   *   38.00  *   12.72  *   15.44  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   16.63  *    2.60  *    8.04  *
**********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q10
**********************************************************************************************
* E.G. Elev (ft)         *  700.41  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  700.41  * Reach Len. (ft)        *  550.00  *  970.00  *  800.00  *
```

Crit W.S. (ft)		Flow Area (sq ft)	1385.76	436.90	405.10	
E.G. Slope (ft/ft)	0.000246	Area (sq ft)	1385.76	436.90	405.10	
Q Total (cfs)	1038.00	Flow (cfs)	520.76	385.83	131.40	
Top Width (ft)	799.09	Top Width (ft)	514.58	97.00	187.51	
Vel Total (ft/s)	0.47	Avg. Vel. (ft/s)	0.38	0.88	0.32	
Max Chl Dpth (ft)	7.63	Hydr. Depth (ft)	2.69	4.50	2.16	
Conv. Total (cfs)	66200.6	Conv. (cfs)	33212.8	24607.4	8380.3	
Length Wtd. (ft)	804.63	Wetted Per. (ft)	514.62	101.09	187.60	
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.04	0.07	0.03	
Alpha	1.72	Stream Power (lb/ft s)	1304.00	0.00	0.00	
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	9.48	7.69	10.60	
C & E Loss (ft)	0.00	Cum SA (acres)	3.69	1.58	5.81	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.01	Reach Len. (ft)			
Crit W.S. (ft)	696.99	Flow Area (sq ft)	116.28	253.60	749.66
E.G. Slope (ft/ft)	0.001088	Area (sq ft)	116.28	253.60	749.66
Q Total (cfs)	1034.00	Flow (cfs)	66.58	534.32	433.10
Top Width (ft)	560.67	Top Width (ft)	69.97	45.00	445.70
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	0.57	2.11	0.58
Max Chl Dpth (ft)	7.80	Hydr. Depth (ft)	1.66	5.64	1.68
Conv. Total (cfs)	31340.7	Conv. (cfs)	2017.9	16195.4	13127.3
Length Wtd. (ft)		Wetted Per. (ft)	70.08	48.60	445.77
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.11	0.35	0.11
Alpha	2.88	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	# Chl
Blackberry Creek	121556	Q10	1071.00	694.58	701.48	699.27	701.49	0.000637	1.58	1764.98	865.14	0.12
Blackberry Creek	120564	Q10	1041.00	693.57	700.90	698.31	700.92	0.000701	1.50	1462.72	666.32	0.12

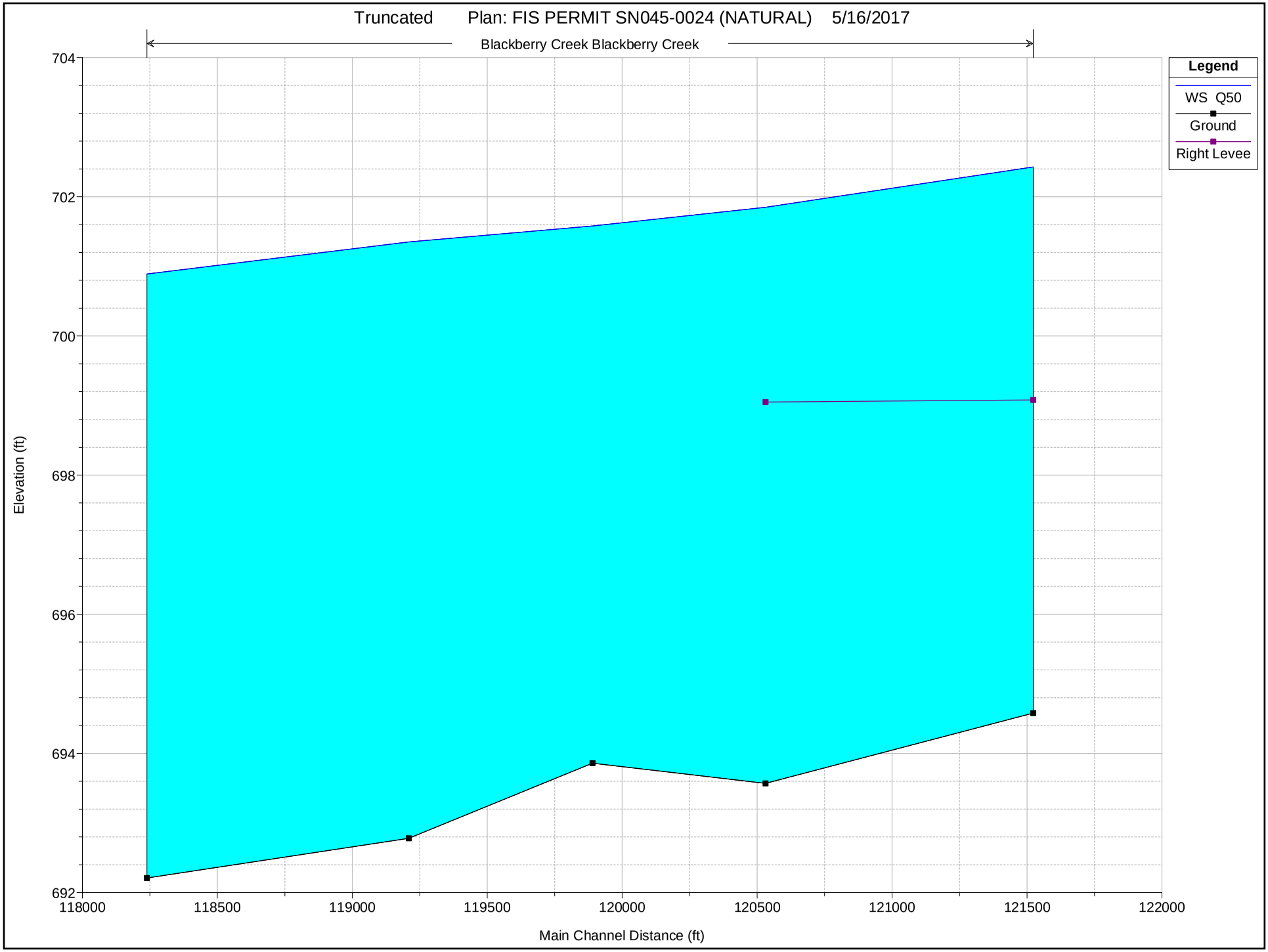
* Blackberry Creek	* 119920	* Q10	* 1038.00	* 693.86	* 700.62	*	* 700.63	* 0.000348	* 1.27	* 2336.39	* 1115.40	* 0.09
* Blackberry Creek	* 119239	* Q10	* 1038.00	* 692.78	* 700.41	*	* 700.41	* 0.000246	* 0.88	* 2227.76	* 799.09	* 0.07
* Blackberry Creek	* 118239	* Q10	* 1034.00	* 692.21	* 700.01	* 696.99	* 700.05	* 0.001088	* 2.11	* 1119.53	* 560.67	* 0.16

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q10	701.49	701.48	0.01	0.58	0.00	451.90	321.24	297.86	865.14
Blackberry Creek	120564	Q10	700.92	700.90	0.02	0.29	0.00	207.63	449.01	384.36	666.32
Blackberry Creek	119920	Q10	700.63	700.62	0.01	0.21	0.00	569.64	264.28	204.08	1115.40
Blackberry Creek	119239	Q10	700.41	700.41	0.01	0.36	0.00	520.76	385.83	131.40	799.09
Blackberry Creek	118239	Q10	700.05	700.01	0.04			66.58	534.32	433.10	560.67

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PER. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120564 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.


Truncated Plan: FIS PERMIT SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q50
Ground
Right Levee
Elevation (ft)
704
702
700
698
696
694
692
118000
118500
119000
119500
120000
120500
121000
121500
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:43:32 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  702.44  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.            *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.43  * Reach Len. (ft)       *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  699.84  * Flow Area (sq ft)     * 1569.56  *  238.39  *  830.30  *
* E.G. Slope (ft/ft)     *0.000631  * Area (sq ft)          * 1569.56  *  238.39  *  830.30  *
* Q Total (cfs)          * 1824.00  * Flow (cfs)            *  899.16  *  417.25  *  507.59  *
* Top Width (ft)         *  966.45  * Top Width (ft)        *  628.10  *   37.00  *  301.35  *
* Vel Total (ft/s)       *    0.69  * Avg. Vel. (ft/s)      *    0.57  *    1.75  *    0.61  *
* Max Chl Dpth (ft)      *    7.85  * Hydr. Depth (ft)      *    2.50  *    6.44  *    2.76  *
* Conv. Total (cfs)      * 72597.4  * Conv. (cfs)           * 35787.8  * 16607.0  * 20202.6  *
* Length Wtd. (ft)       *  848.16  * Wetted Per. (ft)      *  628.15  *   40.10  *  301.44  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)      *    0.10  *    0.23  *    0.11  *
* Alpha                  *    2.02  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.57  * Cum Volume (acre-ft)  *   91.96  *   26.38  *   55.68  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   31.49  *    4.48  *   20.65  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  701.87  * Element               *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.85  * Reach Len. (ft)        *  580.00  *  641.00  *  573.00  *
* Crit W.S. (ft)         *  699.20  * Flow Area (sq ft)      *  588.18  *  360.33  * 1169.44  *
* E.G. Slope (ft/ft)     *0.000726  * Area (sq ft)           *  588.18  *  360.33  * 1169.44  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  385.49  *  623.93  *  755.57  *
* Top Width (ft)         *  711.67  * Top Width (ft)         *  213.15  *   64.48  *  434.04  *
* Vel Total (ft/s)       *    0.83  * Avg. Vel. (ft/s)       *    0.66  *    1.73  *    0.65  *
* Max Chl Dpth (ft)      *    8.28  * Hydr. Depth (ft)       *    2.76  *    5.59  *    2.69  *
* Conv. Total (cfs)      * 65490.6  * Conv. (cfs)            * 14303.8  * 23151.2  * 28035.6  *
* Length Wtd. (ft)       *  594.26  * Wetted Per. (ft)       *  213.71  *   68.43  *  434.11  *
* Min Ch El (ft)         *  693.57  * Shear (lb/sq ft)       *    0.12  *    0.24  *    0.12  *
* Alpha                  *    1.92  * Stream Power (lb/ft s) *  670.00  *    0.00  *  141.50  *
* Frctn Loss (ft)        *    0.28  * Cum Volume (acre-ft)   *   74.23  *   19.56  *   35.85  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   24.58  *    3.32  *   13.36  *
*********************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119920


CROSS SECTION OUTPUT  Profile #Q50
*********************************************************************************************
* E.G. Elev (ft)         *  701.59  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.58  * Reach Len. (ft)        *  831.00  *  681.00  *  453.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2417.09  *  239.65  *  771.92  *
* E.G. Slope (ft/ft)     *0.000328  * Area (sq ft)           * 2417.09  *  239.65  *  771.92  *
* Q Total (cfs)          * 1759.00  * Flow (cfs)             * 1088.23  *  326.05  *  344.73  *
* Top Width (ft)         * 1156.36  * Top Width (ft)         *  848.53  *   33.49  *  274.34  *
* Vel Total (ft/s)       *    0.51  * Avg. Vel. (ft/s)       *    0.45  *    1.36  *    0.45  *
* Max Chl Dpth (ft)      *    7.72  * Hydr. Depth (ft)       *    2.85  *    7.16  *    2.81  *
* Conv. Total (cfs)      * 97196.7  * Conv. (cfs)            * 60131.9  * 18016.4  * 19048.4  *
* Length Wtd. (ft)       *  727.51  * Wetted Per. (ft)       *  848.78  *   35.96  *  274.39  *
* Min Ch El (ft)         *  693.86  * Shear (lb/sq ft)       *    0.06  *    0.14  *    0.06  *
* Alpha                  *    1.93  * Stream Power (lb/ft s) *  499.58  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.23  * Cum Volume (acre-ft)   *   54.22  *   15.15  *   23.08  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   17.51  *    2.60  *    8.70  *
*********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q50
*********************************************************************************************
* E.G. Elev (ft)         *  701.36  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
```

W.S. Elev (ft)	701.35	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	1888.99	528.32	587.41
E.G. Slope (ft/ft)	0.000298	Area (sq ft)	1888.99	528.32	587.41
Q Total (cfs)	1759.00	Flow (cfs)	918.46	582.73	257.81
Top Width (ft)	846.53	Top Width (ft)	550.15	97.00	199.37
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.49	1.10	0.44
Max Chl Dpth (ft)	8.57	Hydr. Depth (ft)	3.43	5.45	2.95
Conv. Total (cfs)	101950.0	Conv. (cfs)	53233.0	33774.3	14942.7
Length Wtd. (ft)	789.14	Wetted Per. (ft)	550.20	101.09	199.49
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.06	0.10	0.05
Alpha	1.62	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	13.15	9.15	16.02
C & E Loss (ft)	0.00	Cum SA (acres)	4.17	1.58	6.23

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	700.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.89	Reach Len. (ft)			
Crit W.S. (ft)	697.74	Flow Area (sq ft)	193.44	293.20	1156.72
E.G. Slope (ft/ft)	0.001232	Area (sq ft)	193.44	293.20	1156.72
Q Total (cfs)	1751.00	Flow (cfs)	122.60	724.05	904.35
Top Width (ft)	634.19	Top Width (ft)	109.75	45.00	479.44
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)	0.63	2.47	0.78
Max Chl Dpth (ft)	8.68	Hydr. Depth (ft)	1.76	6.52	2.41
Conv. Total (cfs)	49881.2	Conv. (cfs)	3492.5	20626.2	25762.6
Length Wtd. (ft)		Wetted Per. (ft)	109.87	48.60	479.53
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.14	0.46	0.19
Alpha	2.52	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q50	1824.00	694.58	702.43	699.84	702.44	0.000631	1.75	2638.26	966.45	0.12
Blackberry Creek	120564	Q50	1765.00	693.57	701.85	699.20	701.87	0.000726	1.73	2117.95	711.67	0.13

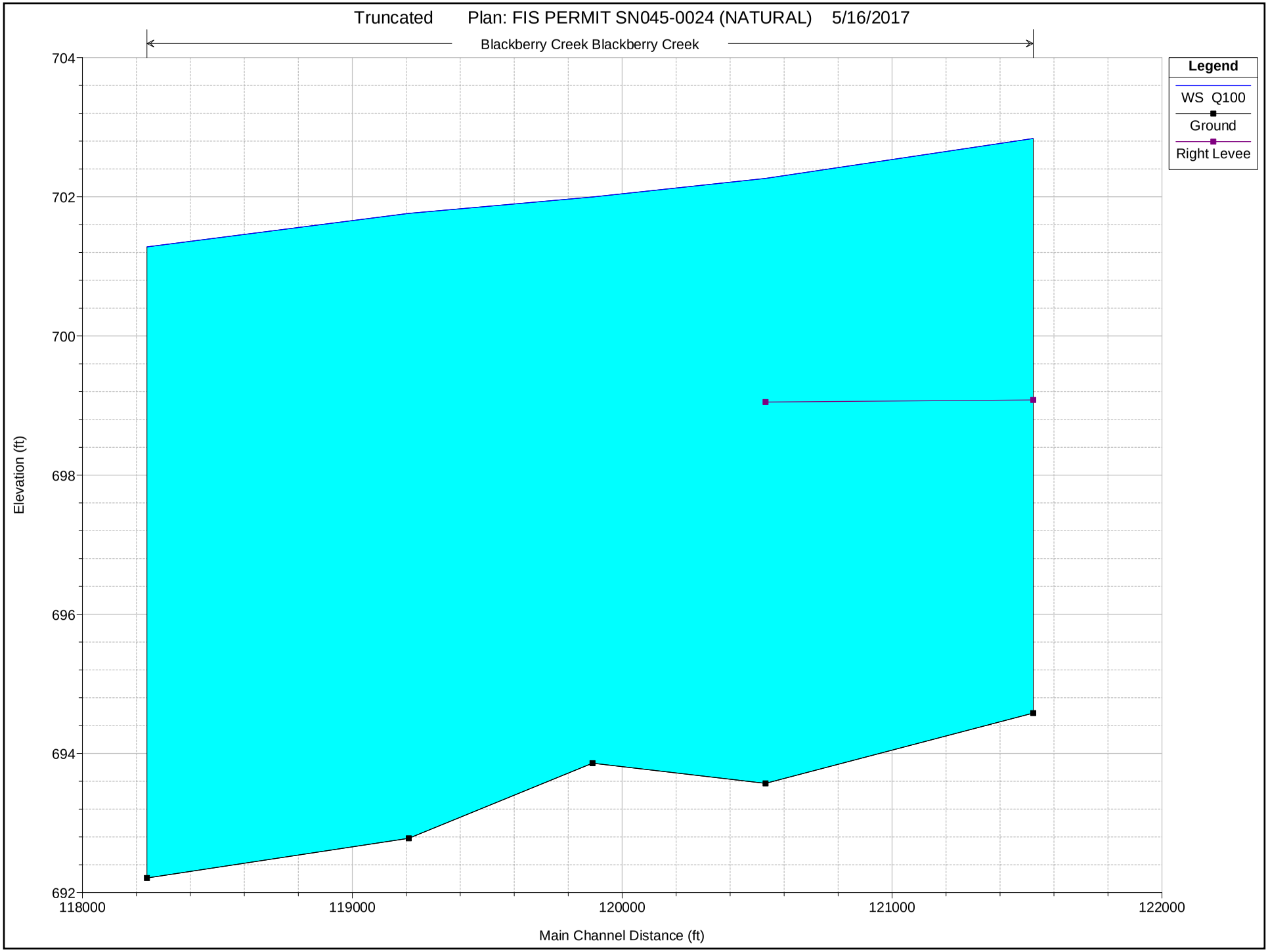
Blackberry Creek	119920	Q50	1759.00	693.86	701.58			701.59	0.000328	1.36	3428.67	1156.36	0.09
Blackberry Creek	119239	Q50	1759.00	692.78	701.35			701.36	0.000298	1.10	3004.71	846.53	0.08
Blackberry Creek	118239	Q50	1751.00	692.21	700.89	697.74		700.93	0.001232	2.47	1643.36	634.19	0.17

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q50	702.44	702.43	0.02	0.57	0.00	899.16	417.25	507.59	966.45
Blackberry Creek	120564	Q50	701.87	701.85	0.02	0.28	0.00	385.49	623.93	755.57	711.67
Blackberry Creek	119920	Q50	701.59	701.58	0.01	0.23	0.00	1088.23	326.05	344.73	1156.36
Blackberry Creek	119239	Q50	701.36	701.35	0.01	0.42	0.00	918.46	582.73	257.81	846.53
Blackberry Creek	118239	Q50	700.93	700.89	0.04			122.60	724.05	904.35	634.19

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PER. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120564 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.


Truncated Plan: FIS PERMIT SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q100
Ground
Right Levee
Elevation (ft)
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:43:32 PM

Project in English units

Project Description:
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263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
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375.00  707.99
381.8
3       707.95
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392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  702.85  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.84  * Reach Len. (ft)        *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  700.02  * Flow Area (sq ft)      * 1828.84  *  253.49  *  955.60  *
* E.G. Slope (ft/ft)     *0.000618  * Area (sq ft)           * 1828.84  *  253.49  *  955.60  *
* Q Total (cfs)          * 2207.00  * Flow (cfs)             * 1130.52  *  457.17  *  619.31  *
* Top Width (ft)         *  991.77  * Top Width (ft)         *  642.24  *   37.00  *  312.53  *
* Vel Total (ft/s)       *    0.73  * Avg. Vel. (ft/s)       *    0.62  *    1.80  *    0.65  *
* Max Chl Dpth (ft)      *    8.26  * Hydr. Depth (ft)       *    2.85  *    6.85  *    3.06  *
* Conv. Total (cfs)      * 88812.9  * Conv. (cfs)            * 45493.7  * 18397.3  * 24921.9  *
* Length Wtd. (ft)       *  843.45  * Wetted Per. (ft)       *  642.29  *   40.10  *  312.64  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.11  *    0.24  *    0.12  *
* Alpha                  *    1.87  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.57  * Cum Volume (acre-ft)   *  105.09  *   28.22  *   64.29  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   32.08  *    4.48  *   21.58  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  702.29  * Element                *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.26  * Reach Len. (ft)        *  580.00  *  641.00  *  573.00  *
* Crit W.S. (ft)         *  699.56  * Flow Area (sq ft)      *  678.29  *  387.05  * 1351.68  *
* E.G. Slope (ft/ft)     *0.000733  * Area (sq ft)           *  678.29  *  387.05  * 1351.68  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             *  478.36  *  706.00  *  949.64  *
* Top Width (ft)         *  731.44  * Top Width (ft)         *  221.65  *   64.48  *  445.31  *
* Vel Total (ft/s)       *    0.88  * Avg. Vel. (ft/s)       *    0.71  *    1.82  *    0.70  *
* Max Chl Dpth (ft)      *    8.69  * Hydr. Depth (ft)       *    3.06  *    6.00  *    3.04  *
* Conv. Total (cfs)      * 78841.2  * Conv. (cfs)            * 17673.2  * 26083.3  * 35084.7  *
* Length Wtd. (ft)       *  592.95  * Wetted Per. (ft)       *  222.22  *   68.43  *  445.38  *
* Min Ch El (ft)         *  693.57  * Shear (lb/sq ft)       *    0.14  *    0.26  *    0.14  *
* Alpha                  *    1.84  * Stream Power (lb/ft s) *  670.00  *    0.00  *  141.50  *
* Frctn Loss (ft)        *    0.28  * Cum Volume (acre-ft)   *   84.48  *   20.92  *   41.41  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   24.98  *    3.32  *   14.07  *
**********************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119920


CROSS SECTION OUTPUT  Profile #Q100
**********************************************************************************************
* E.G. Elev (ft)         *  702.01  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.00  * Reach Len. (ft)        *  831.00  *  681.00  *  453.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2772.20  *  253.64  *  889.65  *
* E.G. Slope (ft/ft)     *0.000322  * Area (sq ft)           * 2772.20  *  253.64  *  889.65  *
* Q Total (cfs)          * 2126.00  * Flow (cfs)             * 1353.04  *  355.41  *  417.56  *
* Top Width (ft)         * 1174.72  * Top Width (ft)         *  851.43  *   33.49  *  289.80  *
* Vel Total (ft/s)       *    0.54  * Avg. Vel. (ft/s)       *    0.49  *    1.40  *    0.47  *
* Max Chl Dpth (ft)      *    8.14  * Hydr. Depth (ft)       *    3.26  *    7.57  *    3.07  *
* Conv. Total (cfs)      *118462.2  * Conv. (cfs)            * 75392.2  * 19803.4  * 23266.5  *
* Length Wtd. (ft)       *  729.56  * Wetted Per. (ft)       *  851.71  *   35.96  *  289.85  *
* Min Ch El (ft)         *  693.86  * Shear (lb/sq ft)       *    0.07  *    0.14  *    0.06  *
* Alpha                  *    1.77  * Stream Power (lb/ft s) *  499.58  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.23  * Cum Volume (acre-ft)   *   61.51  *   16.21  *   26.66  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   17.84  *    2.60  *    9.23  *
**********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q100
**********************************************************************************************
* E.G. Elev (ft)         *  701.77  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
```

W.S. Elev (ft)	701.76	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	2117.14	568.06	672.53
E.G. Slope (ft/ft)	0.000320	Area (sq ft)	2117.14	568.06	672.53
Q Total (cfs)	2126.00	Flow (cfs)	1132.52	681.46	312.02
Top Width (ft)	882.25	Top Width (ft)	563.67	97.00	221.57
Vel Total (ft/s)	0.63	Avg. Vel. (ft/s)	0.53	1.20	0.46
Max Chl Dpth (ft)	8.98	Hydr. Depth (ft)	3.76	5.86	3.04
Conv. Total (cfs)	118905.4	Conv. (cfs)	63340.7	38113.5	17451.2
Length Wtd. (ft)	783.20	Wetted Per. (ft)	563.73	101.09	221.70
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.07	0.11	0.06
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	14.88	9.78	18.54
C & E Loss (ft)	0.00	Cum SA (acres)	4.34	1.58	6.57

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.28	Reach Len. (ft)			
Crit W.S. (ft)	698.98	Flow Area (sq ft)	239.14	310.75	1346.63
E.G. Slope (ft/ft)	0.001251	Area (sq ft)	239.14	310.75	1346.63
Q Total (cfs)	2116.00	Flow (cfs)	162.43	803.62	1149.95
Top Width (ft)	663.05	Top Width (ft)	123.66	45.00	494.40
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)	0.68	2.59	0.85
Max Chl Dpth (ft)	9.07	Hydr. Depth (ft)	1.93	6.91	2.72
Conv. Total (cfs)	59836.2	Conv. (cfs)	4593.3	22724.7	32518.1
Length Wtd. (ft)		Wetted Per. (ft)	123.78	48.60	494.48
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.15	0.50	0.21
Alpha	2.39	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q100	2207.00	694.58	702.84	700.02	702.85	0.000618	1.80	3037.93	991.77	0.12
Blackberry Creek	120564	Q100	2134.00	693.57	702.26	699.56	702.29	0.000733	1.82	2417.02	731.44	0.13

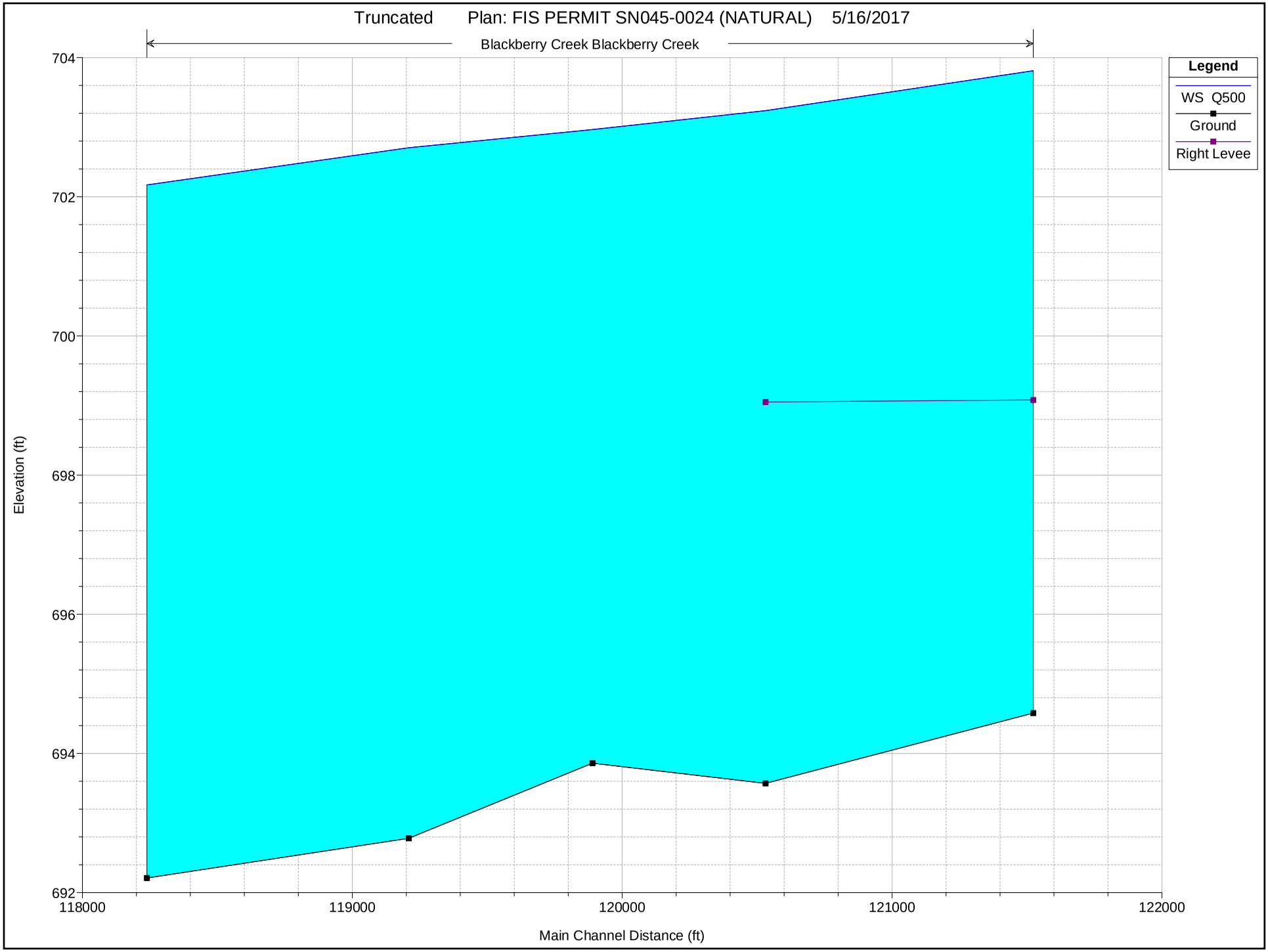
* Blackberry Creek	* 119920	* Q100	* 2126.00	* 693.86	* 702.00	*	* 702.01	* 0.000322	* 1.40	* 3915.50	* 1174.72	* 0.09
* Blackberry Creek	* 119239	* Q100	* 2126.00	* 692.78	* 701.76	*	* 701.77	* 0.000320	* 1.20	* 3357.73	* 882.25	* 0.09
* Blackberry Creek	* 118239	* Q100	* 2116.00	* 692.21	* 701.28	* 698.98	* 701.33	* 0.001251	* 2.59	* 1896.52	* 663.05	* 0.17

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q100	702.85	702.84	0.02	0.57	0.00	1130.52	457.17	619.31	991.77
Blackberry Creek	120564	Q100	702.29	702.26	0.02	0.28	0.00	478.36	706.00	949.64	731.44
Blackberry Creek	119920	Q100	702.01	702.00	0.01	0.23	0.00	1353.04	355.41	417.56	1174.72
Blackberry Creek	119239	Q100	701.77	701.76	0.01	0.44	0.00	1132.52	681.46	312.02	882.25
Blackberry Creek	118239	Q100	701.33	701.28	0.05			162.43	803.62	1149.95	663.05

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PER. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120564 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.


Truncated Plan: FIS PERMIT SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q500
Ground
Right Levee
Elevation (ft)
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:43:32 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************
* E.G. Elev (ft)         *  703.83  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  703.81  * Reach Len. (ft)        *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  700.44  * Flow Area (sq ft)      * 2471.22  *  289.55  * 1273.19  *
* E.G. Slope (ft/ft)     *0.000600  * Area (sq ft)           * 2471.22  *  289.55  * 1273.19  *
* Q Total (cfs)          * 3269.00  * Flow (cfs)             * 1774.52  *  562.32  *  932.16  *
* Top Width (ft)         * 1054.32  * Top Width (ft)         *  678.08  *   37.00  *  339.24  *
* Vel Total (ft/s)       *    0.81  * Avg. Vel. (ft/s)       *    0.72  *    1.94  *    0.73  *
* Max Chl Dpth (ft)      *    9.23  * Hydr. Depth (ft)       *    3.64  *    7.83  *    3.75  *
* Conv. Total (cfs)      *133491.0  * Conv. (cfs)            * 72463.2  * 22962.5  * 38065.2  *
* Length Wtd. (ft)       *  836.26  * Wetted Per. (ft)       *  678.14  *   40.10  *  339.36  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.14  *    0.27  *    0.14  *
* Alpha                  *    1.65  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.56  * Cum Volume (acre-ft)   *  136.68  *   32.47  *   86.31  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   34.04  *    4.48  *   24.49  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************
* E.G. Elev (ft)         *  703.26  * Element                *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  703.24  * Reach Len. (ft)        *  580.00  *  641.00  *  573.00  *
* Crit W.S. (ft)         *  699.91  * Flow Area (sq ft)      *  909.91  *  449.82  * 1796.13  *
* E.G. Slope (ft/ft)     *0.000765  * Area (sq ft)           *  909.91  *  449.82  * 1796.13  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             *  717.93  *  926.98  * 1512.09  *
* Top Width (ft)         *  790.32  * Top Width (ft)         *  259.72  *   64.48  *  466.12  *
* Vel Total (ft/s)       *    1.00  * Avg. Vel. (ft/s)       *    0.79  *    2.06  *    0.84  *
* Max Chl Dpth (ft)      *    9.67  * Hydr. Depth (ft)       *    3.50  *    6.98  *    3.85  *
* Conv. Total (cfs)      *114116.5  * Conv. (cfs)            * 25951.2  * 33507.8  * 54657.6  *
* Length Wtd. (ft)       *  590.87  * Wetted Per. (ft)       *  260.30  *   68.43  *  466.22  *
* Min Ch El (ft)         *  693.57  * Shear (lb/sq ft)       *    0.17  *    0.31  *    0.18  *
* Alpha                  *    1.73  * Stream Power (lb/ft s) *  670.00  *    0.00  *  141.50  *
* Frctn Loss (ft)        *    0.28  * Cum Volume (acre-ft)   *  108.89  *   24.06  *   55.87  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *   26.33  *    3.32  *   16.50  *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119920


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  702.98  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.97  * Reach Len. (ft)        *  831.00  *  681.00  *  453.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 3600.12  *  286.08  * 1219.56  *
* E.G. Slope (ft/ft)     *0.000329  * Area (sq ft)           * 3600.12  *  286.08  * 1219.56  *
* Q Total (cfs)          * 3144.00  * Flow (cfs)             * 2101.37  *  438.70  *  603.93  *
* Top Width (ft)         * 1263.70  * Top Width (ft)         *  858.15  *   33.49  *  372.06  *
* Vel Total (ft/s)       *    0.62  * Avg. Vel. (ft/s)       *    0.58  *    1.53  *    0.50  *
* Max Chl Dpth (ft)      *    9.11  * Hydr. Depth (ft)       *    4.20  *    8.54  *    3.28  *
* Conv. Total (cfs)      *173445.3  * Conv. (cfs)            *115926.2  * 24201.9  * 33317.1  *
* Length Wtd. (ft)       *  733.46  * Wetted Per. (ft)       *  858.50  *   35.96  *  372.16  *
* Min Ch El (ft)         *  693.86  * Shear (lb/sq ft)       *    0.09  *    0.16  *    0.07  *
* Alpha                  *    1.59  * Stream Power (lb/ft s) *  499.58  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.26  * Cum Volume (acre-ft)   *   78.87  *   18.64  *   36.03  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   18.89  *    2.60  *   10.99  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  702.72  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
```

W.S. Elev (ft)	702.70	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	2663.57	659.56	913.99
E.G. Slope (ft/ft)	0.000373	Area (sq ft)	2663.57	659.56	913.99
Q Total (cfs)	3144.00	Flow (cfs)	1730.14	943.98	469.89
Top Width (ft)	981.57	Top Width (ft)	594.80	97.00	289.76
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.65	1.43	0.51
Max Chl Dpth (ft)	9.92	Hydr. Depth (ft)	4.48	6.80	3.15
Conv. Total (cfs)	162819.6	Conv. (cfs)	89599.2	48886.2	24334.2
Length Wtd. (ft)	772.95	Wetted Per. (ft)	594.87	101.09	289.90
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.10	0.15	0.07
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	19.12	11.25	24.94
C & E Loss (ft)	0.00	Cum SA (acres)	5.03	1.58	7.55

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	702.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.17	Reach Len. (ft)			
Crit W.S. (ft)	699.46	Flow Area (sq ft)	365.35	350.80	1802.10
E.G. Slope (ft/ft)	0.001329	Area (sq ft)	365.35	350.80	1802.10
Q Total (cfs)	3129.00	Flow (cfs)	280.16	1014.08	1834.76
Top Width (ft)	778.97	Top Width (ft)	201.91	45.00	532.06
Vel Total (ft/s)	1.24	Avg. Vel. (ft/s)	0.77	2.89	1.02
Max Chl Dpth (ft)	9.96	Hydr. Depth (ft)	1.81	7.80	3.39
Conv. Total (cfs)	85817.5	Conv. (cfs)	7683.8	27812.7	50321.0
Length Wtd. (ft)		Wetted Per. (ft)	202.05	48.60	532.16
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.15	0.60	0.28
Alpha	2.18	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q500	3269.00	694.58	703.81	700.44	703.83	0.000600	1.94	4033.96	1054.32	0.12

Blackberry Creek	120564	Q500	3157.00	693.57	703.24	699.91	703.26	0.000765	2.06	3155.86	790.32	0.14
Blackberry Creek	119920	Q500	3144.00	693.86	702.97		702.98	0.000329	1.53	5105.76	1263.70	0.09
Blackberry Creek	119239	Q500	3144.00	692.78	702.70		702.72	0.000373	1.43	4237.12	981.57	0.10
Blackberry Creek	118239	Q500	3129.00	692.21	702.17	699.46	702.22	0.001329	2.89	2518.25	778.97	0.18

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q500	703.83	703.81	0.02	0.56	0.00	1774.52	562.32	932.16	1054.32
Blackberry Creek	120564	Q500	703.26	703.24	0.03	0.28	0.01	717.93	926.98	1512.09	790.32
Blackberry Creek	119920	Q500	702.98	702.97	0.01	0.26	0.00	2101.37	438.70	603.93	1263.70
Blackberry Creek	119239	Q500	702.72	702.70	0.01	0.49	0.00	1730.14	943.98	469.89	981.57
Blackberry Creek	118239	Q500	702.22	702.17	0.05			280.16	1014.08	1834.76	778.97

ERRORS WARNINGS AND NOTES

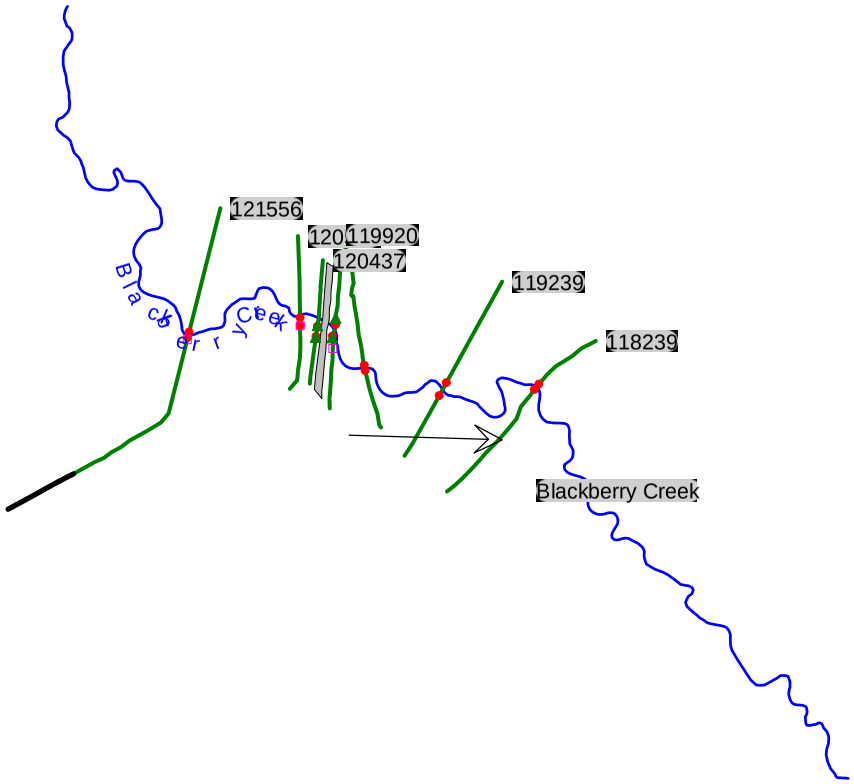
Errors Warnings and Notes for Plan : PER. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120564 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: Blackberry Creek Reach: Blackberry Creek RS: 118239 Profile: Q500
Warning:Divided flow computed for this cross-section.

EXISTING CONDITIONS
(PERMIT MODEL)


121556
120
119920
120437
119239
118239
Blackberry Creek
Blackberry Creek

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
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****

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:12:03 PM

Project in English units

Project Description:
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125.8 778.6
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343.1 760.6
377.4
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391.0 756.3
399.0 755.5
401.8 754.5
408.0 751.2
413.0 753.5
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406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

****

PLAN DATA

Plan Title: FIS PERMIT SN045-0024
Plan File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.p15

Geometry Title: FIS PERMIT SN045-0024
Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g15

Flow Title : FIS PERMIT SN045-0024
Flow File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f08

Plan Description:
PERMIT FIS Model with Surveyed Bridge

Plan Summary Information:
Number of: Cross Sections = 7 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

****

FLOW DATA

Flow Title: FIS PERMIT SN045-0024
Flow File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f08

Flow Data (cfs)

River	Reach	RS	Q2	Q10	Q50	Q100	Q200	Q500
Blackberry Creek	Blackberry Creek	121556	457	1071	1824	2207	2677	3269
Blackberry Creek	Blackberry Creek	120564	449	1041	1765	2134	2586	3157
Blackberry Creek	Blackberry Creek	119920	448	1038	1759	2126	2576	3144
Blackberry Creek	Blackberry Creek	118239	447	1034	1751	2116	2564	3129

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blackberry Creek	Blackberry Creek	Q2		Known WS = 698.84
Blackberry Creek	Blackberry Creek	Q10		Known WS = 700.01
Blackberry Creek	Blackberry Creek	Q50		Known WS = 700.89
Blackberry Creek	Blackberry Creek	Q100		Known WS = 701.28
Blackberry Creek	Blackberry Creek	Q200		Known WS = 701.66
Blackberry Creek	Blackberry Creek	Q500		Known WS = 702.17

****

GEOMETRY DATA

Geometry Title: FIS PERMIT SN045-0024
Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g15

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 121556

INPUT
Description: IDNR 1985. B11424 Reach Lengths Not Including RT 47

XS extended
by DS; new XY data from 2004 TIN added Jan. 2005 by BW; shcematic
updated 2-11-05 by BW to include xs endpoints
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.68	60.07	705.38	110.1	704.28	160.12	703.78	212.07	702.28
255.01	701.58	300	701.08	348.08	700.18	397.06	700.08	425.04	700.48
472.1	700.08	523.03	699.88	591.09	699.48	647.04	698.78	695	699.58
749.03	698.78	802.01	698.98	835.01	698.48	841.07	696.98	848.03	697.28
850.09	695.38	855.12	695.08	860.02	694.68	866.08	694.58	870.07	695.38
872.01	698.88	886.06	699.08	915.06	697.48	961.99	698.38	1015.11	699.28
1065.01	700.18	1115.02	701.18	1172.01	702.38	1224.08	704.28	1280.03	706.18
1330.05	708.68	1384.08	711.98	1462.4	719.7	1570.2	720.3	1697	713.5
1765.9	711.4	1838.7	712.1	1897.5	713.4	1964.8	714.6	2046.8	713.6
2123.9	708.8	2197.4	706.1	2279.5	705	2377.8	704.3	2466.9	704.6
2546.8	705	2609.8	705.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	835.01	.07	872.01	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
835.01	872.01	716	992	864	.1	.3

Right Levee Station= 886 Elevation= 699.08
Blocked Obstructions num= 1

Sta L	Sta R	Elev
2123	2609.8	707.5

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120564

INPUT
Description: Smith Engrg 2001. Approach RT47-XS1. 3 extend pts on LHS, 2
extend pts on RHS elevations from bb_tinascii
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-580	708	-400	706	-214	703.9	-150.71	702.56	-114.8	700.81
-82.02	699.55	-36.46	698.6	0	698.46	38.76	698.62	52.08	698.65
54.07	697.19	77.02	698.14	105.29	696.88	115.18	696.85	115.87	696.1
118.21	695.19	125.26	694.62	135.96	693.57	141.44	696.28	141.5	699.05
175.97	698.37	222.09	698.32	262.92	699.25	324.25	699.27	389.05	698.65
460.82	698.76	530.46	700.19	594.85	702.56	622	704	670	706.1

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-580	.12	77.02	.07	141.5	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
77.02	141.5	205	127	109	.1	.3

Right Levee Station= 141.5 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120437

INPUT
Description: Smith Engrg 2001. USF RT47-XS2. 1 extend pt on RHS, 5 extend pt on LHS, elevation from bb_tinascii The use of n=100 is to block of conveyance but retain storage computation. This is for f-table computation only.
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-712	707.9	-598	706	-547	704	-479	702	-244	702.1
-152.86	702.09	-149.79	701.61	-121.3	701.05	-114.99	699.24	-97.63	698.87
-52.62	698.29	-.05	698.23	0	698.23	39.161	696.79	39.27	696.02
40.67	692.58	40.7	690.35	91.03	690.55	91.99	691.68	92.3	696.03
92.72	696.76	108.979	697.96	151.73	698.46	197.92	698.6	249.49	698.55
324.65	699.09	387.31	699.02	443.81	699.71	502	700.92	551.53	702.41
618	706								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-712	.12	0	.07	108.979	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	108.979	151	145	129	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-712	9.122	706.1	F
135.215	618	706.1	F

BRIDGE

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120403

INPUT
Description: Lin Engineering - 2015
Distance from Upstream XS = 34
Deck/Roadway Width = 53
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 30
Upstream Deck/Roadway Coordinates
num= 20

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-602.381	706.45		-512.358	706.59		-427.028	706.52	
-341.196	706.67		-254.213	706.69		-169.256	706.61	
-83.181	706.8		-24.828	707.07		15.769	707.11	
15.769	707.11	704.5	62.536	707.2	704.5	106.825	707.16	704.5
108.773	707.14	704.5	108.773	707.14		202.945	706.65	
271.56	706.41		355.088	706.29		417.829	706.5	
521.226	706.5		614.449	707.08				

Upstream Bridge Cross Section Data
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-602.381	705.57	-512.358	705.645	-432.684	705.63	-427.028	705.535	-341.95	705.674
-253.988	705.412	-232.122	705.332	-195.108	705.826	-177.301	705.84	-138.659	706.15
-126.085	705.466	-87.027	705.353	-63.332	706.188	-18.083	706.906	9.379	707.052
16.03	703.337	31.532	697.658	33.914	697.251	36.477	695.807	37.993	695.136
43.837	694.738	52.022	694.967	60.336	695.463	63.887	695.171	65.705	695.065
75.145	695.111	83.978	695.009	90.162	695.719	93.938	697.25	100.511	700.308
107.569	702.407	111.846	704.435	115.796	706.911	137.308	706.894	202.944	706.5
224.075	705.312	265.038	705.659	289.893	705.761	349.684	705.918	441.218	705.872
491.14	703.97	502.78	704.48	510.479	705.26	521.191	705.53	532.458	705.08
557.166	705.25	582.549	705.81	614.454	706				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-602.381	.117	33.914	.035	93.938	.117

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
        33.914  93.938             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
-602.381   9.122   706.1       F
 135.215 614.454   706.1       F

Downstream  Deck/Roadway Coordinates
    num=      21
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************************************
-598.077  707.21        -509.682  707.11        -423.175   707.1
-334.753  707.27        -248.489  707.34        -162.475  707.29
 -76.808  707.51         -14.731  707.83          39.058  708.04
  42.271  708.05          42.271  708.05   705.3  88.681  708.06   705.3
 135.271  707.97   705.3 135.271  707.97         164.813  707.75
 207.976  707.34         275.076  707.11         362.285   707.2
 450.394  707.23         534.641  707.51         612.433  707.84

Downstream Bridge Cross Section Data
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
-598.077 706.369 -509.69 706.467-422.534 706.217-337.057 705.692-249.848 706.582
-161.384  705.44-118.602 706.824 -95.739 707.073 -53.304 707.506  -9.691   707.8
  35.464 707.975  44.427 702.872  55.685 697.897  59.929 697.736  63.653  697.17
  65.177 695.537  67.368 694.916  73.517 695.052  81.076 694.875  87.486 695.131
  91.383 695.146  93.115 695.618  98.285 695.076 102.477 695.714  108.86 695.078
 111.111 695.179 114.714 695.283 116.065 695.792 118.238 697.402 120.022 697.821
 126.551 698.296 131.515 700.906 133.247 702.697 140.348 705.557 145.068 707.606
 208.002 706.999  250.16 706.597  272.98 705.888 284.836 706.481  316.02  704.35
 359.747 706.625 447.467 706.563 530.475 706.573 612.436  707.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
-598.077    .117  63.653    .035 118.238    .117

Bank Sta: Left   Right    Coeff Contr.   Expan.
        63.653 118.238             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
-598.077   29.03   705.2       F
 175.969 612.436   705.2       F
Right Levee     Station=  242.31      Elevation=

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream=  62.536    Downstream=  88.776
Upstream     num=       2
    Width   Elev    Width   Elev
********************************
     2.9       0     2.9   704.5
Downstream     num=       2
    Width   Elev    Width   Elev
********************************
     2.9       0     2.9   705.3

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =    1.33
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
```

```
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120302

INPUT
Description: Smith Engrg 2001.  DSF RT47-XS3. The use of n=100 is to block of
             conveyance but retain storage computation. This is for f-table
             computation only. 1 extend pt on LHS and 2 on RHS, elevations from
             bb_tinascii
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -328     706  -290.9  702.21 -244.09  700.82 -191.68  700.71 -128.01  700.78
  -61.52  699.62       0  699.13   48.44  698.76   62.57  699.07   64.82  697.72
    67.1  698.33  76.631  697.41   77.71  696.23  79.279  692.99  123.13  692.69
 124.961  695.89  125.48   697.4  141.85  698.74   148.4  698.95  151.79  700.39
  190.46  700.58  242.31  700.65  290.83  700.09  366.96   699.3  425.49  698.65
 483.611   699.1  550.61  699.84  590.12  701.48  609.84  703.17     630     706
     679   708.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -328     .12   62.57     .07  151.79     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         62.57  151.79              224     369     335             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -328   29.03   705.2       F
 175.969     679   705.2       F
Right Levee     Station=  242.31      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119920

INPUT
Description: Smith Engrg 2001.  Departure RT47-XS4
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -794.32  705.97 -750.82   699.7 -706.28  699.78 -650.62  699.91 -596.69  699.48
  -521.2  698.57 -459.76  699.03 -430.55  699.09 -430.55  699.15    -387  698.29
 -376.39  698.89 -309.99  698.85 -264.97  698.75 -198.45  699.26 -120.19   697.7
  -58.06  697.96       0  697.86   41.16  697.17   84.67  696.84   86.16   695.5
   89.14  693.98   100.8  694.39  113.68  693.86  117.02  695.44  118.16   697.5
  164.48  697.37  226.77  698.19  277.74  698.61   305.5  699.14  407.14  701.99
  479.39  702.64   489.5  702.72  494.25  704.34  499.58  704.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 -794.32     .12   84.67     .07  118.16     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         84.67  118.16              831     681     453             .1       .3

CROSS SECTION
```

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

INPUT
Description: IDNR 1985. B11211

2 points added to the RHS which are
intrpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	707.88	33	706.18	127	703.68	226	700.68	325	698.68
415	697.08	512	696.68	605	697.08	687	697.78	754	697.98
785	696.68	788	693.68	788	692.78	793	692.88	798	693.08
803	692.98	808	693.48	808	693.68	809	695.98	840	696.08
851	698.08	918	697.88	1012.99	698.38	1051.99	701.48	1114.99	702.34
1211.2	703.7	1304	704						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	754	.07	851	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
754	851	550	970	800	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

INPUT
Description: Interpolated crossection. Channel data from interpolated xs 118256
between xs 119239 and xs 116290; floodplain data interpolated from
TIN 2004 by MJ and added to Hec-ras by BW
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.95	49.5	705.47	67.5	705.15	103.5	704	153	703.23
180	702.78	252	702.15	283.5	702.09	292.5	702.23	306	702.22
328.5	701.9	360	700.94	387	700.45	405	699.94	445.5	698.11
450	697.85	472.5	696.2	477	696	478	695.78	478	694.18
482.9	694.04	487.8	693.36	491.5	693.07	491.5	692.71	492.8	692.41
497.7	692.36	497.7	692.21	499.9	692.81	502.2	693.43	504	694.06
504	694.69	505.3	694.86	506.3	695.91	513	696	517.5	696.18
540	697.58	558	698	661.5	698.01	693	698.34	742.5	698.51
828	698.5	895.5	698.3	954	699.77	1039.5	702	1062	702.38
1089	702.58	1161	702.96	1228.5	702.93	1242	702.86	1269	703.02
1309.5	703.05	1345.5	703.36	1381.5	703.75	1390.5	703.96	1404	705.99

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	472.5	.07	517.5	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
472.5	517.5	4591	6020	4722	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek

Reach	River Sta.	n1	n2	n3
Blackberry Creek	121556	.12	.07	.12
Blackberry Creek	120564	.12	.07	.12
Blackberry Creek	120437	.12	.07	.12
Blackberry Creek	120403	Bridge		
Blackberry Creek	120302	.12	.07	.12
Blackberry Creek	119920	.12	.07	.12

```
*Blackberry Creek*    119239      *      .12*      .07*      .12*
*Blackberry Creek*    118239      *      .12*      .07*      .12*
****************************************************************

*******************************************************************************

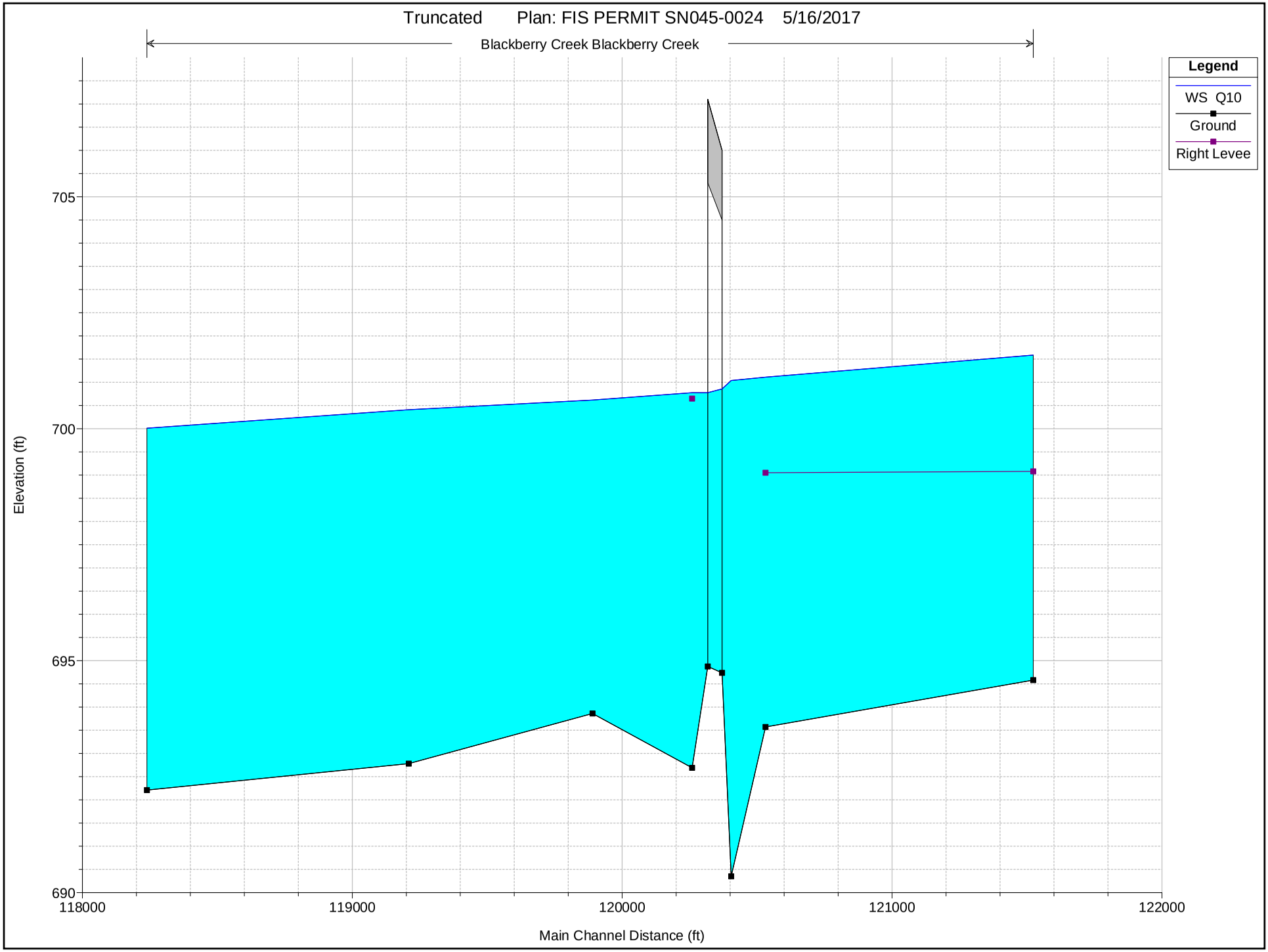
SUMMARY OF REACH LENGTHS

River: Blackberry Creek
****************************************************************
*     Reach      *   River Sta.   *  Left   * Channel *  Right  *
****************************************************************
*Blackberry Creek*    121556      *      716*      992*      864*
*Blackberry Creek*    120564      *      205*      127*      109*
*Blackberry Creek*    120437      *      151*      145*      129*
*Blackberry Creek*    120403      *Bridge   *         *         *
*Blackberry Creek*    120302      *      224*      369*      335*
*Blackberry Creek*    119920      *      831*      681*      453*
*Blackberry Creek*    119239      *      550*      970*      800*
*Blackberry Creek*    118239      *     4591*     6020*     4722*
****************************************************************

*******************************************************************************

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

*****************************************************
*     Reach      *   River Sta.   * Contr.  * Expan.  *
*****************************************************
*Blackberry Creek*    121556  *       .1*       .3*
*Blackberry Creek*    120564  *       .1*       .3*
*Blackberry Creek*    120437  *       .3*       .5*
*Blackberry Creek*    120403  *Bridge   *         *
*Blackberry Creek*    120302  *       .3*       .5*
*Blackberry Creek*    119920  *       .1*       .3*
*Blackberry Creek*    119239  *       .1*       .3*
*Blackberry Creek*    118239  *       .1*       .3*
*****************************************************
```


Truncated Plan: FIS PERMIT SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q10
Ground
Right Levee
705
700
695
690
Elevation (ft)
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:12:03 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.60  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.59  * Reach Len. (ft)        *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  699.27  * Flow Area (sq ft)      * 1059.93  *  207.27  *  592.84  *
* E.G. Slope (ft/ft)     *0.000557  * Area (sq ft)           * 1059.93  *  207.27  *  592.84  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)             *  462.55  *  310.32  *  298.14  *
* Top Width (ft)         *  879.88  * Top Width (ft)         *  580.49  *   37.00  *  262.39  *
* Vel Total (ft/s)       *    0.58  * Avg. Vel. (ft/s)       *    0.44  *    1.50  *    0.50  *
* Max Chl Dpth (ft)      *    7.01  * Hydr. Depth (ft)       *    1.83  *    5.60  *    2.26  *
* Conv. Total (cfs)      * 45396.9  * Conv. (cfs)            * 19606.1  * 13153.5  * 12637.3  *
* Length Wtd. (ft)       *  861.30  * Wetted Per. (ft)       *  580.53  *   40.10  *  262.48  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.06  *    0.18  *    0.08  *
* Alpha                  *    2.42  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.47  * Cum Volume (acre-ft)   *   57.12  *   24.39  *   36.22  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   26.93  *    4.75  *   18.76  *
*****************************************************************************************


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.13  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.11	Reach Len. (ft)	205.00	127.00	109.00
Crit W.S. (ft)	698.31	Flow Area (sq ft)	436.54	312.76	856.67
E.G. Slope (ft/ft)	0.000544	Area (sq ft)	436.54	312.76	856.67
Q Total (cfs)	1041.00	Flow (cfs)	213.09	426.33	401.58
Top Width (ft)	676.50	Top Width (ft)	198.01	64.48	414.00
Vel Total (ft/s)	0.65	Avg. Vel. (ft/s)	0.49	1.36	0.47
Max Chl Dpth (ft)	7.54	Hydr. Depth (ft)	2.20	4.85	2.07
Conv. Total (cfs)	44649.5	Conv. (cfs)	9139.8	18285.6	17224.0
Length Wtd. (ft)	131.20	Wetted Per. (ft)	198.55	68.43	414.06
Min Ch El (ft)	693.57	Shear (lb/sq ft)	0.07	0.16	0.07
Alpha	2.13	Stream Power (lb/ft s)	670.00	0.00	141.50
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	44.82	18.47	21.84
C & E Loss (ft)	0.00	Cum SA (acres)	20.53	3.60	12.06

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120437

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	701.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.070	0.120
W.S. Elev (ft)	701.04	Reach Len. (ft)	34.00	34.00	34.00
Crit W.S. (ft)	692.81	Flow Area (sq ft)		727.81	76.77
E.G. Slope (ft/ft)	0.000341	Area (sq ft)	297.08	754.97	792.21
Q Total (cfs)	1041.00	Flow (cfs)		1005.08	35.92
Top Width (ft)	627.24	Top Width (ft)	121.26	108.98	397.00
Vel Total (ft/s)	1.29	Avg. Vel. (ft/s)		1.38	0.47
Max Chl Dpth (ft)	10.69	Hydr. Depth (ft)		7.29	2.93
Conv. Total (cfs)	56361.3	Conv. (cfs)		54416.5	1944.8
Length Wtd. (ft)	34.00	Wetted Per. (ft)		110.10	26.24
Min Ch El (ft)	690.35	Shear (lb/sq ft)		0.14	0.06
Alpha	1.10	Stream Power (lb/ft s)	618.00	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	43.10	16.91	19.78
C & E Loss (ft)	0.04	Cum SA (acres)	19.78	3.35	11.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120403

BRIDGE OUTPUT Profile #Q10

E.G. US. (ft)	701.07	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	701.04	E.G. Elev (ft)	701.01	700.96
Q Total (cfs)	1041.00	W.S. Elev (ft)	700.86	700.78
Q Bridge (cfs)	1041.00	Crit W.S. (ft)	697.44	697.61
Q Weir (cfs)		Max Chl Dpth (ft)	6.12	5.90
Weir Sta Lft (ft)		Vel Total (ft/s)	2.92	2.99
Weir Sta Rgt (ft)		Flow Area (sq ft)	356.29	347.90
Weir Submerg		Froude # Chl	0.24	0.26
Weir Max Depth (ft)		Specif Force (cu ft)	1051.10	982.62
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	4.65	4.39
Min El Prs (ft)	704.50	W.P. Total (ft)	90.07	93.43
Delta EG (ft)	0.23	Conv. Total (cfs)	38395.2	33791.0
Delta WS (ft)	0.26	Top Width (ft)	76.66	79.20
BR Open Area (sq ft)	669.17	Frctn Loss (ft)	0.04	0.06
BR Open Vel (ft/s)	2.99	C & E Loss (ft)	0.01	0.06
Coef of Q		Shear Total (lb/sq ft)	0.18	0.22
Br Sel Method	Energy only	Power Total (lb/ft s)	-602.38	-598.08

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy.
This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120302

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.78	Reach Len. (ft)	224.00	369.00	335.00
Crit W.S. (ft)	695.42	Flow Area (sq ft)	64.00	476.01	7.90
E.G. Slope (ft/ft)	0.001147	Area (sq ft)	242.56	476.01	435.65
Q Total (cfs)	1041.00	Flow (cfs)	41.28	998.15	1.57
Top Width (ft)	792.74	Top Width (ft)	282.15	89.22	421.38
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)	0.65	2.10	0.20
Max Chl Dpth (ft)	8.09	Hydr. Depth (ft)	1.91	5.34	0.33
Conv. Total (cfs)	30737.9	Conv. (cfs)	1219.0	29472.5	46.4
Length Wtd. (ft)	323.03	Wetted Per. (ft)	33.54	95.56	24.18
Min Ch El (ft)	692.69	Shear (lb/sq ft)	0.14	0.36	0.02
Alpha	1.17	Stream Power (lb/ft s)	679.00	0.00	242.31
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	42.75	15.62	19.13
C & E Loss (ft)	0.03	Cum SA (acres)	19.52	3.12	10.58

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119920

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.62	Reach Len. (ft)	831.00	681.00	453.00
Crit W.S. (ft)		Flow Area (sq ft)	1604.35	207.44	524.60
E.G. Slope (ft/ft)	0.000348	Area (sq ft)	1604.35	207.44	524.60
Q Total (cfs)	1038.00	Flow (cfs)	569.64	264.28	204.08
Top Width (ft)	1115.40	Top Width (ft)	841.86	33.49	240.05
Vel Total (ft/s)	0.44	Avg. Vel. (ft/s)	0.36	1.27	0.39
Max Chl Dpth (ft)	6.76	Hydr. Depth (ft)	1.91	6.19	2.19
Conv. Total (cfs)	55635.3	Conv. (cfs)	30532.0	14164.9	10938.4
Length Wtd. (ft)	722.94	Wetted Per. (ft)	842.04	35.96	240.08
Min Ch El (ft)	693.86	Shear (lb/sq ft)	0.04	0.13	0.05
Alpha	2.59	Stream Power (lb/ft s)	499.58	0.00	0.00
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	38.00	12.72	15.44
C & E Loss (ft)	0.00	Cum SA (acres)	16.63	2.60	8.04

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.41	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	1385.79	436.91	405.11
E.G. Slope (ft/ft)	0.000246	Area (sq ft)	1385.79	436.91	405.11
Q Total (cfs)	1038.00	Flow (cfs)	520.77	385.83	131.40
Top Width (ft)	799.10	Top Width (ft)	514.58	97.00	187.52
Vel Total (ft/s)	0.47	Avg. Vel. (ft/s)	0.38	0.88	0.32
Max Chl Dpth (ft)	7.63	Hydr. Depth (ft)	2.69	4.50	2.16
Conv. Total (cfs)	66202.6	Conv. (cfs)	33214.0	24608.0	8380.7
Length Wtd. (ft)	804.63	Wetted Per. (ft)	514.62	101.09	187.60
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.04	0.07	0.03
Alpha	1.72	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	9.48	7.69	10.60
C & E Loss (ft)	0.00	Cum SA (acres)	3.69	1.58	5.81

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.01	Reach Len. (ft)			
Crit W.S. (ft)	696.99	Flow Area (sq ft)	116.28	253.60	749.66
E.G. Slope (ft/ft)	0.001088	Area (sq ft)	116.28	253.60	749.66
Q Total (cfs)	1034.00	Flow (cfs)	66.58	534.32	433.10
Top Width (ft)	560.67	Top Width (ft)	69.97	45.00	445.70
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	0.57	2.11	0.58
Max Chl Dpth (ft)	7.80	Hydr. Depth (ft)	1.66	5.64	1.68
Conv. Total (cfs)	31340.7	Conv. (cfs)	2017.9	16195.4	13127.3
Length Wtd. (ft)		Wetted Per. (ft)	70.08	48.60	445.77
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.11	0.35	0.11
Alpha	2.88	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

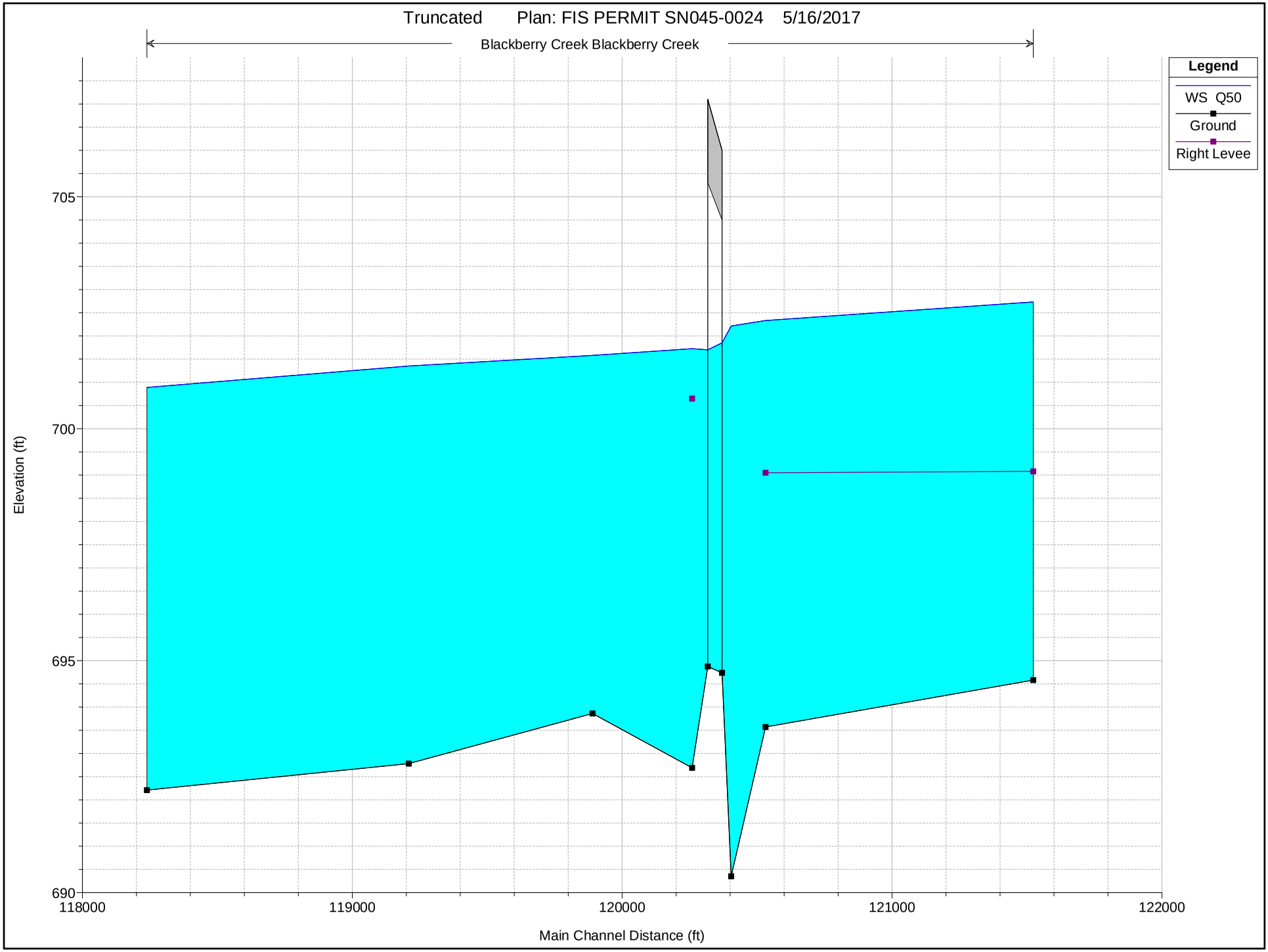
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q10	1071.00	694.58	701.59	699.27	701.60	0.000557	1.50	1860.04	879.88	0.11
Blackberry Creek	120564	Q10	1041.00	693.57	701.11	698.31	701.13	0.000544	1.36	1605.98	676.50	0.11
Blackberry Creek	120437	Q10	1041.00	690.35	701.04	692.81	701.07	0.000341	1.38	804.58	627.24	0.09
Blackberry Creek	120403		Bridge									
Blackberry Creek	120302	Q10	1041.00	692.69	700.78	695.42	700.84	0.001147	2.10	547.91	792.74	0.16
Blackberry Creek	119920	Q10	1038.00	693.86	700.62		700.63	0.000348	1.27	2336.39	1115.40	0.09
Blackberry Creek	119239	Q10	1038.00	692.78	700.41		700.41	0.000246	0.88	2227.81	799.10	0.07
Blackberry Creek	118239	Q10	1034.00	692.21	700.01	696.99	700.05	0.001088	2.11	1119.53	560.67	0.16

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q10	701.60	701.59	0.01	0.47	0.00	462.55	310.32	298.14	879.88
Blackberry Creek	120564	Q10	701.13	701.11	0.01	0.06	0.00	213.09	426.33	401.58	676.50
Blackberry Creek	120437	Q10	701.07	701.04	0.03	0.02	0.04		1005.08	35.92	627.24
Blackberry Creek	120403		Bridge								
Blackberry Creek	120302	Q10	700.84	700.78	0.07	0.19	0.03	41.28	998.15	1.57	792.74
Blackberry Creek	119920	Q10	700.63	700.62	0.01	0.21	0.00	569.64	264.28	204.08	1115.40
Blackberry Creek	119239	Q10	700.41	700.41	0.01	0.36	0.00	520.77	385.83	131.40	799.10
Blackberry Creek	118239	Q10	700.05	700.01	0.04			66.58	534.32	433.10	560.67

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PERMIT

River: Blackberry Creek Reach: Blackberry Creek RS: 120564 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120437 Profile: Q10
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q10
Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q10 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q10 Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120302 Profile: Q10
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q10
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.


Truncated Plan: FIS PERMIT SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q50
Ground
Right Levee
705
700
695
690
Elevation (ft)
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:12:03 PM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
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385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  702.74  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.73  * Reach Len. (ft)        *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  699.84  * Flow Area (sq ft)      * 1761.41  *  249.60  *  922.84  *
* E.G. Slope (ft/ft)     *0.000466  * Area (sq ft)           * 1761.41  *  249.60  *  922.84  *
* Q Total (cfs)          * 1824.00  * Flow (cfs)             *  926.10  *  387.07  *  510.82  *
* Top Width (ft)         *  985.24  * Top Width (ft)         *  638.60  *   37.00  *  309.65  *
* Vel Total (ft/s)       *    0.62  * Avg. Vel. (ft/s)       *    0.53  *    1.55  *    0.55  *
* Max Chl Dpth (ft)      *    8.15  * Hydr. Depth (ft)       *    2.76  *    6.75  *    2.98  *
* Conv. Total (cfs)      * 84484.2  * Conv. (cfs)            * 42895.3  * 17928.5  * 23660.4  *
* Length Wtd. (ft)       *  843.86  * Wetted Per. (ft)       *  638.65  *   40.10  *  309.75  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.08  *    0.18  *    0.09  *
* Alpha                  *    1.91  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.40  * Cum Volume (acre-ft)   *   85.52  *   29.21  *   56.64  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   29.76  *    4.75  *   20.55  *
*****************************************************************************************


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  702.35  * Element                *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.33  * Reach Len. (ft)        *  205.00  *  127.00  *  109.00  *
* Crit W.S. (ft)         *  699.20  * Flow Area (sq ft)      *  693.40  *  391.43  * 1381.99  *
* E.G. Slope (ft/ft)     *0.000473  * Area (sq ft)           *  693.40  *  391.43  * 1381.99  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  397.15  *  578.12  *  789.73  *
* Top Width (ft)         *  734.68  * Top Width (ft)         *  223.05  *   64.48  *  447.15  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)       *    0.57  *    1.48  *    0.57  *
* Max Chl Dpth (ft)      *    8.76  * Hydr. Depth (ft)       *    3.11  *    6.07  *    3.09  *
* Conv. Total (cfs)      * 81140.3  * Conv. (cfs)            * 18257.6  * 26577.2  * 36305.5  *
* Length Wtd. (ft)       *  131.33  * Wetted Per. (ft)       *  223.62  *   68.43  *  447.23  *
* Min Ch El (ft)         *  693.57  * Shear (lb/sq ft)       *    0.09  *    0.17  *    0.09  *
* Alpha                  *    1.83  * Stream Power (lb/ft s) *  670.00  *    0.00  *  141.50  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   65.35  *   21.91  *   33.78  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   22.67  *    3.60  *   13.05  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120437


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  702.27  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.06  * Wt. n-Val.             *          *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.21  * Reach Len. (ft)        *   34.00  *   34.00  *   34.00  *
* Crit W.S. (ft)         *  693.79  * Flow Area (sq ft)      *          *  845.08  *  107.59  *
* E.G. Slope (ft/ft)     *0.000581  * Area (sq ft)           *  516.05  *  882.96  * 1281.39  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *          * 1682.73  *   82.27  *
* Top Width (ft)         * 1031.30  * Top Width (ft)         *  486.28  *  108.98  *  436.04  *
* Vel Total (ft/s)       *    1.85  * Avg. Vel. (ft/s)       *          *    1.99  *    0.76  *
* Max Chl Dpth (ft)      *   11.86  * Hydr. Depth (ft)       *          *    8.46  *    4.10  *
* Conv. Total (cfs)      * 73215.1  * Conv. (cfs)            *          * 69802.2  *  3412.9  *
* Length Wtd. (ft)       *   34.00  * Wetted Per. (ft)       *          *  110.10  *   26.24  *
* Min Ch El (ft)         *  690.35  * Shear (lb/sq ft)       *          *    0.28  *    0.15  *
* Alpha                  *    1.11  * Stream Power (lb/ft s) *  618.00  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)   *   62.50  *   20.06  *   30.45  *
* C & E Loss (ft)        *    0.08  * Cum SA (acres)         *   21.01  *    3.35  *   11.94  *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

BRIDGE


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120403


BRIDGE OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. US. (ft)          *     702.27  * Element                *Inside BR US *Inside BR DS *
```

W.S. US. (ft)	702.21	E.G. Elev (ft)	702.17	702.07
Q Total (cfs)	1765.00	W.S. Elev (ft)	701.85	701.70
Q Bridge (cfs)	1765.00	Crit W.S. (ft)	698.36	698.64
Q Weir (cfs)		Max Chl Dpth (ft)	7.11	6.83
Weir Sta Lft (ft)		Vel Total (ft/s)	4.05	4.18
Weir Sta Rgt (ft)		Flow Area (sq ft)	435.55	422.48
Weir Submerg		Froude # Chl	0.31	0.35
Weir Max Depth (ft)		Specif Force (cu ft)	1587.61	1492.72
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	5.27	5.13
Min El Prs (ft)	704.50	W.P. Total (ft)	98.44	98.94
Delta EG (ft)	0.42	Conv. Total (cfs)	49860.0	43479.0
Delta WS (ft)	0.49	Top Width (ft)	82.72	82.31
BR Open Area (sq ft)	669.17	Frctn Loss (ft)	0.08	0.10
BR Open Vel (ft/s)	4.18	C & E Loss (ft)	0.02	0.12
Coef of Q		Shear Total (lb/sq ft)	0.35	0.44
Br Sel Method	Energy only	Power Total (lb/ft s)	-602.38	-598.08

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy.
This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120302

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.73	Reach Len. (ft)	224.00	369.00	335.00
Crit W.S. (ft)	696.48	Flow Area (sq ft)	95.82	560.65	30.84
E.G. Slope (ft/ft)	0.001804	Area (sq ft)	546.83	560.65	845.89
Q Total (cfs)	1765.00	Flow (cfs)	101.46	1644.47	19.08
Top Width (ft)	867.54	Top Width (ft)	337.14	89.22	441.19
Vel Total (ft/s)	2.57	Avg. Vel. (ft/s)	1.06	2.93	0.62
Max Chl Dpth (ft)	9.03	Hydr. Depth (ft)	2.86	6.28	1.28
Conv. Total (cfs)	41553.3	Conv. (cfs)	2388.6	38715.5	449.2
Length Wtd. (ft)	316.54	Wetted Per. (ft)	33.54	95.56	24.18
Min Ch El (ft)	692.69	Shear (lb/sq ft)	0.32	0.66	0.14
Alpha	1.23	Stream Power (lb/ft s)	679.00	0.00	242.31
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	61.84	18.54	29.30
C & E Loss (ft)	0.06	Cum SA (acres)	20.56	3.12	11.45

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119920

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.58	Reach Len. (ft)	831.00	681.00	453.00
Crit W.S. (ft)		Flow Area (sq ft)	2417.04	239.65	771.91
E.G. Slope (ft/ft)	0.000328	Area (sq ft)	2417.04	239.65	771.91
Q Total (cfs)	1759.00	Flow (cfs)	1088.22	326.05	344.73
Top Width (ft)	1156.36	Top Width (ft)	848.53	33.49	274.34
Vel Total (ft/s)	0.51	Avg. Vel. (ft/s)	0.45	1.36	0.45
Max Chl Dpth (ft)	7.72	Hydr. Depth (ft)	2.85	7.16	2.81
Conv. Total (cfs)	97193.7	Conv. (cfs)	60129.7	18016.2	19047.8
Length Wtd. (ft)	727.51	Wetted Per. (ft)	848.78	35.96	274.39
Min Ch El (ft)	693.86	Shear (lb/sq ft)	0.06	0.14	0.06
Alpha	1.93	Stream Power (lb/ft s)	499.58	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	54.22	15.15	23.08
C & E Loss (ft)	0.00	Cum SA (acres)	17.51	2.60	8.70

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.35	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	1888.96	528.31	587.39
E.G. Slope (ft/ft)	0.000298	Area (sq ft)	1888.96	528.31	587.39
Q Total (cfs)	1759.00	Flow (cfs)	918.46	582.73	257.81
Top Width (ft)	846.52	Top Width (ft)	550.15	97.00	199.37
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.49	1.10	0.44
Max Chl Dpth (ft)	8.57	Hydr. Depth (ft)	3.43	5.45	2.95
Conv. Total (cfs)	101947.5	Conv. (cfs)	53231.6	33773.7	14942.2
Length Wtd. (ft)	789.14	Wetted Per. (ft)	550.20	101.09	199.49
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.06	0.10	0.05
Alpha	1.62	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	13.15	9.15	16.02
C & E Loss (ft)	0.00	Cum SA (acres)	4.17	1.58	6.23

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	700.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.89	Reach Len. (ft)			
Crit W.S. (ft)	697.74	Flow Area (sq ft)	193.44	293.20	1156.72
E.G. Slope (ft/ft)	0.001232	Area (sq ft)	193.44	293.20	1156.72
Q Total (cfs)	1751.00	Flow (cfs)	122.60	724.05	904.35
Top Width (ft)	634.19	Top Width (ft)	109.75	45.00	479.44
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)	0.63	2.47	0.78
Max Chl Dpth (ft)	8.68	Hydr. Depth (ft)	1.76	6.52	2.41
Conv. Total (cfs)	49881.2	Conv. (cfs)	3492.5	20626.2	25762.6
Length Wtd. (ft)		Wetted Per. (ft)	109.87	48.60	479.53
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.14	0.46	0.19
Alpha	2.52	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q50	1824.00	694.58	702.73	699.84	702.74	0.000466	1.55	2933.86	985.24	0.11
Blackberry Creek	120564	Q50	1765.00	693.57	702.33	699.20	702.35	0.000473	1.48	2466.82	734.68	0.11
Blackberry Creek	120437	Q50	1765.00	690.35	702.21	693.79	702.27	0.000581	1.99	952.67	1031.30	0.12
Blackberry Creek	120403		Bridge									
Blackberry Creek	120302	Q50	1765.00	692.69	701.73	696.48	701.85	0.001804	2.93	687.31	867.54	0.21
Blackberry Creek	119920	Q50	1759.00	693.86	701.58		701.59	0.000328	1.36	3428.60	1156.36	0.09
Blackberry Creek	119239	Q50	1759.00	692.78	701.35		701.36	0.000298	1.10	3004.66	846.52	0.08
Blackberry Creek	118239	Q50	1751.00	692.21	700.89	697.74	700.93	0.001232	2.47	1643.36	634.19	0.17

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)

Blackberry Creek	121556	Q50		702.74	702.73	0.01	0.40	0.00	926.10	387.07	510.82	985.24
Blackberry Creek	120564	Q50		702.35	702.33	0.01	0.07	0.00	397.15	578.12	789.73	734.68
Blackberry Creek	120437	Q50		702.27	702.21	0.06	0.03	0.08		1682.73	82.27	1031.30
Blackberry Creek	120403			Bridge								
Blackberry Creek	120302	Q50		701.85	701.73	0.13	0.20	0.06	101.46	1644.47	19.08	867.54
Blackberry Creek	119920	Q50		701.59	701.58	0.01	0.23	0.00	1088.22	326.05	344.73	1156.36
Blackberry Creek	119239	Q50		701.36	701.35	0.01	0.42	0.00	918.46	582.73	257.81	846.52
Blackberry Creek	118239	Q50		700.93	700.89	0.04			122.60	724.05	904.35	634.19

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PERMIT

River: Blackberry Creek Reach: Blackberry Creek RS: 120437 Profile: Q50
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

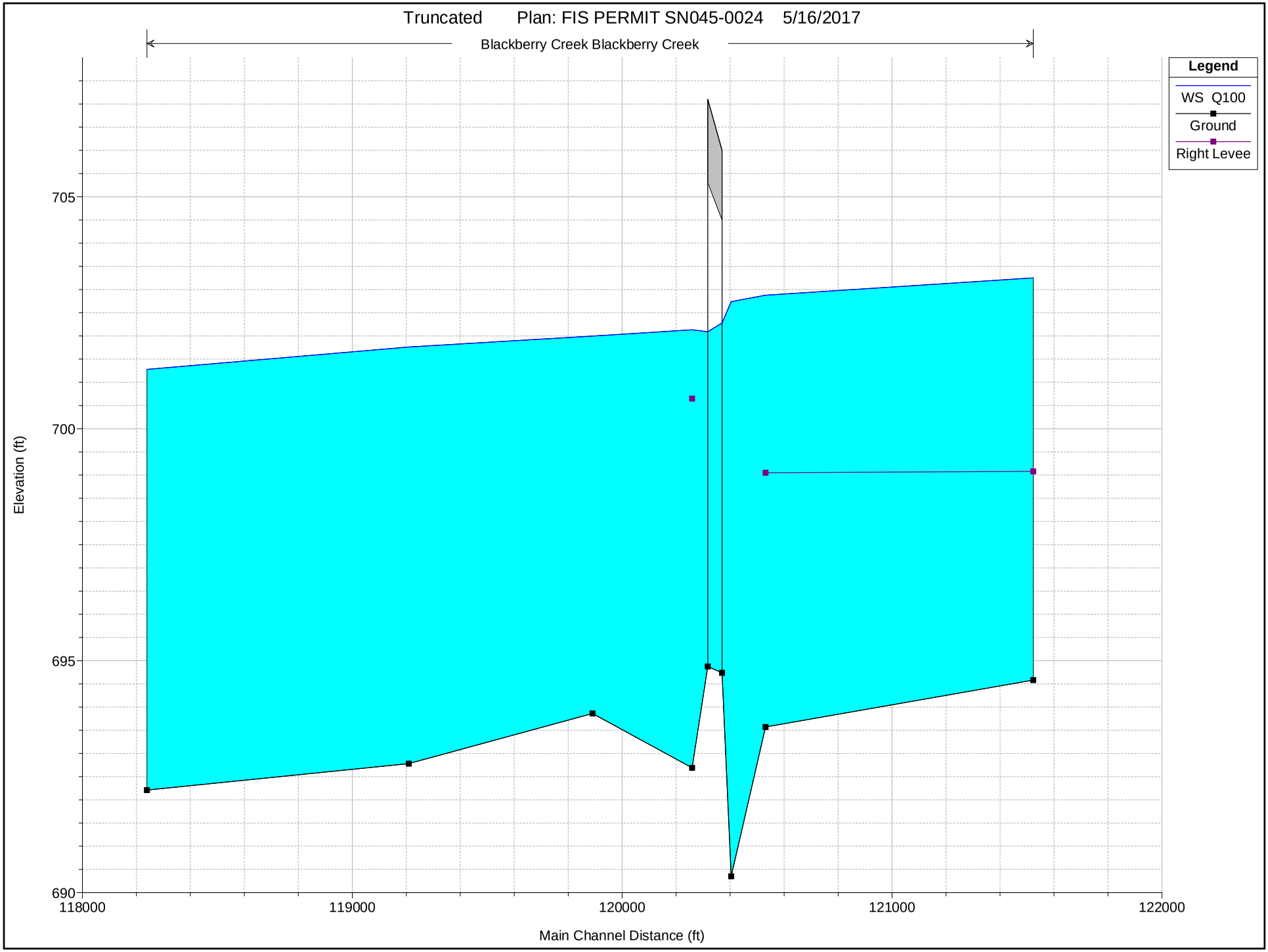
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q50
Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q50 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q50 Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 120302 Profile: Q50
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q50
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.


Truncated Plan: FIS PERMIT SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q100
Ground
Right Levee
705
700
695
690
Elevation (ft)
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:12:03 PM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

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385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  703.26  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  703.25  * Reach Len. (ft)        *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  700.02  * Flow Area (sq ft)      * 2097.58  *  268.81  * 1087.28  *
* E.G. Slope (ft/ft)     *0.000427  * Area (sq ft)           * 2097.58  *  268.81  * 1087.28  *
* Q Total (cfs)          * 2207.00  * Flow (cfs)             * 1164.18  *  419.21  *  623.62  *
* Top Width (ft)         * 1017.45  * Top Width (ft)         *  656.57  *   37.00  *  323.87  *
* Vel Total (ft/s)       *    0.64  * Avg. Vel. (ft/s)       *    0.56  *    1.56  *    0.57  *
* Max Chl Dpth (ft)      *    8.67  * Hydr. Depth (ft)       *    3.19  *    7.27  *    3.36  *
* Conv. Total (cfs)      *106802.3  * Conv. (cfs)            * 56337.3  * 20286.4  * 30178.5  *
* Length Wtd. (ft)       *  839.37  * Wetted Per. (ft)       *  656.63  *   40.10  *  323.98  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.09  *    0.18  *    0.09  *
* Alpha                  *    1.76  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.37  * Cum Volume (acre-ft)   *   99.01  *   31.34  *   66.28  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   30.54  *    4.75  *   21.47  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  702.89  * Element                *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.88  * Reach Len. (ft)        *  205.00  *  127.00  *  109.00  *
* Crit W.S. (ft)         *  699.56  * Flow Area (sq ft)      *  819.65  *  426.66  * 1629.89  *
* E.G. Slope (ft/ft)     *0.000451  * Area (sq ft)           *  819.65  *  426.66  * 1629.89  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             *  484.59  *  651.92  *  997.49  *
* Top Width (ft)         *  766.58  * Top Width (ft)         *  242.75  *   64.48  *  459.35  *
* Vel Total (ft/s)       *    0.74  * Avg. Vel. (ft/s)       *    0.59  *    1.53  *    0.61  *
* Max Chl Dpth (ft)      *    9.31  * Hydr. Depth (ft)       *    3.38  *    6.62  *    3.55  *
* Conv. Total (cfs)      *100433.8  * Conv. (cfs)            * 22806.7  * 30681.5  * 46945.6  *
* Length Wtd. (ft)       *  131.19  * Wetted Per. (ft)       *  243.33  *   68.43  *  459.43  *
* Min Ch El (ft)         *  693.57  * Shear (lb/sq ft)       *    0.09  *    0.18  *    0.10  *
* Alpha                  *    1.76  * Stream Power (lb/ft s) *  670.00  *    0.00  *  141.50  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   75.03  *   23.42  *   39.33  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *   23.15  *    3.60  *   13.70  *
*****************************************************************************************************
```

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120437

CROSS SECTION OUTPUT Profile #Q100

```
*****************************************************************************************************
* E.G. Elev (ft)         *  702.81  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.08  * Wt. n-Val.             *          *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.74  * Reach Len. (ft)        *   34.00  *   34.00  *   34.00  *
* Crit W.S. (ft)         *  694.24  * Flow Area (sq ft)      *          *  897.49  *  121.36  *
* E.G. Slope (ft/ft)     *0.000688  * Area (sq ft)           *  775.95  *  940.15  * 1514.02  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             *          * 2024.55  *  109.45  *
* Top Width (ft)         * 1061.75  * Top Width (ft)         *  504.12  *  108.98  *  448.64  *
* Vel Total (ft/s)       *    2.09  * Avg. Vel. (ft/s)       *          *    2.26  *    0.90  *
* Max Chl Dpth (ft)      *   12.39  * Hydr. Depth (ft)       *          *    8.99  *    4.63  *
* Conv. Total (cfs)      * 81336.7  * Conv. (cfs)            *          * 77165.2  *  4171.5  *
* Length Wtd. (ft)       *   34.00  * Wetted Per. (ft)       *          *  110.10  *   26.24  *
* Min Ch El (ft)         *  690.35  * Shear (lb/sq ft)       *          *    0.35  *    0.20  *
* Alpha                  *    1.11  * Stream Power (lb/ft s) *  618.00  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)   *   71.28  *   21.42  *   35.40  *
* C & E Loss (ft)        *    0.10  * Cum SA (acres)         *   21.40  *    3.35  *   12.57  *
*****************************************************************************************************
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120403

BRIDGE OUTPUT Profile #Q100

```
*****************************************************************************************************
* E.G. US. (ft)          *     702.81  * Element               *Inside BR US *Inside BR DS *
```

W.S. US. (ft)	702.74	E.G. Elev (ft)	702.68	702.57
Q Total (cfs)	2134.00	W.S. Elev (ft)	702.28	702.09
Q Bridge (cfs)	2134.00	Crit W.S. (ft)	698.78	699.08
Q Weir (cfs)		Max Chl Dpth (ft)	7.54	7.21
Weir Sta Lft (ft)		Vel Total (ft/s)	4.53	4.69
Weir Sta Rgt (ft)		Flow Area (sq ft)	471.51	454.72
Weir Submerg		Froude # Chl	0.34	0.39
Weir Max Depth (ft)		Specif Force (cu ft)	1870.79	1760.30
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	5.53	5.44
Min El Prs (ft)	704.50	W.P. Total (ft)	102.04	101.22
Delta EG (ft)	0.53	Conv. Total (cfs)	55130.2	47815.6
Delta WS (ft)	0.61	Top Width (ft)	85.33	83.56
BR Open Area (sq ft)	669.17	Frctn Loss (ft)	0.09	0.12
BR Open Vel (ft/s)	4.69	C & E Loss (ft)	0.02	0.16
Coef of Q		Shear Total (lb/sq ft)	0.43	0.56
Br Sel Method	Energy only	Power Total (lb/ft s)	-602.38	-598.08

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy.
This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120302

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.13	Reach Len. (ft)	224.00	369.00	335.00
Crit W.S. (ft)	696.96	Flow Area (sq ft)	109.48	597.01	40.70
E.G. Slope (ft/ft)	0.002089	Area (sq ft)	687.02	597.01	1026.66
Q Total (cfs)	2134.00	Flow (cfs)	136.35	1965.06	32.59
Top Width (ft)	886.02	Top Width (ft)	350.86	89.22	445.94
Vel Total (ft/s)	2.86	Avg. Vel. (ft/s)	1.25	3.29	0.80
Max Chl Dpth (ft)	9.44	Hydr. Depth (ft)	3.26	6.69	1.68
Conv. Total (cfs)	46686.1	Conv. (cfs)	2983.0	42990.0	713.0
Length Wtd. (ft)	314.71	Wetted Per. (ft)	33.54	95.56	24.18
Min Ch El (ft)	692.69	Shear (lb/sq ft)	0.43	0.81	0.22
Alpha	1.24	Stream Power (lb/ft s)	679.00	0.00	242.31
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	70.41	19.81	34.03
C & E Loss (ft)	0.07	Cum SA (acres)	20.93	3.12	12.06

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119920

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.00	Reach Len. (ft)	831.00	681.00	453.00
Crit W.S. (ft)		Flow Area (sq ft)	2772.15	253.64	889.64
E.G. Slope (ft/ft)	0.000322	Area (sq ft)	2772.15	253.64	889.64
Q Total (cfs)	2126.00	Flow (cfs)	1353.03	355.41	417.56
Top Width (ft)	1174.71	Top Width (ft)	851.43	33.49	289.79
Vel Total (ft/s)	0.54	Avg. Vel. (ft/s)	0.49	1.40	0.47
Max Chl Dpth (ft)	8.14	Hydr. Depth (ft)	3.26	7.57	3.07
Conv. Total (cfs)	118459.2	Conv. (cfs)	75389.9	19803.2	23266.1
Length Wtd. (ft)	729.56	Wetted Per. (ft)	851.71	35.96	289.85
Min Ch El (ft)	693.86	Shear (lb/sq ft)	0.07	0.14	0.06
Alpha	1.77	Stream Power (lb/ft s)	499.58	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	61.51	16.21	26.66
C & E Loss (ft)	0.00	Cum SA (acres)	17.84	2.60	9.23

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.76	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	2117.11	568.05	672.52
E.G. Slope (ft/ft)	0.000320	Area (sq ft)	2117.11	568.05	672.52
Q Total (cfs)	2126.00	Flow (cfs)	1132.51	681.46	312.02
Top Width (ft)	882.24	Top Width (ft)	563.67	97.00	221.57
Vel Total (ft/s)	0.63	Avg. Vel. (ft/s)	0.53	1.20	0.46
Max Chl Dpth (ft)	8.98	Hydr. Depth (ft)	3.76	5.86	3.04
Conv. Total (cfs)	118902.8	Conv. (cfs)	63339.1	38112.9	17450.9
Length Wtd. (ft)	783.20	Wetted Per. (ft)	563.73	101.09	221.70
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.07	0.11	0.06
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	14.88	9.78	18.54
C & E Loss (ft)	0.00	Cum SA (acres)	4.34	1.58	6.57

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.28	Reach Len. (ft)			
Crit W.S. (ft)	698.98	Flow Area (sq ft)	239.14	310.75	1346.63
E.G. Slope (ft/ft)	0.001251	Area (sq ft)	239.14	310.75	1346.63
Q Total (cfs)	2116.00	Flow (cfs)	162.43	803.62	1149.95
Top Width (ft)	663.05	Top Width (ft)	123.66	45.00	494.40
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)	0.68	2.59	0.85
Max Chl Dpth (ft)	9.07	Hydr. Depth (ft)	1.93	6.91	2.72
Conv. Total (cfs)	59836.2	Conv. (cfs)	4593.3	22724.7	32518.1
Length Wtd. (ft)		Wetted Per. (ft)	123.78	48.60	494.48
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.15	0.50	0.21
Alpha	2.39	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q100	2207.00	694.58	703.25	700.02	703.26	0.000427	1.56	3453.66	1017.45	0.10
Blackberry Creek	120564	Q100	2134.00	693.57	702.88	699.56	702.89	0.000451	1.53	2876.20	766.58	0.10
Blackberry Creek	120437	Q100	2134.00	690.35	702.74	694.24	702.81	0.000688	2.26	1018.85	1061.75	0.13
Blackberry Creek	120403		Bridge									
Blackberry Creek	120302	Q100	2134.00	692.69	702.13	696.96	702.29	0.002089	3.29	747.19	886.02	0.22
Blackberry Creek	119920	Q100	2126.00	693.86	702.00		702.01	0.000322	1.40	3915.43	1174.71	0.09
Blackberry Creek	119239	Q100	2126.00	692.78	701.76		701.77	0.000320	1.20	3357.67	882.24	0.09
Blackberry Creek	118239	Q100	2116.00	692.21	701.28	698.98	701.33	0.001251	2.59	1896.52	663.05	0.17

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)

Blackberry Creek	121556	Q100		703.26	703.25	0.01	0.37	0.00	1164.18	419.21	623.62	1017.45
Blackberry Creek	120564	Q100		702.89	702.88	0.02	0.07	0.01	484.59	651.92	997.49	766.58
Blackberry Creek	120437	Q100		702.81	702.74	0.08	0.03	0.10		2024.55	109.45	1061.75
Blackberry Creek	120403			Bridge								
Blackberry Creek	120302	Q100		702.29	702.13	0.16	0.21	0.07	136.35	1965.06	32.59	886.02
Blackberry Creek	119920	Q100		702.01	702.00	0.01	0.23	0.00	1353.03	355.41	417.56	1174.71
Blackberry Creek	119239	Q100		701.77	701.76	0.01	0.44	0.00	1132.51	681.46	312.02	882.24
Blackberry Creek	118239	Q100		701.33	701.28	0.05			162.43	803.62	1149.95	663.05

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PERMIT

River: Blackberry Creek Reach: Blackberry Creek RS: 120437 Profile: Q100
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q100
Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q100 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q100 Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 120302 Profile: Q100
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q100
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
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Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:12:03 PM

Project in English units

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399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
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437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
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3       707.95
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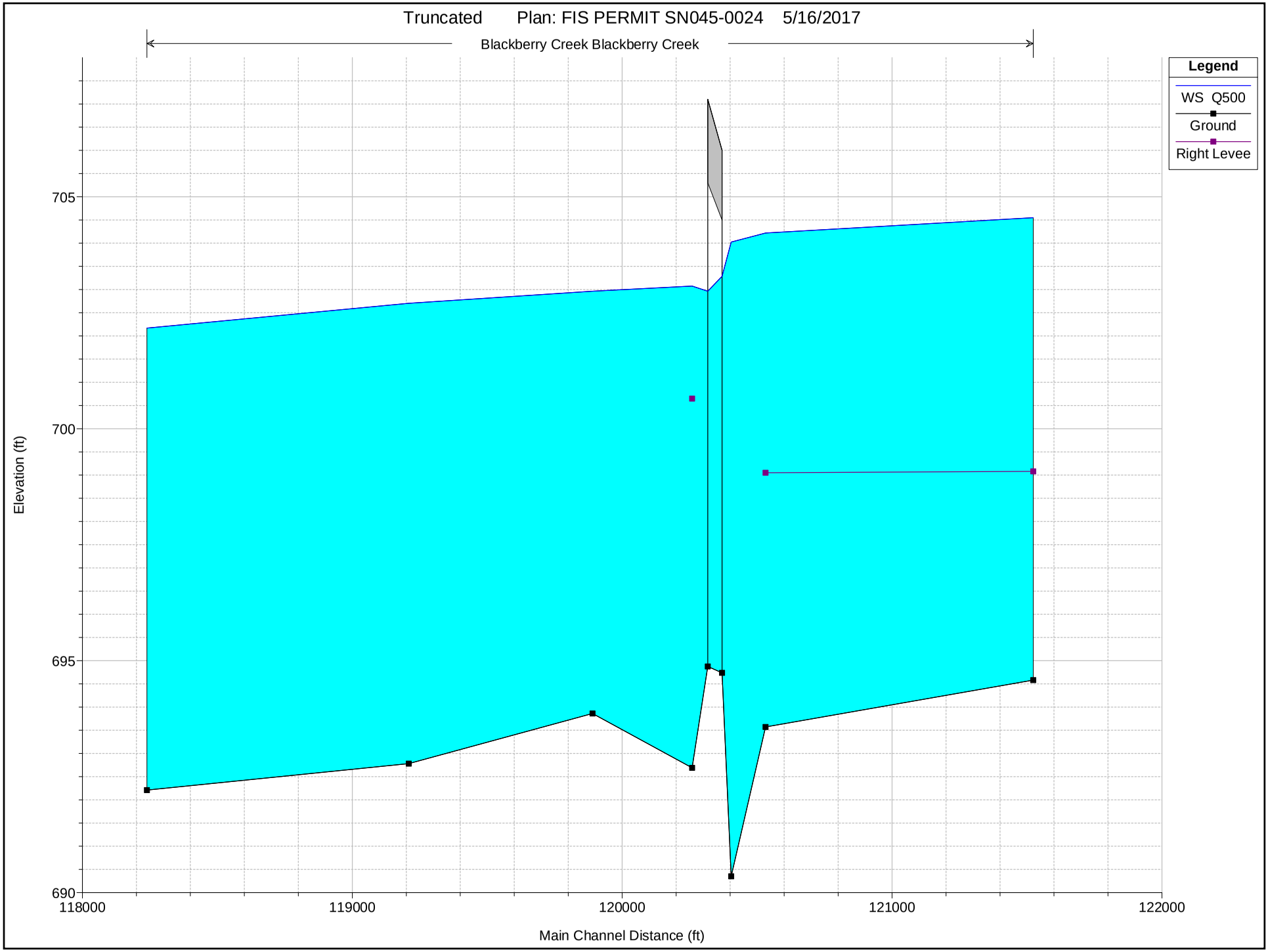
Truncated Plan: FIS PERMIT SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q500
Ground
Right Levee
705
700
695
690
Elevation (ft)
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
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PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 5:12:03 PM

Project in English units

Project Description:
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263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
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539.2   756.8
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687.9   756.7
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401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************
* E.G. Elev (ft)         *  704.56  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.            *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  704.55  * Reach Len. (ft)       *  716.00  *  992.00  *  864.00  *
* Crit W.S. (ft)         *  700.44  * Flow Area (sq ft)     * 2995.98  *  316.81  * 1530.64  *
* E.G. Slope (ft/ft)     *0.000366  * Area (sq ft)          * 2995.98  *  316.81  * 1530.64  *
* Q Total (cfs)          * 3269.00  * Flow (cfs)            * 1807.30  *  510.33  *  951.37  *
* Top Width (ft)         * 1134.11  * Top Width (ft)        *  737.13  *   37.00  *  359.98  *
* Vel Total (ft/s)       *    0.67  * Avg. Vel. (ft/s)      *    0.60  *    1.61  *    0.62  *
* Max Chl Dpth (ft)      *    9.97  * Hydr. Depth (ft)      *    4.06  *    8.56  *    4.25  *
* Conv. Total (cfs)      *170886.2  * Conv. (cfs)           * 94476.0  * 26677.5  * 49732.7  *
* Length Wtd. (ft)       *  832.88  * Wetted Per. (ft)      *  737.20  *   40.10  *  360.11  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)      *    0.09  *    0.18  *    0.10  *
* Alpha                  *    1.58  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.32  * Cum Volume (acre-ft)  *  132.75  *   36.35  *   91.30  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   33.24  *    4.75  *   24.28  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120564


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************
* E.G. Elev (ft)         *  704.24  * Element               *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.02	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	704.22	Reach Len. (ft)	205.00	127.00	109.00
Crit W.S. (ft)	699.91	Flow Area (sq ft)	1189.80	513.13	2262.98
E.G. Slope (ft/ft)	0.000413	Area (sq ft)	1189.80	513.13	2262.98
Q Total (cfs)	3157.00	Flow (cfs)	719.08	848.46	1589.46
Top Width (ft)	869.28	Top Width (ft)	319.29	64.48	485.51
Vel Total (ft/s)	0.80	Avg. Vel. (ft/s)	0.60	1.65	0.70
Max Chl Dpth (ft)	10.65	Hydr. Depth (ft)	3.73	7.96	4.66
Conv. Total (cfs)	155275.8	Conv. (cfs)	35367.7	41731.3	78176.8
Length Wtd. (ft)	130.80	Wetted Per. (ft)	319.88	68.43	485.63
Min Ch El (ft)	693.57	Shear (lb/sq ft)	0.10	0.19	0.12
Alpha	1.68	Stream Power (lb/ft s)	670.00	0.00	141.50
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	98.35	26.90	53.67
C & E Loss (ft)	0.01	Cum SA (acres)	24.56	3.60	15.90

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120437

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	704.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.070	0.120
W.S. Elev (ft)	704.02	Reach Len. (ft)	34.00	34.00	34.00
Crit W.S. (ft)	695.36	Flow Area (sq ft)		1025.76	155.05
E.G. Slope (ft/ft)	0.000945	Area (sq ft)	1451.54	1080.14	2105.57
Q Total (cfs)	3157.00	Flow (cfs)		2964.05	192.95
Top Width (ft)	1129.00	Top Width (ft)	547.60	108.98	472.42
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)		2.89	1.24
Max Chl Dpth (ft)	13.67	Hydr. Depth (ft)		10.27	5.91
Conv. Total (cfs)	102683.4	Conv. (cfs)		96407.5	6275.8
Length Wtd. (ft)	34.00	Wetted Per. (ft)		110.10	26.24
Min Ch El (ft)	690.35	Shear (lb/sq ft)		0.55	0.35
Alpha	1.11	Stream Power (lb/ft s)	618.00	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	92.13	24.57	48.21
C & E Loss (ft)	0.16	Cum SA (acres)	22.52	3.35	14.70

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120403

BRIDGE OUTPUT Profile #Q500

E.G. US. (ft)	704.15	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	704.02	E.G. Elev (ft)	703.94	703.76
Q Total (cfs)	3157.00	W.S. Elev (ft)	703.29	702.96
Q Bridge (cfs)	3157.00	Crit W.S. (ft)	699.84	700.16
Q Weir (cfs)		Max Chl Dpth (ft)	8.55	8.09
Weir Sta Lft (ft)		Vel Total (ft/s)	5.64	5.97
Weir Sta Rgt (ft)		Flow Area (sq ft)	559.81	529.14
Weir Submerg		Froude # Chl	0.39	0.47
Weir Max Depth (ft)		Specif Force (cu ft)	2683.22	2518.26
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	6.24	6.10
Min El Prs (ft)	704.50	W.P. Total (ft)	108.75	106.66
Delta EG (ft)	0.83	Conv. Total (cfs)	68327.1	58076.2
Delta WS (ft)	0.95	Top Width (ft)	89.70	86.75
BR Open Area (sq ft)	669.17	Frctn Loss (ft)	0.13	0.17
BR Open Vel (ft/s)	5.97	C & E Loss (ft)	0.04	0.28
Coef of Q		Shear Total (lb/sq ft)	0.69	0.92
Br Sel Method	Energy only	Power Total (lb/ft s)	-602.38	-598.08

Warning: For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy.
This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120302

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	703.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	703.07	Reach Len. (ft)	224.00	369.00	335.00
Crit W.S. (ft)	698.60	Flow Area (sq ft)	141.08	681.06	63.47
E.G. Slope (ft/ft)	0.002807	Area (sq ft)	1023.55	681.06	1451.92
Q Total (cfs)	3157.00	Flow (cfs)	241.14	2836.62	79.24
Top Width (ft)	908.09	Top Width (ft)	361.93	89.22	456.94
Vel Total (ft/s)	3.56	Avg. Vel. (ft/s)	1.71	4.17	1.25
Max Chl Dpth (ft)	10.38	Hydr. Depth (ft)	4.21	7.63	2.63
Conv. Total (cfs)	59590.5	Conv. (cfs)	4551.8	53543.1	1495.7
Length Wtd. (ft)	311.41	Wetted Per. (ft)	33.54	95.56	24.18
Min Ch El (ft)	692.69	Shear (lb/sq ft)	0.74	1.25	0.46
Alpha	1.25	Stream Power (lb/ft s)	679.00	0.00	242.31
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	90.74	22.74	46.30
C & E Loss (ft)	0.12	Cum SA (acres)	22.03	3.12	14.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119920

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	702.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.97	Reach Len. (ft)	831.00	681.00	453.00
Crit W.S. (ft)		Flow Area (sq ft)	3599.34	286.05	1219.22
E.G. Slope (ft/ft)	0.000329	Area (sq ft)	3599.34	286.05	1219.22
Q Total (cfs)	3144.00	Flow (cfs)	2101.36	438.78	603.87
Top Width (ft)	1263.69	Top Width (ft)	858.14	33.49	372.06
Vel Total (ft/s)	0.62	Avg. Vel. (ft/s)	0.58	1.53	0.50
Max Chl Dpth (ft)	9.11	Hydr. Depth (ft)	4.19	8.54	3.28
Conv. Total (cfs)	173384.0	Conv. (cfs)	115884.7	24197.6	33301.7
Length Wtd. (ft)	733.47	Wetted Per. (ft)	858.50	35.96	372.15
Min Ch El (ft)	693.86	Shear (lb/sq ft)	0.09	0.16	0.07
Alpha	1.59	Stream Power (lb/ft s)	499.58	0.00	0.00
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	78.85	18.64	36.03
C & E Loss (ft)	0.00	Cum SA (acres)	18.89	2.60	10.99

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	702.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.70	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)	2662.92	659.46	913.67
E.G. Slope (ft/ft)	0.000373	Area (sq ft)	2662.92	659.46	913.67
Q Total (cfs)	3144.00	Flow (cfs)	1730.09	944.05	469.86
Top Width (ft)	981.45	Top Width (ft)	594.77	97.00	289.69
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.65	1.43	0.51
Max Chl Dpth (ft)	9.92	Hydr. Depth (ft)	4.48	6.80	3.15
Conv. Total (cfs)	162763.6	Conv. (cfs)	89566.2	48873.0	24324.4
Length Wtd. (ft)	772.95	Wetted Per. (ft)	594.84	101.09	289.82
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.10	0.15	0.07
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	19.12	11.25	24.94
C & E Loss (ft)	0.00	Cum SA (acres)	5.03	1.58	7.55

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	702.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.17	Reach Len. (ft)			
Crit W.S. (ft)	699.46	Flow Area (sq ft)	365.35	350.80	1802.10
E.G. Slope (ft/ft)	0.001329	Area (sq ft)	365.35	350.80	1802.10
Q Total (cfs)	3129.00	Flow (cfs)	280.16	1014.08	1834.76
Top Width (ft)	778.97	Top Width (ft)	201.91	45.00	532.06
Vel Total (ft/s)	1.24	Avg. Vel. (ft/s)	0.77	2.89	1.02
Max Chl Dpth (ft)	9.96	Hydr. Depth (ft)	1.81	7.80	3.39
Conv. Total (cfs)	85817.5	Conv. (cfs)	7683.8	27812.7	50321.0
Length Wtd. (ft)		Wetted Per. (ft)	202.05	48.60	532.16
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.15	0.60	0.28
Alpha	2.18	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q500	3269.00	694.58	704.55	700.44	704.56	0.000366	1.61	4843.43	1134.11	0.10
Blackberry Creek	120564	Q500	3157.00	693.57	704.22	699.91	704.24	0.000413	1.65	3965.91	869.28	0.10
Blackberry Creek	120437	Q500	3157.00	690.35	704.02	695.36	704.15	0.000945	2.89	1180.81	1129.00	0.16
Blackberry Creek	120403		Bridge									
Blackberry Creek	120302	Q500	3157.00	692.69	703.07	698.60	703.32	0.002807	4.17	885.61	908.09	0.27
Blackberry Creek	119920	Q500	3144.00	693.86	702.97		702.97	0.000329	1.53	5104.60	1263.69	0.09
Blackberry Creek	119239	Q500	3144.00	692.78	702.70		702.72	0.000373	1.43	4236.04	981.45	0.10
Blackberry Creek	118239	Q500	3129.00	692.21	702.17	699.46	702.22	0.001329	2.89	2518.25	778.97	0.18

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q500	704.56	704.55	0.01	0.32	0.00	1807.30	510.33	951.37	1134.11
Blackberry Creek	120564	Q500	704.24	704.22	0.02	0.08	0.01	719.08	848.46	1589.46	869.28
Blackberry Creek	120437	Q500	704.15	704.02	0.12	0.05	0.16		2964.05	192.95	1129.00
Blackberry Creek	120403		Bridge								
Blackberry Creek	120302	Q500	703.32	703.07	0.25	0.23	0.12	241.14	2836.62	79.24	908.09
Blackberry Creek	119920	Q500	702.97	702.97	0.01	0.26	0.00	2101.36	438.78	603.87	1263.69
Blackberry Creek	119239	Q500	702.72	702.70	0.01	0.49	0.00	1730.09	944.05	469.86	981.45
Blackberry Creek	118239	Q500	702.22	702.17	0.05			280.16	1014.08	1834.76	778.97

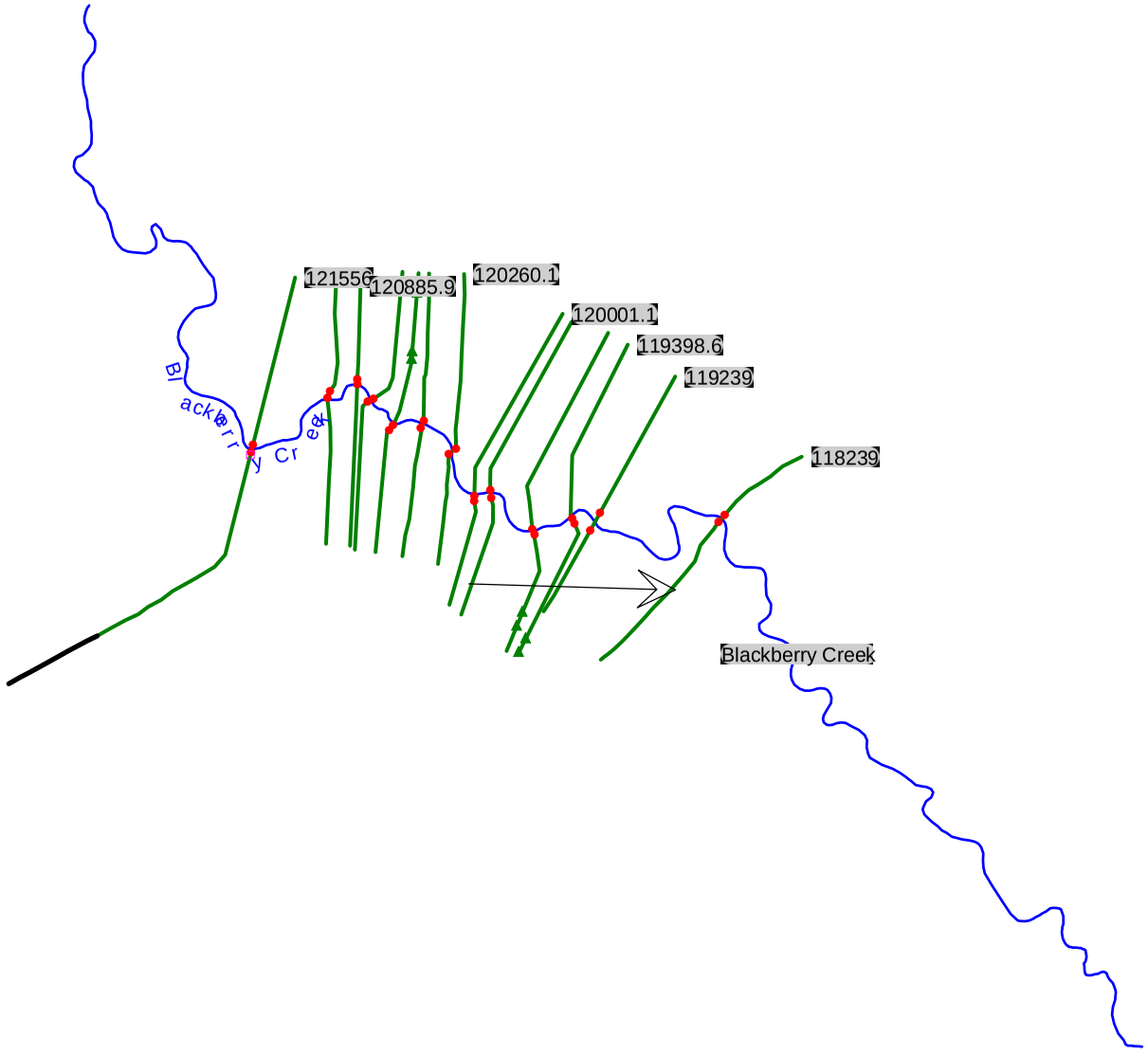
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : PERMIT

River: Blackberry Creek Reach: Blackberry Creek RS: 120564 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 120437 Profile: Q500
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q500
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This is not physically possible, the momentum answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q500 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q500 Downstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120302 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 118239 Profile: Q500
Warning:Divided flow computed for this cross-section.

EXHIBIT J

HEC-RAS MODEL REPORT (DESIGN)

NATURAL CONDITIONS
(DESIGN MODEL)


121556
120885.9
120260.1
120001.1
119398.6
119239
118239
Blackberry Creek
Blackberry Creek

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 6:15:59 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.
```

```
*****************************************************************************

PLAN DATA

Plan Title: EX DESIGN SN045-0024 (NATURAL)
Plan File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.p12

           Geometry Title: EX DESIGN SN045-0024 (NATURAL)
           Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g11

           Flow Title    : EX DESIGN SN045-0024
           Flow File     : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f06

Plan Description:
DESIGN Natural Model


Plan Summary Information:
Number of:  Cross Sections =   13    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


*****************************************************************************

FLOW DATA

Flow Title: EX DESIGN SN045-0024
Flow File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f06

Flow Data (cfs)
*****************************************************************************************************************************
*********************
* River           Reach           RS      *              Q2             Q10             Q50            Q100
Q200            Q500 *
* Blackberry CreekBlackberry Creek121556  *             457            1071            1824            2207
2677            3269 *
* Blackberry CreekBlackberry Creek120466.6*             449            1041            1765            2134
2586            3157 *
* Blackberry CreekBlackberry Creek118239  *             447            1034            1751            2116
2564            3129 *
*****************************************************************************************************************************
*********************

Boundary Conditions
*****************************************************************************************************************
* River           Reach           Profile          *            Upstream                Downstream    *
*****************************************************************************************************************
* Blackberry CreekBlackberry CreekQ2               *                                Known WS = 698.84 *
* Blackberry CreekBlackberry CreekQ10              *                                Known WS = 700.01 *
* Blackberry CreekBlackberry CreekQ50              *                                Known WS = 700.89 *
* Blackberry CreekBlackberry CreekQ100             *                                Known WS = 701.28 *
* Blackberry CreekBlackberry CreekQ200             *                                Known WS = 701.66 *
* Blackberry CreekBlackberry CreekQ500             *                                Known WS = 702.17 *
*****************************************************************************************************************

*****************************************************************************

GEOMETRY DATA

Geometry Title: EX DESIGN SN045-0024 (NATURAL)
```

Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g11

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 121556

INPUT
Description: IDNR 1985. B11424 Reach Lengths Not Including RT 47

XS extended
by DS; new XY data from 2004 TIN added Jan. 2005 by BW; shcematic
updated 2-11-05 by BW to include xs endpoints
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.68	60.07	705.38	110.1	704.28	160.12	703.78	212.07	702.28
255.01	701.58	300	701.08	348.08	700.18	397.06	700.08	425.04	700.48
472.1	700.08	523.03	699.88	591.09	699.48	647.04	698.78	695	699.58
749.03	698.78	802.01	698.98	835.01	698.48	841.07	696.98	848.03	697.28
850.09	695.38	855.12	695.08	860.02	694.68	866.08	694.58	870.07	695.38
872.01	698.88	886.06	699.08	915.06	697.48	961.99	698.38	1015.11	699.28
1065.01	700.18	1115.02	701.18	1172.01	702.38	1224.08	704.28	1280.03	706.18
1330.05	708.68	1384.08	711.98	1462.4	719.7	1570.2	720.3	1697	713.5
1765.9	711.4	1838.7	712.1	1897.5	713.4	1964.8	714.6	2046.8	713.6
2123.9	708.8	2197.4	706.1	2279.5	705	2377.8	704.3	2466.9	704.6
2546.8	705	2609.8	705.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	835.01	.07	872.01	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
835.01	872.01	480	483.5	500	.1	.3

Right Levee Station= 886 Elevation= 699.08
Blocked Obstructions num= 1

Sta L	Sta R	Elev
2123	2609.8	707.5

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 121072.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	708	5.24	707.96	12.73	706.18	17.05	705.94	25.16	707.64
27.62	707.86	60.51	708.57	97.87	709.19	116.4	708.9	133.16	707.56
155.86	707.43	180.84	705.15	211.89	703.7	235.56	701.97	267.21	700.01
298.76	699.6	325.19	699.75	340.55	699.4	370.5	699.52	386.34	699.4
409.14	699.8	425.31	699.96	447.47	699.83	460.53	699.93	477.88	700.01
517.09	698.74	519.87	696.13	522.78	695.62	526.41	694.73	530.89	694.41
536.12	694.47	542.35	694.57	546.92	695.62	548.34	696.18	552.05	699.06
567.89	700.13	623.77	700.13	653.87	700.28	695.23	699.25	719.96	699.98
746.13	700.15	782	700.3	811.67	700.1	830.11	700.02	853.62	700.17
860.98	700.01	890.17	699.96	912.26	699.79	923.25	700.16	951.74	699.89
982.52	699.71	1011.26	699.3	1037.25	699.03	1070.56	699.39	1085.24	699.46
1100.75	699.8	1117.33	701.27	1132.42	702.97	1142.94	704.08	1165.19	705.68
1197.52	706.41	1215.32	706.92	1234.85	707.58	1259.12	709		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	517.09	.0728	552.05	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
517.09	552.05	188	188	188	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.63	17.22	706.62	43.19	706.98	62.88	707.98	81.02	709.67
104.83	709.35	114.94	707.89	126.48	707.34	146.56	706.14	156.69	705.51
195.23	704.73	218.83	703.98	243.37	703.63	263.32	703.1	282.81	702.6
309.57	702.29	322.13	701.34	332.48	700.26	344.13	699.66	365.33	699.7
376.08	699.51	392.5	699.69	415.72	699.51	437.84	699.77	452.23	699.71
453.2	699.72	454.19	699.7	456.02	695.87	457.08	695.48	460.85	694.92
466.6	694.97	471.06	695.15	473.24	695.69	476.54	697.92	479.24	697.95
487.29	698.45	490.65	699.41	517.99	700.09	592.57	699.45	637.86	700.05
662.52	700.08	667.78	700.1	675.2	699.54	683.16	699.63	688.46	700.24
708.02	700.67	720.49	700.69	734.87	700.13	750.7	699.96	765.5	700.1
775.63	700.27	783.42	699.94	794	701.02	819.86	699.7	845.45	699.94
863.06	700.15	892.44	699.65	901.57	699.95	926.62	699.45	947.55	700.34
964.7	699.22	991.75	699.97	1039.48	698.82	1078.82	699.58	1113.38	700.65
1133.95	702.27	1149.2	703.25	1162.27	704.15	1180.51	704.88	1188.67	705.69
1202.46	706.05	1215.79	706.69	1231.74	707.37	1239.86	707.68	1251.28	708.05
1259.66	708.52								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	452.23	.0728	476.54	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
452.23	476.54	130	103	100	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	706.05	19.07	706.01	44.79	705.72	70.14	704.32	91.9	703.88
101.21	705.6	108.19	706.65	142.57	706.69	160.15	705.47	175.17	704.56
201.67	703.56	217.43	702.97	232.8	702.75	254.16	702.72	262.05	702.76
265.63	702.93	273.61	703.04	281.56	702.95	294.37	702.89	298.17	703.11
305.96	703.17	320.62	703.08	326.55	702.92	335.94	703.59	345.24	704.12
364.69	703.5	404.25	702.61	410.99	702.41	435.77	702.87	460.25	702.51
475.73	701.8	489.63	701.27	515.17	699.19	520.55	698.74	530.32	699.51
570.7	698.93	597.38	698.83	614.14	698.82	628.48	699.32	641.18	699.07
656.58	698.87	659.93	698.34	661.96	696.33	665.01	694.61	668.11	694.48
674.2	694.2	675.12	694.15	681.97	693.76	686.6	694.98	689.21	696
691.23	698.3	702.77	699.5	714.98	700.07	725	699.16	746.35	699.45
755.29	699.38	769.94	698.58	777.75	698.75	783.93	699.44	820.17	700.14
842.48	700.79	848.28	699.84	856.74	699.89	863.54	700.56	876.6	700.41
894.6	700.59	905	700.56	920.86	699.95	934.05	700.8	966.51	700.83
973.79	700.07	989.93	700.08	997.29	699.48	1003.02	700.06	1014.62	700.01
1028.85	699.52	1061.46	700.21	1086.85	699.88	1127.81	698.96	1131.79	699.48
1142.34	699.13	1157.03	698.85	1181.18	698.99	1192.14	699.23	1208.8	699.01
1225.96	698.75	1249.43	700.08	1275.73	701.73	1301.92	703.75	1324.85	704.8
1340.43	705.59	1355.93	706.1	1391.32	707.86	1420.55	709		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	659.93	.0728	691.23	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
659.93	691.23	170	170	170	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120612.4

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.95	28.53	706.21	59.93	706.39	79.47	706.31	101.09	703.9
111.88	702.96	128.25	702.86	137.28	702.14	153.21	702.1	172.84	701.99
188.72	701.34	193.3	701.53	196.76	701.09	201.22	700.61	204.22	700.37
209.82	700.21	215.45	700.11	241.87	700.31	259.96	700.45	294.69	700.35
298.96	700.95	307.87	701.61	316.08	702.33	332.57	702.26	349.44	702.3
357.01	702.68	370.68	703.1	386.08	703.47	394.8	702.79	400.4	702.87
407.48	703.33	410.86	703.23	422.16	703.37	427.19	702.97	438.69	702.84
479.11	702.42	511.42	700.77	525.99	700.26	543.84	700.07	581.98	699.9
605.22	700.34	636.31	699.86	649.26	699.62	663.9	698.6	669.96	697.92
680.82	697.2	686.83	697.61	691.96	697.73	698.19	698.2	707.32	698.9
718.25	698.09	742.05	698.71	750.62	698.22	754.02	695.71	755.34	695.23
759.97	694.55	766.66	693.66	772.2	693.7	776.43	694.88	778.08	695.7
782.53	699.12	790.28	699.91	801.26	699.7	812.98	699.92	827.3	699.5
830.58	699.76	860.35	699.2	877.64	700.33	901.23	699.77	914.88	700.03
922.23	699.98	937.03	700.67	957.69	699.81	998.27	699.19	1009.81	698.91
1021.61	699.05	1032.07	699.1	1065.17	698.71	1085.45	698.86	1100.68	698.94
1112.93	698.9	1122.19	698.97	1140.53	698.8	1147.73	699	1155.2	699.18
1166.53	699.29	1171.6	699.34	1181.56	700.03	1187.33	699.68	1195.33	700.27
1204.44	700.61	1214.77	701.41	1218.55	701.54	1237.31	703.07	1251.06	703.7
1276.24	704.5	1283.92	705.16	1291.95	705.17	1299.28	705.43	1326.27	706.56
1346.85	707.5	1363.3	708.22	1378.97	709				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	750.62	.0728	782.53	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
750.62	782.53	144	146	146	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
100	386.08	703.47	F
386.08	422.16	703.37	F

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120466.6

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	704.06	51.44	703.33	90.3	702.47	120.4	702.27	132.95	701.9
150.04	701.55	186.85	701.27	200.82	701.22	219.41	701.11	236.66	701.1
264.1	700.99	276.5	701.54	288.81	701.55	401.46	700.6	488.39	700.03
507.94	701.12	548.8	699.6	583.47	699.25	612.84	698.55	664.35	699.05
700.39	698.78	710.7	697.72	715.85	697.35	716.98	695.7	718	693.74
724.5	692.86	730.3	693.86	731.43	694.06	739.22	693.99	747.14	695.63
753.9	697.76	763.19	698.06	768.49	698.09	819.23	698.26	888.5	698.65
940.11	698.73	1045.64	699.45	1066.48	699.62	1113.27	699.5	1158.96	699.96
1201.59	701.44	1281.57	705.72	1340.52	707.35	1383.85	709.51		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	715.85	.0728	753.9	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
715.85	753.9	221	212	174	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120260.1

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	702.98	100.83	700.42	276.15	698.68	404.6	701.33	518.63	700.07
603.33	700.23	708.77	698.95	753.59	699.62	761.86	700.11	822.2	699.26
832.35	698.44	847.73	696.7	848.99	695.54	849.91	692.81	852.37	692.98
858.57	693.72	871.19	694.73	877.77	695.26	879.54	695.6	883.28	696.08
885.76	696.43	888.46	696.69	893.74	698.65	899.36	698.81	909.62	699.38
910.18	699.47	939.47	699.22	953.64	699.54	990.14	700.5	998.84	700.57
1031.49	699.93	1042.95	699.52	1045.92	699.85	1088.9	698.43	1120.97	699.41
1139.25	699.69	1237.22	701.56	1317.15	702.19	1331.82	702.49	1396.46	706.92
1417.61	708.04	1429.54	708.47						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	847.73	.0728	893.74	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
847.73	893.74	247	260	268	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	713.99	25.03	712.14	46.9	709.79	81.71	706.94	109.89	705.77
149.68	704.43	195.82	701.83	237.75	700.02	285.09	698.93	314.19	698.74
346.07	698.54	375.07	698.11	391.9	698.01	421.12	698.09	456	698
487.37	698.23	515.22	698.06	541.58	698.17	560.8	698.4	581.51	698.73
601.18	699.15	613.74	700.04	624.94	699.31	643.91	699.39	649.68	699.31
655.34	698.95	668.25	699.24	682.64	698.81	702.7	699.09	718.74	699.2
735.51	699.44	759.99	698.95	772.99	698.4	795.2	699.25	806.87	699.24
819.4	699.3	826.02	699.99	844.54	699.85	871.71	699.27	888.88	699.19
905.15	698.83	916.38	698.74	956.22	698.06	975.45	697.48	983.86	697.39
984.83	697.38	993.56	697.3	997.25	695.69	998.19	694.92	1003.67	693.99
1009.9	693.89	1014.04	694.38	1016.2	695.16	1016.8	695.69	1018.85	698.73
1035.96	699.44	1065.53	697.95	1087.79	698.34	1148.15	700.28	1167.41	700.99
1208.68	702.13	1222.36	701.91	1256.48	702.39	1265.88	703.19	1275.93	704.01
1332.61	704.75	1378.7	706.77	1407.96	708.48	1420.47	709.06	1436.23	709.58
1463.43	711.34	1474.52	711.72	1492.37	712.43	1505.82	713.15	1516.94	713.93
1529.23	714.46	1539.1	715						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	993.56	.0728	1018.85	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
993.56	1018.85	80	80	80	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	714	17.14	711.81	40.3	709.76	66.57	707.3	84.5	706.39
110.13	705.58	134.43	704.76	163.86	703.22	186.06	701.74	209.61	701.29
238.26	700.08	267.89	700.24	283.69	700.38	294.85	701.16	308	701.96
321.22	701.93	335.06	701.18	354.83	700.31	372.73	699.73	376.63	699.59
381.36	699.47	388.43	699.33	391.69	699.17	400.27	698.85	404.1	699.2
416.22	699.88	419.57	699.97	437.95	699.24	453.2	698.73	470.75	698.24
477.07	698.09	486.35	698.31	498.21	698.15	512.26	698.28	541.63	698.36
569.81	698.6	591.23	698.81	615.83	699.07	635.16	699.2	645.57	698.67
649.99	699.01	652.66	698.96	655.22	698.73	683.61	698.98	697.75	698.39
714.68	699.11	728.76	698.41	738.23	698.91	748.61	698.56	765.06	699.15
788.86	699.71	810.68	698.74	847.08	697.74	858.62	697.66	868.07	697.27
881.18	697.41	901.77	697.77	915.7	697.74	918.88	695.95	919.55	694.87
923.86	693.99	929.49	694.1	935.29	694.23	943.65	693.72	949.93	694.61
951.95	695.89	954.11	698.41	959.88	698.68	972.13	698.05	981.56	697.56
992.63	697.74	1003.23	697.86	1012.59	698.01	1027.02	698.05	1044.69	698.08
1077.19	698.22	1094.31	698.67	1110.68	698.95	1119.77	699.93	1127.78	700.76
1144.16	702.87	1160.04	702.86	1177.69	701.73	1192.41	702.02	1212.51	702.06
1218.36	701.76	1233.95	702.74	1252.72	703.36	1263.05	703.29	1284.74	703.66
1299.38	703.46	1311.73	703.87	1330.74	704.73	1350.26	705.71	1373.11	706.32
1387.66	706.92	1414.51	707.68	1441.23	708.79	1448.77	708.89	1459.65	709.23
1468.03	709.85	1482.72	710.66	1490.85	711.13	1500.29	711.8	1512.88	712.65
1519.65	713.15	1530.17	713.82	1541.35	714.66	1546.28	715.01		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	915.7	.0728	954.11	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
915.7	954.11	321	321	321	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	712	25.06	711.12	54.59	710.52	79.65	709.07	100.24	707.68
110.78	707.31	128.14	706.86	138.51	706.4	155.83	705.81	168.87	705.19
184.56	704.37	202.78	703.48	219.54	701.66	246.84	701.62	286.68	700.23
308.99	699.92	336.95	699.72	363.16	699.4	373.9	699.47	400.05	699.6
425.38	699.42	440.66	699.4	469.93	699.07	501.5	698.92	529.03	698.74
556.15	698.61	571.72	697.9	599.87	697.47	620.25	697.57	651.51	697.64
677.3	697.7	707.9	697.47	725.73	697.43	741.92	697.66	752.39	697.6
768.84	697.73	776.04	697.79	799.34	698.27	838.38	698.79	896.71	698.38
915.2	698.23	920.55	698.19	926.84	699.07	945.5	697.9	953.53	697.96
968.49	698.91	997.59	696.42	1030.18	698.31	1037.95	698.02	1050.04	696.53
1054.27	695.55	1058.31	695.15	1059.11	695.06	1062.79	694.65	1067.9	694.42
1074.27	694.76	1076.77	695.69	1079.12	696.29	1091.71	698.84	1132.08	698.86
1157.5	700.24	1166.69	701.26	1187.96	701.89	1257.13	701.31	1275.48	702.16
1297.63	702.47	1321.48	702.86	1347.09	703.65	1376.18	704.08	1394.67	704.23
1406.97	704.1	1413.47	703.72	1422.79	703.75	1431.82	704.1	1433.18	703.9
1436.63	703.74	1440.66	704.07	1443.46	703.71	1446	703.82	1451.91	704.04
1460.48	703.85	1466.16	704.13	1477.29	704.64	1485.61	704.58	1496.33	703.69
1500.95	702.35	1505.32	701.39	1509.4	699.88	1512.71	699.47	1521.53	699.37
1538.51	704.61	1540.14	704.89	1553.91	707.57	1564.73	708.9	1570.6	709.41
1583.19	709.93	1598.71	710.48	1614.86	709.38	1643.45	708.03	1658.87	706.96
1676.69	706								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.106	1050.04	.0728	1079.12	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
1050.04	1079.12	206	206	206	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1477.29	1550	704.64	F

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119398.6

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	716	12.05	714.93	26.53	713.94	36.87	713.03	55.84	711.45
70.09	710.73	87.84	708.86	93.58	708.65	104.2	707.79	110.3	707.34
115.65	707	121.26	706.59	126.58	706.45	144.97	705.57	175.67	704.32
193.97	703.76	212.13	701.95	223.42	701.82	236.47	701.49	253.01	700.91
276.47	700.49	302.53	699.79	331.69	699.91	341.32	699.75	356.74	699.65
372.65	699.28	380.91	699.32	390.06	699.1	414.43	698.95	428.73	698.78
437.09	698.77	448.14	698.59	461.52	698.76	479.88	698.77	490.42	698.44
506.89	698.4	513.8	698.43	530.48	698.35	555.5	698.21	565.93	697.58
585.41	697.31	608.57	697.47	647.14	696.69	738.42	697.04	810.59	696.74
841.14	698.08	856.72	696.64	880.57	695.76	893.84	696.6	895.25	696.61
905.48	695.66	907.86	694.06	909.55	693.72	914.47	693.75	920.25	692.53
923.82	692.33	927.45	692.92	928.56	693.95	933.49	698.18	936.38	698.45
952.35	698.48	967.17	698.27	991.93	697.14	999.05	697.93	1016.54	698.3
1048.03	698.24	1072.92	697.9	1114.02	698.79	1135.88	699.27	1150.66	700.99
1171.94	702.6	1195.08	703.23	1221.17	702.78	1270.26	703.36	1308.78	703.18
1348.47	703.26	1413.08	703.88	1420.54	703.71	1444.96	703.76	1464.33	703.92
1486.67	704.6	1508.64	705.34	1525.51	705.74	1540.57	706.48	1549.6	706.49
1559.51	706.71	1568.14	706.62	1574.09	705.94	1580.13	703.93	1584.16	703.22
1597.74	699.16	1606.12	699.2	1616.96	701.99	1622.28	704.63	1633.77	706

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.106	905.48	.0728	933.49	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
905.48	933.49	162	160	95	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1559.51	1633.77	706.71	F

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

INPUT
Description: IDNR 1985. B11211

2 points added to the RHS which are
intrpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	707.88	33	706.18	127	703.68	226	700.68	325	698.68
415	697.08	512	696.68	605	697.08	687	697.78	754	697.98
785	696.68	788	693.68	788	692.78	793	692.88	798	693.08
803	692.98	808	693.48	808	693.68	809	695.98	840	696.08
851	698.08	918	697.88	1012.99	698.38	1051.99	701.48	1114.99	702.34
1211.2	703.7	1304	704						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	754	.07	851	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
754	851	550	970	800	.1	.3

CROSS SECTION

RIVER: Blackberry Creek

REACH: Blackberry Creek RS: 118239

INPUT
Description: Interpolated crossection. Channel data from interpolated xs 118256 between xs 119239 and xs 116290; floodplain data interpolated from TIN 2004 by MJ and added to Hec-ras by BW

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.95	49.5	705.47	67.5	705.15	103.5	704	153	703.23
180	702.78	252	702.15	283.5	702.09	292.5	702.23	306	702.22
328.5	701.9	360	700.94	387	700.45	405	699.94	445.5	698.11
450	697.85	472.5	696.2	477	696	478	695.78	478	694.18
482.9	694.04	487.8	693.36	491.5	693.07	491.5	692.71	492.8	692.41
497.7	692.36	497.7	692.21	499.9	692.81	502.2	693.43	504	694.06
504	694.69	505.3	694.86	506.3	695.91	513	696	517.5	696.18
540	697.58	558	698	661.5	698.01	693	698.34	742.5	698.51
828	698.5	895.5	698.3	954	699.77	1039.5	702	1062	702.38
1089	702.58	1161	702.96	1228.5	702.93	1242	702.86	1269	703.02
1309.5	703.05	1345.5	703.36	1381.5	703.75	1390.5	703.96	1404	705.99

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	472.5	.07	517.5	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
472.5	517.5	4591	6020	4722	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek

Reach	River Sta.	n1	n2	n3
Blackberry Creek	121556	.12	.07	.12
Blackberry Creek	121072.5	.117	.0728	.117
Blackberry Creek	120885.9	.117	.0728	.117
Blackberry Creek	120782.5	.117	.0728	.117
Blackberry Creek	120612.4	.117	.0728	.117
Blackberry Creek	120466.6	.117	.0728	.117
Blackberry Creek	120260.1	.117	.0728	.117
Blackberry Creek	120001.1	.117	.0728	.117
Blackberry Creek	119921.9	.117	.0728	.117
Blackberry Creek	119601.5	.106	.0728	.117
Blackberry Creek	119398.6	.106	.0728	.117
Blackberry Creek	119239	.12	.07	.12
Blackberry Creek	118239	.12	.07	.12

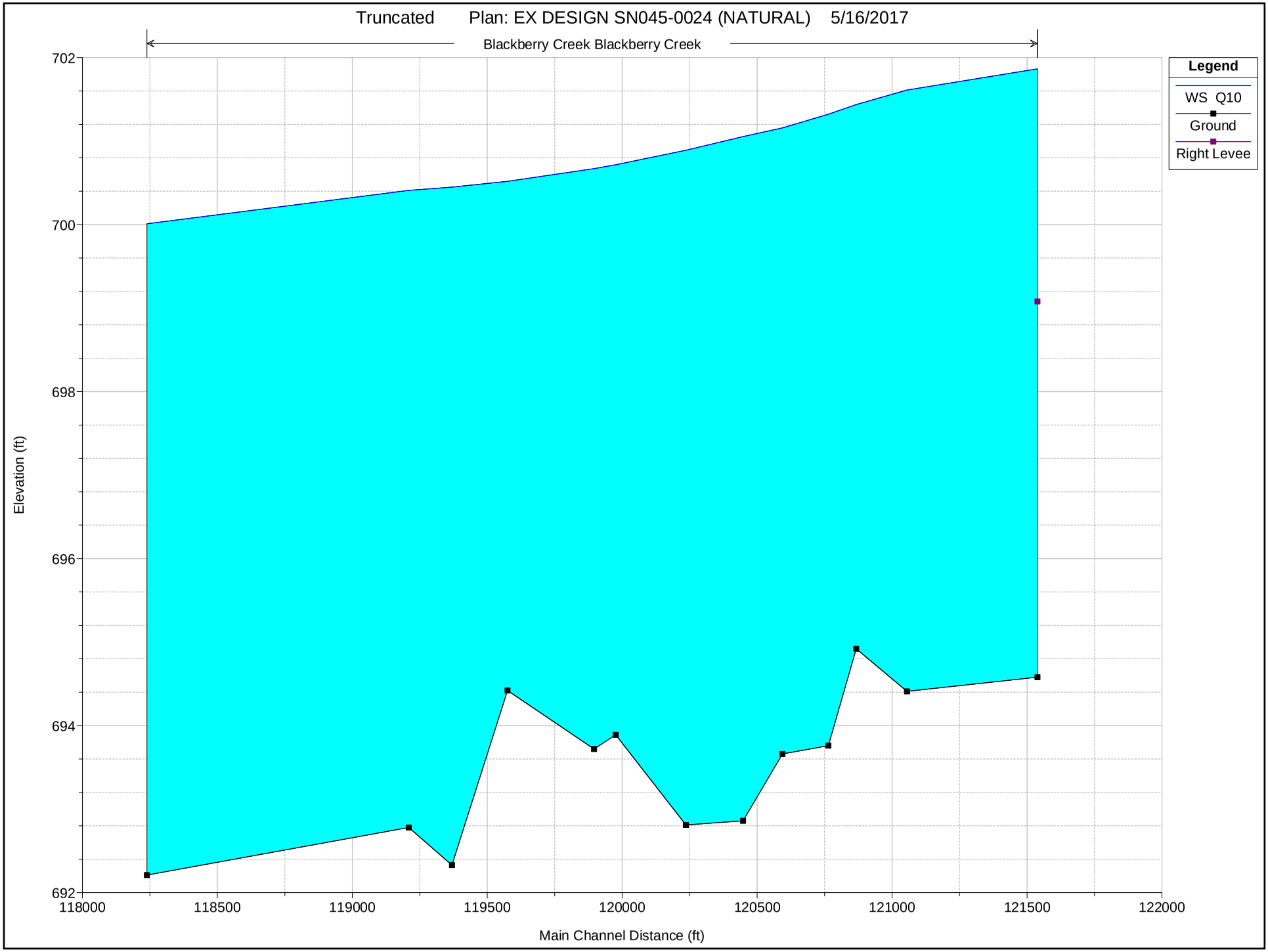
SUMMARY OF REACH LENGTHS

River: Blackberry Creek

Reach	River Sta.	Left	Channel	Right
Blackberry Creek	121556	480	483.5	500
Blackberry Creek	121072.5	188	188	188
Blackberry Creek	120885.9	130	103	100
Blackberry Creek	120782.5	170	170	170
Blackberry Creek	120612.4	144	146	146
Blackberry Creek	120466.6	221	212	174
Blackberry Creek	120260.1	247	260	268
Blackberry Creek	120001.1	80	80	80
Blackberry Creek	119921.9	321	321	321
Blackberry Creek	119601.5	206	206	206
Blackberry Creek	119398.6	162	160	95
Blackberry Creek	119239	550	970	800
Blackberry Creek	118239	4591	6020	4722

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

Reach	River Sta.	Contr.	Expan.
Blackberry Creek	121556	.1	.3
Blackberry Creek	121072.5	.1	.3
Blackberry Creek	120885.9	.1	.3
Blackberry Creek	120782.5	.1	.3
Blackberry Creek	120612.4	.1	.3
Blackberry Creek	120466.6	.1	.3
Blackberry Creek	120260.1	.1	.3
Blackberry Creek	120001.1	.1	.3
Blackberry Creek	119921.9	.1	.3
Blackberry Creek	119601.5	.1	.3
Blackberry Creek	119398.6	.1	.3
Blackberry Creek	119239	.1	.3
Blackberry Creek	118239	.1	.3


Truncated Plan: EX DESIGN SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q10
Ground
Right Levee
Elevation (ft)
702
700
698
696
694
692
118000
118500
119000
119500
120000
120500
121000
121500
122000
Main Channel Distance (ft)

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                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 6:15:59 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

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385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.87  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.            *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.87  * Reach Len. (ft)       *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  699.27  * Flow Area (sq ft)     * 1223.54  *  217.55  *  667.56  *
* E.G. Slope (ft/ft)     *0.000399  * Area (sq ft)          * 1223.54  *  217.55  *  667.56  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)            *  488.19  *  284.93  *  297.88  *
* Top Width (ft)         *  910.12  * Top Width (ft)        *  597.53  *   37.00  *  275.58  *
* Vel Total (ft/s)       *    0.51  * Avg. Vel. (ft/s)      *    0.40  *    1.31  *    0.45  *
* Max Chl Dpth (ft)      *    7.29  * Hydr. Depth (ft)      *    2.05  *    5.88  *    2.42  *
* Conv. Total (cfs)      * 53594.3  * Conv. (cfs)           * 24429.6  * 14258.3  * 14906.4  *
* Length Wtd. (ft)       *  488.11  * Wetted Per. (ft)      *  597.57  *   40.10  *  275.67  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)      *    0.05  *    0.14  *    0.06  *
* Alpha                  *    2.27  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.24  * Cum Volume (acre-ft)  *   60.20  *   19.03  *   41.79  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   30.91  *    3.50  *   23.49  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.63  * Element               *  Left OB *  Channel * Right OB *
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```
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.61  * Reach Len. (ft)        *  188.00  *  188.00  *  188.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  509.45  *  217.61  *  980.63  *
* E.G. Slope (ft/ft)     *0.000649  * Area (sq ft)           *  509.45  *  217.61  *  980.63  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)             *  248.19  *  366.34  *  456.46  *
* Top Width (ft)         *  879.02  * Top Width (ft)         *  275.75  *   34.96  *  568.31  *
* Vel Total (ft/s)       *    0.63  * Avg. Vel. (ft/s)       *    0.49  *    1.68  *    0.47  *
* Max Chl Dpth (ft)      *    7.20  * Hydr. Depth (ft)       *    1.85  *    6.22  *    1.73  *
* Conv. Total (cfs)      * 42029.6  * Conv. (cfs)            *  9739.9  * 14376.5  * 17913.1  *
* Length Wtd. (ft)       *  188.00  * Wetted Per. (ft)       *  275.83  *   37.37  *  568.48  *
* Min Ch El (ft)         *  694.41  * Shear (lb/sq ft)       *    0.07  *    0.24  *    0.07  *
* Alpha                  *    2.84  * Stream Power (lb/ft s) * 1259.12  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.17  * Cum Volume (acre-ft)   *   50.65  *   16.61  *   32.33  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   26.10  *    3.10  *   18.65  *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120885.9


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  701.46  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.44  * Reach Len. (ft)        *  130.00  *  103.00  *  100.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  217.87  *  133.87  * 1029.23  *
* E.G. Slope (ft/ft)     *0.001317  * Area (sq ft)           *  217.87  *  133.87  * 1029.23  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)             *  140.62  *  284.21  *  646.18  *
* Top Width (ft)         *  802.54  * Top Width (ft)         *  131.39  *   24.31  *  646.84  *
* Vel Total (ft/s)       *    0.78  * Avg. Vel. (ft/s)       *    0.65  *    2.12  *    0.63  *
* Max Chl Dpth (ft)      *    6.52  * Hydr. Depth (ft)       *    1.66  *    5.51  *    1.59  *
* Conv. Total (cfs)      * 29513.4  * Conv. (cfs)            *  3874.9  *  7831.9  * 17806.6  *
* Length Wtd. (ft)       *  106.01  * Wetted Per. (ft)       *  131.47  *   27.59  *  647.33  *
* Min Ch El (ft)         *  694.92  * Shear (lb/sq ft)       *    0.14  *    0.40  *    0.13  *
* Alpha                  *    2.47  * Stream Power (lb/ft s) * 1259.66  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *   49.08  *   15.86  *   27.99  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   25.22  *    2.98  *   16.03  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120782.5


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  701.35  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
```

```
* W.S. Elev (ft)         *  701.32  * Reach Len. (ft)        *  170.00  *  170.00  *  170.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  358.62  *  202.35  *  895.94  *
* E.G. Slope (ft/ft)     *0.000874  * Area (sq ft)           *  358.62  *  202.35  *  895.94  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)             *  219.83  *  401.00  *  450.17  *
* Top Width (ft)         *  780.97  * Top Width (ft)         *  171.67  *   31.30  *  578.00  *
* Vel Total (ft/s)       *    0.74  * Avg. Vel. (ft/s)       *    0.61  *    1.98  *    0.50  *
* Max Chl Dpth (ft)      *    7.56  * Hydr. Depth (ft)       *    2.09  *    6.46  *    1.55  *
* Conv. Total (cfs)      * 36233.5  * Conv. (cfs)            *  7437.1  * 13566.6  * 15229.8  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  171.86  *   33.99  *  578.60  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.11  *    0.32  *    0.08  *
* Alpha                  *    3.06  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   48.22  *   15.46  *   25.78  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   24.77  *    2.91  *   14.62  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  701.19  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.16  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  698.60  * Flow Area (sq ft)      *  437.36  *  194.82  *  715.23  *
* E.G. Slope (ft/ft)     *0.001021  * Area (sq ft)           *  519.18  *  194.82  *  715.23  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)             *  259.73  *  403.33  *  407.93  *
* Top Width (ft)         *  813.25  * Top Width (ft)         *  352.35  *   31.91  *  428.99  *
* Vel Total (ft/s)       *    0.79  * Avg. Vel. (ft/s)       *    0.59  *    2.07  *    0.57  *
* Max Chl Dpth (ft)      *    7.50  * Hydr. Depth (ft)       *    1.77  *    6.11  *    1.67  *
* Conv. Total (cfs)      * 33518.9  * Conv. (cfs)            *  8128.8  * 12623.1  * 12767.0  *
* Length Wtd. (ft)       *  145.56  * Wetted Per. (ft)       *  247.04  *   34.45  *  429.24  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.11  *    0.36  *    0.11  *
* Alpha                  *    2.89  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *   46.50  *   14.68  *   22.64  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   23.74  *    2.79  *   12.66  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  701.07  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.05  * Reach Len. (ft)        *  221.00  *  212.00  *  174.00  *
```

```
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  474.84  *  248.30  *  879.70  *
* E.G. Slope (ft/ft)     *0.000587  * Area (sq ft)           *  474.84  *  248.30  *  879.70  *
* Q Total (cfs)          * 1041.00  * Flow (cfs)             *  199.76  *  409.47  *  431.77  *
* Top Width (ft)         *  857.34  * Top Width (ft)         *  382.72  *   38.05  *  436.57  *
* Vel Total (ft/s)       *    0.65  * Avg. Vel. (ft/s)       *    0.42  *    1.65  *    0.49  *
* Max Chl Dpth (ft)      *    8.19  * Hydr. Depth (ft)       *    1.24  *    6.53  *    2.02  *
* Conv. Total (cfs)      * 42970.7  * Conv. (cfs)            *  8245.8  * 16902.3  * 17822.7  *
* Length Wtd. (ft)       *  203.50  * Wetted Per. (ft)       *  382.86  *   40.77  *  436.60  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.05  *    0.22  *    0.07  *
* Alpha                  *    2.85  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.15  * Cum Volume (acre-ft)   *   44.86  *   13.94  *   19.97  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   22.53  *    2.67  *   11.21  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120260.1


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  700.92  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  700.89  * Reach Len. (ft)        *  247.00  *  260.00  *  268.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  812.77  *  270.25  *  371.33  *
* E.G. Slope (ft/ft)     *0.000942  * Area (sq ft)           *  812.77  *  270.25  *  371.33  *
* Q Total (cfs)          * 1041.00  * Flow (cfs)             *  348.64  *  528.58  *  163.78  *
* Top Width (ft)         * 1058.67  * Top Width (ft)         *  704.28  *   46.01  *  308.38  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)       *    0.43  *    1.96  *    0.44  *
* Max Chl Dpth (ft)      *    8.08  * Hydr. Depth (ft)       *    1.15  *    5.87  *    1.20  *
* Conv. Total (cfs)      * 33917.0  * Conv. (cfs)            * 11358.9  * 17221.8  *  5336.2  *
* Length Wtd. (ft)       *  254.35  * Wetted Per. (ft)       *  704.48  *   48.99  *  308.51  *
* Min Ch El (ft)         *  692.81  * Shear (lb/sq ft)       *    0.07  *    0.32  *    0.07  *
* Alpha                  *    3.97  * Stream Power (lb/ft s) * 1429.54  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.19  * Cum Volume (acre-ft)   *   41.60  *   12.68  *   17.47  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *   19.77  *    2.47  *    9.72  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120001.1


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  700.73  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  700.72  * Reach Len. (ft)        *   80.00  *   80.00  *   80.00  *
```

Crit W.S. (ft)		Flow Area (sq ft)	1495.14	147.65	232.44	
E.G. Slope (ft/ft)	0.000593	Area (sq ft)	1495.14	147.65	232.44	
Q Total (cfs)	1041.00	Flow (cfs)	718.28	222.52	100.19	
Top Width (ft)	938.38	Top Width (ft)	771.95	25.29	141.15	
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.48	1.51	0.43	
Max Chl Dpth (ft)	6.83	Hydr. Depth (ft)	1.94	5.84	1.65	
Conv. Total (cfs)	42752.3	Conv. (cfs)	29498.9	9138.7	4114.7	
Length Wtd. (ft)	80.00	Wetted Per. (ft)	772.17	27.96	141.24	
Min Ch El (ft)	693.89	Shear (lb/sq ft)	0.07	0.20	0.06	
Alpha	2.15	Stream Power (lb/ft s)	1539.10	0.00	0.00	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	35.05	11.43	15.61	
C & E Loss (ft)	0.00	Cum SA (acres)	15.59	2.25	8.33	

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	700.67	Reach Len. (ft)	321.00	321.00	321.00
Crit W.S. (ft)		Flow Area (sq ft)	1134.25	232.99	405.38
E.G. Slope (ft/ft)	0.000505	Area (sq ft)	1134.25	232.99	405.38
Q Total (cfs)	1041.00	Flow (cfs)	497.48	339.35	204.17
Top Width (ft)	843.82	Top Width (ft)	632.61	38.41	172.80
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.44	1.46	0.50
Max Chl Dpth (ft)	6.95	Hydr. Depth (ft)	1.79	6.07	2.35
Conv. Total (cfs)	46319.2	Conv. (cfs)	22135.2	15099.4	9084.6
Length Wtd. (ft)	321.00	Wetted Per. (ft)	632.91	41.18	172.94
Min Ch El (ft)	693.72	Shear (lb/sq ft)	0.06	0.18	0.07
Alpha	2.42	Stream Power (lb/ft s)	1546.28	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	32.64	11.08	15.02
C & E Loss (ft)	0.00	Cum SA (acres)	14.30	2.19	8.05

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	700.52	Reach Len. (ft)	206.00	206.00	206.00
Crit W.S. (ft)	698.36	Flow Area (sq ft)	1594.09	157.19	129.44
E.G. Slope (ft/ft)	0.000465	Area (sq ft)	1594.09	157.19	144.59

```
* Q Total (cfs)          * 1041.00  * Flow (cfs)             *  781.50  *  211.11  *   48.39  *
* Top Width (ft)         *  899.14  * Top Width (ft)         *  771.60  *   29.08  *   98.45  *
* Vel Total (ft/s)       *    0.55  * Avg. Vel. (ft/s)       *    0.49  *    1.34  *    0.37  *
* Max Chl Dpth (ft)      *    6.10  * Hydr. Depth (ft)       *    2.07  *    5.41  *    1.60  *
* Conv. Total (cfs)      * 48266.0  * Conv. (cfs)            * 36234.3  *  9788.3  *  2243.4  *
* Length Wtd. (ft)       *  206.00  * Wetted Per. (ft)       *  772.04  *   29.50  *   81.19  *
* Min Ch El (ft)         *  694.42  * Shear (lb/sq ft)       *    0.06  *    0.15  *    0.05  *
* Alpha                  *    1.80  * Stream Power (lb/ft s) * 1676.69  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   22.58  *    9.64  *   13.00  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    9.12  *    1.95  *    7.05  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119398.6


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  700.45  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  700.45  * Reach Len. (ft)        *  162.00  *  160.00  *   95.00  *
* Crit W.S. (ft)         *  697.56  * Flow Area (sq ft)      * 1598.71  *  186.08  *  449.27  *
* E.G. Slope (ft/ft)     *0.000266  * Area (sq ft)           * 1598.71  *  186.08  *  465.71  *
* Q Total (cfs)          * 1041.00  * Flow (cfs)             *  681.75  *  206.02  *  153.22  *
* Top Width (ft)         *  885.53  * Top Width (ft)         *  627.46  *   28.01  *  230.06  *
* Vel Total (ft/s)       *    0.47  * Avg. Vel. (ft/s)       *    0.43  *    1.11  *    0.34  *
* Max Chl Dpth (ft)      *    8.12  * Hydr. Depth (ft)       *    2.55  *    6.64  *    2.11  *
* Conv. Total (cfs)      * 63820.3  * Conv. (cfs)            * 41796.1  * 12630.6  *  9393.5  *
* Length Wtd. (ft)       *  152.26  * Wetted Per. (ft)       *  627.70  *   30.68  *  212.69  *
* Min Ch El (ft)         *  692.33  * Shear (lb/sq ft)       *    0.04  *    0.10  *    0.04  *
* Alpha                  *    1.74  * Stream Power (lb/ft s) * 1633.77  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.04  * Cum Volume (acre-ft)   *   15.04  *    8.83  *   11.55  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    5.81  *    1.81  *    6.27  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************************
* E.G. Elev (ft)         *  700.42  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  700.41  * Reach Len. (ft)        *  550.00  *  970.00  *  800.00  *
```

Crit W.S. (ft)		Flow Area (sq ft)	1386.11	436.97	405.22	
E.G. Slope (ft/ft)	0.000247	Area (sq ft)	1386.11	436.97	405.22	
Q Total (cfs)	1041.00	Flow (cfs)	522.29	386.91	131.80	
Top Width (ft)	799.14	Top Width (ft)	514.61	97.00	187.52	
Vel Total (ft/s)	0.47	Avg. Vel. (ft/s)	0.38	0.89	0.33	
Max Chl Dpth (ft)	7.63	Hydr. Depth (ft)	2.69	4.50	2.16	
Conv. Total (cfs)	66223.2	Conv. (cfs)	33225.2	24613.5	8384.4	
Length Wtd. (ft)	804.53	Wetted Per. (ft)	514.65	101.09	187.61	
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.04	0.07	0.03	
Alpha	1.72	Stream Power (lb/ft s)	1304.00	0.00	0.00	
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	9.48	7.69	10.60	
C & E Loss (ft)	0.00	Cum SA (acres)	3.69	1.58	5.81	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.01	Reach Len. (ft)			
Crit W.S. (ft)	696.99	Flow Area (sq ft)	116.28	253.60	749.66
E.G. Slope (ft/ft)	0.001088	Area (sq ft)	116.28	253.60	749.66
Q Total (cfs)	1034.00	Flow (cfs)	66.58	534.32	433.10
Top Width (ft)	560.67	Top Width (ft)	69.97	45.00	445.70
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	0.57	2.11	0.58
Max Chl Dpth (ft)	7.80	Hydr. Depth (ft)	1.66	5.64	1.68
Conv. Total (cfs)	31340.7	Conv. (cfs)	2017.9	16195.4	13127.3
Length Wtd. (ft)		Wetted Per. (ft)	70.08	48.60	445.77
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.11	0.35	0.11
Alpha	2.88	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q10	1071.00	694.58	701.87	699.27	701.87	0.000399	1.31	2108.65	910.12	0.10
Blackberry Creek	121072.5	Q10	1071.00	694.41	701.61		701.63	0.000649	1.68	1707.69	879.02	0.12

* Blackberry Creek	* 120885.9	* Q10	* 1071.00	* 694.92	* 701.44	*	* 701.46	* 0.001317	* 2.12	* 1380.98	* 802.54	* 0.16
* Blackberry Creek	* 120782.5	* Q10	* 1071.00	* 693.76	* 701.32	*	* 701.35	* 0.000874	* 1.98	* 1456.91	* 780.97	* 0.14
* Blackberry Creek	* 120612.4	* Q10	* 1071.00	* 693.66	* 701.16	* 698.60	* 701.19	* 0.001021	* 2.07	* 1347.42	* 813.25	* 0.15
* Blackberry Creek	* 120466.6	* Q10	* 1041.00	* 692.86	* 701.05	*	* 701.07	* 0.000587	* 1.65	* 1602.83	* 857.34	* 0.11
* Blackberry Creek	* 120260.1	* Q10	* 1041.00	* 692.81	* 700.89	*	* 700.92	* 0.000942	* 1.96	* 1454.35	* 1058.67	* 0.14
* Blackberry Creek	* 120001.1	* Q10	* 1041.00	* 693.89	* 700.72	*	* 700.73	* 0.000593	* 1.51	* 1875.23	* 938.38	* 0.11
* Blackberry Creek	* 119921.9	* Q10	* 1041.00	* 693.72	* 700.67	*	* 700.68	* 0.000505	* 1.46	* 1772.62	* 843.82	* 0.10
* Blackberry Creek	* 119601.5	* Q10	* 1041.00	* 694.42	* 700.52	* 698.36	* 700.53	* 0.000465	* 1.34	* 1880.72	* 899.14	* 0.10
* Blackberry Creek	* 119398.6	* Q10	* 1041.00	* 692.33	* 700.45	* 697.56	* 700.45	* 0.000266	* 1.11	* 2234.06	* 885.53	* 0.08
* Blackberry Creek	* 119239	* Q10	* 1041.00	* 692.78	* 700.41	*	* 700.42	* 0.000247	* 0.89	* 2228.30	* 799.14	* 0.07
* Blackberry Creek	* 118239	* Q10	* 1034.00	* 692.21	* 700.01	* 696.99	* 700.05	* 0.001088	* 2.11	* 1119.53	* 560.67	* 0.16

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q10	701.87	701.87	0.01	0.24	0.00	488.19	284.93	297.88	910.12
Blackberry Creek	121072.5	Q10	701.63	701.61	0.02	0.17	0.00	248.19	366.34	456.46	879.02
Blackberry Creek	120885.9	Q10	701.46	701.44	0.02	0.11	0.00	140.62	284.21	646.18	802.54
Blackberry Creek	120782.5	Q10	701.35	701.32	0.03	0.16	0.00	219.83	401.00	450.17	780.97
Blackberry Creek	120612.4	Q10	701.19	701.16	0.03	0.11	0.00	259.73	403.33	407.93	813.25
Blackberry Creek	120466.6	Q10	701.07	701.05	0.02	0.15	0.00	199.76	409.47	431.77	857.34
Blackberry Creek	120260.1	Q10	700.92	700.89	0.03	0.19	0.01	348.64	528.58	163.78	1058.67
Blackberry Creek	120001.1	Q10	700.73	700.72	0.01	0.04	0.00	718.28	222.52	100.19	938.38
Blackberry Creek	119921.9	Q10	700.68	700.67	0.01	0.16	0.00	497.48	339.35	204.17	843.82
Blackberry Creek	119601.5	Q10	700.53	700.52	0.01	0.07	0.00	781.50	211.11	48.39	899.14
Blackberry Creek	119398.6	Q10	700.45	700.45	0.01	0.04	0.00	681.75	206.02	153.22	885.53
Blackberry Creek	119239	Q10	700.42	700.41	0.01	0.36	0.00	522.29	386.91	131.80	799.14
Blackberry Creek	118239	Q10	700.05	700.01	0.04			66.58	534.32	433.10	560.67

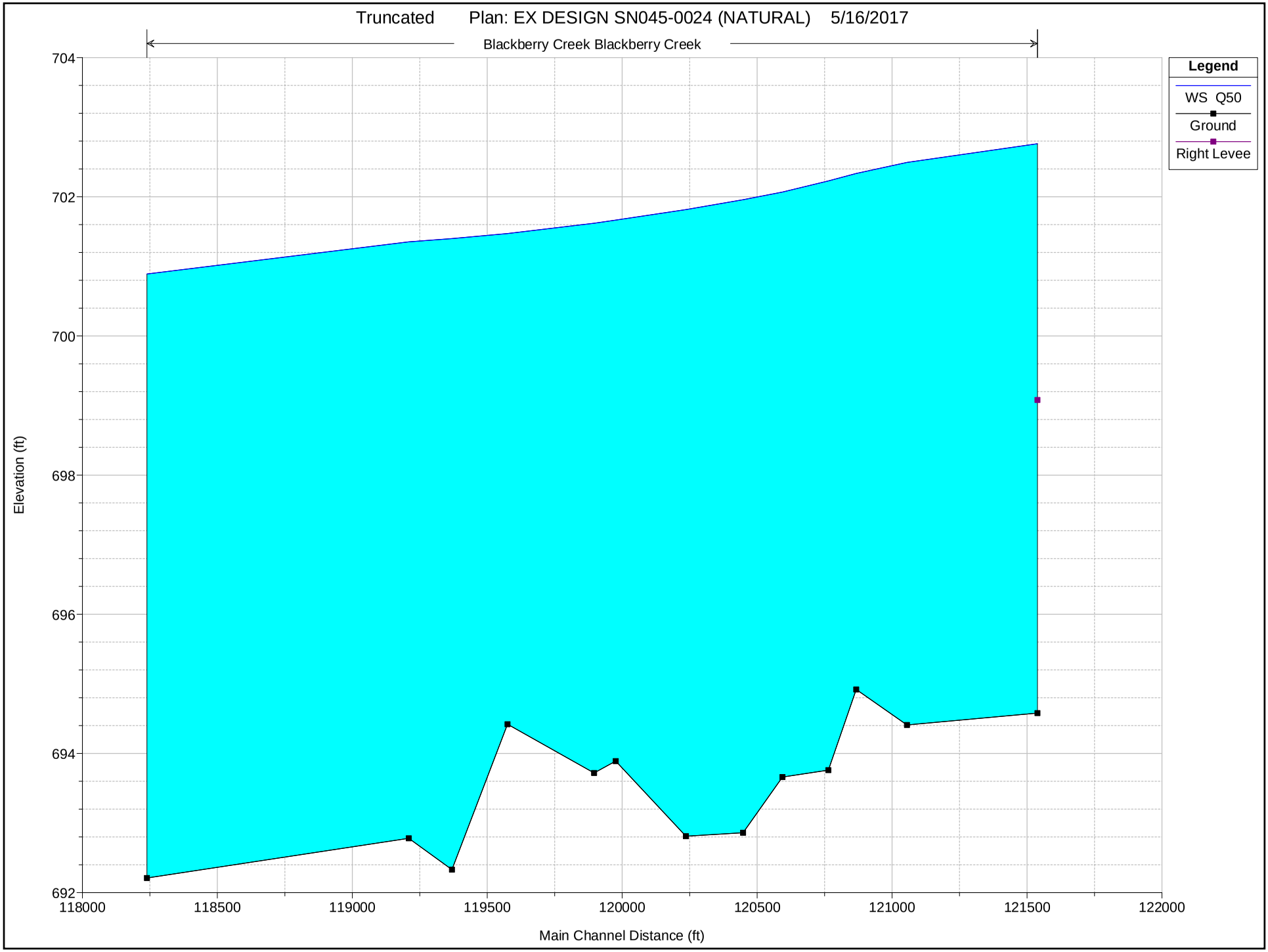
ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : DES. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 121072.5 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q10
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

```
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120466.6     Profile: Q10
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120260.1     Profile: Q10
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119921.9     Profile: Q10
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q10
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q10
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```


Truncated Plan: EX DESIGN SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q50
Ground
Right Levee
Elevation (ft)
704
702
700
698
696
694
692
118000
118500
119000
119500
120000
120500
121000
121500
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 6:15:59 PM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  702.77  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.            *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.76  * Reach Len. (ft)       *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  699.84  * Flow Area (sq ft)     * 1780.92  *  250.73  *  932.31  *
* E.G. Slope (ft/ft)     *0.000453  * Area (sq ft)          * 1780.92  *  250.73  *  932.31  *
* Q Total (cfs)          * 1824.00  * Flow (cfs)            *  928.54  *  384.34  *  511.12  *
* Top Width (ft)         *  987.14  * Top Width (ft)        *  639.65  *   37.00  *  310.48  *
* Vel Total (ft/s)       *    0.62  * Avg. Vel. (ft/s)      *    0.52  *    1.53  *    0.55  *
* Max Chl Dpth (ft)      *    8.18  * Hydr. Depth (ft)      *    2.78  *    6.78  *    3.00  *
* Conv. Total (cfs)      * 85728.5  * Conv. (cfs)           * 43641.7  * 18063.9  * 24022.9  *
* Length Wtd. (ft)       *  488.55  * Wetted Per. (ft)      *  639.70  *   40.10  *  310.59  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)      *    0.08  *    0.18  *    0.08  *
* Alpha                  *    1.90  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.26  * Cum Volume (acre-ft)  *   90.67  *   22.26  *   63.75  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   34.24  *    3.50  *   25.21  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  702.51  * Element               *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.49	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)		Flow Area (sq ft)	758.49	248.43	1485.10
E.G. Slope (ft/ft)	0.000647	Area (sq ft)	758.49	248.43	1485.10
Q Total (cfs)	1824.00	Flow (cfs)	466.38	455.99	901.63
Top Width (ft)	899.79	Top Width (ft)	288.69	34.96	576.14
Vel Total (ft/s)	0.73	Avg. Vel. (ft/s)	0.61	1.84	0.61
Max Chl Dpth (ft)	8.08	Hydr. Depth (ft)	2.63	7.11	2.58
Conv. Total (cfs)	71713.8	Conv. (cfs)	18336.6	17927.9	35449.2
Length Wtd. (ft)	188.00	Wetted Per. (ft)	288.80	37.37	576.36
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.11	0.27	0.10
Alpha	2.09	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	76.68	19.49	49.87
C & E Loss (ft)	0.00	Cum SA (acres)	29.12	3.10	20.12

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q50

			Left OB	Channel	Right OB
E.G. Elev (ft)	702.36	Element			
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.33	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	341.11	155.68	1614.50
E.G. Slope (ft/ft)	0.001102	Area (sq ft)	341.11	155.68	1614.50
Q Total (cfs)	1824.00	Flow (cfs)	252.51	334.34	1237.14
Top Width (ft)	829.23	Top Width (ft)	146.51	24.31	658.41
Vel Total (ft/s)	0.86	Avg. Vel. (ft/s)	0.74	2.15	0.77
Max Chl Dpth (ft)	7.41	Hydr. Depth (ft)	2.33	6.40	2.45
Conv. Total (cfs)	54943.5	Conv. (cfs)	7606.3	10071.3	37265.9
Length Wtd. (ft)	105.87	Wetted Per. (ft)	146.62	27.59	658.94
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.16	0.39	0.17
Alpha	1.77	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	74.30	18.62	43.18
C & E Loss (ft)	0.00	Cum SA (acres)	28.18	2.98	17.46

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q50

			Left OB	Channel	Right OB
E.G. Elev (ft)	702.25	Element			
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.23	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)		Flow Area (sq ft)	524.40	230.69	1425.46
E.G. Slope (ft/ft)	0.000856	Area (sq ft)	524.40	230.69	1425.46

```
* Q Total (cfs)          * 1824.00  * Flow (cfs)             *  378.39  *  493.76  *  951.84  *
* Top Width (ft)         *  815.78  * Top Width (ft)         *  193.52  *   31.30  *  590.95  *
* Vel Total (ft/s)       *    0.84  * Avg. Vel. (ft/s)       *    0.72  *    2.14  *    0.67  *
* Max Chl Dpth (ft)      *    8.47  * Hydr. Depth (ft)       *    2.71  *    7.37  *    2.41  *
* Conv. Total (cfs)      * 62352.5  * Conv. (cfs)            * 12935.2  * 16879.0  * 32538.3  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  193.74  *   33.99  *  591.58  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.14  *    0.36  *    0.13  *
* Alpha                  *    2.26  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   73.01  *   18.16  *   39.69  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   27.68  *    2.91  *   16.02  *
*********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q50
*********************************************************************************************
* E.G. Elev (ft)         *  702.09  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.07  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  699.85  * Flow Area (sq ft)      *  669.70  *  223.82  * 1111.51  *
* E.G. Slope (ft/ft)     *0.000997  * Area (sq ft)           *  864.69  *  223.82  * 1111.51  *
* Q Total (cfs)          * 1824.00  * Flow (cfs)             *  498.43  *  502.26  *  823.30  *
* Top Width (ft)         *  892.97  * Top Width (ft)         *  418.57  *   31.91  *  442.48  *
* Vel Total (ft/s)       *    0.91  * Avg. Vel. (ft/s)       *    0.74  *    2.24  *    0.74  *
* Max Chl Dpth (ft)      *    8.41  * Hydr. Depth (ft)       *    2.53  *    7.01  *    2.51  *
* Conv. Total (cfs)      * 57767.3  * Conv. (cfs)            * 15785.7  * 15907.0  * 26074.6  *
* Length Wtd. (ft)       *  145.49  * Wetted Per. (ft)       *  264.86  *   34.45  *  442.76  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.16  *    0.40  *    0.16  *
* Alpha                  *    2.16  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *   70.30  *   17.27  *   34.74  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   26.48  *    2.79  *   14.01  *
*********************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q50
*********************************************************************************************
* E.G. Elev (ft)         *  701.98  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.96  * Reach Len. (ft)        *  221.00  *  212.00  *  174.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  947.79  *  282.68  * 1284.60  *
* E.G. Slope (ft/ft)     *0.000635  * Area (sq ft)           *  947.79  *  282.68  * 1284.60  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  418.31  *  528.56  *  818.13  *
```

```
* Top Width (ft)         * 1080.27  * Top Width (ft)         *  584.86  *   38.05  *  457.36  *
* Vel Total (ft/s)       *    0.70  * Avg. Vel. (ft/s)       *    0.44  *    1.87  *    0.64  *
* Max Chl Dpth (ft)      *    9.10  * Hydr. Depth (ft)       *    1.62  *    7.43  *    2.81  *
* Conv. Total (cfs)      * 70059.8  * Conv. (cfs)           * 16604.3  * 20980.6  * 32475.0  *
* Length Wtd. (ft)       *  202.54  * Wetted Per. (ft)       *  585.02  *   40.77  *  457.42  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.06  *    0.27  *    0.11  *
* Alpha                  *    2.60  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.14  * Cum Volume (acre-ft)   *   67.31  *   16.42  *   30.73  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   24.82  *    2.67  *   12.50  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120260.1


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  701.84  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.82  * Reach Len. (ft)        *  247.00  *  260.00  *  268.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1524.27  *  312.81  *  681.46  *
* E.G. Slope (ft/ft)     *0.000748  * Area (sq ft)           * 1524.27  *  312.81  *  681.46  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  812.21  *  600.96  *  351.83  *
* Top Width (ft)         * 1223.72  * Top Width (ft)         *  801.85  *   46.01  *  375.86  *
* Vel Total (ft/s)       *    0.70  * Avg. Vel. (ft/s)       *    0.53  *    1.92  *    0.52  *
* Max Chl Dpth (ft)      *    9.01  * Hydr. Depth (ft)       *    1.90  *    6.80  *    1.81  *
* Conv. Total (cfs)      * 64542.3  * Conv. (cfs)           * 29700.8  * 21976.0  * 12865.5  *
* Length Wtd. (ft)       *  253.42  * Wetted Per. (ft)       *  802.08  *   48.99  *  375.99  *
* Min Ch El (ft)         *  692.81  * Shear (lb/sq ft)       *    0.09  *    0.30  *    0.08  *
* Alpha                  *    2.93  * Stream Power (lb/ft s) * 1429.54  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   61.04  *   14.97  *   26.80  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   21.31  *    2.47  *   10.83  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120001.1


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  701.68  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.66  * Reach Len. (ft)        *   80.00  *   80.00  *   80.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2237.50  *  171.63  *  380.53  *
* E.G. Slope (ft/ft)     *0.000531  * Area (sq ft)           * 2237.50  *  171.63  *  380.53  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             * 1306.14  *  270.60  *  188.26  *
* Top Width (ft)         *  992.20  * Top Width (ft)         *  793.91  *   25.29  *  172.99  *
* Vel Total (ft/s)       *    0.63  * Avg. Vel. (ft/s)       *    0.58  *    1.58  *    0.49  *
* Max Chl Dpth (ft)      *    7.77  * Hydr. Depth (ft)       *    2.82  *    6.79  *    2.20  *
* Conv. Total (cfs)      * 76600.9  * Conv. (cfs)           * 56686.3  * 11744.0  *  8170.6  *
```

```
* Length Wtd. (ft)       *   80.00  * Wetted Per. (ft)       *  794.15  *   27.96  *  173.10  *
* Min Ch El (ft)         *  693.89  * Shear (lb/sq ft)       *    0.09  *    0.20  *    0.07  *
* Alpha                  *    1.65  * Stream Power (lb/ft s) * 1539.10  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.04  * Cum Volume (acre-ft)   *   50.37  *   13.53  *   23.53  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   16.78  *    2.25  *    9.14  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119921.9


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  701.63  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.62  * Reach Len. (ft)        *  321.00  *  321.00  *  321.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1763.54  *  269.45  *  573.08  *
* E.G. Slope (ft/ft)     *0.000509  * Area (sq ft)           * 1763.54  *  269.45  *  573.08  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  976.52  *  433.94  *  354.54  *
* Top Width (ft)         *  917.54  * Top Width (ft)         *  698.78  *   38.41  *  180.34  *
* Vel Total (ft/s)       *    0.68  * Avg. Vel. (ft/s)       *    0.55  *    1.61  *    0.62  *
* Max Chl Dpth (ft)      *    7.90  * Hydr. Depth (ft)       *    2.52  *    7.02  *    3.18  *
* Conv. Total (cfs)      * 78257.2  * Conv. (cfs)            * 43297.3  * 19240.0  * 15719.8  *
* Length Wtd. (ft)       *  321.00  * Wetted Per. (ft)       *  699.15  *   41.18  *  180.54  *
* Min Ch El (ft)         *  693.72  * Shear (lb/sq ft)       *    0.08  *    0.21  *    0.10  *
* Alpha                  *    1.93  * Stream Power (lb/ft s) * 1546.28  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.15  * Cum Volume (acre-ft)   *   46.70  *   13.12  *   22.66  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   15.41  *    2.19  *    8.82  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119601.5


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  701.48  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.47  * Reach Len. (ft)        *  206.00  *  206.00  *  206.00  *
* Crit W.S. (ft)         *  698.64  * Flow Area (sq ft)      * 2342.94  *  184.92  *  213.04  *
* E.G. Slope (ft/ft)     *0.000435  * Area (sq ft)           * 2342.94  *  184.92  *  247.66  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             * 1402.19  *  267.50  *   95.31  *
* Top Width (ft)         *  968.81  * Top Width (ft)         *  798.94  *   29.08  *  140.79  *
* Vel Total (ft/s)       *    0.64  * Avg. Vel. (ft/s)       *    0.60  *    1.45  *    0.45  *
* Max Chl Dpth (ft)      *    7.05  * Hydr. Depth (ft)       *    2.93  *    6.36  *    1.81  *
* Conv. Total (cfs)      * 84669.1  * Conv. (cfs)            * 67264.5  * 12832.5  *  4572.1  *
* Length Wtd. (ft)       *  206.00  * Wetted Per. (ft)       *  799.39  *   29.50  *  117.76  *
* Min Ch El (ft)         *  694.42  * Shear (lb/sq ft)       *    0.08  *    0.17  *    0.05  *
```

```
* Alpha                  *    1.48  * Stream Power (lb/ft s) * 1676.69  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   31.57  *   11.45  *   19.63  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    9.89  *    1.95  *    7.64  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119398.6


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  701.41  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.40  * Reach Len. (ft)        *  162.00  *  160.00  *   95.00  *
* Crit W.S. (ft)         *  698.01  * Flow Area (sq ft)      * 2216.24  *  212.70  *  655.50  *
* E.G. Slope (ft/ft)     *0.000299  * Area (sq ft)           * 2216.24  *  212.70  *  691.86  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             * 1196.54  *  272.91  *  295.56  *
* Top Width (ft)         *  941.40  * Top Width (ft)         *  666.41  *   28.01  *  246.98  *
* Vel Total (ft/s)       *    0.57  * Avg. Vel. (ft/s)       *    0.54  *    1.28  *    0.45  *
* Max Chl Dpth (ft)      *    9.07  * Hydr. Depth (ft)       *    3.33  *    7.59  *    2.95  *
* Conv. Total (cfs)      *102077.7  * Conv. (cfs)            * 69201.0  * 15783.4  * 17093.4  *
* Length Wtd. (ft)       *  150.99  * Wetted Per. (ft)       *  666.66  *   30.68  *  222.79  *
* Min Ch El (ft)         *  692.33  * Shear (lb/sq ft)       *    0.06  *    0.13  *    0.05  *
* Alpha                  *    1.48  * Stream Power (lb/ft s) * 1633.77  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.05  * Cum Volume (acre-ft)   *   20.78  *   10.51  *   17.41  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    6.43  *    1.81  *    6.72  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  701.36  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.35  * Reach Len. (ft)        *  550.00  *  970.00  *  800.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1889.56  *  528.42  *  587.61  *
* E.G. Slope (ft/ft)     *0.000299  * Area (sq ft)           * 1889.56  *  528.42  *  587.61  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  921.62  *  584.65  *  258.72  *
* Top Width (ft)         *  846.57  * Top Width (ft)         *  550.19  *   97.00  *  199.38  *
* Vel Total (ft/s)       *    0.59  * Avg. Vel. (ft/s)       *    0.49  *    1.11  *    0.44  *
* Max Chl Dpth (ft)      *    8.57  * Hydr. Depth (ft)       *    3.43  *    5.45  *    2.95  *
* Conv. Total (cfs)      *101993.5  * Conv. (cfs)            * 53257.6  * 33785.0  * 14950.8  *
```

Length Wtd. (ft)	789.03	Wetted Per. (ft)	550.24	101.09	199.50	
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.06	0.10	0.06	
Alpha	1.62	Stream Power (lb/ft s)	1304.00	0.00	0.00	
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	13.15	9.15	16.02	
C & E Loss (ft)	0.00	Cum SA (acres)	4.17	1.58	6.23	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	700.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.89	Reach Len. (ft)			
Crit W.S. (ft)	697.74	Flow Area (sq ft)	193.44	293.20	1156.72
E.G. Slope (ft/ft)	0.001232	Area (sq ft)	193.44	293.20	1156.72
Q Total (cfs)	1751.00	Flow (cfs)	122.60	724.05	904.35
Top Width (ft)	634.19	Top Width (ft)	109.75	45.00	479.44
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)	0.63	2.47	0.78
Max Chl Dpth (ft)	8.68	Hydr. Depth (ft)	1.76	6.52	2.41
Conv. Total (cfs)	49881.2	Conv. (cfs)	3492.5	20626.2	25762.6
Length Wtd. (ft)		Wetted Per. (ft)	109.87	48.60	479.53
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.14	0.46	0.19
Alpha	2.52	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q50	1824.00	694.58	702.76	699.84	702.77	0.000453	1.53	2963.95	987.14	0.10
Blackberry Creek	121072.5	Q50	1824.00	694.41	702.49		702.51	0.000647	1.84	2492.02	899.79	0.12
Blackberry Creek	120885.9	Q50	1824.00	694.92	702.33		702.36	0.001102	2.15	2111.29	829.23	0.15
Blackberry Creek	120782.5	Q50	1824.00	693.76	702.23		702.25	0.000856	2.14	2180.56	815.78	0.14
Blackberry Creek	120612.4	Q50	1824.00	693.66	702.07	699.85	702.09	0.000997	2.24	2005.03	892.97	0.15
Blackberry Creek	120466.6	Q50	1765.00	692.86	701.96		701.98	0.000635	1.87	2515.08	1080.27	0.12

Blackberry Creek	120260.1	Q50	1765.00	692.81	701.82			701.84	0.000748	1.92	2518.54	1223.72	0.13
Blackberry Creek	120001.1	Q50	1765.00	693.89	701.66			701.68	0.000531	1.58	2789.66	992.20	0.11
Blackberry Creek	119921.9	Q50	1765.00	693.72	701.62			701.63	0.000509	1.61	2606.07	917.54	0.11
Blackberry Creek	119601.5	Q50	1765.00	694.42	701.47	698.64		701.48	0.000435	1.45	2740.90	968.81	0.10
Blackberry Creek	119398.6	Q50	1765.00	692.33	701.40	698.01		701.41	0.000299	1.28	3084.43	941.40	0.08
Blackberry Creek	119239	Q50	1765.00	692.78	701.35			701.36	0.000299	1.11	3005.59	846.57	0.08
Blackberry Creek	118239	Q50	1751.00	692.21	700.89	697.74		700.93	0.001232	2.47	1643.36	634.19	0.17

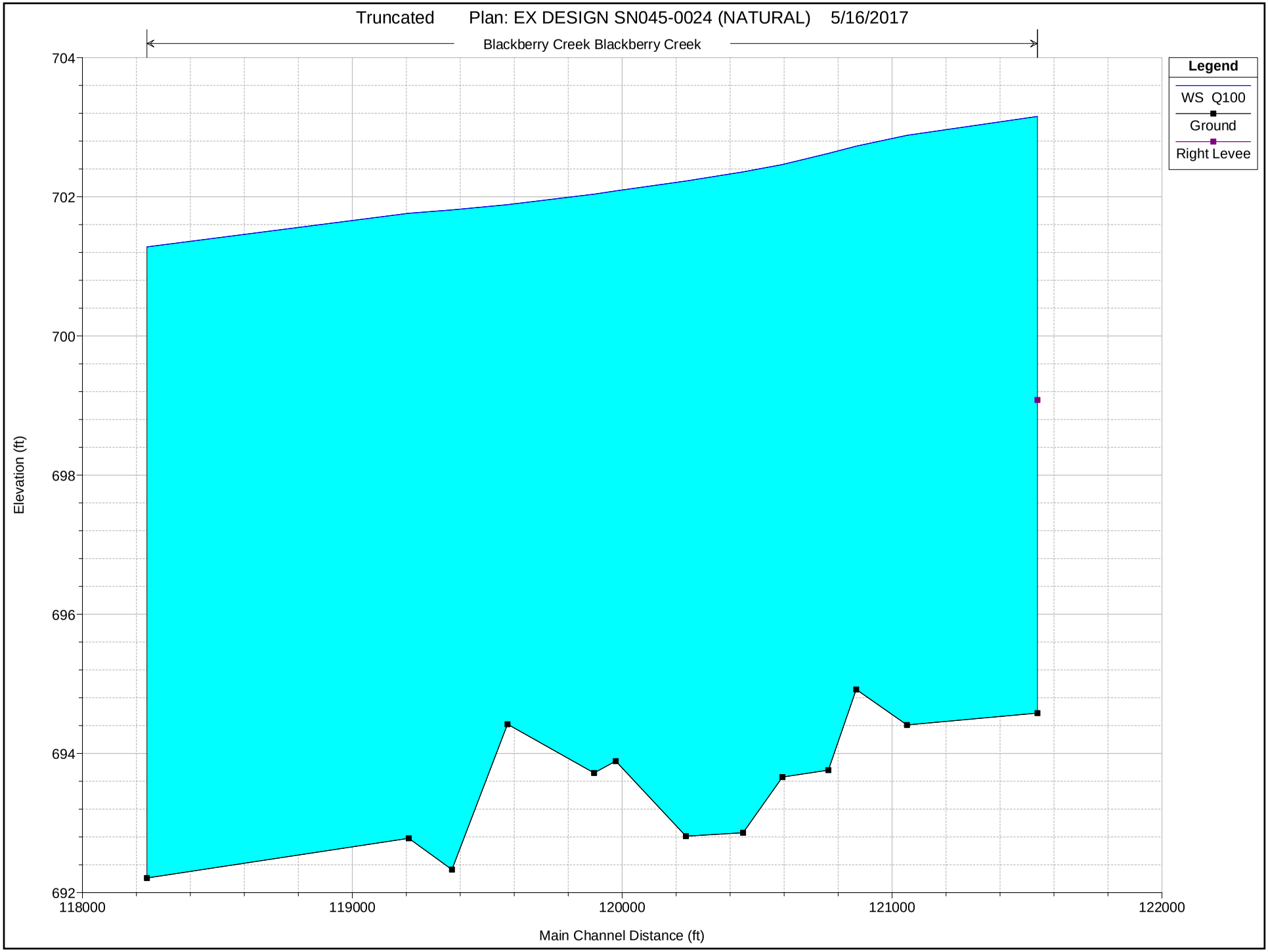
Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q50	702.77	702.76	0.01	0.26	0.00	928.54	384.34	511.12	987.14
Blackberry Creek	121072.5	Q50	702.51	702.49	0.02	0.16	0.00	466.38	455.99	901.63	899.79
Blackberry Creek	120885.9	Q50	702.36	702.33	0.02	0.10	0.00	252.51	334.34	1237.14	829.23
Blackberry Creek	120782.5	Q50	702.25	702.23	0.02	0.16	0.00	378.39	493.76	951.84	815.78
Blackberry Creek	120612.4	Q50	702.09	702.07	0.03	0.11	0.00	498.43	502.26	823.30	892.97
Blackberry Creek	120466.6	Q50	701.98	701.96	0.02	0.14	0.00	418.31	528.56	818.13	1080.27
Blackberry Creek	120260.1	Q50	701.84	701.82	0.02	0.16	0.00	812.21	600.96	351.83	1223.72
Blackberry Creek	120001.1	Q50	701.68	701.66	0.01	0.04	0.00	1306.14	270.60	188.26	992.20
Blackberry Creek	119921.9	Q50	701.63	701.62	0.01	0.15	0.00	976.52	433.94	354.54	917.54
Blackberry Creek	119601.5	Q50	701.48	701.47	0.01	0.07	0.00	1402.19	267.50	95.31	968.81
Blackberry Creek	119398.6	Q50	701.41	701.40	0.01	0.05	0.00	1196.54	272.91	295.56	941.40
Blackberry Creek	119239	Q50	701.36	701.35	0.01	0.42	0.00	921.62	584.65	258.72	846.57
Blackberry Creek	118239	Q50	700.93	700.89	0.04			122.60	724.05	904.35	634.19

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : DES. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q50
  Warning:Divided flow computed for this cross-section.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119921.9 Profile: Q50
  Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 119601.5 Profile: Q50
  Warning:Divided flow computed for this cross-section.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119398.6 Profile: Q50
  Warning:Divided flow computed for this cross-section.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119239 Profile: Q50
  Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.


Truncated Plan: EX DESIGN SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q100
Ground
Right Levee
Elevation (ft)
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 6:15:59 PM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
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385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  703.17  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  703.15  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  700.02  * Flow Area (sq ft)      * 2034.38  *  265.23  * 1056.15  *
* E.G. Slope (ft/ft)     *0.000464  * Area (sq ft)           * 2034.38  *  265.23  * 1056.15  *
* Q Total (cfs)          * 2207.00  * Flow (cfs)             * 1157.02  *  427.30  *  622.67  *
* Top Width (ft)         * 1011.46  * Top Width (ft)         *  653.23  *   37.00  *  321.23  *
* Vel Total (ft/s)       *    0.66  * Avg. Vel. (ft/s)       *    0.57  *    1.61  *    0.59  *
* Max Chl Dpth (ft)      *    8.57  * Hydr. Depth (ft)       *    3.11  *    7.17  *    3.29  *
* Conv. Total (cfs)      *102468.9  * Conv. (cfs)            * 53719.5  * 19839.3  * 28910.1  *
* Length Wtd. (ft)       *  488.68  * Wetted Per. (ft)       *  653.29  *   40.10  *  321.34  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.09  *    0.19  *    0.10  *
* Alpha                  *    1.78  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.26  * Cum Volume (acre-ft)   *  104.90  *   23.67  *   74.08  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   35.69  *    3.50  *   26.83  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  702.90  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.88	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)		Flow Area (sq ft)	872.10	262.07	1710.44
E.G. Slope (ft/ft)	0.000642	Area (sq ft)	872.10	262.07	1710.44
Q Total (cfs)	2207.00	Flow (cfs)	578.95	496.37	1131.68
Top Width (ft)	908.59	Top Width (ft)	294.03	34.96	579.60
Vel Total (ft/s)	0.78	Avg. Vel. (ft/s)	0.66	1.89	0.66
Max Chl Dpth (ft)	8.47	Hydr. Depth (ft)	2.97	7.50	2.95
Conv. Total (cfs)	87135.8	Conv. (cfs)	22858.0	19597.4	44680.4
Length Wtd. (ft)	188.00	Wetted Per. (ft)	294.15	37.37	579.84
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.12	0.28	0.12
Alpha	1.91	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	88.89	20.75	58.21
C & E Loss (ft)	0.00	Cum SA (acres)	30.47	3.10	21.66

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q100

			Left OB	Channel	Right OB
E.G. Elev (ft)	702.75	Element			
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.73	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	404.95	165.23	1874.38
E.G. Slope (ft/ft)	0.001065	Area (sq ft)	404.95	165.23	1874.38
Q Total (cfs)	2207.00	Flow (cfs)	294.16	362.93	1549.91
Top Width (ft)	863.23	Top Width (ft)	174.39	24.31	664.53
Vel Total (ft/s)	0.90	Avg. Vel. (ft/s)	0.73	2.20	0.83
Max Chl Dpth (ft)	7.81	Hydr. Depth (ft)	2.32	6.80	2.82
Conv. Total (cfs)	67633.3	Conv. (cfs)	9014.4	11122.1	47496.8
Length Wtd. (ft)	105.70	Wetted Per. (ft)	174.50	27.59	665.06
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.15	0.40	0.19
Alpha	1.65	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	86.13	19.82	50.47
C & E Loss (ft)	0.00	Cum SA (acres)	29.46	2.98	18.97

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q100

			Left OB	Channel	Right OB
E.G. Elev (ft)	702.65	Element			
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.62	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)		Flow Area (sq ft)	604.84	243.06	1659.95
E.G. Slope (ft/ft)	0.000850	Area (sq ft)	604.84	243.06	1659.95

```
* Q Total (cfs)          * 2207.00  * Flow (cfs)             *  454.54  *  536.82  * 1215.65  *
* Top Width (ft)         *  853.49  * Top Width (ft)         *  226.11  *   31.30  *  596.07  *
* Vel Total (ft/s)       *    0.88  * Avg. Vel. (ft/s)       *    0.75  *    2.21  *    0.73  *
* Max Chl Dpth (ft)      *    8.86  * Hydr. Depth (ft)       *    2.67  *    7.77  *    2.78  *
* Conv. Total (cfs)      * 75703.7  * Conv. (cfs)            * 15591.3  * 18413.7  * 41698.6  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  226.34  *   33.99  *  596.72  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.14  *    0.38  *    0.15  *
* Alpha                  *    2.06  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   84.63  *   19.34  *   46.41  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   28.86  *    2.91  *   17.52  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  702.49  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.46  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  700.14  * Flow Area (sq ft)      *  776.03  *  236.45  * 1287.61  *
* E.G. Slope (ft/ft)     *0.000990  * Area (sq ft)           * 1047.23  *  236.45  * 1287.61  *
* Q Total (cfs)          * 2207.00  * Flow (cfs)             *  617.90  *  548.44  * 1040.66  *
* Top Width (ft)         *  974.32  * Top Width (ft)         *  495.08  *   31.91  *  447.33  *
* Vel Total (ft/s)       *    0.96  * Avg. Vel. (ft/s)       *    0.80  *    2.32  *    0.81  *
* Max Chl Dpth (ft)      *    8.80  * Hydr. Depth (ft)       *    2.82  *    7.41  *    2.88  *
* Conv. Total (cfs)      * 70144.9  * Conv. (cfs)            * 19638.5  * 17431.1  * 33075.2  *
* Length Wtd. (ft)       *  145.45  * Wetted Per. (ft)       *  275.90  *   34.45  *  447.63  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.17  *    0.42  *    0.18  *
* Alpha                  *    1.98  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *   81.40  *   18.41  *   40.66  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   27.46  *    2.79  *   15.49  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  702.38  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.36  * Reach Len. (ft)        *  221.00  *  212.00  *  174.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1184.84  *  297.90  * 1469.00  *
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* E.G. Slope (ft/ft)     *0.000608  * Area (sq ft)           * 1184.84  *  297.90  * 1469.00  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             *  578.50  *  564.70  *  990.80  *
* Top Width (ft)         * 1111.52  * Top Width (ft)         *  608.63  *   38.05  *  464.84  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)       *    0.49  *    1.90  *    0.67  *
* Max Chl Dpth (ft)      *    9.50  * Hydr. Depth (ft)       *    1.95  *    7.83  *    3.16  *
* Conv. Total (cfs)      * 86525.9  * Conv. (cfs)            * 23456.2  * 22896.4  * 40173.3  *
* Length Wtd. (ft)       *  202.69  * Wetted Per. (ft)       *  608.80  *   40.77  *  464.90  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.07  *    0.28  *    0.12  *
* Alpha                  *    2.35  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.13  * Cum Volume (acre-ft)   *   77.71  *   17.51  *   36.04  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   25.63  *    2.67  *   13.96  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120260.1


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  702.25  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.23  * Reach Len. (ft)        *  247.00  *  260.00  *  268.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1857.12  *  331.72  *  846.58  *
* E.G. Slope (ft/ft)     *0.000678  * Area (sq ft)           * 1857.12  *  331.72  *  846.58  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             * 1060.30  *  630.83  *  442.87  *
* Top Width (ft)         * 1289.23  * Top Width (ft)         *  818.04  *   46.01  *  425.18  *
* Vel Total (ft/s)       *    0.70  * Avg. Vel. (ft/s)       *    0.57  *    1.90  *    0.52  *
* Max Chl Dpth (ft)      *    9.42  * Hydr. Depth (ft)       *    2.27  *    7.21  *    1.99  *
* Conv. Total (cfs)      * 81980.1  * Conv. (cfs)            * 40732.8  * 24234.2  * 17013.2  *
* Length Wtd. (ft)       *  253.16  * Wetted Per. (ft)       *  818.27  *   48.99  *  425.31  *
* Min Ch El (ft)         *  692.81  * Shear (lb/sq ft)       *    0.10  *    0.29  *    0.08  *
* Alpha                  *    2.61  * Stream Power (lb/ft s) * 1429.54  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.15  * Cum Volume (acre-ft)   *   70.00  *   15.98  *   31.42  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   22.01  *    2.47  *   12.18  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120001.1


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  702.09  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.08  * Reach Len. (ft)        *   80.00  *   80.00  *   80.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2572.31  *  182.24  *  458.28  *
* E.G. Slope (ft/ft)     *0.000510  * Area (sq ft)           * 2572.31  *  182.24  *  458.28  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             * 1604.50  *  293.21  *  236.29  *
* Top Width (ft)         * 1038.93  * Top Width (ft)         *  802.25  *   25.29  *  211.39  *
* Vel Total (ft/s)       *    0.66  * Avg. Vel. (ft/s)       *    0.62  *    1.61  *    0.52  *
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* Max Chl Dpth (ft)      *    8.19  * Hydr. Depth (ft)       *    3.21  *    7.21  *    2.17  *
* Conv. Total (cfs)      * 94457.7  * Conv. (cfs)            * 71020.5  * 12978.2  * 10459.0  *
* Length Wtd. (ft)       *   80.00  * Wetted Per. (ft)       *  802.50  *   27.96  *  211.51  *
* Min Ch El (ft)         *  693.89  * Shear (lb/sq ft)       *    0.10  *    0.21  *    0.07  *
* Alpha                  *    1.54  * Stream Power (lb/ft s) * 1539.10  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.04  * Cum Volume (acre-ft)   *   57.44  *   14.44  *   27.40  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   17.42  *    2.25  *   10.22  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119921.9


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  702.05  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.04  * Reach Len. (ft)        *  321.00  *  321.00  *  321.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2062.87  *  285.52  *  653.77  *
* E.G. Slope (ft/ft)     *0.000533  * Area (sq ft)           * 2062.87  *  285.52  *  653.77  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             * 1203.45  *  488.98  *  441.57  *
* Top Width (ft)         *  994.36  * Top Width (ft)         *  734.11  *   38.41  *  221.85  *
* Vel Total (ft/s)       *    0.71  * Avg. Vel. (ft/s)       *    0.58  *    1.71  *    0.68  *
* Max Chl Dpth (ft)      *    8.32  * Hydr. Depth (ft)       *    2.81  *    7.43  *    2.95  *
* Conv. Total (cfs)      * 92475.9  * Conv. (cfs)            * 52151.1  * 21189.8  * 19135.0  *
* Length Wtd. (ft)       *  321.00  * Wetted Per. (ft)       *  734.51  *   41.18  *  222.10  *
* Min Ch El (ft)         *  693.72  * Shear (lb/sq ft)       *    0.09  *    0.23  *    0.10  *
* Alpha                  *    1.90  * Stream Power (lb/ft s) * 1546.28  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.15  * Cum Volume (acre-ft)   *   53.18  *   14.02  *   26.38  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   16.01  *    2.19  *    9.83  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119601.5


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  701.90  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.89  * Reach Len. (ft)        *  206.00  *  206.00  *  206.00  *
* Crit W.S. (ft)         *  699.02  * Flow Area (sq ft)      * 2682.63  *  196.98  *  276.74  *
* E.G. Slope (ft/ft)     *0.000437  * Area (sq ft)           * 2682.63  *  196.98  *  321.73  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             * 1715.06  *  298.18  *  120.77  *
* Top Width (ft)         * 1078.09  * Top Width (ft)         *  832.58  *   29.08  *  216.43  *
* Vel Total (ft/s)       *    0.68  * Avg. Vel. (ft/s)       *    0.64  *    1.51  *    0.44  *
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* Max Chl Dpth (ft)      *    7.47  * Hydr. Depth (ft)       *    3.22  *    6.77  *    1.46  *
* Conv. Total (cfs)      *102037.6  * Conv. (cfs)            * 82005.9  * 14257.3  *  5774.4  *
* Length Wtd. (ft)       *  206.00  * Wetted Per. (ft)       *  833.05  *   29.50  *  190.18  *
* Min Ch El (ft)         *  694.42  * Shear (lb/sq ft)       *    0.09  *    0.18  *    0.04  *
* Alpha                  *    1.44  * Stream Power (lb/ft s) * 1676.69  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.08  * Cum Volume (acre-ft)   *   35.70  *   12.24  *   22.79  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   10.24  *    1.95  *    8.21  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119398.6


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  701.82  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.81  * Reach Len. (ft)        *  162.00  *  160.00  *   95.00  *
* Crit W.S. (ft)         *  698.21  * Flow Area (sq ft)      * 2494.44  *  224.26  *  748.54  *
* E.G. Slope (ft/ft)     *0.000310  * Area (sq ft)           * 2494.44  *  224.26  *  795.60  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             * 1461.18  *  303.46  *  369.36  *
* Top Width (ft)         *  965.17  * Top Width (ft)         *  681.73  *   28.01  *  255.43  *
* Vel Total (ft/s)       *    0.62  * Avg. Vel. (ft/s)       *    0.59  *    1.35  *    0.49  *
* Max Chl Dpth (ft)      *    9.48  * Hydr. Depth (ft)       *    3.66  *    8.01  *    3.28  *
* Conv. Total (cfs)      *121232.0  * Conv. (cfs)            * 83009.1  * 17239.7  * 20983.2  *
* Length Wtd. (ft)       *  150.82  * Wetted Per. (ft)       *  681.99  *   30.68  *  228.27  *
* Min Ch El (ft)         *  692.33  * Shear (lb/sq ft)       *    0.07  *    0.14  *    0.06  *
* Alpha                  *    1.42  * Stream Power (lb/ft s) * 1633.77  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.05  * Cum Volume (acre-ft)   *   23.46  *   11.24  *   20.15  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    6.66  *    1.81  *    7.10  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  701.77  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.76  * Reach Len. (ft)        *  550.00  *  970.00  *  800.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2117.83  *  568.17  *  672.80  *
* E.G. Slope (ft/ft)     *0.000322  * Area (sq ft)           * 2117.83  *  568.17  *  672.80  *
* Q Total (cfs)          * 2134.00  * Flow (cfs)             * 1136.85  *  683.97  *  313.19  *
```

Top Width (ft)	882.38	Top Width (ft)	563.71	97.00	221.66	
Vel Total (ft/s)	0.64	Avg. Vel. (ft/s)	0.54	1.20	0.47	
Max Chl Dpth (ft)	8.98	Hydr. Depth (ft)	3.76	5.86	3.04	
Conv. Total (cfs)	118957.0	Conv. (cfs)	63372.0	38126.8	17458.2	
Length Wtd. (ft)	783.08	Wetted Per. (ft)	563.77	101.09	221.79	
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.08	0.11	0.06	
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	14.88	9.79	18.54	
C & E Loss (ft)	0.00	Cum SA (acres)	4.34	1.58	6.58	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.28	Reach Len. (ft)			
Crit W.S. (ft)	698.98	Flow Area (sq ft)	239.14	310.75	1346.63
E.G. Slope (ft/ft)	0.001251	Area (sq ft)	239.14	310.75	1346.63
Q Total (cfs)	2116.00	Flow (cfs)	162.43	803.62	1149.95
Top Width (ft)	663.05	Top Width (ft)	123.66	45.00	494.40
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)	0.68	2.59	0.85
Max Chl Dpth (ft)	9.07	Hydr. Depth (ft)	1.93	6.91	2.72
Conv. Total (cfs)	59836.2	Conv. (cfs)	4593.3	22724.7	32518.1
Length Wtd. (ft)		Wetted Per. (ft)	123.78	48.60	494.48
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.15	0.50	0.21
Alpha	2.39	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q100	2207.00	694.58	703.15	700.02	703.17	0.000464	1.61	3355.77	1011.46	0.11
Blackberry Creek	121072.5	Q100	2207.00	694.41	702.88		702.90	0.000642	1.89	2844.61	908.59	0.12
Blackberry Creek	120885.9	Q100	2207.00	694.92	702.73		702.75	0.001065	2.20	2444.56	863.23	0.15
Blackberry Creek	120782.5	Q100	2207.00	693.76	702.62		702.65	0.000850	2.21	2507.85	853.49	0.14

Blackberry Creek	120612.4	Q100	2207.00	693.66	702.46	700.14	702.49	0.000990	2.32	2300.09	974.32	0.15
Blackberry Creek	120466.6	Q100	2134.00	692.86	702.36		702.38	0.000608	1.90	2951.74	1111.52	0.12
Blackberry Creek	120260.1	Q100	2134.00	692.81	702.23		702.25	0.000678	1.90	3035.42	1289.23	0.12
Blackberry Creek	120001.1	Q100	2134.00	693.89	702.08		702.09	0.000510	1.61	3212.83	1038.93	0.11
Blackberry Creek	119921.9	Q100	2134.00	693.72	702.04		702.05	0.000533	1.71	3002.15	994.36	0.11
Blackberry Creek	119601.5	Q100	2134.00	694.42	701.89	699.02	701.90	0.000437	1.51	3156.35	1078.09	0.10
Blackberry Creek	119398.6	Q100	2134.00	692.33	701.81	698.21	701.82	0.000310	1.35	3467.24	965.17	0.08
Blackberry Creek	119239	Q100	2134.00	692.78	701.76		701.77	0.000322	1.20	3358.81	882.38	0.09
Blackberry Creek	118239	Q100	2116.00	692.21	701.28	698.98	701.33	0.001251	2.59	1896.52	663.05	0.17

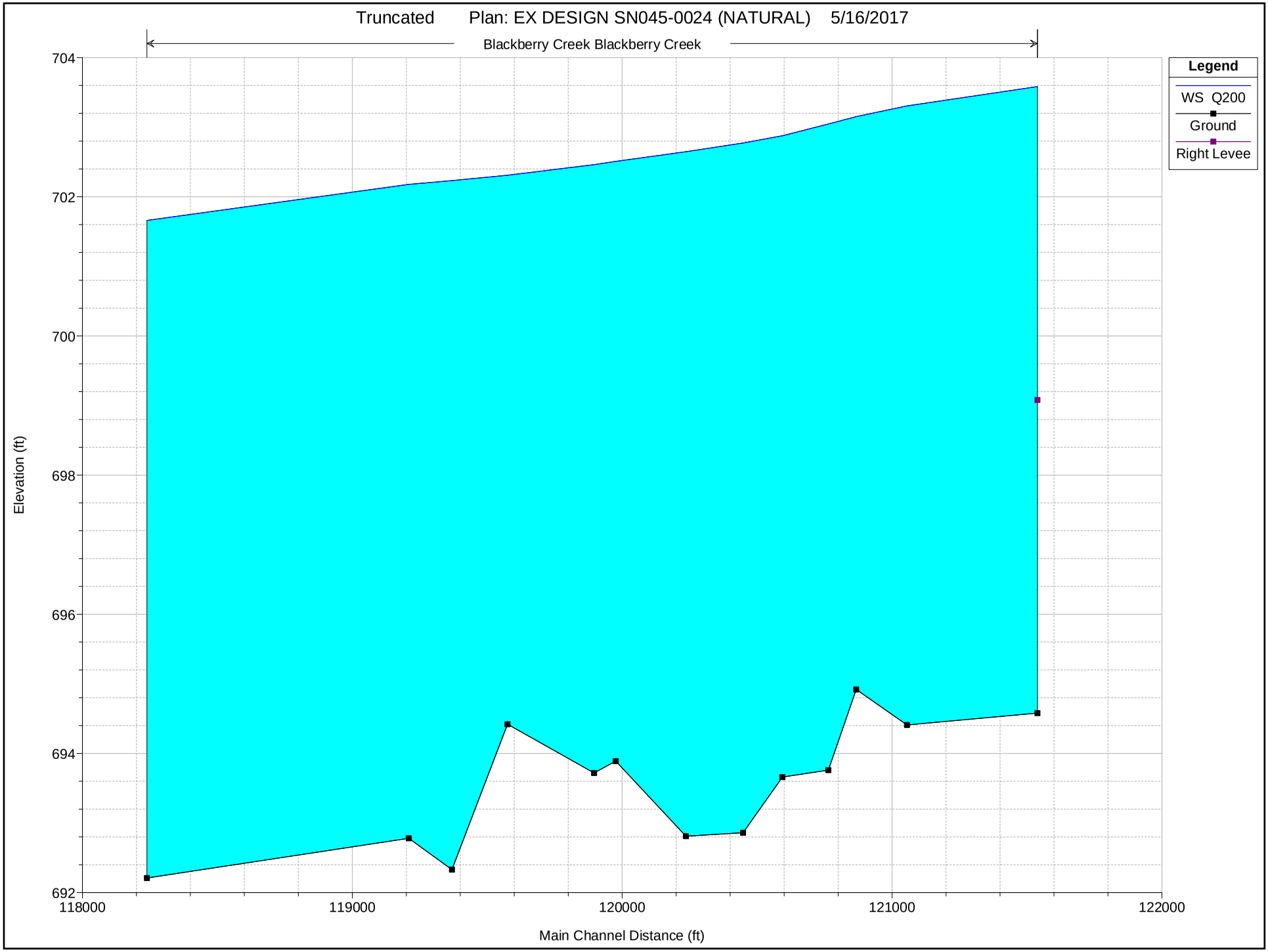
Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q100	703.17	703.15	0.01	0.26	0.00	1157.02	427.30	622.67	1011.46
Blackberry Creek	121072.5	Q100	702.90	702.88	0.02	0.15	0.00	578.95	496.37	1131.68	908.59
Blackberry Creek	120885.9	Q100	702.75	702.73	0.02	0.10	0.00	294.16	362.93	1549.91	863.23
Blackberry Creek	120782.5	Q100	702.65	702.62	0.02	0.16	0.00	454.54	536.82	1215.65	853.49
Blackberry Creek	120612.4	Q100	702.49	702.46	0.03	0.11	0.00	617.90	548.44	1040.66	974.32
Blackberry Creek	120466.6	Q100	702.38	702.36	0.02	0.13	0.00	578.50	564.70	990.80	1111.52
Blackberry Creek	120260.1	Q100	702.25	702.23	0.02	0.15	0.00	1060.30	630.83	442.87	1289.23
Blackberry Creek	120001.1	Q100	702.09	702.08	0.01	0.04	0.00	1604.50	293.21	236.29	1038.93
Blackberry Creek	119921.9	Q100	702.05	702.04	0.01	0.15	0.00	1203.45	488.98	441.57	994.36
Blackberry Creek	119601.5	Q100	701.90	701.89	0.01	0.08	0.00	1715.06	298.18	120.77	1078.09
Blackberry Creek	119398.6	Q100	701.82	701.81	0.01	0.05	0.00	1461.18	303.46	369.36	965.17
Blackberry Creek	119239	Q100	701.77	701.76	0.01	0.44	0.00	1136.85	683.97	313.19	882.38
Blackberry Creek	118239	Q100	701.33	701.28	0.05			162.43	803.62	1149.95	663.05

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : DES. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q100
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q100
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120001.1 Profile: Q100
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 119921.9 Profile: Q100
Warning:Divided flow computed for this cross-section.

```
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```


Truncated Plan: EX DESIGN SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q200
Ground
Right Levee
Elevation (ft)
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 6:15:59 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************
* E.G. Elev (ft)         *  703.60  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  703.58  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  700.27  * Flow Area (sq ft)      * 2317.16  *  281.07  * 1196.16  *
* E.G. Slope (ft/ft)     *0.000479  * Area (sq ft)           * 2317.16  *  281.07  * 1196.16  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             * 1438.66  *  478.22  *  760.13  *
* Top Width (ft)         * 1038.02  * Top Width (ft)         *  668.06  *   37.00  *  332.96  *
* Vel Total (ft/s)       *    0.71  * Avg. Vel. (ft/s)       *    0.62  *    1.70  *    0.64  *
* Max Chl Dpth (ft)      *    9.00  * Hydr. Depth (ft)       *    3.47  *    7.60  *    3.59  *
* Conv. Total (cfs)      *122329.2  * Conv. (cfs)            * 65741.5  * 21852.7  * 34735.0  *
* Length Wtd. (ft)       *  488.79  * Wetted Per. (ft)       *  668.12  *   40.10  *  333.08  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.10  *    0.21  *    0.11  *
* Alpha                  *    1.69  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.27  * Cum Volume (acre-ft)   *  120.22  *   25.12  *   85.45  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   37.13  *    3.50  *   27.93  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************
* E.G. Elev (ft)         *  703.32  * Element                *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.31  * Reach Len. (ft)        *  188.00  *  188.00  *  188.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  997.62  *  276.84  * 1956.28  *
* E.G. Slope (ft/ft)     *0.000646  * Area (sq ft)           *  997.62  *  276.84  * 1956.28  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  717.43  *  545.72  * 1413.86  *
* Top Width (ft)         *  918.33  * Top Width (ft)         *  299.81  *   34.96  *  583.56  *
* Vel Total (ft/s)       *    0.83  * Avg. Vel. (ft/s)       *    0.72  *    1.97  *    0.72  *
* Max Chl Dpth (ft)      *    8.90  * Hydr. Depth (ft)       *    3.33  *    7.92  *    3.35  *
* Conv. Total (cfs)      *105338.4  * Conv. (cfs)            * 28230.3  * 21473.7  * 55634.4  *
* Length Wtd. (ft)       *  188.00  * Wetted Per. (ft)       *  299.95  *   37.37  *  583.82  *
* Min Ch El (ft)         *  694.41  * Shear (lb/sq ft)       *    0.13  *    0.30  *    0.14  *
* Alpha                  *    1.76  * Stream Power (lb/ft s) * 1259.12  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.15  * Cum Volume (acre-ft)   *  101.96  *   22.03  *   67.35  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   31.80  *    3.10  *   22.67  *
**********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120885.9


CROSS SECTION OUTPUT  Profile #Q200
**********************************************************************************************
* E.G. Elev (ft)         *  703.17  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.15  * Reach Len. (ft)        *  130.00  *  103.00  *  100.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  482.49  *  175.55  * 2157.88  *
* E.G. Slope (ft/ft)     *0.001032  * Area (sq ft)           *  482.49  *  175.55  * 2157.88  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  365.11  *  395.22  * 1916.67  *
* Top Width (ft)         *  886.31  * Top Width (ft)         *  190.87  *   24.31  *  671.13  *
* Vel Total (ft/s)       *    0.95  * Avg. Vel. (ft/s)       *    0.76  *    2.25  *    0.89  *
* Max Chl Dpth (ft)      *    8.23  * Hydr. Depth (ft)       *    2.53  *    7.22  *    3.22  *
* Conv. Total (cfs)      * 83338.3  * Conv. (cfs)            * 11366.2  * 12303.7  * 59668.4  *
* Length Wtd. (ft)       *  105.47  * Wetted Per. (ft)       *  190.99  *   27.59  *  671.68  *
* Min Ch El (ft)         *  694.92  * Shear (lb/sq ft)       *    0.16  *    0.41  *    0.21  *
* Alpha                  *    1.54  * Stream Power (lb/ft s) * 1259.66  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.10  * Cum Volume (acre-ft)   *   98.76  *   21.05  *   58.48  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   30.74  *    2.98  *   19.96  *
**********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120782.5


CROSS SECTION OUTPUT  Profile #Q200
**********************************************************************************************
* E.G. Elev (ft)         *  703.07  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.05  * Reach Len. (ft)        *  170.00  *  170.00  *  170.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *  729.19  *  256.29  * 1913.09  *
* E.G. Slope (ft/ft)     *0.000889  * Area (sq ft)           *  729.19  *  256.29  * 1913.09  *
```

```
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  511.66  *  599.77  * 1565.57  *
* Top Width (ft)         *  995.94  * Top Width (ft)         *  363.09  *   31.30  *  601.56  *
* Vel Total (ft/s)       *    0.92  * Avg. Vel. (ft/s)       *    0.70  *    2.34  *    0.82  *
* Max Chl Dpth (ft)      *    9.29  * Hydr. Depth (ft)       *    2.01  *    8.19  *    3.18  *
* Conv. Total (cfs)      * 89779.2  * Conv. (cfs)            * 17159.8  * 20114.5  * 52504.9  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  363.34  *   33.99  *  602.21  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.11  *    0.42  *    0.18  *
* Alpha                  *    2.01  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   96.96  *   20.54  *   53.80  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   29.92  *    2.91  *   18.50  *
**********************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q200
**********************************************************************************************
* E.G. Elev (ft)         *  702.91  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.88  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  700.32  * Flow Area (sq ft)      *  898.60  *  249.68  * 1474.16  *
* E.G. Slope (ft/ft)     *0.001037  * Area (sq ft)           * 1264.17  *  249.68  * 1474.16  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  738.25  *  614.53  * 1324.22  *
* Top Width (ft)         * 1044.45  * Top Width (ft)         *  560.12  *   31.91  *  452.42  *
* Vel Total (ft/s)       *    1.02  * Avg. Vel. (ft/s)       *    0.82  *    2.46  *    0.90  *
* Max Chl Dpth (ft)      *    9.22  * Hydr. Depth (ft)       *    2.85  *    7.82  *    3.26  *
* Conv. Total (cfs)      * 83146.9  * Conv. (cfs)            * 22929.9  * 19087.1  * 41129.8  *
* Length Wtd. (ft)       *  145.42  * Wetted Per. (ft)       *  315.52  *   34.45  *  452.73  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.18  *    0.47  *    0.21  *
* Alpha                  *    1.90  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *   93.07  *   19.55  *   47.19  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   28.11  *    2.79  *   16.44  *
**********************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q200
**********************************************************************************************
* E.G. Elev (ft)         *  702.79  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.77  * Reach Len. (ft)        *  221.00  *  212.00  *  174.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1445.39  *  313.68  * 1663.39  *
```

```
* E.G. Slope (ft/ft)     *0.000601  * Area (sq ft)           * 1445.39  *  313.68  * 1663.39  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             *  775.41  *  611.95  * 1198.64  *
* Top Width (ft)         * 1149.85  * Top Width (ft)         *  639.21  *   38.05  *  472.59  *
* Vel Total (ft/s)       *    0.76  * Avg. Vel. (ft/s)       *    0.54  *    1.95  *    0.72  *
* Max Chl Dpth (ft)      *    9.91  * Hydr. Depth (ft)       *    2.26  *    8.24  *    3.52  *
* Conv. Total (cfs)      *105448.4  * Conv. (cfs)            * 31618.7  * 24953.4  * 48876.3  *
* Length Wtd. (ft)       *  202.64  * Wetted Per. (ft)       *  639.38  *   40.77  *  472.66  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.08  *    0.29  *    0.13  *
* Alpha                  *    2.15  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.12  * Cum Volume (acre-ft)   *   88.59  *   18.61  *   41.93  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   26.13  *    2.67  *   14.89  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120260.1


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  702.67  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.65  * Reach Len. (ft)        *  247.00  *  260.00  *  268.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2205.73  *  351.13  * 1029.88  *
* E.G. Slope (ft/ft)     *0.000628  * Area (sq ft)           * 2205.73  *  351.13  * 1029.88  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             * 1341.27  *  667.51  *  577.22  *
* Top Width (ft)         * 1321.05  * Top Width (ft)         *  834.65  *   46.01  *  440.39  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)       *    0.61  *    1.90  *    0.56  *
* Max Chl Dpth (ft)      *    9.84  * Hydr. Depth (ft)       *    2.64  *    7.63  *    2.34  *
* Conv. Total (cfs)      *103218.4  * Conv. (cfs)            * 53535.8  * 26643.4  * 23039.2  *
* Length Wtd. (ft)       *  252.98  * Wetted Per. (ft)       *  834.89  *   48.99  *  440.53  *
* Min Ch El (ft)         *  692.81  * Shear (lb/sq ft)       *    0.10  *    0.28  *    0.09  *
* Alpha                  *    2.30  * Stream Power (lb/ft s) * 1429.54  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.14  * Cum Volume (acre-ft)   *   79.33  *   16.99  *   36.56  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   22.39  *    2.47  *   13.07  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120001.1


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  702.52  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.51  * Reach Len. (ft)        *   80.00  *   80.00  *   80.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2914.56  *  192.98  *  555.84  *
* E.G. Slope (ft/ft)     *0.000518  * Area (sq ft)           * 2914.56  *  192.98  *  555.84  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             * 1978.90  *  325.08  *  282.02  *
* Top Width (ft)         * 1074.10  * Top Width (ft)         *  809.79  *   25.29  *  239.03  *
* Vel Total (ft/s)       *    0.71  * Avg. Vel. (ft/s)       *    0.68  *    1.68  *    0.51  *
```

```
* Max Chl Dpth (ft)      *    8.62  * Hydr. Depth (ft)       *    3.60  *    7.63  *    2.33  *
* Conv. Total (cfs)      *113578.2  * Conv. (cfs)            * 86914.2  * 14277.7  * 12386.4  *
* Length Wtd. (ft)       *   80.00  * Wetted Per. (ft)       *  810.05  *   27.96  *  239.15  *
* Min Ch El (ft)         *  693.89  * Shear (lb/sq ft)       *    0.12  *    0.22  *    0.08  *
* Alpha                  *    1.48  * Stream Power (lb/ft s) * 1539.10  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.04  * Cum Volume (acre-ft)   *   64.81  *   15.37  *   31.68  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   17.73  *    2.25  *   10.98  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119921.9


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  702.48  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.46  * Reach Len. (ft)        *  321.00  *  321.00  *  321.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2375.93  *  301.83  *  756.32  *
* E.G. Slope (ft/ft)     *0.000534  * Area (sq ft)           * 2375.93  *  301.83  *  756.32  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             * 1515.94  *  537.02  *  533.04  *
* Top Width (ft)         * 1029.05  * Top Width (ft)         *  740.48  *   38.41  *  250.17  *
* Vel Total (ft/s)       *    0.75  * Avg. Vel. (ft/s)       *    0.64  *    1.78  *    0.70  *
* Max Chl Dpth (ft)      *    8.74  * Hydr. Depth (ft)       *    3.21  *    7.86  *    3.02  *
* Conv. Total (cfs)      *111937.9  * Conv. (cfs)            * 65619.2  * 23245.3  * 23073.4  *
* Length Wtd. (ft)       *  321.00  * Wetted Per. (ft)       *  740.89  *   41.18  *  250.48  *
* Min Ch El (ft)         *  693.72  * Shear (lb/sq ft)       *    0.11  *    0.24  *    0.10  *
* Alpha                  *    1.76  * Stream Power (lb/ft s) * 1546.28  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   59.95  *   14.91  *   30.47  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   16.31  *    2.19  *   10.53  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119601.5


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  702.32  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.31  * Reach Len. (ft)        *  206.00  *  206.00  *  206.00  *
* Crit W.S. (ft)         *  699.19  * Flow Area (sq ft)      * 3035.82  *  209.28  *  359.82  *
* E.G. Slope (ft/ft)     *0.000443  * Area (sq ft)           * 3035.82  *  209.28  *  416.77  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             * 2115.03  *  332.06  *  138.91  *
* Top Width (ft)         * 1102.49  * Top Width (ft)         *  836.48  *   29.08  *  236.93  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)       *    0.70  *    1.59  *    0.39  *
* Max Chl Dpth (ft)      *    7.89  * Hydr. Depth (ft)       *    3.63  *    7.20  *    1.74  *
* Conv. Total (cfs)      *122834.9  * Conv. (cfs)            *100464.0  * 15772.7  *  6598.2  *
```

```
* Length Wtd. (ft)       *  206.00  * Wetted Per. (ft)       *  836.97  *   29.50  *  207.40  *
* Min Ch El (ft)         *  694.42  * Shear (lb/sq ft)       *    0.10  *    0.20  *    0.05  *
* Alpha                  *    1.42  * Stream Power (lb/ft s) * 1676.69  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.08  * Cum Volume (acre-ft)   *   40.01  *   13.03  *   26.15  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   10.50  *    1.95  *    8.73  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119398.6


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  702.24  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.23  * Reach Len. (ft)        *  162.00  *  160.00  *   95.00  *
* Crit W.S. (ft)         *  698.29  * Flow Area (sq ft)      * 2785.42  *  236.03  *  845.55  *
* E.G. Slope (ft/ft)     *0.000330  * Area (sq ft)           * 2785.42  *  236.03  *  904.71  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             * 1785.94  *  340.81  *  459.25  *
* Top Width (ft)         *  987.76  * Top Width (ft)         *  696.18  *   28.01  *  263.57  *
* Vel Total (ft/s)       *    0.67  * Avg. Vel. (ft/s)       *    0.64  *    1.44  *    0.54  *
* Max Chl Dpth (ft)      *    9.90  * Hydr. Depth (ft)       *    4.00  *    8.43  *    3.62  *
* Conv. Total (cfs)      *142453.9  * Conv. (cfs)            * 98381.1  * 18774.2  * 25298.5  *
* Length Wtd. (ft)       *  150.70  * Wetted Per. (ft)       *  696.45  *   30.68  *  233.84  *
* Min Ch El (ft)         *  692.33  * Shear (lb/sq ft)       *    0.08  *    0.16  *    0.07  *
* Alpha                  *    1.37  * Stream Power (lb/ft s) * 1633.77  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.05  * Cum Volume (acre-ft)   *   26.25  *   11.98  *   23.03  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    6.87  *    1.81  *    7.55  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  702.19  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.18  * Reach Len. (ft)        *  550.00  *  970.00  *  800.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2354.88  *  608.47  *  771.22  *
* E.G. Slope (ft/ft)     *0.000355  * Area (sq ft)           * 2354.88  *  608.47  *  771.22  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             * 1401.97  *  805.07  *  378.96  *
* Top Width (ft)         *  926.52  * Top Width (ft)         *  577.42  *   97.00  *  252.10  *
* Vel Total (ft/s)       *    0.69  * Avg. Vel. (ft/s)       *    0.60  *    1.32  *    0.49  *
```

Max Chl Dpth (ft)	9.40	Hydr. Depth (ft)	4.08	6.27	3.06
Conv. Total (cfs)	137285.2	Conv. (cfs)	74427.6	42739.7	20117.9
Length Wtd. (ft)	777.95	Wetted Per. (ft)	577.49	101.09	252.23
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.09	0.13	0.07
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	16.69	10.43	21.20
C & E Loss (ft)	0.00	Cum SA (acres)	4.50	1.58	6.99

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	701.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.66	Reach Len. (ft)			
Crit W.S. (ft)	699.22	Flow Area (sq ft)	288.49	327.85	1537.24
E.G. Slope (ft/ft)	0.001322	Area (sq ft)	288.49	327.85	1537.24
Q Total (cfs)	2564.00	Flow (cfs)	214.20	903.57	1446.22
Top Width (ft)	690.09	Top Width (ft)	136.12	45.00	508.96
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	0.74	2.76	0.94
Max Chl Dpth (ft)	9.45	Hydr. Depth (ft)	2.12	7.29	3.02
Conv. Total (cfs)	70505.3	Conv. (cfs)	5890.2	24846.6	39768.5
Length Wtd. (ft)		Wetted Per. (ft)	136.26	48.60	509.06
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.17	0.56	0.25
Alpha	2.27	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q200	2677.00	694.58	703.58	700.27	703.60	0.000479	1.70	3794.40	1038.02	0.11
Blackberry Creek	121072.5	Q200	2677.00	694.41	703.31		703.32	0.000646	1.97	3230.74	918.33	0.12
Blackberry Creek	120885.9	Q200	2677.00	694.92	703.15		703.17	0.001032	2.25	2815.91	886.31	0.15
Blackberry Creek	120782.5	Q200	2677.00	693.76	703.05		703.07	0.000889	2.34	2898.57	995.94	0.14
Blackberry Creek	120612.4	Q200	2677.00	693.66	702.88	700.32	702.91	0.001037	2.46	2622.44	1044.45	0.16

Blackberry Creek	120466.6	Q200	2586.00	692.86	702.77		702.79	0.000601	1.95	3422.46	1149.85	0.12
Blackberry Creek	120260.1	Q200	2586.00	692.81	702.65		702.67	0.000628	1.90	3586.74	1321.05	0.12
Blackberry Creek	120001.1	Q200	2586.00	693.89	702.51		702.52	0.000518	1.68	3663.38	1074.10	0.11
Blackberry Creek	119921.9	Q200	2586.00	693.72	702.46		702.48	0.000534	1.78	3434.08	1029.05	0.11
Blackberry Creek	119601.5	Q200	2586.00	694.42	702.31	699.19	702.32	0.000443	1.59	3604.93	1102.49	0.10
Blackberry Creek	119398.6	Q200	2586.00	692.33	702.23	698.29	702.24	0.000330	1.44	3867.00	987.76	0.09
Blackberry Creek	119239	Q200	2586.00	692.78	702.18		702.19	0.000355	1.32	3734.57	926.52	0.09
Blackberry Creek	118239	Q200	2564.00	692.21	701.66	699.22	701.71	0.001322	2.76	2153.58	690.09	0.18

Profile Output Table - Standard Table 2

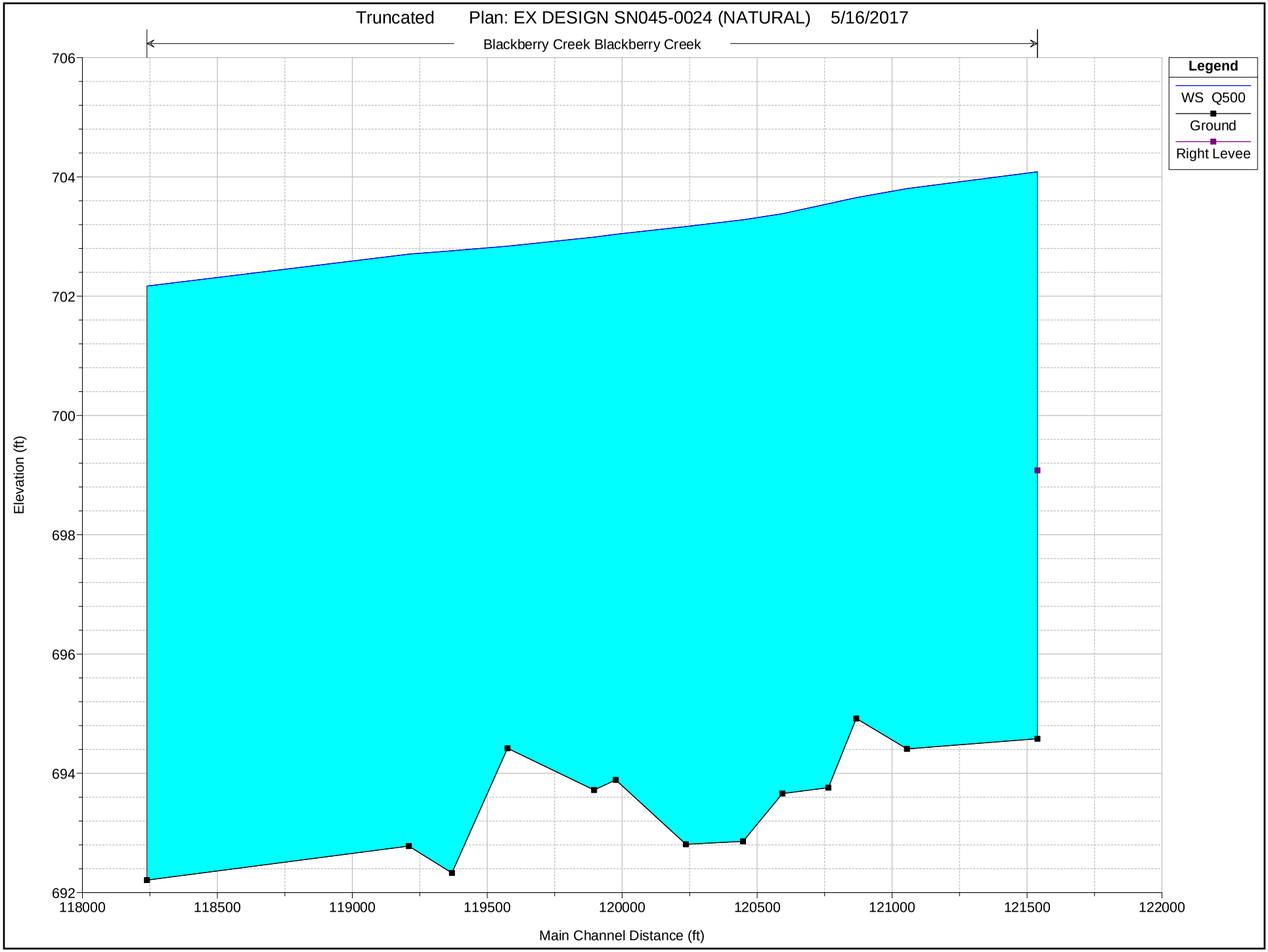
Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q200	703.60	703.58	0.01	0.27	0.00	1438.66	478.22	760.13	1038.02
Blackberry Creek	121072.5	Q200	703.32	703.31	0.02	0.15	0.00	717.43	545.72	1413.86	918.33
Blackberry Creek	120885.9	Q200	703.17	703.15	0.02	0.10	0.00	365.11	395.22	1916.67	886.31
Blackberry Creek	120782.5	Q200	703.07	703.05	0.03	0.16	0.00	511.66	599.77	1565.57	995.94
Blackberry Creek	120612.4	Q200	702.91	702.88	0.03	0.11	0.00	738.25	614.53	1324.22	1044.45
Blackberry Creek	120466.6	Q200	702.79	702.77	0.02	0.12	0.00	775.41	611.95	1198.64	1149.85
Blackberry Creek	120260.1	Q200	702.67	702.65	0.02	0.14	0.00	1341.27	667.51	577.22	1321.05
Blackberry Creek	120001.1	Q200	702.52	702.51	0.01	0.04	0.00	1978.90	325.08	282.02	1074.10
Blackberry Creek	119921.9	Q200	702.48	702.46	0.02	0.16	0.00	1515.94	537.02	533.04	1029.05
Blackberry Creek	119601.5	Q200	702.32	702.31	0.01	0.08	0.00	2115.03	332.06	138.91	1102.49
Blackberry Creek	119398.6	Q200	702.24	702.23	0.01	0.05	0.00	1785.94	340.81	459.25	987.76
Blackberry Creek	119239	Q200	702.19	702.18	0.01	0.48	0.00	1401.97	805.07	378.96	926.52
Blackberry Creek	118239	Q200	701.71	701.66	0.05			214.20	903.57	1446.22	690.09

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : DES. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q200
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q200
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119921.9 Profile: Q200
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 119601.5 Profile: Q200
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 119398.6 Profile: Q200

```
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q200
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```


Truncated Plan: EX DESIGN SN045-0024 (NATURAL) 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q500
Ground
Right Levee
Elevation (ft)
706
704
702
700
698
696
694
692
118000
118500
119000
119500
120000
120500
121000
121500
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 6:15:59 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************
* E.G. Elev (ft)         *  704.10  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.            *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  704.09  * Reach Len. (ft)       *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  700.44  * Flow Area (sq ft)      * 2660.58  *  299.68  * 1367.08  *
* E.G. Slope (ft/ft)     *0.000499  * Area (sq ft)          * 2660.58  *  299.68  * 1367.08  *
* Q Total (cfs)          * 3269.00  * Flow (cfs)            * 1782.61  *  543.08  *  943.31  *
* Top Width (ft)         * 1089.21  * Top Width (ft)         *  705.46  *   37.00  *  346.74  *
* Vel Total (ft/s)       *    0.76  * Avg. Vel. (ft/s)       *    0.67  *    1.81  *    0.69  *
* Max Chl Dpth (ft)      *    9.51  * Hydr. Depth (ft)       *    3.77  *    8.10  *    3.94  *
* Conv. Total (cfs)      *146371.6  * Conv. (cfs)            * 79817.6  * 24316.8  * 42237.2  *
* Length Wtd. (ft)       *  488.92  * Wetted Per. (ft)       *  705.53  *   40.10  *  346.87  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.12  *    0.23  *    0.12  *
* Alpha                  *    1.63  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.28  * Cum Volume (acre-ft)   *  139.87  *   26.94  *  100.06  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   38.83  *    3.50  *   29.27  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************
* E.G. Elev (ft)         *  703.82  * Element               *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.80	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)		Flow Area (sq ft)	1148.40	294.22	2247.56
E.G. Slope (ft/ft)	0.000646	Area (sq ft)	1148.40	294.22	2247.56
Q Total (cfs)	3269.00	Flow (cfs)	892.24	604.13	1772.63
Top Width (ft)	930.64	Top Width (ft)	307.41	34.96	588.27
Vel Total (ft/s)	0.89	Avg. Vel. (ft/s)	0.78	2.05	0.79
Max Chl Dpth (ft)	9.39	Hydr. Depth (ft)	3.74	8.42	3.82
Conv. Total (cfs)	128607.3	Conv. (cfs)	35102.1	23767.2	69738.0
Length Wtd. (ft)	188.00	Wetted Per. (ft)	307.57	37.37	588.55
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.15	0.32	0.15
Alpha	1.63	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	118.88	23.64	79.31
C & E Loss (ft)	0.00	Cum SA (acres)	33.25	3.10	23.90

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	703.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.65	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	582.60	187.70	2495.22
E.G. Slope (ft/ft)	0.000992	Area (sq ft)	582.60	187.70	2495.22
Q Total (cfs)	3269.00	Flow (cfs)	459.33	433.21	2376.47
Top Width (ft)	913.19	Top Width (ft)	210.39	24.31	678.49
Vel Total (ft/s)	1.00	Avg. Vel. (ft/s)	0.79	2.31	0.95
Max Chl Dpth (ft)	8.73	Hydr. Depth (ft)	2.77	7.72	3.68
Conv. Total (cfs)	103801.3	Conv. (cfs)	14585.1	13755.8	75460.4
Length Wtd. (ft)	105.66	Wetted Per. (ft)	210.52	27.59	679.06
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.17	0.42	0.23
Alpha	1.45	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	115.15	22.60	69.08
C & E Loss (ft)	0.00	Cum SA (acres)	32.13	2.98	21.17

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q500

E.G. Elev (ft)	703.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.55	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)		Flow Area (sq ft)	933.91	272.09	2218.42
E.G. Slope (ft/ft)	0.000856	Area (sq ft)	933.91	272.09	2218.42

```
* Q Total (cfs)          * 3269.00  * Flow (cfs)             *  666.06  *  650.39  * 1952.55  *
* Top Width (ft)         * 1069.67  * Top Width (ft)         *  430.27  *   31.30  *  608.10  *
* Vel Total (ft/s)       *    0.95  * Avg. Vel. (ft/s)       *    0.71  *    2.39  *    0.88  *
* Max Chl Dpth (ft)      *    9.79  * Hydr. Depth (ft)       *    2.17  *    8.69  *    3.65  *
* Conv. Total (cfs)      *111700.2  * Conv. (cfs)            * 22758.9  * 22223.5  * 66717.8  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  430.56  *   33.99  *  608.78  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.12  *    0.43  *    0.19  *
* Alpha                  *    1.87  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *  112.88  *   22.06  *   63.67  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   31.18  *    2.91  *   19.69  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  703.42  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.38  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  700.63  * Flow Area (sq ft)      * 1071.35  *  265.80  * 1704.81  *
* E.G. Slope (ft/ft)     *0.001051  * Area (sq ft)           * 1568.71  *  265.80  * 1704.81  *
* Q Total (cfs)          * 3269.00  * Flow (cfs)             *  906.22  *  686.72  * 1676.06  *
* Top Width (ft)         * 1132.36  * Top Width (ft)         *  638.84  *   31.91  *  461.61  *
* Vel Total (ft/s)       *    1.07  * Avg. Vel. (ft/s)       *    0.85  *    2.58  *    0.98  *
* Max Chl Dpth (ft)      *    9.72  * Hydr. Depth (ft)       *    2.95  *    8.33  *    3.69  *
* Conv. Total (cfs)      *100849.3  * Conv. (cfs)            * 27957.1  * 21185.5  * 51706.8  *
* Length Wtd. (ft)       *  145.39  * Wetted Per. (ft)       *  363.75  *   34.45  *  461.94  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.19  *    0.51  *    0.24  *
* Alpha                  *    1.82  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *  108.00  *   21.01  *   56.01  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   29.09  *    2.79  *   17.60  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  703.30  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.28  * Reach Len. (ft)        *  221.00  *  212.00  *  174.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 1776.59  *  333.05  * 1906.34  *
```

```
* E.G. Slope (ft/ft)     *0.000575  * Area (sq ft)           * 1776.59  *  333.05  * 1906.34  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 1044.37  *  661.15  * 1451.48  *
* Top Width (ft)         * 1182.36  * Top Width (ft)         *  662.21  *   38.05  *  482.10  *
* Vel Total (ft/s)       *    0.79  * Avg. Vel. (ft/s)       *    0.59  *    1.99  *    0.76  *
* Max Chl Dpth (ft)      *   10.42  * Hydr. Depth (ft)       *    2.68  *    8.75  *    3.95  *
* Conv. Total (cfs)      *131663.4  * Conv. (cfs)            * 43555.7  * 27573.5  * 60534.2  *
* Length Wtd. (ft)       *  202.62  * Wetted Per. (ft)       *  662.39  *   40.77  *  482.19  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.10  *    0.29  *    0.14  *
* Alpha                  *    1.95  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.12  * Cum Volume (acre-ft)   *  102.47  *   20.00  *   49.96  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   26.94  *    2.67  *   16.02  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120260.1


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  703.18  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.17  * Reach Len. (ft)        *  247.00  *  260.00  *  268.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2643.83  *  375.03  * 1260.56  *
* E.G. Slope (ft/ft)     *0.000561  * Area (sq ft)           * 2643.83  *  375.03  * 1260.56  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 1697.10  *  704.27  *  755.63  *
* Top Width (ft)         * 1341.70  * Top Width (ft)         *  847.73  *   46.01  *  447.96  *
* Vel Total (ft/s)       *    0.74  * Avg. Vel. (ft/s)       *    0.64  *    1.88  *    0.60  *
* Max Chl Dpth (ft)      *   10.36  * Hydr. Depth (ft)       *    3.12  *    8.15  *    2.81  *
* Conv. Total (cfs)      *133284.7  * Conv. (cfs)            * 71649.6  * 29733.3  * 31901.8  *
* Length Wtd. (ft)       *  252.97  * Wetted Per. (ft)       *  848.16  *   48.99  *  448.13  *
* Min Ch El (ft)         *  692.81  * Shear (lb/sq ft)       *    0.11  *    0.27  *    0.10  *
* Alpha                  *    2.01  * Stream Power (lb/ft s) * 1429.54  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.13  * Cum Volume (acre-ft)   *   91.26  *   18.28  *   43.63  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   23.11  *    2.47  *   14.16  *
*****************************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120001.1


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  703.05  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.04  * Reach Len. (ft)        *   80.00  *   80.00  *   80.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 3345.37  *  206.36  *  683.91  *
* E.G. Slope (ft/ft)     *0.000496  * Area (sq ft)           * 3345.37  *  206.36  *  683.91  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 2418.02  *  355.71  *  383.27  *
```

```
* Top Width (ft)         * 1089.71  * Top Width (ft)         *  819.17  *   25.29  *  245.24  *
* Vel Total (ft/s)       *    0.75  * Avg. Vel. (ft/s)       *    0.72  *    1.72  *    0.56  *
* Max Chl Dpth (ft)      *    9.15  * Hydr. Depth (ft)       *    4.08  *    8.16  *    2.79  *
* Conv. Total (cfs)      *141692.7  * Conv. (cfs)           *108525.9  * 15965.0  * 17201.8  *
* Length Wtd. (ft)       *   80.00  * Wetted Per. (ft)       *  819.45  *   27.96  *  245.39  *
* Min Ch El (ft)         *  693.89  * Shear (lb/sq ft)       *    0.13  *    0.23  *    0.09  *
* Alpha                  *    1.39  * Stream Power (lb/ft s) * 1539.10  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.04  * Cum Volume (acre-ft)   *   74.28  *   16.55  *   37.65  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   18.39  *    2.25  *   12.03  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119921.9


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  703.01  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.99  * Reach Len. (ft)        *  321.00  *  321.00  *  321.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2769.24  *  322.12  *  896.23  *
* E.G. Slope (ft/ft)     *0.000553  * Area (sq ft)           * 2769.24  *  322.12  *  896.23  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 1977.26  *  609.09  *  570.65  *
* Top Width (ft)         * 1074.24  * Top Width (ft)         *  748.40  *   38.41  *  287.43  *
* Vel Total (ft/s)       *    0.79  * Avg. Vel. (ft/s)       *    0.71  *    1.89  *    0.64  *
* Max Chl Dpth (ft)      *    9.27  * Hydr. Depth (ft)       *    3.70  *    8.39  *    3.12  *
* Conv. Total (cfs)      *134285.7  * Conv. (cfs)           * 84104.6  * 25908.0  * 24273.1  *
* Length Wtd. (ft)       *  321.00  * Wetted Per. (ft)       *  748.83  *   41.18  *  287.79  *
* Min Ch El (ft)         *  693.72  * Shear (lb/sq ft)       *    0.13  *    0.27  *    0.11  *
* Alpha                  *    1.73  * Stream Power (lb/ft s) * 1546.28  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.16  * Cum Volume (acre-ft)   *   68.66  *   16.06  *   36.20  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   16.95  *    2.19  *   11.54  *
*****************************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119601.5


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  702.85  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.84  * Reach Len. (ft)        *  206.00  *  206.00  *  206.00  *
* Crit W.S. (ft)         *  699.46  * Flow Area (sq ft)      * 3480.01  *  224.68  *  478.75  *
* E.G. Slope (ft/ft)     *0.000426  * Area (sq ft)           * 3480.01  *  224.68  *  552.50  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 2592.65  *  366.33  *  198.02  *
* Top Width (ft)         * 1144.99  * Top Width (ft)         *  841.35  *   29.08  *  274.55  *
* Vel Total (ft/s)       *    0.75  * Avg. Vel. (ft/s)       *    0.75  *    1.63  *    0.41  *
* Max Chl Dpth (ft)      *    8.42  * Hydr. Depth (ft)       *    4.14  *    7.73  *    1.99  *
* Conv. Total (cfs)      *152999.6  * Conv. (cfs)           *125649.1  * 17753.8  *  9596.7  *
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```
* Length Wtd. (ft)       *  206.00  * Wetted Per. (ft)       *  841.87  *   29.50  *  241.44  *
* Min Ch El (ft)         *  694.42  * Shear (lb/sq ft)       *    0.11  *    0.20  *    0.05  *
* Alpha                  *    1.36  * Stream Power (lb/ft s) * 1676.69  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.08  * Cum Volume (acre-ft)   *   45.64  *   14.05  *   30.86  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   11.09  *    1.95  *    9.47  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119398.6


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  702.77  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.106  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.76  * Reach Len. (ft)        *  162.00  *  160.00  *   95.00  *
* Crit W.S. (ft)         *  698.68  * Flow Area (sq ft)      * 3155.69  *  250.88  *  971.47  *
* E.G. Slope (ft/ft)     *0.000336  * Area (sq ft)           * 3155.69  *  250.88  * 1047.28  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 2208.99  *  380.94  *  567.07  *
* Top Width (ft)         * 1006.72  * Top Width (ft)         *  701.50  *   28.01  *  277.22  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)       *    0.70  *    1.52  *    0.58  *
* Max Chl Dpth (ft)      *   10.43  * Hydr. Depth (ft)       *    4.50  *    8.96  *    3.98  *
* Conv. Total (cfs)      *172234.7  * Conv. (cfs)            *120514.8  * 20782.6  * 30937.3  *
* Length Wtd. (ft)       *  150.55  * Wetted Per. (ft)       *  701.80  *   30.68  *  244.66  *
* Min Ch El (ft)         *  692.33  * Shear (lb/sq ft)       *    0.09  *    0.17  *    0.08  *
* Alpha                  *    1.31  * Stream Power (lb/ft s) * 1633.77  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.05  * Cum Volume (acre-ft)   *   29.95  *   12.92  *   27.08  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    7.44  *    1.81  *    8.17  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239


CROSS SECTION OUTPUT  Profile #Q500
*****************************************************************************************************
* E.G. Elev (ft)         *  702.72  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.70  * Reach Len. (ft)        *  550.00  *  970.00  *  800.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      * 2663.86  *  659.61  *  914.13  *
* E.G. Slope (ft/ft)     *0.000376  * Area (sq ft)           * 2663.86  *  659.61  *  914.13  *
* Q Total (cfs)          * 3157.00  * Flow (cfs)             * 1737.31  *  947.85  *  471.84  *
* Top Width (ft)         *  981.62  * Top Width (ft)         *  594.82  *   97.00  *  289.80  *
* Vel Total (ft/s)       *    0.74  * Avg. Vel. (ft/s)       *    0.65  *    1.44  *    0.52  *
```

```
* Max Chl Dpth (ft)      *    9.92  * Hydr. Depth (ft)       *    4.48  *    6.80  *    3.15  *
* Conv. Total (cfs)      *162844.4  * Conv. (cfs)            * 89613.8  * 48892.1  * 24338.6  *
* Length Wtd. (ft)       *  772.82  * Wetted Per. (ft)       *  594.89  *  101.09  *  289.93  *
* Min Ch El (ft)         *  692.78  * Shear (lb/sq ft)       *    0.11  *    0.15  *    0.07  *
* Alpha                  *    1.61  * Stream Power (lb/ft s) * 1304.00  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.49  * Cum Volume (acre-ft)   *   19.12  *   11.25  *   24.94  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    5.03  *    1.58  *    7.55  *
*********************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 118239


CROSS SECTION OUTPUT  Profile #Q500
*********************************************************************************************
* E.G. Elev (ft)         *  702.22  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.05  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.17  * Reach Len. (ft)        *          *          *          *
* Crit W.S. (ft)         *  699.46  * Flow Area (sq ft)      *  365.35  *  350.80  * 1802.10  *
* E.G. Slope (ft/ft)     *0.001329  * Area (sq ft)           *  365.35  *  350.80  * 1802.10  *
* Q Total (cfs)          * 3129.00  * Flow (cfs)             *  280.16  * 1014.08  * 1834.76  *
* Top Width (ft)         *  778.97  * Top Width (ft)         *  201.91  *   45.00  *  532.06  *
* Vel Total (ft/s)       *    1.24  * Avg. Vel. (ft/s)       *    0.77  *    2.89  *    1.02  *
* Max Chl Dpth (ft)      *    9.96  * Hydr. Depth (ft)       *    1.81  *    7.80  *    3.39  *
* Conv. Total (cfs)      * 85817.5  * Conv. (cfs)            *  7683.8  * 27812.7  * 50321.0  *
* Length Wtd. (ft)       *          * Wetted Per. (ft)       *  202.05  *   48.60  *  532.16  *
* Min Ch El (ft)         *  692.21  * Shear (lb/sq ft)       *    0.15  *    0.60  *    0.28  *
* Alpha                  *    2.18  * Stream Power (lb/ft s) * 1404.00  *    0.00  *    0.00  *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)   *          *          *          *
* C & E Loss (ft)        *          * Cum SA (acres)         *          *          *          *
*********************************************************************************************

Warning: Divided flow computed for this cross-section.

Profile Output Table - Standard Table 1
*****************************************************************************************************************************************************************
********
* Reach            * River Sta   * Profile * Q Total * Min Ch El * W.S. Elev * Crit W.S. * E.G. Elev * E.G. Slope * Vel Chnl * Flow Area * Top Width * Froude
# Chl *
*                  *             *         *   (cfs) *      (ft) *      (ft) *      (ft) *      (ft) *    (ft/ft) *   (ft/s) *   (sq ft) *      (ft) *
      *
*****************************************************************************************************************************************************************
********
* Blackberry Creek * 121556      * Q500    * 3269.00 *    694.58 *    704.09 *    700.44 *    704.10 *   0.000499 *     1.81 *   4327.35 *   1089.21 *
 0.11 *
* Blackberry Creek * 121072.5    * Q500    * 3269.00 *    694.41 *    703.80 *           *    703.82 *   0.000646 *     2.05 *   3690.18 *    930.64 *
 0.12 *
* Blackberry Creek * 120885.9    * Q500    * 3269.00 *    694.92 *    703.65 *           *    703.67 *   0.000992 *     2.31 *   3265.53 *    913.19 *
 0.15 *
* Blackberry Creek * 120782.5    * Q500    * 3269.00 *    693.76 *    703.55 *           *    703.58 *   0.000856 *     2.39 *   3424.42 *   1069.67 *
```

0.14													
* Blackberry Creek	* 120612.4	* Q500	* 3269.00	* 693.66	* 703.38	* 700.63	* 703.42	* 0.001051	* 2.58	* 3041.96	* 1132.36		
0.16													
* Blackberry Creek	* 120466.6	* Q500	* 3157.00	* 692.86	* 703.28	*	* 703.30	* 0.000575	* 1.99	* 4015.97	* 1182.36		
0.12													
* Blackberry Creek	* 120260.1	* Q500	* 3157.00	* 692.81	* 703.17	*	* 703.18	* 0.000561	* 1.88	* 4279.41	* 1341.70		
0.12													
* Blackberry Creek	* 120001.1	* Q500	* 3157.00	* 693.89	* 703.04	*	* 703.05	* 0.000496	* 1.72	* 4235.63	* 1089.71		
0.11													
* Blackberry Creek	* 119921.9	* Q500	* 3157.00	* 693.72	* 702.99	*	* 703.01	* 0.000553	* 1.89	* 3987.59	* 1074.24		
0.12													
* Blackberry Creek	* 119601.5	* Q500	* 3157.00	* 694.42	* 702.84	* 699.46	* 702.85	* 0.000426	* 1.63	* 4183.44	* 1144.99		
0.10													
* Blackberry Creek	* 119398.6	* Q500	* 3157.00	* 692.33	* 702.76	* 698.68	* 702.77	* 0.000336	* 1.52	* 4378.04	* 1006.72		
0.09													
* Blackberry Creek	* 119239	* Q500	* 3157.00	* 692.78	* 702.70	*	* 702.72	* 0.000376	* 1.44	* 4237.60	* 981.62		
0.10													
* Blackberry Creek	* 118239	* Q500	* 3129.00	* 692.21	* 702.17	* 699.46	* 702.22	* 0.001329	* 2.89	* 2518.25	* 778.97		
0.18													

****
****

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q500	704.10	704.09	0.01	0.28	0.00	1782.61	543.08	943.31	1089.21
Blackberry Creek	121072.5	Q500	703.82	703.80	0.02	0.15	0.00	892.24	604.13	1772.63	930.64
Blackberry Creek	120885.9	Q500	703.67	703.65	0.02	0.10	0.00	459.33	433.21	2376.47	913.19
Blackberry Creek	120782.5	Q500	703.58	703.55	0.03	0.16	0.00	666.06	650.39	1952.55	1069.67
Blackberry Creek	120612.4	Q500	703.42	703.38	0.03	0.11	0.00	906.22	686.72	1676.06	1132.36
Blackberry Creek	120466.6	Q500	703.30	703.28	0.02	0.12	0.00	1044.37	661.15	1451.48	1182.36
Blackberry Creek	120260.1	Q500	703.18	703.17	0.02	0.13	0.00	1697.10	704.27	755.63	1341.70
Blackberry Creek	120001.1	Q500	703.05	703.04	0.01	0.04	0.00	2418.02	355.71	383.27	1089.71
Blackberry Creek	119921.9	Q500	703.01	702.99	0.02	0.16	0.00	1977.26	609.09	570.65	1074.24
Blackberry Creek	119601.5	Q500	702.85	702.84	0.01	0.08	0.00	2592.65	366.33	198.02	1144.99
Blackberry Creek	119398.6	Q500	702.77	702.76	0.01	0.05	0.00	2208.99	380.94	567.07	1006.72
Blackberry Creek	119239	Q500	702.72	702.70	0.01	0.49	0.00	1737.31	947.85	471.84	981.62
Blackberry Creek	118239	Q500	702.22	702.17	0.05			280.16	1014.08	1834.76	778.97

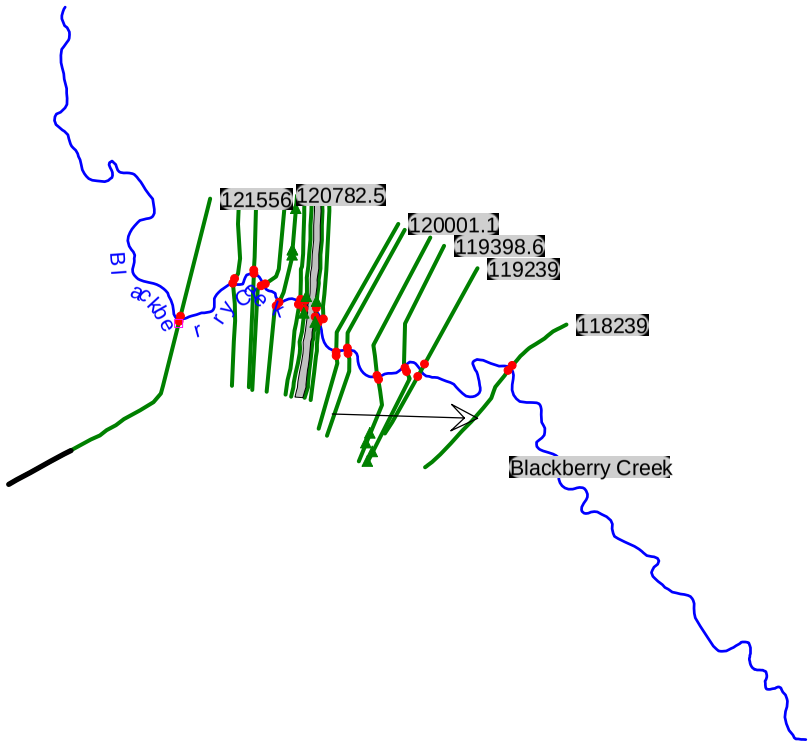
****

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : DES. NATURAL

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q500
  Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q500
  Warning:Divided flow computed for this cross-section.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120260.1 Profile: Q500
  Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Blackberry Creek Reach: Blackberry Creek RS: 119601.5 Profile: Q500
  Warning:Divided flow computed for this cross-section.

```
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 118239     Profile: Q500
     Warning:Divided flow computed for this cross-section.
```

EXISTING CONDITIONS
(DESIGN MODEL)


121556
120782.5
120001.1
119398.6
119239
118239
Blackberry Creek
Blackberry Creek

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 4:12:27 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.
```

```
*******************************************************************************

PLAN DATA

Plan Title: EX DESIGN SN045-0024
Plan File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.p11

           Geometry Title: EX DESIGN SN045-0024
           Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g12

           Flow Title    : EX DESIGN SN045-0024
           Flow File     : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f06

Plan Description:
Existing (Design)


Plan Summary Information:
Number of:  Cross Sections =   15    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    1    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  30
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed at all cross sections
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Program Selects Appropriate method
    Computational Flow Regime:     Subcritical Flow


*******************************************************************************

FLOW DATA

Flow Title: EX DESIGN SN045-0024
Flow File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.f06

Flow Data (cfs)
*****************************************************************************************************************************
*********************
* River           Reach           RS      *              Q2             Q10             Q50            Q100
Q200            Q500 *
* Blackberry CreekBlackberry Creek121556  *             457            1071            1824            2207
2677            3269 *
* Blackberry CreekBlackberry Creek120466.6*             449            1041            1765            2134
2586            3157 *
* Blackberry CreekBlackberry Creek118239  *             447            1034            1751            2116
2564            3129 *
*****************************************************************************************************************************
*********************

Boundary Conditions
*********************************************************************************************************
* River           Reach           Profile          *            Upstream                 Downstream    *
*********************************************************************************************************
* Blackberry CreekBlackberry CreekQ2               *                                Known WS = 698.84 *
* Blackberry CreekBlackberry CreekQ10              *                                Known WS = 700.01 *
* Blackberry CreekBlackberry CreekQ50              *                                Known WS = 700.89 *
* Blackberry CreekBlackberry CreekQ100             *                                Known WS = 701.28 *
* Blackberry CreekBlackberry CreekQ200             *                                Known WS = 701.66 *
* Blackberry CreekBlackberry CreekQ500             *                                Known WS = 702.17 *
*********************************************************************************************************

*******************************************************************************

GEOMETRY DATA

Geometry Title: EX DESIGN SN045-0024
```

Geometry File : e:\1407\Drainage\HEC-RAS Model\Blackberry Creek - LIN ENG 11182016\Truncated\Truncated.g12

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 121556

INPUT
Description: IDNR 1985. B11424 Reach Lengths Not Including RT 47

XS extended
by DS; new XY data from 2004 TIN added Jan. 2005 by BW; shcematic
updated 2-11-05 by BW to include xs endpoints
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.68	60.07	705.38	110.1	704.28	160.12	703.78	212.07	702.28
255.01	701.58	300	701.08	348.08	700.18	397.06	700.08	425.04	700.48
472.1	700.08	523.03	699.88	591.09	699.48	647.04	698.78	695	699.58
749.03	698.78	802.01	698.98	835.01	698.48	841.07	696.98	848.03	697.28
850.09	695.38	855.12	695.08	860.02	694.68	866.08	694.58	870.07	695.38
872.01	698.88	886.06	699.08	915.06	697.48	961.99	698.38	1015.11	699.28
1065.01	700.18	1115.02	701.18	1172.01	702.38	1224.08	704.28	1280.03	706.18
1330.05	708.68	1384.08	711.98	1462.4	719.7	1570.2	720.3	1697	713.5
1765.9	711.4	1838.7	712.1	1897.5	713.4	1964.8	714.6	2046.8	713.6
2123.9	708.8	2197.4	706.1	2279.5	705	2377.8	704.3	2466.9	704.6
2546.8	705	2609.8	705.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	835.01	.07	872.01	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
835.01	872.01	480	483.5	500	.1	.3

Right Levee Station= 886 Elevation= 699.08
Blocked Obstructions num= 1

Sta L	Sta R	Elev
2123	2609.8	707.5

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 121072.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	708	5.24	707.96	12.73	706.18	17.05	705.94	25.16	707.64
27.62	707.86	60.51	708.57	97.87	709.19	116.4	708.9	133.16	707.56
155.86	707.43	180.84	705.15	211.89	703.7	235.56	701.97	267.21	700.01
298.76	699.6	325.19	699.75	340.55	699.4	370.5	699.52	386.34	699.4
409.14	699.8	425.31	699.96	447.47	699.83	460.53	699.93	477.88	700.01
517.09	698.74	519.87	696.13	522.78	695.62	526.41	694.73	530.89	694.41
536.12	694.47	542.35	694.57	546.92	695.62	548.34	696.18	552.05	699.06
567.89	700.13	623.77	700.13	653.87	700.28	695.23	699.25	719.96	699.98
746.13	700.15	782	700.3	811.67	700.1	830.11	700.02	853.62	700.17
860.98	700.01	890.17	699.96	912.26	699.79	923.25	700.16	951.74	699.89
982.52	699.71	1011.26	699.3	1037.25	699.03	1070.56	699.39	1085.24	699.46
1100.75	699.8	1117.33	701.27	1132.42	702.97	1142.94	704.08	1165.19	705.68
1197.52	706.41	1215.32	706.92	1234.85	707.58	1259.12	709		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	517.09	.0728	552.05	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
517.09	552.05	188	188	188	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.63	17.22	706.62	43.19	706.98	62.88	707.98	81.02	709.67
104.83	709.35	114.94	707.89	126.48	707.34	146.56	706.14	156.69	705.51
195.23	704.73	218.83	703.98	243.37	703.63	263.32	703.1	282.81	702.6
309.57	702.29	322.13	701.34	332.48	700.26	344.13	699.66	365.33	699.7
376.08	699.51	392.5	699.69	415.72	699.51	437.84	699.77	452.23	699.71
453.2	699.72	454.19	699.7	456.02	695.87	457.08	695.48	460.85	694.92
466.6	694.97	471.06	695.15	473.24	695.69	476.54	697.92	479.24	697.95
487.29	698.45	490.65	699.41	517.99	700.09	592.57	699.45	637.86	700.05
662.52	700.08	667.78	700.1	675.2	699.54	683.16	699.63	688.46	700.24
708.02	700.67	720.49	700.69	734.87	700.13	750.7	699.96	765.5	700.1
775.63	700.27	783.42	699.94	794	701.02	819.86	699.7	845.45	699.94
863.06	700.15	892.44	699.65	901.57	699.95	926.62	699.45	947.55	700.34
964.7	699.22	991.75	699.97	1039.48	698.82	1078.82	699.58	1113.38	700.65
1133.95	702.27	1149.2	703.25	1162.27	704.15	1180.51	704.88	1188.67	705.69
1202.46	706.05	1215.79	706.69	1231.74	707.37	1239.86	707.68	1251.28	708.05
1259.66	708.52								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	452.23	.0728	476.54	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
452.23	476.54	130	103	100	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	706.05	19.07	706.01	44.79	705.72	70.14	704.32	91.9	703.88
101.21	705.6	108.19	706.65	142.57	706.69	160.15	705.47	175.17	704.56
201.67	703.56	217.43	702.97	232.8	702.75	254.16	702.72	262.05	702.76
265.63	702.93	273.61	703.04	281.56	702.95	294.37	702.89	298.17	703.11
305.96	703.17	320.62	703.08	326.55	702.92	335.94	703.59	345.24	704.12
364.69	703.5	404.25	702.61	410.99	702.41	435.77	702.87	460.25	702.51
475.73	701.8	489.63	701.27	515.17	699.19	520.55	698.74	530.32	699.51
570.7	698.93	597.38	698.83	614.14	698.82	628.48	699.32	641.18	699.07
656.58	698.87	659.93	698.34	661.96	696.33	665.01	694.61	668.11	694.48
674.2	694.2	675.12	694.15	681.97	693.76	686.6	694.98	689.21	696
691.23	698.3	702.77	699.5	714.98	700.07	725	699.16	746.35	699.45
755.29	699.38	769.94	698.58	777.75	698.75	783.93	699.44	820.17	700.14
842.48	700.79	848.28	699.84	856.74	699.89	863.54	700.56	876.6	700.41
894.6	700.59	905	700.56	920.86	699.95	934.05	700.8	966.51	700.83
973.79	700.07	989.93	700.08	997.29	699.48	1003.02	700.06	1014.62	700.01
1028.85	699.52	1061.46	700.21	1086.85	699.88	1127.81	698.96	1131.79	699.48
1142.34	699.13	1157.03	698.85	1181.18	698.99	1192.14	699.23	1208.8	699.01
1225.96	698.75	1249.43	700.08	1275.73	701.73	1301.92	703.75	1324.85	704.8
1340.43	705.59	1355.93	706.1	1391.32	707.86	1420.55	709		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	659.93	.0728	691.23	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
659.93	691.23	170	170	170	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120612.4

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.95	28.53	706.21	59.93	706.39	79.47	706.31	101.09	703.9
111.88	702.96	128.25	702.86	137.28	702.14	153.21	702.1	172.84	701.99
188.72	701.34	193.3	701.53	196.76	701.09	201.22	700.61	204.22	700.37
209.82	700.21	215.45	700.11	241.87	700.31	259.96	700.45	294.69	700.35
298.96	700.95	307.87	701.61	316.08	702.33	332.57	702.26	349.44	702.3
357.01	702.68	370.68	703.1	386.08	703.47	394.8	702.79	400.4	702.87
407.48	703.33	410.86	703.23	422.16	703.37	427.19	702.97	438.69	702.84
479.11	702.42	511.42	700.77	525.99	700.26	543.84	700.07	581.98	699.9
605.22	700.34	636.31	699.86	649.26	699.62	663.9	698.6	669.96	697.92
680.82	697.2	686.83	697.61	691.96	697.73	698.19	698.2	707.32	698.9
718.25	698.09	742.05	698.71	750.62	698.22	754.02	695.71	755.34	695.23
759.97	694.55	766.66	693.66	772.2	693.7	776.43	694.88	778.08	695.7
782.53	699.12	790.28	699.91	801.26	699.7	812.98	699.92	827.3	699.5
830.58	699.76	860.35	699.2	877.64	700.33	901.23	699.77	914.88	700.03
922.23	699.98	937.03	700.67	957.69	699.81	998.27	699.19	1009.81	698.91
1021.61	699.05	1032.07	699.1	1065.17	698.71	1085.45	698.86	1100.68	698.94
1112.93	698.9	1122.19	698.97	1140.53	698.8	1147.73	699	1155.2	699.18
1166.53	699.29	1171.6	699.34	1181.56	700.03	1187.33	699.68	1195.33	700.27
1204.44	700.61	1214.77	701.41	1218.55	701.54	1237.31	703.07	1251.06	703.7
1276.24	704.5	1283.92	705.16	1291.95	705.17	1299.28	705.43	1326.27	706.56
1346.85	707.5	1363.3	708.22	1378.97	709				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	750.62	.0728	782.53	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
750.62	782.53	144	146	146	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
100	386.08	703.47	F
386.08	422.16	703.37	F

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120466.6

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	704.06	51.44	703.33	90.3	702.47	120.4	702.27	132.95	701.9
150.04	701.55	186.85	701.27	200.82	701.22	219.41	701.11	236.66	701.1
264.1	700.99	276.5	701.54	288.81	701.55	401.46	700.6	488.39	700.03
507.94	701.12	548.8	699.6	583.47	699.25	612.84	698.55	664.35	699.05
700.39	698.78	710.7	697.72	715.85	697.35	716.98	695.7	718	693.74
724.5	692.86	730.3	693.86	731.43	694.06	739.22	693.99	747.14	695.63
753.9	697.76	763.19	698.06	768.49	698.09	819.23	698.26	888.5	698.65
940.11	698.73	1045.64	699.45	1066.48	699.62	1113.27	699.5	1158.96	699.96
1201.59	701.44	1281.57	705.72	1340.52	707.35	1383.85	709.51		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	715.85	.0728	753.9	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
715.85	753.9	40	40	40	.1	.3

CROSS SECTION

```
RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120428.0

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      65
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  704.06   11.57  703.58  14.047  703.87  28.821  703.56  63.861  703.48
  72.079  703.85  90.015  703.31 125.297   703.4 151.165  703.19 175.353  702.72
 184.039  702.96  246.09  703.49 261.167  704.11  277.44  704.58 287.953  704.08
  348.16  703.56  384.74  703.61 417.961   703.2 452.827  703.17 474.746  703.83
  488.36  702.59 520.949  702.49   558.5  702.78 584.177  703.57 600.935   704.2
 615.311  700.48 623.045  698.34 627.964  697.81 629.592  695.64 632.285  694.61
 637.074  694.02 647.259  694.13 648.878  694.16 657.114  694.31 664.605  695.67
 671.672  695.74  675.76  694.84 681.207  695.68 683.268  697.74 688.655  698.13
 690.335  699.25 700.329  699.26  701.55  699.25 711.769  700.93 723.902  701.47
 735.247   702.9 764.475  703.23 783.788  702.99 821.694  703.56 860.474  702.44
 884.013  702.32 924.066  704.15 954.819  704.34 972.373  703.961001.723  703.98
1039.551  704.131049.588  704.041093.522  703.971105.161  704.48 1112.86  705.26
1123.573  705.53 1134.84  705.081159.547  705.251184.931  705.811216.835   707.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .117 627.964   .0728 683.268    .117

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       627.964 683.268               90      90      90             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   610.2   706.1       F
  719.661216.835   706.1       F
Skew Angle = 30

BRIDGE


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120403

INPUT
Description: 2 span bridge - IL 47
Distance from Upstream XS =      25
Deck/Roadway Width        =      53
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =      30
Upstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************************************
       0 706.447          90.023 706.585         175.353 706.522
 261.185  706.67         348.168 706.694         433.125 706.613
   519.2 706.801         577.553 707.068          618.15 707.114
  618.15 707.114   704.5 664.917   707.2   704.5 709.206  707.16   704.5
 711.154  707.14   704.5 711.154  707.14         805.326 706.654
 873.941 706.412         957.469  706.29         1020.21   706.5
1123.607   706.6         1216.83  707.08

Upstream Bridge Cross Section Data
Station Elevation Data    num=      48
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  705.57  90.023 705.645 169.698  705.63 175.353 705.535 260.431 705.674
 348.393 705.412  370.26 705.332 407.274 705.826  425.08  705.84 463.722  706.15
 476.297 705.466 515.354 705.353 539.049 706.188 584.299 706.906  611.76 707.052
 618.411 703.337 633.913 697.658 636.295 697.251 638.858 695.807 640.374 695.136
 646.219 694.738 654.403 694.967 662.717 695.463 666.268 695.171 668.087 695.065
 677.526 695.111  686.36 695.009 692.543 695.719 696.319  697.25 702.892 700.308
  709.95 702.407 714.228 704.435 718.178 706.911  739.69 706.894 805.326   706.5
 826.457 705.312  867.42 705.659 892.275 705.761 952.065 705.918  1043.6 705.872
1093.522  703.971105.161  704.48 1112.86  705.261123.573  705.53 1134.84  705.08
1159.547  705.251184.931  705.811216.835     706
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
       0    .117 636.295    .035 696.319    .117

Bank Sta: Left   Right    Coeff Contr.   Expan.
       636.295 696.319             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   610.2   706.1       F
  719.661216.835   706.1       F
Skew Angle = 30

Downstream  Deck/Roadway Coordinates
    num=      21
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
       0 707.211          88.395  707.11         174.902 707.097
 263.324 707.269         349.588 707.339         435.602 707.294
 521.269 707.514         583.346 707.825         637.135 708.039
 640.348 708.045         640.348 708.045   705.3 686.758 708.057   705.3
 733.348 707.971   705.3 733.348 707.971          762.89 707.752
 806.053 707.341         873.153 707.107         960.362 707.201
1048.471 707.231        1132.718 707.508         1210.51 707.838

Downstream Bridge Cross Section Data
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 706.369  88.387 706.467 175.543 706.217  261.02 705.692 348.229 706.582
 436.693  705.44 479.475 706.824 502.338 707.073 544.773 707.506 588.386   707.8
 633.541 707.975 642.504 702.872 653.763 697.897 658.006 697.736  661.73  697.17
 663.254 695.537 665.445 694.916 671.594 695.052 679.154 694.875 685.563 695.131
  689.46 695.146 691.192 695.618 696.362 695.076 700.554 695.714 706.937 695.078
 709.188 695.179 712.791 695.283 714.142 695.792 716.316 697.402   718.1 697.821
 724.629 698.296 729.592 700.906 731.324 702.697 738.425 705.557 743.145 707.606
 806.079 706.999 848.237 706.597 871.057 705.888 882.913 706.481 914.098  704.35
 957.824 706.6251045.544 706.5631128.552 706.5731210.513  707.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
       0    .117  661.73    .035 716.316    .117

Bank Sta: Left   Right    Coeff Contr.   Expan.
        661.73 716.316             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  637.78   705.2       F
  764.971210.513   705.2       F
Skew Angle = 30

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream= 664.917    Downstream= 686.853
Upstream     num=       2
    Width   Elev    Width   Elev
**********************************
       3     691     2.5   704.5
Downstream     num=       2
    Width   Elev    Width   Elev
**********************************
       3   691.7     2.5   705.3

Number of Bridge Coefficient Sets =  1
```

```
Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120339.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  704.58  68.225  704.49  88.387  703.82 102.754  701.54  142.08  703.04
 170.451  703.16 175.543  704.13 210.782  703.66 253.546  703.62 263.315  703.88
 284.074  703.81  349.58  704.71 405.845  704.29 431.696  704.14 462.085  704.35
 501.333  705.11 521.269  704.28 545.336  704.82 588.386  705.34 607.188  704.97
 631.982   704.3 641.656  703.02 646.323  701.82  648.93  701.13 652.879  699.57
   663.8  697.97 668.831   697.4 669.793  696.38 670.719   695.7 671.793  695.47
 674.556  694.08  680.41  694.22 684.983  694.87 687.693  695.25  690.95  695.56
 697.124  695.86 705.308  696.25 712.852  695.71 714.376  695.17 720.447  695.67
 721.616  696.41 724.127   697.8  729.73  699.07 733.627  699.62 739.837  699.95
 742.513  699.97 747.666  699.59 754.377  700.49 758.941  702.13  768.39  703.01
 784.186  702.93 816.463  704.34 823.789  704.19  850.87  703.63 872.114   704.5
 954.299  704.231048.419  704.571129.453  704.451146.912   704.11172.113  705.01
1213.501  706.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
       0    .117 668.831   .0728 724.127    .117

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       668.831 724.127               91      82      44              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  637.78   705.2       F
  764.971213.501   705.2       F
Skew Angle = 30

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120260.1

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  702.98  100.83  700.42  276.15  698.68   404.6  701.33  518.63  700.07
  603.33  700.23  708.77  698.95  753.59  699.62  761.86  700.11   822.2  699.26
  832.35  698.44  847.73   696.7  848.99  695.54  849.91  692.81  852.37  692.98
  858.57  693.72  871.19  694.73  877.77  695.26  879.54   695.6  883.28  696.08
  885.76  696.43  888.46  696.69  893.74  698.65  899.36  698.81  909.62  699.38
  910.18  699.47  939.47  699.22  953.64  699.54  990.14   700.5  998.84  700.57
 1031.49  699.93 1042.95  699.52 1045.92  699.85  1088.9  698.43 1120.97  699.41
 1139.25  699.69 1237.22  701.56 1317.15  702.19 1331.82  702.49 1396.46  706.92
 1417.61  708.04 1429.54  708.47

Manning's n Values        num=       3
```

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	847.73	.0728	893.74	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
847.73	893.74	247	260	268	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	713.99	25.03	712.14	46.9	709.79	81.71	706.94	109.89	705.77
149.68	704.43	195.82	701.83	237.75	700.02	285.09	698.93	314.19	698.74
346.07	698.54	375.07	698.11	391.9	698.01	421.12	698.09	456	698
487.37	698.23	515.22	698.06	541.58	698.17	560.8	698.4	581.51	698.73
601.18	699.15	613.74	700.04	624.94	699.31	643.91	699.39	649.68	699.31
655.34	698.95	668.25	699.24	682.64	698.81	702.7	699.09	718.74	699.2
735.51	699.44	759.99	698.95	772.99	698.4	795.2	699.25	806.87	699.24
819.4	699.3	826.02	699.99	844.54	699.85	871.71	699.27	888.88	699.19
905.15	698.83	916.38	698.74	956.22	698.06	975.45	697.48	983.86	697.39
984.83	697.38	993.56	697.3	997.25	695.69	998.19	694.92	1003.67	693.99
1009.9	693.89	1014.04	694.38	1016.2	695.16	1016.8	695.69	1018.85	698.73
1035.96	699.44	1065.53	697.95	1087.79	698.34	1148.15	700.28	1167.41	700.99
1208.68	702.13	1222.36	701.91	1256.48	702.39	1265.88	703.19	1275.93	704.01
1332.61	704.75	1378.7	706.77	1407.96	708.48	1420.47	709.06	1436.23	709.58
1463.43	711.34	1474.52	711.72	1492.37	712.43	1505.82	713.15	1516.94	713.93
1529.23	714.46	1539.1	715						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.117	993.56	.0728	1018.85	.117

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
993.56	1018.85	80	80	80	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	714	17.14	711.81	40.3	709.76	66.57	707.3	84.5	706.39
110.13	705.58	134.43	704.76	163.86	703.22	186.06	701.74	209.61	701.29
238.26	700.08	267.89	700.24	283.69	700.38	294.85	701.16	308	701.96
321.22	701.93	335.06	701.18	354.83	700.31	372.73	699.73	376.63	699.59
381.36	699.47	388.43	699.33	391.69	699.17	400.27	698.85	404.1	699.2
416.22	699.88	419.57	699.97	437.95	699.24	453.2	698.73	470.75	698.24
477.07	698.09	486.35	698.31	498.21	698.15	512.26	698.28	541.63	698.36
569.81	698.6	591.23	698.81	615.83	699.07	635.16	699.2	645.57	698.67
649.99	699.01	652.66	698.96	655.22	698.73	683.61	698.98	697.75	698.39
714.68	699.11	728.76	698.41	738.23	698.91	748.61	698.56	765.06	699.15
788.86	699.71	810.68	698.74	847.08	697.74	858.62	697.66	868.07	697.27
881.18	697.41	901.77	697.77	915.7	697.74	918.88	695.95	919.55	694.87
923.86	693.99	929.49	694.1	935.29	694.23	943.65	693.72	949.93	694.61
951.95	695.89	954.11	698.41	959.88	698.68	972.13	698.05	981.56	697.56
992.63	697.74	1003.23	697.86	1012.59	698.01	1027.02	698.05	1044.69	698.08
1077.19	698.22	1094.31	698.67	1110.68	698.95	1119.77	699.93	1127.78	700.76
1144.16	702.87	1160.04	702.86	1177.69	701.73	1192.41	702.02	1212.51	702.06
1218.36	701.76	1233.95	702.74	1252.72	703.36	1263.05	703.29	1284.74	703.66
1299.38	703.46	1311.73	703.87	1330.74	704.73	1350.26	705.71	1373.11	706.32
1387.66	706.92	1414.51	707.68	1441.23	708.79	1448.77	708.89	1459.65	709.23
1468.03	709.85	1482.72	710.66	1490.85	711.13	1500.29	711.8	1512.88	712.65

```
 1519.65  713.15 1530.17  713.82 1541.35  714.66 1546.28  715.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .117   915.7   .0728  954.11    .117

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         915.7  954.11              321     321     321             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119601.5

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=     101
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0     712   25.06  711.12   54.59  710.52   79.65  709.07  100.24  707.68
  110.78  707.31  128.14  706.86  138.51   706.4  155.83  705.81  168.87  705.19
  184.56  704.37  202.78  703.48  219.54  701.66  246.84  701.62  286.68  700.23
  308.99  699.92  336.95  699.72  363.16   699.4   373.9  699.47  400.05   699.6
  425.38  699.42  440.66   699.4  469.93  699.07   501.5  698.92  529.03  698.74
  556.15  698.61  571.72   697.9  599.87  697.47  620.25  697.57  651.51  697.64
   677.3   697.7   707.9  697.47  725.73  697.43  741.92  697.66  752.39   697.6
  768.84  697.73  776.04  697.79  799.34  698.27  838.38  698.79  896.71  698.38
   915.2  698.23  920.55  698.19  926.84  699.07   945.5   697.9  953.53  697.96
  968.49  698.91  997.59  696.42 1030.18  698.31 1037.95  698.02 1050.04  696.53
 1054.27  695.55 1058.31  695.15 1059.11  695.06 1062.79  694.65  1067.9  694.42
 1074.27  694.76 1076.77  695.69 1079.12  696.29 1091.71  698.84 1132.08  698.86
  1157.5  700.24 1166.69  701.26 1187.96  701.89 1257.13  701.31 1275.48  702.16
 1297.63  702.47 1321.48  702.86 1347.09  703.65 1376.18  704.08 1394.67  704.23
 1406.97   704.1 1413.47  703.72 1422.79  703.75 1431.82   704.1 1433.18   703.9
 1436.63  703.74 1440.66  704.07 1443.46  703.71    1446  703.82 1451.91  704.04
 1460.48  703.85 1466.16  704.13 1477.29  704.64 1485.61  704.58 1496.33  703.69
 1500.95  702.35 1505.32  701.39  1509.4  699.88 1512.71  699.47 1521.53  699.37
 1538.51  704.61 1540.14  704.89 1553.91  707.57 1564.73   708.9  1570.6  709.41
 1583.19  709.93 1598.71  710.48 1614.86  709.38 1643.45  708.03 1658.87  706.96
 1676.69     706

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .106 1050.04   .0728 1079.12    .117

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1050.04 1079.12              206     206     206             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 1477.29    1550  704.64       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119398.6

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      95
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0     716   12.05  714.93   26.53  713.94   36.87  713.03   55.84  711.45
   70.09  710.73   87.84  708.86   93.58  708.65   104.2  707.79   110.3  707.34
  115.65     707  121.26  706.59  126.58  706.45  144.97  705.57  175.67  704.32
  193.97  703.76  212.13  701.95  223.42  701.82  236.47  701.49  253.01  700.91
  276.47  700.49  302.53  699.79  331.69  699.91  341.32  699.75  356.74  699.65
  372.65  699.28  380.91  699.32  390.06   699.1  414.43  698.95  428.73  698.78
  437.09  698.77  448.14  698.59  461.52  698.76  479.88  698.77  490.42  698.44
  506.89   698.4   513.8  698.43  530.48  698.35   555.5  698.21  565.93  697.58
  585.41  697.31  608.57  697.47  647.14  696.69  738.42  697.04  810.59  696.74
  841.14  698.08  856.72  696.64  880.57  695.76  893.84   696.6  895.25  696.61
```

```
  905.48  695.66  907.86  694.06  909.55  693.72  914.47  693.75  920.25  692.53
  923.82  692.33  927.45  692.92  928.56  693.95  933.49  698.18  936.38  698.45
  952.35  698.48  967.17  698.27  991.93  697.14  999.05  697.93 1016.54   698.3
 1048.03  698.24 1072.92   697.9 1114.02  698.79 1135.88  699.27 1150.66  700.99
 1171.94   702.6 1195.08  703.23 1221.17  702.78 1270.26  703.36 1308.78  703.18
 1348.47  703.26 1413.08  703.88 1420.54  703.71 1444.96  703.76 1464.33  703.92
 1486.67   704.6 1508.64  705.34 1525.51  705.74 1540.57  706.48  1549.6  706.49
 1559.51  706.71 1568.14  706.62 1574.09  705.94 1580.13  703.93 1584.16  703.22
 1597.74  699.16 1606.12   699.2 1616.96  701.99 1622.28  704.63 1633.77     706

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .106  905.48   .0728  933.49    .117

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        905.48  933.49              162     160      95             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 1559.51 1633.77  706.71       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 119239

INPUT
Description: IDNR 1985.  B11211

2 points added to the RHS which are
             intrpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0  707.88      33  706.18     127  703.68     226  700.68     325  698.68
     415  697.08     512  696.68     605  697.08     687  697.78     754  697.98
     785  696.68     788  693.68     788  692.78     793  692.88     798  693.08
     803  692.98     808  693.48     808  693.68     809  695.98     840  696.08
     851  698.08     918  697.88 1012.99  698.38 1051.99  701.48 1114.99  702.34
  1211.2   703.7    1304     704

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0     .12     754     .07     851     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           754     851              550     970     800             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 118239

INPUT
Description: Interpolated crossection. Channel data from interpolated xs 118256
             between xs 119239 and xs 116290; floodplain data interpolated from
             TIN 2004 by MJ and added to Hec-ras by BW
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
       0  705.95    49.5  705.47    67.5  705.15   103.5     704     153  703.23
     180  702.78     252  702.15   283.5  702.09   292.5  702.23     306  702.22
   328.5   701.9     360  700.94     387  700.45     405  699.94   445.5  698.11
     450  697.85   472.5   696.2     477     696     478  695.78     478  694.18
   482.9  694.04   487.8  693.36   491.5  693.07   491.5  692.71   492.8  692.41
   497.7  692.36   497.7  692.21   499.9  692.81   502.2  693.43     504  694.06
     504  694.69   505.3  694.86   506.3  695.91     513     696   517.5  696.18
     540  697.58     558     698   661.5  698.01     693  698.34   742.5  698.51
     828   698.5   895.5   698.3     954  699.77  1039.5     702    1062  702.38
    1089  702.58    1161  702.96  1228.5  702.93    1242  702.86    1269  703.02
  1309.5  703.05  1345.5  703.36  1381.5  703.75  1390.5  703.96    1404  705.99
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0     .12   472.5     .07   517.5     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         472.5   517.5             4591    6020    4722             .1       .3
```

****

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek

Reach	River Sta.	n1	n2	n3
Blackberry Creek	121556	.12	.07	.12
Blackberry Creek	121072.5	.117	.0728	.117
Blackberry Creek	120885.9	.117	.0728	.117
Blackberry Creek	120782.5	.117	.0728	.117
Blackberry Creek	120612.4	.117	.0728	.117
Blackberry Creek	120466.6	.117	.0728	.117
Blackberry Creek	120428.0	.117	.0728	.117
Blackberry Creek	120403	Bridge		
Blackberry Creek	120339.5	.117	.0728	.117
Blackberry Creek	120260.1	.117	.0728	.117
Blackberry Creek	120001.1	.117	.0728	.117
Blackberry Creek	119921.9	.117	.0728	.117
Blackberry Creek	119601.5	.106	.0728	.117
Blackberry Creek	119398.6	.106	.0728	.117
Blackberry Creek	119239	.12	.07	.12
Blackberry Creek	118239	.12	.07	.12

****

SUMMARY OF REACH LENGTHS

River: Blackberry Creek

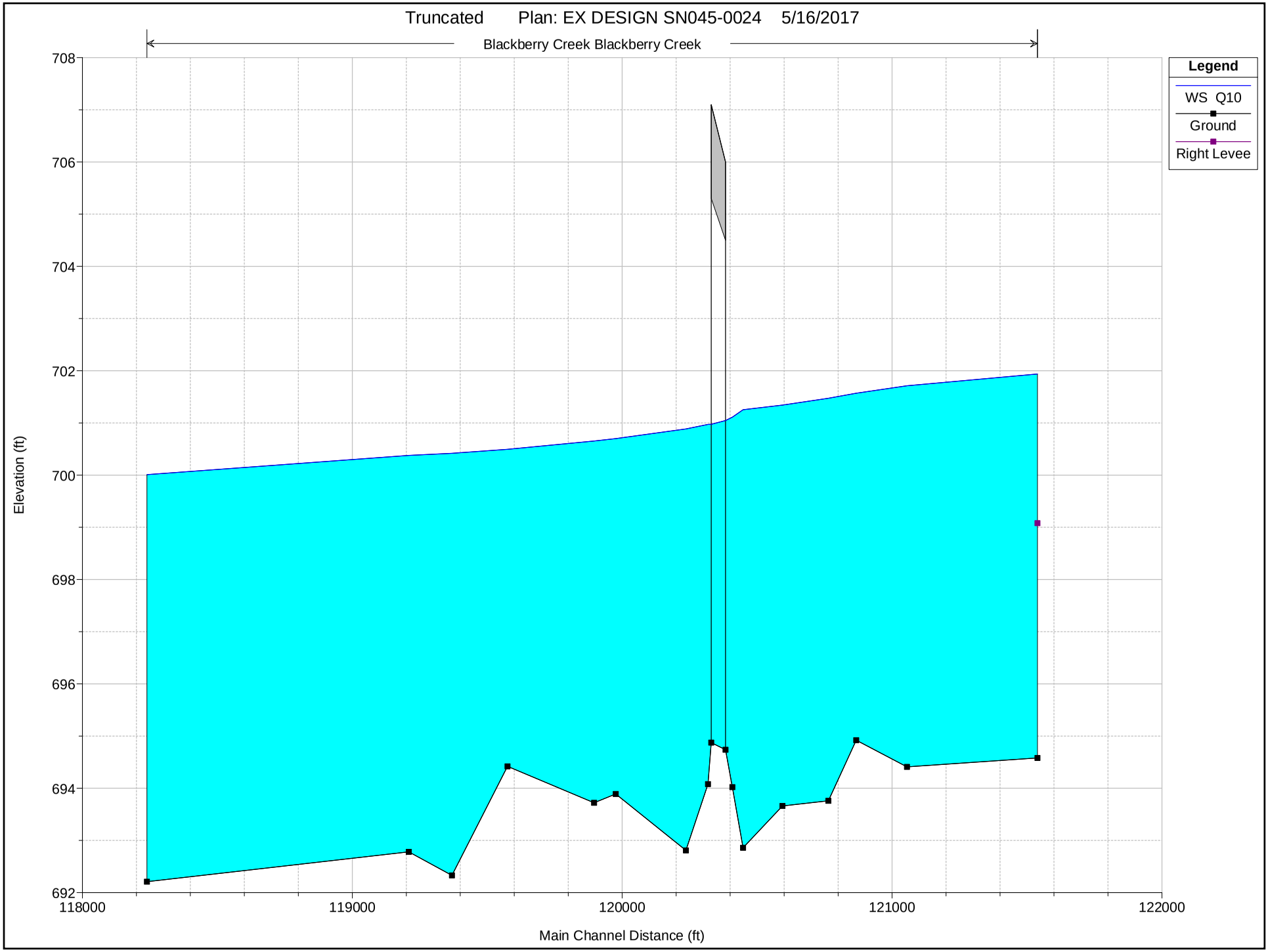
Reach	River Sta.	Left	Channel	Right
Blackberry Creek	121556	480	483.5	500
Blackberry Creek	121072.5	188	188	188
Blackberry Creek	120885.9	130	103	100
Blackberry Creek	120782.5	170	170	170
Blackberry Creek	120612.4	144	146	146
Blackberry Creek	120466.6	40	40	40
Blackberry Creek	120428.0	90	90	90
Blackberry Creek	120403	Bridge		
Blackberry Creek	120339.5	91	82	44
Blackberry Creek	120260.1	247	260	268
Blackberry Creek	120001.1	80	80	80
Blackberry Creek	119921.9	321	321	321
Blackberry Creek	119601.5	206	206	206
Blackberry Creek	119398.6	162	160	95
Blackberry Creek	119239	550	970	800
Blackberry Creek	118239	4591	6020	4722

****

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

Reach	River Sta.	Contr.	Expan.
Blackberry Creek	121556	.1	.3
Blackberry Creek	121072.5	.1	.3
Blackberry Creek	120885.9	.1	.3
Blackberry Creek	120782.5	.1	.3
Blackberry Creek	120612.4	.1	.3
Blackberry Creek	120466.6	.1	.3
Blackberry Creek	120428.0	.3	.5

```
*Blackberry Creek*    120403  *Bridge   *         *
*Blackberry Creek*    120339.5*       .3*       .5*
*Blackberry Creek*    120260.1*       .1*       .3*
*Blackberry Creek*    120001.1*       .1*       .3*
*Blackberry Creek*    119921.9*       .1*       .3*
*Blackberry Creek*    119601.5*       .1*       .3*
*Blackberry Creek*    119398.6*       .1*       .3*
*Blackberry Creek*    119239  *       .1*       .3*
*Blackberry Creek*    118239  *       .1*       .3*
*****************************************************
```


Truncated Plan: EX DESIGN SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q10
Ground
Right Levee
Elevation (ft)
708
706
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 4:12:27 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.95  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  701.94  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  699.27  * Flow Area (sq ft)      * 1266.00  *  220.17  *  687.19  *
* E.G. Slope (ft/ft)     *0.000368  * Area (sq ft)           * 1266.00  *  220.17  *  687.19  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)             *  493.95  *  279.19  *  297.86  *
* Top Width (ft)         *  917.82  * Top Width (ft)         *  601.88  *   37.00  *  278.94  *
* Vel Total (ft/s)       *    0.49  * Avg. Vel. (ft/s)       *    0.39  *    1.27  *    0.43  *
* Max Chl Dpth (ft)      *    7.36  * Hydr. Depth (ft)       *    2.10  *    5.95  *    2.46  *
* Conv. Total (cfs)      * 55798.0  * Conv. (cfs)            * 25734.3  * 14545.6  * 15518.1  *
* Length Wtd. (ft)       *  488.18  * Wetted Per. (ft)       *  601.92  *   40.10  *  279.03  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.05  *    0.13  *    0.06  *
* Alpha                  *    2.23  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.22  * Cum Volume (acre-ft)   *   58.70  *   19.29  *   41.44  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   29.36  *    3.55  *   22.47  *
*****************************************************************************************


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.73  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.71	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)	698.42	Flow Area (sq ft)	537.00	221.09	1037.28
E.G. Slope (ft/ft)	0.000566	Area (sq ft)	537.00	221.09	1037.28
Q Total (cfs)	1071.00	Flow (cfs)	252.07	351.30	467.63
Top Width (ft)	881.51	Top Width (ft)	277.36	34.96	569.20
Vel Total (ft/s)	0.60	Avg. Vel. (ft/s)	0.47	1.59	0.45
Max Chl Dpth (ft)	7.30	Hydr. Depth (ft)	1.94	6.32	1.82
Conv. Total (cfs)	45004.7	Conv. (cfs)	10592.2	14762.0	19650.4
Length Wtd. (ft)	188.00	Wetted Per. (ft)	277.44	37.37	569.37
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.07	0.21	0.06
Alpha	2.72	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	48.76	16.84	31.55
C & E Loss (ft)	0.00	Cum SA (acres)	24.51	3.15	17.60

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	701.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.57	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)	700.31	Flow Area (sq ft)	235.25	137.07	1114.30
E.G. Slope (ft/ft)	0.001066	Area (sq ft)	235.25	137.07	1114.30
Q Total (cfs)	1071.00	Flow (cfs)	142.52	265.96	662.52
Top Width (ft)	805.95	Top Width (ft)	133.13	24.31	648.51
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.61	1.94	0.59
Max Chl Dpth (ft)	6.65	Hydr. Depth (ft)	1.77	5.64	1.72
Conv. Total (cfs)	32802.3	Conv. (cfs)	4365.0	8145.7	20291.6
Length Wtd. (ft)	105.98	Wetted Per. (ft)	133.21	27.59	649.00
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.12	0.33	0.11
Alpha	2.32	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	47.10	16.07	26.90
C & E Loss (ft)	0.00	Cum SA (acres)	23.63	3.02	14.98

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	701.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.47	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	698.16	Flow Area (sq ft)	384.64	207.05	982.77
E.G. Slope (ft/ft)	0.000715	Area (sq ft)	384.64	207.05	982.77

```
* Q Total (cfs)          * 1071.00  * Flow (cfs)            *  220.18  *  376.94  *  473.87  *
* Top Width (ft)         *  787.29  * Top Width (ft)        *  175.60  *   31.30  *  580.39  *
* Vel Total (ft/s)       *    0.68  * Avg. Vel. (ft/s)      *    0.57  *    1.82  *    0.48  *
* Max Chl Dpth (ft)      *    7.71  * Hydr. Depth (ft)      *    2.19  *    6.61  *    1.69  *
* Conv. Total (cfs)      * 40047.4  * Conv. (cfs)           *  8233.2  * 14094.9  * 17719.4  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)      *  175.80  *   33.99  *  580.99  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)      *    0.10  *    0.27  *    0.08  *
* Alpha                  *    2.89  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.13  * Cum Volume (acre-ft)  *   46.17  *   15.66  *   24.50  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   23.16  *    2.96  *   13.57  *
*********************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q10
*********************************************************************************************
* E.G. Elev (ft)         *  701.36  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.            *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.34  * Reach Len. (ft)       *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  698.60  * Flow Area (sq ft)     *  483.11  *  200.69  *  794.40  *
* E.G. Slope (ft/ft)     *0.000798  * Area (sq ft)          *  584.71  *  200.69  *  794.40  *
* Q Total (cfs)          * 1071.00  * Flow (cfs)            *  268.40  *  374.63  *  427.97  *
* Top Width (ft)         *  823.28  * Top Width (ft)        *  360.00  *   31.91  *  431.37  *
* Vel Total (ft/s)       *    0.72  * Avg. Vel. (ft/s)      *    0.56  *    1.87  *    0.54  *
* Max Chl Dpth (ft)      *    7.68  * Hydr. Depth (ft)      *    1.93  *    6.29  *    1.84  *
* Conv. Total (cfs)      * 37918.0  * Conv. (cfs)           *  9502.5  * 13263.6  * 15151.9  *
* Length Wtd. (ft)       *  145.56  * Wetted Per. (ft)      *  250.65  *   34.45  *  431.62  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)      *    0.10  *    0.29  *    0.09  *
* Alpha                  *    2.69  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.09  * Cum Volume (acre-ft)  *   44.28  *   14.86  *   21.03  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *   22.12  *    2.83  *   11.59  *
*********************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q10
*********************************************************************************************
* E.G. Elev (ft)         *  701.27  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.            *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.25  * Reach Len. (ft)       *   40.00  *   40.00  *   40.00  *
* Crit W.S. (ft)         *  697.34  * Flow Area (sq ft)     *  560.72  *  255.88  *  967.22  *
* E.G. Slope (ft/ft)     *0.000485  * Area (sq ft)          *  560.72  *  255.88  *  967.22  *
* Q Total (cfs)          * 1041.00  * Flow (cfs)            *  193.60  *  391.50  *  455.90  *
```

```
* Top Width (ft)         *  950.71  * Top Width (ft)         *  470.35  *   38.05  *  442.31  *
* Vel Total (ft/s)       *    0.58  * Avg. Vel. (ft/s)       *    0.35  *    1.53  *    0.47  *
* Max Chl Dpth (ft)      *    8.39  * Hydr. Depth (ft)       *    1.19  *    6.72  *    2.19  *
* Conv. Total (cfs)      * 47252.3  * Conv. (cfs)            *  8787.7  * 17770.7  * 20693.9  *
* Length Wtd. (ft)       *   40.00  * Wetted Per. (ft)       *  470.50  *   40.77  *  442.34  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.04  *    0.19  *    0.07  *
* Alpha                  *    2.94  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)   *   42.39  *   14.10  *   18.08  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *   20.75  *    2.72  *   10.13  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120428.0


CROSS SECTION OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. Elev (ft)         *  701.23  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.12  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  701.11  * Reach Len. (ft)        *   25.00  *   25.00  *   25.00  *
* Crit W.S. (ft)         *  697.09  * Flow Area (sq ft)      *   28.83  *  344.07  *   52.73  *
* E.G. Slope (ft/ft)     *0.001798  * Area (sq ft)           *   28.83  *  344.07  *   52.73  *
* Q Total (cfs)          * 1041.00  * Flow (cfs)             *   23.50  *  978.70  *   38.80  *
* Top Width (ft)         *  102.92  * Top Width (ft)         *   15.08  *   55.30  *   32.53  *
* Vel Total (ft/s)       *    2.45  * Avg. Vel. (ft/s)       *    0.82  *    2.84  *    0.74  *
* Max Chl Dpth (ft)      *    7.09  * Hydr. Depth (ft)       *    1.91  *    6.22  *    1.62  *
* Conv. Total (cfs)      * 24548.1  * Conv. (cfs)            *   554.2  * 23078.9  *   915.0  *
* Length Wtd. (ft)       *   25.00  * Wetted Per. (ft)       *   15.48  *   57.76  *   33.02  *
* Min Ch El (ft)         *  694.02  * Shear (lb/sq ft)       *    0.21  *    0.67  *    0.18  *
* Alpha                  *    1.28  * Stream Power (lb/ft s) * 1216.84  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)   *   42.12  *   13.82  *   17.61  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *   20.52  *    2.67  *    9.91  *
*****************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

BRIDGE


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120403


BRIDGE OUTPUT  Profile #Q10
*****************************************************************************************
* E.G. US. (ft)          *     701.23  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)          *     701.11  * E.G. Elev (ft)         *     701.19  *     701.14  *
```

Q Total (cfs)	1041.00	W.S. Elev (ft)	701.04	700.97
Q Bridge (cfs)	1041.00	Crit W.S. (ft)	697.44	697.61
Q Weir (cfs)		Max Chl Dpth (ft)	6.31	6.10
Weir Sta Lft (ft)		Vel Total (ft/s)	2.80	2.86
Weir Sta Rgt (ft)		Flow Area (sq ft)	371.68	364.28
Weir Submerg		Froude # Chl	0.23	0.25
Weir Max Depth (ft)		Specif Force (cu ft)	1117.38	1049.48
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	4.76	4.54
Min El Prs (ft)	704.50	W.P. Total (ft)	91.70	94.70
Delta EG (ft)	0.11	Conv. Total (cfs)	40630.9	35914.1
Delta WS (ft)	0.14	Top Width (ft)	78.07	80.20
BR Open Area (sq ft)	671.28	Frctn Loss (ft)	0.04	0.02
BR Open Vel (ft/s)	2.86	C & E Loss (ft)	0.01	0.01
Coef of Q		Shear Total (lb/sq ft)	0.17	0.20
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120339.5

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	701.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	700.97	Reach Len. (ft)	91.00	82.00	44.00
Crit W.S. (ft)	697.72	Flow Area (sq ft)	43.05	302.81	43.31
E.G. Slope (ft/ft)	0.002610	Area (sq ft)	43.05	302.81	43.31
Q Total (cfs)	1041.00	Flow (cfs)	46.69	959.88	34.43
Top Width (ft)	106.38	Top Width (ft)	19.50	55.30	31.59
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)	1.08	3.17	0.79
Max Chl Dpth (ft)	6.89	Hydr. Depth (ft)	2.21	5.48	1.37
Conv. Total (cfs)	20378.3	Conv. (cfs)	914.0	18790.2	674.0
Length Wtd. (ft)	80.10	Wetted Per. (ft)	19.91	57.13	31.94
Min Ch El (ft)	694.08	Shear (lb/sq ft)	0.35	0.86	0.22
Alpha	1.31	Stream Power (lb/ft s)	1213.50	0.00	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	42.05	13.17	17.55
C & E Loss (ft)	0.06	Cum SA (acres)	20.50	2.56	9.88

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek

REACH: Blackberry Creek RS: 120260.1

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	700.88	Reach Len. (ft)	247.00	260.00	268.00
Crit W.S. (ft)	697.46	Flow Area (sq ft)	808.86	269.99	369.62
E.G. Slope (ft/ft)	0.000950	Area (sq ft)	808.86	269.99	369.62
Q Total (cfs)	1041.00	Flow (cfs)	347.66	530.02	163.33
Top Width (ft)	1057.39	Top Width (ft)	703.29	46.01	308.09
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.43	1.96	0.44
Max Chl Dpth (ft)	8.07	Hydr. Depth (ft)	1.15	5.87	1.20
Conv. Total (cfs)	33772.0	Conv. (cfs)	11278.7	17194.7	5298.6
Length Wtd. (ft)	254.36	Wetted Per. (ft)	703.49	48.99	308.22
Min Ch El (ft)	692.81	Shear (lb/sq ft)	0.07	0.33	0.07
Alpha	3.98	Stream Power (lb/ft s)	1429.54	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	41.16	12.63	17.34
C & E Loss (ft)	0.01	Cum SA (acres)	19.74	2.47	9.71

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	700.70	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	698.95	Flow Area (sq ft)	1482.33	147.23	230.10
E.G. Slope (ft/ft)	0.000607	Area (sq ft)	1482.33	147.23	230.10
Q Total (cfs)	1041.00	Flow (cfs)	716.91	224.17	99.93
Top Width (ft)	937.55	Top Width (ft)	771.56	25.29	140.70
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.48	1.52	0.43
Max Chl Dpth (ft)	6.81	Hydr. Depth (ft)	1.92	5.82	1.64
Conv. Total (cfs)	42238.4	Conv. (cfs)	29088.4	9095.5	4054.6
Length Wtd. (ft)	80.00	Wetted Per. (ft)	771.78	27.96	140.79
Min Ch El (ft)	693.89	Shear (lb/sq ft)	0.07	0.20	0.06
Alpha	2.16	Stream Power (lb/ft s)	1539.10	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	34.67	11.38	15.50
C & E Loss (ft)	0.00	Cum SA (acres)	15.56	2.25	8.33

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	700.65	Reach Len. (ft)	321.00	321.00	321.00
Crit W.S. (ft)	697.46	Flow Area (sq ft)	1122.91	232.30	402.28
E.G. Slope (ft/ft)	0.000517	Area (sq ft)	1122.91	232.30	402.28
Q Total (cfs)	1041.00	Flow (cfs)	495.47	341.52	204.01
Top Width (ft)	842.56	Top Width (ft)	631.52	38.41	172.63
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.44	1.47	0.51
Max Chl Dpth (ft)	6.93	Hydr. Depth (ft)	1.78	6.05	2.33
Conv. Total (cfs)	45798.1	Conv. (cfs)	21797.9	15025.0	8975.2
Length Wtd. (ft)	321.00	Wetted Per. (ft)	631.82	41.18	172.77
Min Ch El (ft)	693.72	Shear (lb/sq ft)	0.06	0.18	0.08
Alpha	2.43	Stream Power (lb/ft s)	1546.28	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	32.28	11.03	14.91
C & E Loss (ft)	0.00	Cum SA (acres)	14.27	2.19	8.04

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	700.49	Reach Len. (ft)	206.00	206.00	206.00
Crit W.S. (ft)	698.36	Flow Area (sq ft)	1576.11	156.51	127.55
E.G. Slope (ft/ft)	0.000481	Area (sq ft)	1576.11	156.51	142.30
Q Total (cfs)	1041.00	Flow (cfs)	779.89	213.04	48.08
Top Width (ft)	898.12	Top Width (ft)	770.93	29.08	98.10
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.49	1.36	0.38
Max Chl Dpth (ft)	6.07	Hydr. Depth (ft)	2.04	5.38	1.58
Conv. Total (cfs)	47487.2	Conv. (cfs)	35576.2	9718.0	2193.0
Length Wtd. (ft)	206.00	Wetted Per. (ft)	771.37	29.50	80.98
Min Ch El (ft)	694.42	Shear (lb/sq ft)	0.06	0.16	0.05
Alpha	1.82	Stream Power (lb/ft s)	1676.69	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	22.33	9.60	12.91
C & E Loss (ft)	0.00	Cum SA (acres)	9.10	1.95	7.04

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119398.6

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	700.42	Reach Len. (ft)	162.00	160.00	95.00
Crit W.S. (ft)	697.56	Flow Area (sq ft)	1579.89	185.24	442.90
E.G. Slope (ft/ft)	0.000275	Area (sq ft)	1579.89	185.24	458.81
Q Total (cfs)	1041.00	Flow (cfs)	680.71	207.98	152.31
Top Width (ft)	883.94	Top Width (ft)	626.34	28.01	229.58
Vel Total (ft/s)	0.47	Avg. Vel. (ft/s)	0.43	1.12	0.34
Max Chl Dpth (ft)	8.09	Hydr. Depth (ft)	2.52	6.61	2.09
Conv. Total (cfs)	62743.2	Conv. (cfs)	41027.8	12535.6	9179.8
Length Wtd. (ft)	152.31	Wetted Per. (ft)	626.59	30.68	212.43
Min Ch El (ft)	692.33	Shear (lb/sq ft)	0.04	0.10	0.04
Alpha	1.76	Stream Power (lb/ft s)	1633.77	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	14.87	8.79	11.49
C & E Loss (ft)	0.00	Cum SA (acres)	5.80	1.81	6.27

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.38	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)	697.41	Flow Area (sq ft)	1370.02	433.93	399.36
E.G. Slope (ft/ft)	0.000255	Area (sq ft)	1370.02	433.93	399.36
Q Total (cfs)	1041.00	Flow (cfs)	521.51	388.60	130.89
Top Width (ft)	797.19	Top Width (ft)	513.06	97.00	187.13
Vel Total (ft/s)	0.47	Avg. Vel. (ft/s)	0.38	0.90	0.33
Max Chl Dpth (ft)	7.60	Hydr. Depth (ft)	2.67	4.47	2.13
Conv. Total (cfs)	65174.2	Conv. (cfs)	32650.6	24329.0	8194.7
Length Wtd. (ft)	804.76	Wetted Per. (ft)	513.10	101.09	187.21
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.04	0.07	0.03
Alpha	1.73	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	9.38	7.65	10.55
C & E Loss (ft)	0.00	Cum SA (acres)	3.68	1.58	5.81

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q10

E.G. Elev (ft)	700.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.01	Reach Len. (ft)			
Crit W.S. (ft)	697.00	Flow Area (sq ft)	116.28	253.60	749.66
E.G. Slope (ft/ft)	0.001088	Area (sq ft)	116.28	253.60	749.66
Q Total (cfs)	1034.00	Flow (cfs)	66.58	534.32	433.10
Top Width (ft)	560.67	Top Width (ft)	69.97	45.00	445.70
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	0.57	2.11	0.58
Max Chl Dpth (ft)	7.80	Hydr. Depth (ft)	1.66	5.64	1.68
Conv. Total (cfs)	31340.7	Conv. (cfs)	2017.9	16195.4	13127.3
Length Wtd. (ft)		Wetted Per. (ft)	70.08	48.60	445.77
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.11	0.35	0.11
Alpha	2.88	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	# Chl
Blackberry Creek	121556	Q10	1071.00	694.58	701.94	699.27	701.95	0.000368	1.27	2173.36	917.82	0.09
Blackberry Creek	121072.5	Q10	1071.00	694.41	701.71	698.42	701.73	0.000566	1.59	1795.37	881.51	0.11
Blackberry Creek	120885.9	Q10	1071.00	694.92	701.57	700.31	701.59	0.001066	1.94	1486.61	805.95	0.14
Blackberry Creek	120782.5	Q10	1071.00	693.76	701.47	698.16	701.49	0.000715	1.82	1574.46	787.29	0.12
Blackberry Creek	120612.4	Q10	1071.00	693.66	701.34	698.60	701.36	0.000798	1.87	1478.20	823.28	0.13
Blackberry Creek	120466.6	Q10	1041.00	692.86	701.25	697.34	701.27	0.000485	1.53	1783.81	950.71	0.10
Blackberry Creek	120428.0	Q10	1041.00	694.02	701.11	697.09	701.23	0.001798	2.84	425.64	102.92	0.20
Blackberry Creek	120403		Bridge									
Blackberry Creek	120339.5	Q10	1041.00	694.08	700.97	697.72	701.12	0.002610	3.17	389.17	106.38	0.24
Blackberry Creek	120260.1	Q10	1041.00	692.81	700.88	697.46	700.92	0.000950	1.96	1448.47	1057.39	0.14
Blackberry Creek	120001.1	Q10	1041.00	693.89	700.70	698.95	700.71	0.000607	1.52	1859.66	937.55	0.11
Blackberry Creek	119921.9	Q10	1041.00	693.72	700.65	697.46	700.67	0.000517	1.47	1757.49	842.56	0.11

* Blackberry Creek	* 119601.5	* Q10	* 1041.00	* 694.42	* 700.49	* 698.36	* 700.50	* 0.000481	* 1.36	* 1860.17	* 898.12	* 0.10
* Blackberry Creek	* 119398.6	* Q10	* 1041.00	* 692.33	* 700.42	* 697.56	* 700.42	* 0.000275	* 1.12	* 2208.02	* 883.94	* 0.08
* Blackberry Creek	* 119239	* Q10	* 1041.00	* 692.78	* 700.38	* 697.41	* 700.38	* 0.000255	* 0.90	* 2203.31	* 797.19	* 0.07
* Blackberry Creek	* 118239	* Q10	* 1034.00	* 692.21	* 700.01	* 697.00	* 700.05	* 0.001088	* 2.11	* 1119.53	* 560.67	* 0.16

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q10	701.95	701.94	0.01	0.22	0.00	493.95	279.19	297.86	917.82
Blackberry Creek	121072.5	Q10	701.73	701.71	0.02	0.14	0.00	252.07	351.30	467.63	881.51
Blackberry Creek	120885.9	Q10	701.59	701.57	0.02	0.09	0.00	142.52	265.96	662.52	805.95
Blackberry Creek	120782.5	Q10	701.49	701.47	0.02	0.13	0.00	220.18	376.94	473.87	787.29
Blackberry Creek	120612.4	Q10	701.36	701.34	0.02	0.09	0.00	268.40	374.63	427.97	823.28
Blackberry Creek	120466.6	Q10	701.27	701.25	0.02	0.03	0.01	193.60	391.50	455.90	950.71
Blackberry Creek	120428.0	Q10	701.23	701.11	0.12	0.03	0.01	23.50	978.70	38.80	102.92
Blackberry Creek	120403		Bridge								
Blackberry Creek	120339.5	Q10	701.12	700.97	0.15	0.14	0.06	46.69	959.88	34.43	106.38
Blackberry Creek	120260.1	Q10	700.92	700.88	0.03	0.20	0.01	347.66	530.02	163.33	1057.39
Blackberry Creek	120001.1	Q10	700.71	700.70	0.01	0.04	0.00	716.91	224.17	99.93	937.55
Blackberry Creek	119921.9	Q10	700.67	700.65	0.01	0.16	0.00	495.47	341.52	204.01	842.56
Blackberry Creek	119601.5	Q10	700.50	700.49	0.01	0.08	0.00	779.89	213.04	48.08	898.12
Blackberry Creek	119398.6	Q10	700.42	700.42	0.01	0.04	0.00	680.71	207.98	152.31	883.94
Blackberry Creek	119239	Q10	700.38	700.38	0.01	0.33	0.00	521.51	388.60	130.89	797.19
Blackberry Creek	118239	Q10	700.05	700.01	0.04			66.58	534.32	433.10	560.67

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : DESIGN

River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q10
  Warning:Divided flow computed for this cross-section.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120466.6 Profile: Q10
  Warning:Divided flow computed for this cross-section.
  Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
    This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 120428.0 Profile: Q10
  Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
    This may indicate the need for additional cross sections.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
    used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q10 Upstream
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
    used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q10 Downstream
  Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

```
            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120339.5     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120260.1     Profile: Q10
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119921.9     Profile: Q10
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q10
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q10
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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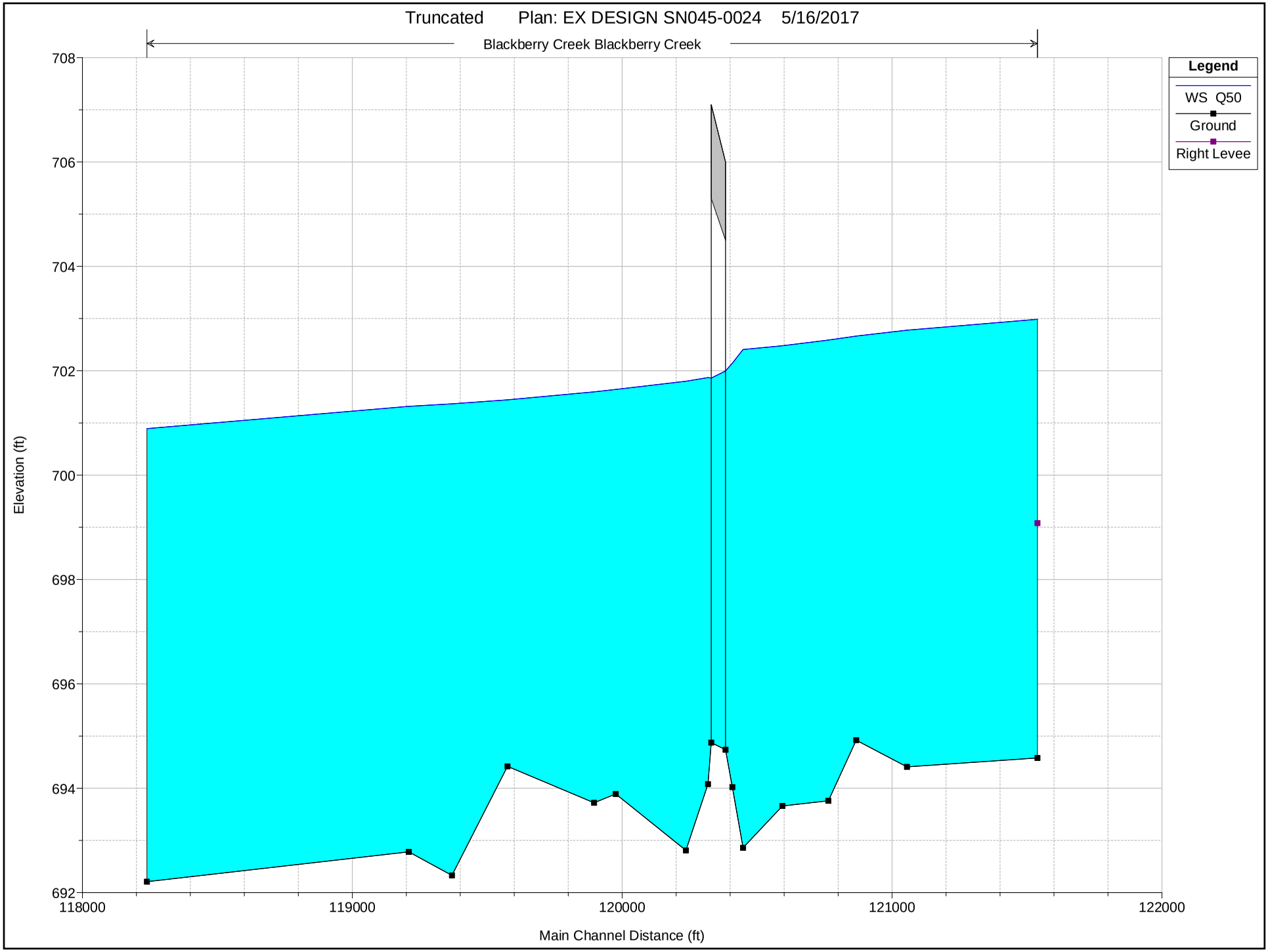
Truncated Plan: EX DESIGN SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q50
Ground
Right Levee
Elevation (ft)
708
706
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

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                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
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PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 4:12:27 PM

Project in English units

Project Description:
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125.8   778.6
205.9   768.9
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343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
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369.07  708.00
375.00  707.99
381.8
3       707.95
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396.12  702.94
397.39  702.73
399.73  702
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400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  703.00  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  702.99  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  699.84  * Flow Area (sq ft)      * 1924.79  *  259.00  * 1002.41  *
* E.G. Slope (ft/ft)     *0.000368  * Area (sq ft)           * 1924.79  *  259.00  * 1002.41  *
* Q Total (cfs)          * 1824.00  * Flow (cfs)             *  945.11  *  365.71  *  513.18  *
* Top Width (ft)         * 1001.01  * Top Width (ft)         *  647.40  *   37.00  *  316.61  *
* Vel Total (ft/s)       *    0.57  * Avg. Vel. (ft/s)       *    0.49  *    1.41  *    0.51  *
* Max Chl Dpth (ft)      *    8.41  * Hydr. Depth (ft)       *    2.97  *    7.00  *    3.17  *
* Conv. Total (cfs)      * 95102.9  * Conv. (cfs)            * 49277.6  * 19068.1  * 26757.2  *
* Length Wtd. (ft)       *  488.65  * Wetted Per. (ft)       *  647.45  *   40.10  *  316.72  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.07  *    0.15  *    0.07  *
* Alpha                  *    1.83  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.20  * Cum Volume (acre-ft)   *   89.14  *   22.72  *   64.93  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   32.48  *    3.55  *   24.09  *
*****************************************************************************************


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************
* E.G. Elev (ft)         *  702.79  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.78	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)	700.53	Flow Area (sq ft)	840.95	258.35	1648.94
E.G. Slope (ft/ft)	0.000485	Area (sq ft)	840.95	258.35	1648.94
Q Total (cfs)	1824.00	Flow (cfs)	475.48	421.55	926.97
Top Width (ft)	906.19	Top Width (ft)	292.57	34.96	578.66
Vel Total (ft/s)	0.66	Avg. Vel. (ft/s)	0.57	1.63	0.56
Max Chl Dpth (ft)	8.37	Hydr. Depth (ft)	2.87	7.39	2.85
Conv. Total (cfs)	82802.6	Conv. (cfs)	21584.9	19136.9	42080.8
Length Wtd. (ft)	188.00	Wetted Per. (ft)	292.70	37.37	578.89
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.09	0.21	0.09
Alpha	1.95	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	73.90	19.85	49.71
C & E Loss (ft)	0.00	Cum SA (acres)	27.30	3.15	18.96

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	702.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.66	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)	700.64	Flow Area (sq ft)	393.82	163.67	1831.71
E.G. Slope (ft/ft)	0.000778	Area (sq ft)	393.82	163.67	1831.71
Q Total (cfs)	1824.00	Flow (cfs)	242.36	305.37	1276.27
Top Width (ft)	859.72	Top Width (ft)	171.88	24.31	663.53
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)	0.62	1.87	0.70
Max Chl Dpth (ft)	7.74	Hydr. Depth (ft)	2.29	6.73	2.76
Conv. Total (cfs)	65390.2	Conv. (cfs)	8688.8	10947.3	45754.1
Length Wtd. (ft)	105.71	Wetted Per. (ft)	172.00	27.59	664.06
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.11	0.29	0.13
Alpha	1.67	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	71.24	18.94	42.20
C & E Loss (ft)	0.00	Cum SA (acres)	26.30	3.02	16.28

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	702.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.59	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	700.14	Flow Area (sq ft)	597.03	241.97	1639.11
E.G. Slope (ft/ft)	0.000599	Area (sq ft)	597.03	241.97	1639.11

```
* Q Total (cfs)          * 1824.00  * Flow (cfs)             *  376.86  *  447.31  *  999.83  *
* Top Width (ft)         *  847.46  * Top Width (ft)         *  220.54  *   31.30  *  595.62  *
* Vel Total (ft/s)       *    0.74  * Avg. Vel. (ft/s)       *    0.63  *    1.85  *    0.61  *
* Max Chl Dpth (ft)      *    8.83  * Hydr. Depth (ft)       *    2.71  *    7.73  *    2.75  *
* Conv. Total (cfs)      * 74523.9  * Conv. (cfs)            * 15397.6  * 18275.7  * 40850.6  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  220.76  *   33.99  *  596.26  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.10  *    0.27  *    0.10  *
* Alpha                  *    2.08  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.11  * Cum Volume (acre-ft)   *   69.76  *   18.46  *   38.22  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   25.71  *    2.96  *   14.83  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  702.50  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.48  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  699.85  * Flow Area (sq ft)      *  780.32  *  236.94  * 1294.55  *
* E.G. Slope (ft/ft)     *0.000667  * Area (sq ft)           * 1054.92  *  236.94  * 1294.55  *
* Q Total (cfs)          * 1824.00  * Flow (cfs)             *  510.19  *  451.89  *  861.92  *
* Top Width (ft)         *  976.51  * Top Width (ft)         *  497.07  *   31.91  *  447.52  *
* Vel Total (ft/s)       *    0.79  * Avg. Vel. (ft/s)       *    0.65  *    1.91  *    0.67  *
* Max Chl Dpth (ft)      *    8.82  * Hydr. Depth (ft)       *    2.82  *    7.43  *    2.89  *
* Conv. Total (cfs)      * 70603.7  * Conv. (cfs)            * 19748.5  * 17492.0  * 33363.3  *
* Length Wtd. (ft)       *  145.45  * Wetted Per. (ft)       *  277.39  *   34.45  *  447.82  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.12  *    0.29  *    0.12  *
* Alpha                  *    1.98  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.08  * Cum Volume (acre-ft)   *   66.54  *   17.52  *   32.49  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   24.31  *    2.83  *   12.80  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q50
*****************************************************************************************************
* E.G. Elev (ft)         *  702.42  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.41  * Reach Len. (ft)        *   40.00  *   40.00  *   40.00  *
* Crit W.S. (ft)         *  699.40  * Flow Area (sq ft)      * 1214.10  *  299.72  * 1491.23  *
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```
* E.G. Slope (ft/ft)     *0.000398  * Area (sq ft)           * 1214.10  *  299.72  * 1491.23  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *  483.37  *  461.25  *  820.39  *
* Top Width (ft)         * 1119.61  * Top Width (ft)         *  615.83  *   38.05  *  465.73  *
* Vel Total (ft/s)       *    0.59  * Avg. Vel. (ft/s)       *    0.40  *    1.54  *    0.55  *
* Max Chl Dpth (ft)      *    9.55  * Hydr. Depth (ft)       *    1.97  *    7.88  *    3.20  *
* Conv. Total (cfs)      * 88507.9  * Conv. (cfs)            * 24238.9  * 23129.8  * 41139.2  *
* Length Wtd. (ft)       *   40.00  * Wetted Per. (ft)       *  616.00  *   40.77  *  465.79  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.05  *    0.18  *    0.08  *
* Alpha                  *    2.33  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)   *   62.79  *   16.63  *   27.83  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *   22.47  *    2.72  *   11.26  *
*****************************************************************************************************
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Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120428.0

CROSS SECTION OUTPUT Profile #Q50

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*****************************************************************************************************
* E.G. Elev (ft)         *  702.37  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.22  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.14  * Reach Len. (ft)        *   25.00  *   25.00  *   25.00  *
* Crit W.S. (ft)         *  698.06  * Flow Area (sq ft)      *   46.29  *  401.33  *   90.08  *
* E.G. Slope (ft/ft)     *0.002861  * Area (sq ft)           *   46.52  *  401.33  *   95.15  *
* Q Total (cfs)          * 1765.00  * Flow (cfs)             *   58.49  * 1595.54  *  110.97  *
* Top Width (ft)         *  120.38  * Top Width (ft)         *   19.09  *   55.30  *   45.99  *
* Vel Total (ft/s)       *    3.28  * Avg. Vel. (ft/s)       *    1.26  *    3.98  *    1.23  *
* Max Chl Dpth (ft)      *    8.12  * Hydr. Depth (ft)       *    2.61  *    7.26  *    2.48  *
* Conv. Total (cfs)      * 32996.9  * Conv. (cfs)            *  1093.5  * 29828.9  *  2074.5  *
* Length Wtd. (ft)       *   25.00  * Wetted Per. (ft)       *   18.25  *   57.76  *   36.89  *
* Min Ch El (ft)         *  694.02  * Shear (lb/sq ft)       *    0.45  *    1.24  *    0.44  *
* Alpha                  *    1.34  * Stream Power (lb/ft s) * 1216.84  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.05  * Cum Volume (acre-ft)   *   62.21  *   16.30  *   27.10  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *   22.18  *    2.67  *   11.03  *
*****************************************************************************************************
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120403

BRIDGE OUTPUT Profile #Q50

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*****************************************************************************************************
* E.G. US. (ft)          *     702.37  * Element                *Inside BR US *Inside BR DS *
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W.S. US. (ft)	702.14	E.G. Elev (ft)	702.30	702.21
Q Total (cfs)	1765.00	W.S. Elev (ft)	702.00	701.86
Q Bridge (cfs)	1765.00	Crit W.S. (ft)	698.35	698.63
Q Weir (cfs)		Max Chl Dpth (ft)	7.26	6.98
Weir Sta Lft (ft)		Vel Total (ft/s)	3.93	4.04
Weir Sta Rgt (ft)		Flow Area (sq ft)	448.74	436.53
Weir Submerg		Froude # Chl	0.30	0.34
Weir Max Depth (ft)		Specif Force (cu ft)	1647.83	1555.04
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	5.35	5.25
Min El Prs (ft)	704.50	W.P. Total (ft)	99.71	99.89
Delta EG (ft)	0.22	Conv. Total (cfs)	51847.5	45423.2
Delta WS (ft)	0.27	Top Width (ft)	83.91	83.09
BR Open Area (sq ft)	671.28	Frctn Loss (ft)	0.07	0.03
BR Open Vel (ft/s)	4.04	C & E Loss (ft)	0.02	0.04
Coef of Q		Shear Total (lb/sq ft)	0.33	0.41
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120339.5

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	702.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.87	Reach Len. (ft)	91.00	82.00	44.00
Crit W.S. (ft)	698.71	Flow Area (sq ft)	61.94	352.52	72.83
E.G. Slope (ft/ft)	0.004199	Area (sq ft)	63.71	352.52	72.83
Q Total (cfs)	1765.00	Flow (cfs)	97.97	1568.57	98.46
Top Width (ft)	122.81	Top Width (ft)	33.42	55.30	34.09
Vel Total (ft/s)	3.62	Avg. Vel. (ft/s)	1.58	4.45	1.35
Max Chl Dpth (ft)	7.79	Hydr. Depth (ft)	2.73	6.38	2.14
Conv. Total (cfs)	27238.9	Conv. (cfs)	1512.0	24207.4	1519.5
Length Wtd. (ft)	79.47	Wetted Per. (ft)	23.24	57.13	34.59
Min Ch El (ft)	694.08	Shear (lb/sq ft)	0.70	1.62	0.55
Alpha	1.36	Stream Power (lb/ft s)	1213.50	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	62.11	15.54	27.00
C & E Loss (ft)	0.13	Cum SA (acres)	22.15	2.56	10.99

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120260.1

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.80	Reach Len. (ft)	247.00	260.00	268.00
Crit W.S. (ft)	698.65	Flow Area (sq ft)	1511.55	312.08	675.51
E.G. Slope (ft/ft)	0.000762	Area (sq ft)	1511.55	312.08	675.51
Q Total (cfs)	1765.00	Flow (cfs)	809.18	604.47	351.36
Top Width (ft)	1221.08	Top Width (ft)	801.23	46.01	373.84
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.54	1.94	0.52
Max Chl Dpth (ft)	8.99	Hydr. Depth (ft)	1.89	6.78	1.81
Conv. Total (cfs)	63919.0	Conv. (cfs)	29304.1	21890.5	12724.4
Length Wtd. (ft)	253.44	Wetted Per. (ft)	801.45	48.99	373.98
Min Ch El (ft)	692.81	Shear (lb/sq ft)	0.09	0.30	0.09
Alpha	2.95	Stream Power (lb/ft s)	1429.54	0.00	0.00
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	60.47	14.91	26.63
C & E Loss (ft)	0.00	Cum SA (acres)	21.28	2.47	10.78

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.64	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	699.38	Flow Area (sq ft)	2219.34	171.05	376.58
E.G. Slope (ft/ft)	0.000544	Area (sq ft)	2219.34	171.05	376.58
Q Total (cfs)	1765.00	Flow (cfs)	1304.78	272.35	187.87
Top Width (ft)	990.84	Top Width (ft)	793.38	25.29	172.16
Vel Total (ft/s)	0.64	Avg. Vel. (ft/s)	0.59	1.59	0.50
Max Chl Dpth (ft)	7.75	Hydr. Depth (ft)	2.80	6.76	2.19
Conv. Total (cfs)	75679.8	Conv. (cfs)	55946.3	11678.0	8055.5
Length Wtd. (ft)	80.00	Wetted Per. (ft)	793.62	27.96	172.27
Min Ch El (ft)	693.89	Shear (lb/sq ft)	0.09	0.21	0.07
Alpha	1.65	Stream Power (lb/ft s)	1539.10	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	49.89	13.47	23.39
C & E Loss (ft)	0.00	Cum SA (acres)	16.75	2.25	9.10

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.60	Reach Len. (ft)	321.00	321.00	321.00
Crit W.S. (ft)	699.03	Flow Area (sq ft)	1746.76	268.53	568.74
E.G. Slope (ft/ft)	0.000521	Area (sq ft)	1746.76	268.53	568.74
Q Total (cfs)	1765.00	Flow (cfs)	973.99	436.55	354.46
Top Width (ft)	915.25	Top Width (ft)	696.69	38.41	180.16
Vel Total (ft/s)	0.68	Avg. Vel. (ft/s)	0.56	1.63	0.62
Max Chl Dpth (ft)	7.88	Hydr. Depth (ft)	2.51	6.99	3.16
Conv. Total (cfs)	77344.9	Conv. (cfs)	42681.7	19130.2	15532.9
Length Wtd. (ft)	321.00	Wetted Per. (ft)	697.05	41.18	180.35
Min Ch El (ft)	693.72	Shear (lb/sq ft)	0.08	0.21	0.10
Alpha	1.94	Stream Power (lb/ft s)	1546.28	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	46.25	13.07	22.52
C & E Loss (ft)	0.00	Cum SA (acres)	15.39	2.19	8.78

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	701.44	Reach Len. (ft)	206.00	206.00	206.00
Crit W.S. (ft)	698.64	Flow Area (sq ft)	2320.03	184.08	209.75
E.G. Slope (ft/ft)	0.000447	Area (sq ft)	2320.03	184.08	243.70
Q Total (cfs)	1765.00	Flow (cfs)	1400.40	269.35	95.25
Top Width (ft)	962.75	Top Width (ft)	798.11	29.08	135.56
Vel Total (ft/s)	0.65	Avg. Vel. (ft/s)	0.60	1.46	0.45
Max Chl Dpth (ft)	7.02	Hydr. Depth (ft)	2.91	6.33	1.87
Conv. Total (cfs)	83457.5	Conv. (cfs)	66217.4	12736.2	4504.0
Length Wtd. (ft)	206.00	Wetted Per. (ft)	798.56	29.50	112.75
Min Ch El (ft)	694.42	Shear (lb/sq ft)	0.08	0.17	0.05
Alpha	1.48	Stream Power (lb/ft s)	1676.69	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	31.27	11.40	19.53
C & E Loss (ft)	0.00	Cum SA (acres)	9.88	1.95	7.62

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119398.6

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	701.37	Reach Len. (ft)	162.00	160.00	95.00
Crit W.S. (ft)	698.01	Flow Area (sq ft)	2194.33	211.77	648.18
E.G. Slope (ft/ft)	0.000308	Area (sq ft)	2194.33	211.77	683.75
Q Total (cfs)	1765.00	Flow (cfs)	1195.34	274.93	294.74
Top Width (ft)	939.79	Top Width (ft)	665.47	28.01	246.31
Vel Total (ft/s)	0.58	Avg. Vel. (ft/s)	0.54	1.30	0.45
Max Chl Dpth (ft)	9.04	Hydr. Depth (ft)	3.30	7.56	2.92
Conv. Total (cfs)	100596.7	Conv. (cfs)	68128.7	15669.6	16798.5
Length Wtd. (ft)	151.03	Wetted Per. (ft)	665.72	30.68	222.36
Min Ch El (ft)	692.33	Shear (lb/sq ft)	0.06	0.13	0.06
Alpha	1.49	Stream Power (lb/ft s)	1633.77	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	20.59	10.46	17.33
C & E Loss (ft)	0.00	Cum SA (acres)	6.42	1.81	6.72

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	701.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.32	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)	697.82	Flow Area (sq ft)	1870.81	525.11	580.82
E.G. Slope (ft/ft)	0.000308	Area (sq ft)	1870.81	525.11	580.82
Q Total (cfs)	1765.00	Flow (cfs)	920.52	586.75	257.72
Top Width (ft)	845.02	Top Width (ft)	549.06	97.00	198.96
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.49	1.12	0.44
Max Chl Dpth (ft)	8.54	Hydr. Depth (ft)	3.41	5.41	2.92
Conv. Total (cfs)	100569.2	Conv. (cfs)	52451.2	33433.1	14684.9
Length Wtd. (ft)	789.21	Wetted Per. (ft)	549.11	101.09	199.07
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.07	0.10	0.06
Alpha	1.62	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	13.03	9.11	15.96
C & E Loss (ft)	0.00	Cum SA (acres)	4.16	1.58	6.23

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q50

E.G. Elev (ft)	700.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	700.89	Reach Len. (ft)			
Crit W.S. (ft)	697.93	Flow Area (sq ft)	193.44	293.20	1156.72
E.G. Slope (ft/ft)	0.001232	Area (sq ft)	193.44	293.20	1156.72
Q Total (cfs)	1751.00	Flow (cfs)	122.60	724.05	904.35
Top Width (ft)	634.19	Top Width (ft)	109.75	45.00	479.44
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)	0.63	2.47	0.78
Max Chl Dpth (ft)	8.68	Hydr. Depth (ft)	1.76	6.52	2.41
Conv. Total (cfs)	49881.2	Conv. (cfs)	3492.5	20626.2	25762.6
Length Wtd. (ft)		Wetted Per. (ft)	109.87	48.60	479.53
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.14	0.46	0.19
Alpha	2.52	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q50	1824.00	694.58	702.99	699.84	703.00	0.000368	1.41	3186.20	1001.01	0.09
Blackberry Creek	121072.5	Q50	1824.00	694.41	702.78	700.53	702.79	0.000485	1.63	2748.24	906.19	0.11
Blackberry Creek	120885.9	Q50	1824.00	694.92	702.66	700.64	702.68	0.000778	1.87	2389.19	859.72	0.13
Blackberry Creek	120782.5	Q50	1824.00	693.76	702.59	700.14	702.61	0.000599	1.85	2478.10	847.46	0.12
Blackberry Creek	120612.4	Q50	1824.00	693.66	702.48	699.85	702.50	0.000667	1.91	2311.81	976.51	0.12
Blackberry Creek	120466.6	Q50	1765.00	692.86	702.41	699.40	702.42	0.000398	1.54	3005.05	1119.61	0.10
Blackberry Creek	120428.0	Q50	1765.00	694.02	702.14	698.06	702.37	0.002861	3.98	537.70	120.38	0.26
Blackberry Creek	120403		Bridge									
Blackberry Creek	120339.5	Q50	1765.00	694.08	701.87	698.71	702.15	0.004199	4.45	487.29	122.81	0.31
Blackberry Creek	120260.1	Q50	1765.00	692.81	701.80	698.65	701.82	0.000762	1.94	2499.15	1221.08	0.13
Blackberry Creek	120001.1	Q50	1765.00	693.89	701.64	699.38	701.65	0.000544	1.59	2766.97	990.84	0.11

* Blackberry Creek	* 119921.9	* Q50	* 1765.00	* 693.72	* 701.60	* 699.03	* 701.61	* 0.000521	* 1.63	* 2584.03	* 915.25	* 0.11
* Blackberry Creek	* 119601.5	* Q50	* 1765.00	* 694.42	* 701.44	* 698.64	* 701.45	* 0.000447	* 1.46	* 2713.86	* 962.75	* 0.10
* Blackberry Creek	* 119398.6	* Q50	* 1765.00	* 692.33	* 701.37	* 698.01	* 701.37	* 0.000308	* 1.30	* 3054.29	* 939.79	* 0.08
* Blackberry Creek	* 119239	* Q50	* 1765.00	* 692.78	* 701.32	* 697.82	* 701.33	* 0.000308	* 1.12	* 2976.73	* 845.02	* 0.08
* Blackberry Creek	* 118239	* Q50	* 1751.00	* 692.21	* 700.89	* 697.93	* 700.93	* 0.001232	* 2.47	* 1643.36	* 634.19	* 0.17

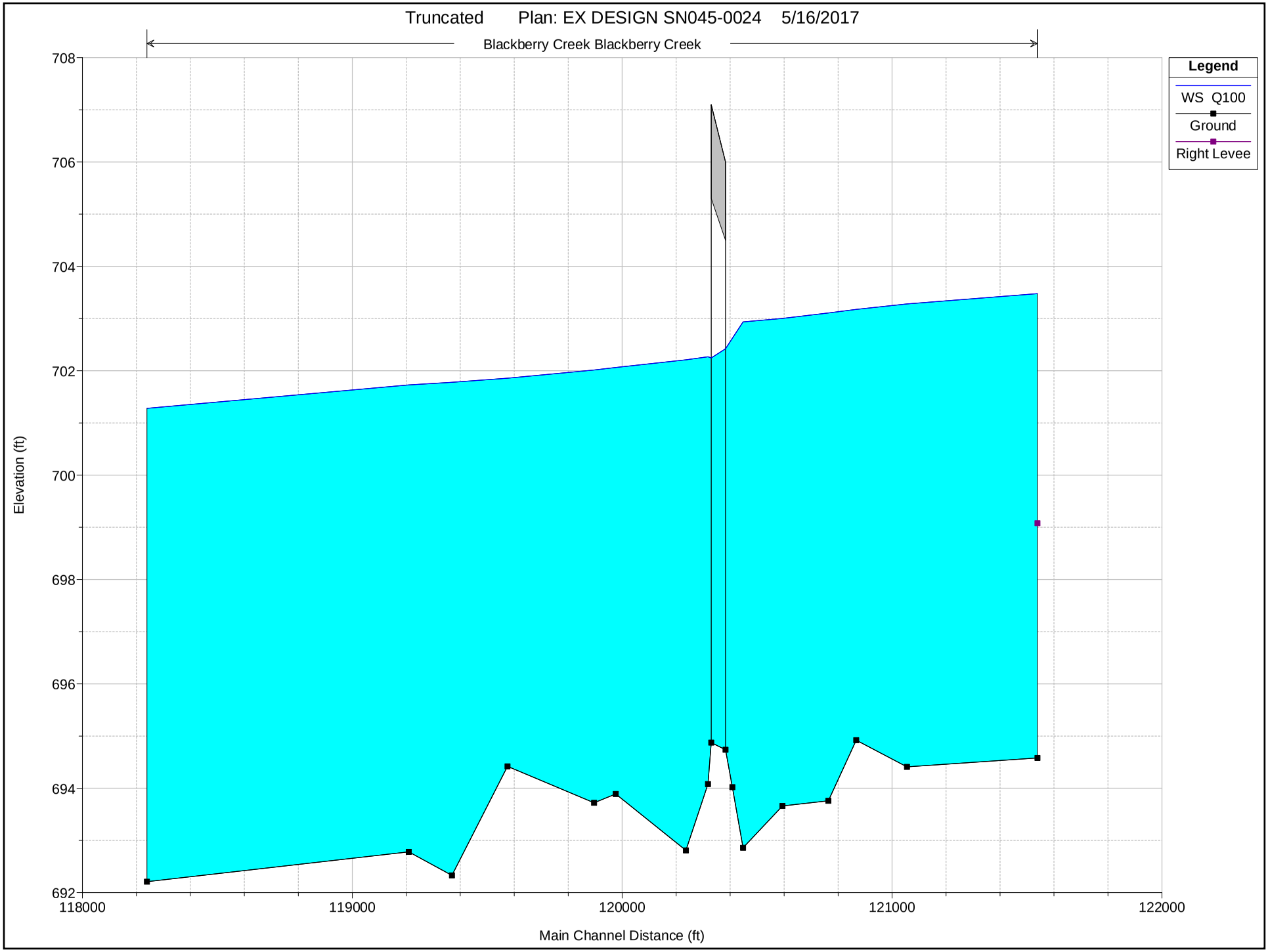
Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q50	703.00	702.99	0.01	0.20	0.00	945.11	365.71	513.18	1001.01
Blackberry Creek	121072.5	Q50	702.79	702.78	0.01	0.11	0.00	475.48	421.55	926.97	906.19
Blackberry Creek	120885.9	Q50	702.68	702.66	0.02	0.07	0.00	242.36	305.37	1276.27	859.72
Blackberry Creek	120782.5	Q50	702.61	702.59	0.02	0.11	0.00	376.86	447.31	999.83	847.46
Blackberry Creek	120612.4	Q50	702.50	702.48	0.02	0.08	0.00	510.19	451.89	861.92	976.51
Blackberry Creek	120466.6	Q50	702.42	702.41	0.01	0.03	0.02	483.37	461.25	820.39	1119.61
Blackberry Creek	120428.0	Q50	702.37	702.14	0.22	0.05	0.02	58.49	1595.54	110.97	120.38
Blackberry Creek	120403		Bridge								
Blackberry Creek	120339.5	Q50	702.15	701.87	0.28	0.20	0.13	97.97	1568.57	98.46	122.81
Blackberry Creek	120260.1	Q50	701.82	701.80	0.02	0.17	0.00	809.18	604.47	351.36	1221.08
Blackberry Creek	120001.1	Q50	701.65	701.64	0.01	0.04	0.00	1304.78	272.35	187.87	990.84
Blackberry Creek	119921.9	Q50	701.61	701.60	0.01	0.16	0.00	973.99	436.55	354.46	915.25
Blackberry Creek	119601.5	Q50	701.45	701.44	0.01	0.08	0.00	1400.40	269.35	95.25	962.75
Blackberry Creek	119398.6	Q50	701.37	701.37	0.01	0.05	0.00	1195.34	274.93	294.74	939.79
Blackberry Creek	119239	Q50	701.33	701.32	0.01	0.39	0.00	920.52	586.75	257.72	845.02
Blackberry Creek	118239	Q50	700.93	700.89	0.04			122.60	724.05	904.35	634.19

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : DESIGN

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q50
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q50
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120466.6 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 120428.0 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q50 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was

```
            used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120403     Profile: Q50 Downstream
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120339.5     Profile: Q50
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119921.9     Profile: Q50
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q50
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q50
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 118239     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
```


Truncated Plan: EX DESIGN SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q100
Ground
Right Levee
Elevation (ft)
708
706
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 4:12:27 PM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

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385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  703.49  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  703.48  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  700.02  * Flow Area (sq ft)      * 2246.70  *  277.16  * 1161.10  *
* E.G. Slope (ft/ft)     *0.000354  * Area (sq ft)           * 2246.70  *  277.16  * 1161.10  *
* Q Total (cfs)          * 2207.00  * Flow (cfs)             * 1179.50  *  401.77  *  625.73  *
* Top Width (ft)         * 1031.45  * Top Width (ft)         *  664.39  *   37.00  *  330.06  *
* Vel Total (ft/s)       *    0.60  * Avg. Vel. (ft/s)       *    0.52  *    1.45  *    0.54  *
* Max Chl Dpth (ft)      *    8.90  * Hydr. Depth (ft)       *    3.38  *    7.49  *    3.52  *
* Conv. Total (cfs)      *117268.4  * Conv. (cfs)            * 62672.6  * 21347.9  * 33247.9  *
* Length Wtd. (ft)       *  488.79  * Wetted Per. (ft)       *  664.45  *   40.10  *  330.18  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.07  *    0.15  *    0.08  *
* Alpha                  *    1.71  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.19  * Cum Volume (acre-ft)   *  103.98  *   24.26  *   76.34  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   34.42  *    3.55  *   25.63  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         *  703.29  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.28	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)	700.67	Flow Area (sq ft)	989.66	275.92	1940.79
E.G. Slope (ft/ft)	0.000449	Area (sq ft)	989.66	275.92	1940.79
Q Total (cfs)	2207.00	Flow (cfs)	590.76	452.50	1163.74
Top Width (ft)	917.71	Top Width (ft)	299.45	34.96	583.30
Vel Total (ft/s)	0.69	Avg. Vel. (ft/s)	0.60	1.64	0.60
Max Chl Dpth (ft)	8.87	Hydr. Depth (ft)	3.30	7.89	3.33
Conv. Total (cfs)	104150.6	Conv. (cfs)	27878.7	21353.9	54918.0
Length Wtd. (ft)	188.00	Wetted Per. (ft)	299.59	37.37	583.56
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.09	0.21	0.09
Alpha	1.77	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	86.15	21.19	58.53
C & E Loss (ft)	0.00	Cum SA (acres)	29.11	3.15	20.39

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	703.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.18	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)	700.79	Flow Area (sq ft)	487.12	176.14	2174.14
E.G. Slope (ft/ft)	0.000686	Area (sq ft)	487.12	176.14	2174.14
Q Total (cfs)	2207.00	Flow (cfs)	301.46	323.99	1581.56
Top Width (ft)	887.60	Top Width (ft)	191.78	24.31	671.51
Vel Total (ft/s)	0.78	Avg. Vel. (ft/s)	0.62	1.84	0.73
Max Chl Dpth (ft)	8.26	Hydr. Depth (ft)	2.54	7.25	3.24
Conv. Total (cfs)	84282.1	Conv. (cfs)	11512.1	12372.6	60397.3
Length Wtd. (ft)	105.49	Wetted Per. (ft)	191.90	27.59	672.06
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.11	0.27	0.14
Alpha	1.53	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	82.96	20.21	49.65
C & E Loss (ft)	0.00	Cum SA (acres)	28.05	3.02	17.68

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	703.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.11	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	700.38	Flow Area (sq ft)	751.75	258.21	1949.97
E.G. Slope (ft/ft)	0.000572	Area (sq ft)	751.75	258.21	1949.97

```
* Q Total (cfs)          * 2207.00  * Flow (cfs)             *  424.82  *  487.06  * 1295.13  *
* Top Width (ft)         * 1008.65  * Top Width (ft)         *  375.00  *   31.30  *  602.35  *
* Vel Total (ft/s)       *    0.75  * Avg. Vel. (ft/s)       *    0.57  *    1.89  *    0.66  *
* Max Chl Dpth (ft)      *    9.35  * Hydr. Depth (ft)       *    2.00  *    8.25  *    3.24  *
* Conv. Total (cfs)      * 92284.7  * Conv. (cfs)            * 17763.5  * 20366.0  * 54155.2  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  375.26  *   33.99  *  603.01  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.07  *    0.27  *    0.12  *
* Alpha                  *    1.99  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.10  * Cum Volume (acre-ft)   *   81.11  *   19.70  *   44.92  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   27.21  *    2.96  *   16.22  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  703.02  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.00  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  700.14  * Flow Area (sq ft)      *  938.55  *  253.66  * 1530.67  *
* E.G. Slope (ft/ft)     *0.000636  * Area (sq ft)           * 1336.27  *  253.66  * 1530.67  *
* Q Total (cfs)          * 2207.00  * Flow (cfs)             *  610.77  *  494.25  * 1101.98  *
* Top Width (ft)         * 1076.15  * Top Width (ft)         *  590.29  *   31.91  *  453.95  *
* Vel Total (ft/s)       *    0.81  * Avg. Vel. (ft/s)       *    0.65  *    1.95  *    0.72  *
* Max Chl Dpth (ft)      *    9.34  * Hydr. Depth (ft)       *    2.90  *    7.95  *    3.37  *
* Conv. Total (cfs)      * 87505.6  * Conv. (cfs)            * 24216.6  * 19596.8  * 43692.3  *
* Length Wtd. (ft)       *  145.41  * Wetted Per. (ft)       *  324.11  *   34.45  *  454.27  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.11  *    0.29  *    0.13  *
* Alpha                  *    1.87  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   77.04  *   18.70  *   38.13  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   25.32  *    2.83  *   14.16  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         *  702.95  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  702.94  * Reach Len. (ft)        *   40.00  *   40.00  *   40.00  *
* Crit W.S. (ft)         *  699.61  * Flow Area (sq ft)      * 1550.32  *  319.89  * 1740.77  *
```

E.G. Slope (ft/ft)	0.000353	Area (sq ft)	1550.32	319.89	1740.77	
Q Total (cfs)	2134.00	Flow (cfs)	662.78	484.55	986.66	
Top Width (ft)	1160.27	Top Width (ft)	646.59	38.05	475.64	
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.43	1.51	0.57	
Max Chl Dpth (ft)	10.08	Hydr. Depth (ft)	2.40	8.41	3.66	
Conv. Total (cfs)	113545.8	Conv. (cfs)	35265.4	25782.1	52498.3	
Length Wtd. (ft)	40.00	Wetted Per. (ft)	646.76	40.77	475.71	
Min Ch El (ft)	692.86	Shear (lb/sq ft)	0.05	0.17	0.08	
Alpha	2.08	Stream Power (lb/ft s)	1383.85	0.00	0.00	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	72.27	17.74	32.65	
C & E Loss (ft)	0.03	Cum SA (acres)	23.28	2.72	12.60	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120428.0

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.62	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	698.55	Flow Area (sq ft)	54.77	427.71	107.44
E.G. Slope (ft/ft)	0.003256	Area (sq ft)	59.85	427.71	125.24
Q Total (cfs)	2134.00	Flow (cfs)	82.57	1892.63	158.79
Top Width (ft)	212.40	Top Width (ft)	70.90	55.30	86.20
Vel Total (ft/s)	3.62	Avg. Vel. (ft/s)	1.51	4.43	1.48
Max Chl Dpth (ft)	8.60	Hydr. Depth (ft)	3.08	7.73	2.95
Conv. Total (cfs)	37398.1	Conv. (cfs)	1447.1	33168.1	2782.8
Length Wtd. (ft)	25.00	Wetted Per. (ft)	18.25	57.76	36.89
Min Ch El (ft)	694.02	Shear (lb/sq ft)	0.61	1.51	0.59
Alpha	1.35	Stream Power (lb/ft s)	1216.84	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	71.53	17.39	31.79
C & E Loss (ft)	0.03	Cum SA (acres)	22.95	2.67	12.34

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120403

BRIDGE OUTPUT Profile #Q100

E.G. US. (ft)	702.90	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	702.62	E.G. Elev (ft)	702.80	702.70
Q Total (cfs)	2134.00	W.S. Elev (ft)	702.42	702.25
Q Bridge (cfs)	2134.00	Crit W.S. (ft)	698.78	699.07
Q Weir (cfs)		Max Chl Dpth (ft)	7.68	7.37
Weir Sta Lft (ft)		Vel Total (ft/s)	4.40	4.55
Weir Sta Rgt (ft)		Flow Area (sq ft)	484.91	468.96
Weir Submerg		Froude # Chl	0.33	0.37
Weir Max Depth (ft)		Specif Force (cu ft)	1933.28	1825.14
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	5.61	5.56
Min El Prs (ft)	704.50	W.P. Total (ft)	103.26	102.16
Delta EG (ft)	0.28	Conv. Total (cfs)	57177.8	49831.4
Delta WS (ft)	0.35	Top Width (ft)	86.49	84.35
BR Open Area (sq ft)	671.28	Frctn Loss (ft)	0.08	0.03
BR Open Vel (ft/s)	4.55	C & E Loss (ft)	0.02	0.05
Coef of Q		Shear Total (lb/sq ft)	0.41	0.53
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120339.5

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.27	Reach Len. (ft)	91.00	82.00	44.00
Crit W.S. (ft)	699.15	Flow Area (sq ft)	71.29	374.54	86.71
E.G. Slope (ft/ft)	0.004877	Area (sq ft)	79.91	374.54	86.71
Q Total (cfs)	2134.00	Flow (cfs)	127.69	1870.27	136.05
Top Width (ft)	139.51	Top Width (ft)	47.92	55.30	36.30
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	1.79	4.99	1.57
Max Chl Dpth (ft)	8.19	Hydr. Depth (ft)	2.94	6.77	2.39
Conv. Total (cfs)	30556.8	Conv. (cfs)	1828.3	26780.3	1948.1
Length Wtd. (ft)	79.36	Wetted Per. (ft)	24.84	57.13	36.85
Min Ch El (ft)	694.08	Shear (lb/sq ft)	0.87	2.00	0.72
Alpha	1.38	Stream Power (lb/ft s)	1213.50	0.00	0.00
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	71.42	16.58	31.68
C & E Loss (ft)	0.16	Cum SA (acres)	22.90	2.56	12.29

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120260.1

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.21	Reach Len. (ft)	247.00	260.00	268.00
Crit W.S. (ft)	699.94	Flow Area (sq ft)	1843.04	330.93	839.27
E.G. Slope (ft/ft)	0.000691	Area (sq ft)	1843.04	330.93	839.27
Q Total (cfs)	2134.00	Flow (cfs)	1057.97	634.59	441.44
Top Width (ft)	1287.71	Top Width (ft)	817.36	46.01	424.34
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.57	1.92	0.53
Max Chl Dpth (ft)	9.40	Hydr. Depth (ft)	2.25	7.19	1.98
Conv. Total (cfs)	81170.8	Conv. (cfs)	40241.8	24137.8	16791.2
Length Wtd. (ft)	253.16	Wetted Per. (ft)	817.59	48.99	424.47
Min Ch El (ft)	692.81	Shear (lb/sq ft)	0.10	0.29	0.09
Alpha	2.62	Stream Power (lb/ft s)	1429.54	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	69.41	15.92	31.21
C & E Loss (ft)	0.00	Cum SA (acres)	21.99	2.47	12.06

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.06	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	699.52	Flow Area (sq ft)	2554.00	181.66	453.50
E.G. Slope (ft/ft)	0.000522	Area (sq ft)	2554.00	181.66	453.50
Q Total (cfs)	2134.00	Flow (cfs)	1603.36	294.84	235.80
Top Width (ft)	1034.66	Top Width (ft)	801.85	25.29	207.52
Vel Total (ft/s)	0.67	Avg. Vel. (ft/s)	0.63	1.62	0.52
Max Chl Dpth (ft)	8.17	Hydr. Depth (ft)	3.19	7.18	2.19
Conv. Total (cfs)	93438.0	Conv. (cfs)	70203.7	12909.8	10324.5
Length Wtd. (ft)	80.00	Wetted Per. (ft)	802.10	27.96	207.64
Min Ch El (ft)	693.89	Shear (lb/sq ft)	0.10	0.21	0.07
Alpha	1.54	Stream Power (lb/ft s)	1539.10	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	56.95	14.39	27.23
C & E Loss (ft)	0.00	Cum SA (acres)	17.40	2.25	10.11

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	702.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.01	Reach Len. (ft)	321.00	321.00	321.00
Crit W.S. (ft)	699.24	Flow Area (sq ft)	2045.35	284.60	648.62
E.G. Slope (ft/ft)	0.000545	Area (sq ft)	2045.35	284.60	648.62
Q Total (cfs)	2134.00	Flow (cfs)	1200.30	491.87	441.83
Top Width (ft)	983.39	Top Width (ft)	733.75	38.41	211.23
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.59	1.73	0.68
Max Chl Dpth (ft)	8.29	Hydr. Depth (ft)	2.79	7.41	3.07
Conv. Total (cfs)	91440.5	Conv. (cfs)	51432.0	21076.5	18932.1
Length Wtd. (ft)	321.00	Wetted Per. (ft)	734.15	41.18	211.48
Min Ch El (ft)	693.72	Shear (lb/sq ft)	0.09	0.23	0.10
Alpha	1.91	Stream Power (lb/ft s)	1546.28	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	52.72	13.96	26.22
C & E Loss (ft)	0.00	Cum SA (acres)	15.99	2.19	9.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	701.86	Reach Len. (ft)	206.00	206.00	206.00
Crit W.S. (ft)	699.02	Flow Area (sq ft)	2658.50	196.13	271.31
E.G. Slope (ft/ft)	0.000450	Area (sq ft)	2658.50	196.13	315.53
Q Total (cfs)	2134.00	Flow (cfs)	1713.45	300.20	120.35
Top Width (ft)	1072.53	Top Width (ft)	832.31	29.08	211.14
Vel Total (ft/s)	0.68	Avg. Vel. (ft/s)	0.64	1.53	0.44
Max Chl Dpth (ft)	7.44	Hydr. Depth (ft)	3.19	6.74	1.47
Conv. Total (cfs)	100628.2	Conv. (cfs)	80797.3	14155.8	5675.1
Length Wtd. (ft)	206.00	Wetted Per. (ft)	832.78	29.50	185.12
Min Ch El (ft)	694.42	Shear (lb/sq ft)	0.09	0.19	0.04
Alpha	1.45	Stream Power (lb/ft s)	1676.69	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	35.39	12.19	22.67
C & E Loss (ft)	0.00	Cum SA (acres)	10.22	1.95	8.17

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119398.6

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	701.78	Reach Len. (ft)	162.00	160.00	95.00
Crit W.S. (ft)	698.21	Flow Area (sq ft)	2472.08	223.34	741.06
E.G. Slope (ft/ft)	0.000318	Area (sq ft)	2472.08	223.34	787.23
Q Total (cfs)	2134.00	Flow (cfs)	1460.18	305.35	368.47
Top Width (ft)	963.20	Top Width (ft)	680.43	28.01	254.76
Vel Total (ft/s)	0.62	Avg. Vel. (ft/s)	0.59	1.37	0.50
Max Chl Dpth (ft)	9.45	Hydr. Depth (ft)	3.63	7.97	3.26
Conv. Total (cfs)	119659.6	Conv. (cfs)	81876.4	17122.0	20661.1
Length Wtd. (ft)	150.83	Wetted Per. (ft)	680.69	30.68	227.83
Min Ch El (ft)	692.33	Shear (lb/sq ft)	0.07	0.14	0.06
Alpha	1.42	Stream Power (lb/ft s)	1633.77	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	23.26	11.20	20.06
C & E Loss (ft)	0.00	Cum SA (acres)	6.64	1.81	7.07

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.73	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)	698.11	Flow Area (sq ft)	2098.72	564.88	665.32
E.G. Slope (ft/ft)	0.000330	Area (sq ft)	2098.72	564.88	665.32
Q Total (cfs)	2134.00	Flow (cfs)	1134.91	685.60	313.49
Top Width (ft)	878.77	Top Width (ft)	562.59	97.00	219.18
Vel Total (ft/s)	0.64	Avg. Vel. (ft/s)	0.54	1.21	0.47
Max Chl Dpth (ft)	8.95	Hydr. Depth (ft)	3.73	5.82	3.04
Conv. Total (cfs)	117529.1	Conv. (cfs)	62504.6	37759.3	17265.2
Length Wtd. (ft)	783.25	Wetted Per. (ft)	562.65	101.09	219.30
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.08	0.12	0.06
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	14.76	9.75	18.48
C & E Loss (ft)	0.00	Cum SA (acres)	4.33	1.58	6.55

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	701.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.28	Reach Len. (ft)			
Crit W.S. (ft)	697.93	Flow Area (sq ft)	239.14	310.75	1346.63
E.G. Slope (ft/ft)	0.001251	Area (sq ft)	239.14	310.75	1346.63
Q Total (cfs)	2116.00	Flow (cfs)	162.43	803.62	1149.95
Top Width (ft)	663.05	Top Width (ft)	123.66	45.00	494.40
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)	0.68	2.59	0.85
Max Chl Dpth (ft)	9.07	Hydr. Depth (ft)	1.93	6.91	2.72
Conv. Total (cfs)	59836.2	Conv. (cfs)	4593.3	22724.7	32518.1
Length Wtd. (ft)		Wetted Per. (ft)	123.78	48.60	494.48
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.15	0.50	0.21
Alpha	2.39	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Blackberry Creek	121556	Q100	2207.00	694.58	703.48	700.02	703.49	0.000354	1.45	3684.95	1031.45	0.09
Blackberry Creek	121072.5	Q100	2207.00	694.41	703.28	700.67	703.29	0.000449	1.64	3206.37	917.71	0.10
Blackberry Creek	120885.9	Q100	2207.00	694.92	703.18	700.79	703.19	0.000686	1.84	2837.40	887.60	0.12
Blackberry Creek	120782.5	Q100	2207.00	693.76	703.11	700.38	703.12	0.000572	1.89	2959.94	1008.65	0.12
Blackberry Creek	120612.4	Q100	2207.00	693.66	703.00	700.14	703.02	0.000636	1.95	2722.88	1076.15	0.12
Blackberry Creek	120466.6	Q100	2134.00	692.86	702.94	699.61	702.95	0.000353	1.51	3610.97	1160.27	0.09
Blackberry Creek	120428.0	Q100	2134.00	694.02	702.62	698.55	702.90	0.003256	4.43	589.92	212.40	0.28
Blackberry Creek	120403		Bridge									
Blackberry Creek	120339.5	Q100	2134.00	694.08	702.27	699.15	702.61	0.004877	4.99	532.54	139.51	0.34

* Blackberry Creek	* 120260.1	* Q100	* 2134.00	* 692.81	* 702.21	* 699.94	* 702.23	* 0.000691	* 1.92	* 3013.24	* 1287.71	* 0.13
* Blackberry Creek	* 120001.1	* Q100	* 2134.00	* 693.89	* 702.06	* 699.52	* 702.07	* 0.000522	* 1.62	* 3189.16	* 1034.66	* 0.11
* Blackberry Creek	* 119921.9	* Q100	* 2134.00	* 693.72	* 702.01	* 699.24	* 702.03	* 0.000545	* 1.73	* 2978.57	* 983.39	* 0.11
* Blackberry Creek	* 119601.5	* Q100	* 2134.00	* 694.42	* 701.86	* 699.02	* 701.87	* 0.000450	* 1.53	* 3125.94	* 1072.53	* 0.10
* Blackberry Creek	* 119398.6	* Q100	* 2134.00	* 692.33	* 701.78	* 698.21	* 701.79	* 0.000318	* 1.37	* 3436.48	* 963.20	* 0.09
* Blackberry Creek	* 119239	* Q100	* 2134.00	* 692.78	* 701.73	* 698.11	* 701.74	* 0.000330	* 1.21	* 3328.92	* 878.77	* 0.09
* Blackberry Creek	* 118239	* Q100	* 2116.00	* 692.21	* 701.28	* 697.93	* 701.33	* 0.001251	* 2.59	* 1896.52	* 663.05	* 0.17

**

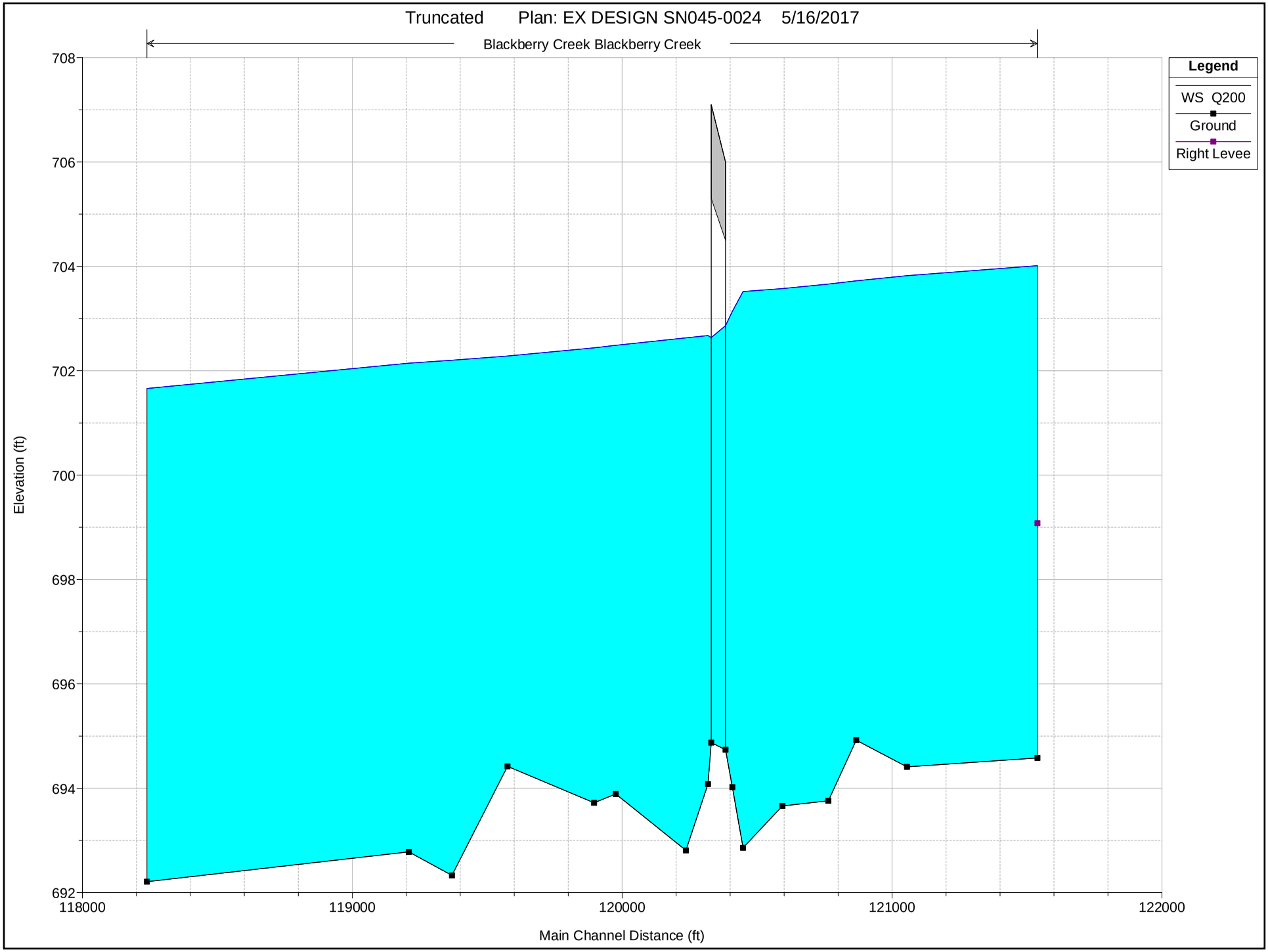
Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q100	703.49	703.48	0.01	0.19	0.00	1179.50	401.77	625.73	1031.45
Blackberry Creek	121072.5	Q100	703.29	703.28	0.01	0.10	0.00	590.76	452.50	1163.74	917.71
Blackberry Creek	120885.9	Q100	703.19	703.18	0.01	0.07	0.00	301.46	323.99	1581.56	887.60
Blackberry Creek	120782.5	Q100	703.12	703.11	0.02	0.10	0.00	424.82	487.06	1295.13	1008.65
Blackberry Creek	120612.4	Q100	703.02	703.00	0.02	0.07	0.00	610.77	494.25	1101.98	1076.15
Blackberry Creek	120466.6	Q100	702.95	702.94	0.01	0.03	0.03	662.78	484.55	986.66	1160.27
Blackberry Creek	120428.0	Q100	702.90	702.62	0.27	0.06	0.03	82.57	1892.63	158.79	212.40
Blackberry Creek	120403		Bridge								
Blackberry Creek	120339.5	Q100	702.61	702.27	0.34	0.22	0.16	127.69	1870.27	136.05	139.51
Blackberry Creek	120260.1	Q100	702.23	702.21	0.02	0.15	0.00	1057.97	634.59	441.44	1287.71
Blackberry Creek	120001.1	Q100	702.07	702.06	0.01	0.04	0.00	1603.36	294.84	235.80	1034.66
Blackberry Creek	119921.9	Q100	702.03	702.01	0.02	0.16	0.00	1200.30	491.87	441.83	983.39
Blackberry Creek	119601.5	Q100	701.87	701.86	0.01	0.08	0.00	1713.45	300.20	120.35	1072.53
Blackberry Creek	119398.6	Q100	701.79	701.78	0.01	0.05	0.00	1460.18	305.35	368.47	963.20
Blackberry Creek	119239	Q100	701.74	701.73	0.01	0.41	0.00	1134.91	685.60	313.49	878.77
Blackberry Creek	118239	Q100	701.33	701.28	0.05			162.43	803.62	1149.95	663.05

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : DESIGN

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q100
  Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q100
  Warning:Divided flow computed for this cross-section.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120466.6 Profile: Q100
  Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
  Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120428.0 Profile: Q100
  Warning:Divided flow computed for this cross-section.

```
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120403     Profile: Q100 Upstream
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120403     Profile: Q100 Downstream
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120339.5     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120001.1     Profile: Q100
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119921.9     Profile: Q100
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 118239     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
```


Truncated Plan: EX DESIGN SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q200
Ground
Right Levee
Elevation (ft)
708
706
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

```
                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 4:12:27 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

```
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************
* E.G. Elev (ft)         *  704.02  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  704.01  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  700.27  * Flow Area (sq ft)      * 2609.23  *  296.97  * 1341.78  *
* E.G. Slope (ft/ft)     *0.000351  * Area (sq ft)           * 2609.23  *  296.97  * 1341.78  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             * 1457.98  *  448.83  *  770.19  *
* Top Width (ft)         * 1079.88  * Top Width (ft)         *  698.14  *   37.00  *  344.74  *
* Vel Total (ft/s)       *    0.63  * Avg. Vel. (ft/s)       *    0.56  *    1.51  *    0.57  *
* Max Chl Dpth (ft)      *    9.43  * Hydr. Depth (ft)       *    3.74  *    8.03  *    3.89  *
* Conv. Total (cfs)      *142858.2  * Conv. (cfs)            * 77805.4  * 23951.7  * 41101.1  *
* Length Wtd. (ft)       *  488.92  * Wetted Per. (ft)       *  698.21  *   40.10  *  344.86  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.08  *    0.16  *    0.09  *
* Alpha                  *    1.63  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.19  * Cum Volume (acre-ft)   *  120.30  *   25.84  *   88.96  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   35.73  *    3.55  *   26.90  *
*****************************************************************************************


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************
* E.G. Elev (ft)         *  703.83  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.82	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)	700.81	Flow Area (sq ft)	1153.71	294.83	2257.72
E.G. Slope (ft/ft)	0.000428	Area (sq ft)	1153.71	294.83	2257.72
Q Total (cfs)	2677.00	Flow (cfs)	730.95	493.20	1452.84
Top Width (ft)	931.17	Top Width (ft)	307.78	34.96	588.43
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.63	1.67	0.64
Max Chl Dpth (ft)	9.41	Hydr. Depth (ft)	3.75	8.43	3.84
Conv. Total (cfs)	129444.6	Conv. (cfs)	35344.8	23848.6	70251.2
Length Wtd. (ft)	188.00	Wetted Per. (ft)	307.94	37.37	588.72
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.10	0.21	0.10
Alpha	1.63	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	99.56	22.55	68.30
C & E Loss (ft)	0.00	Cum SA (acres)	30.19	3.15	21.55

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	703.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.72	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)	700.90	Flow Area (sq ft)	597.89	189.44	2543.96
E.G. Slope (ft/ft)	0.000628	Area (sq ft)	597.89	189.44	2543.96
Q Total (cfs)	2677.00	Flow (cfs)	375.69	350.11	1951.19
Top Width (ft)	919.27	Top Width (ft)	215.42	24.31	679.54
Vel Total (ft/s)	0.80	Avg. Vel. (ft/s)	0.63	1.85	0.77
Max Chl Dpth (ft)	8.80	Hydr. Depth (ft)	2.78	7.79	3.74
Conv. Total (cfs)	106812.9	Conv. (cfs)	14990.3	13969.5	77853.1
Length Wtd. (ft)	105.70	Wetted Per. (ft)	215.55	27.59	680.10
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.11	0.27	0.15
Alpha	1.44	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	95.78	21.51	57.94
C & E Loss (ft)	0.00	Cum SA (acres)	29.06	3.02	18.81

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	703.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.66	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	700.55	Flow Area (sq ft)	981.84	275.55	2285.60
E.G. Slope (ft/ft)	0.000524	Area (sq ft)	981.84	275.55	2285.60

```
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  554.54  *  519.61  * 1602.85  *
* Top Width (ft)         * 1079.29  * Top Width (ft)         *  438.46  *   31.30  *  609.53  *
* Vel Total (ft/s)       *    0.76  * Avg. Vel. (ft/s)       *    0.56  *    1.89  *    0.70  *
* Max Chl Dpth (ft)      *    9.90  * Hydr. Depth (ft)       *    2.24  *    8.80  *    3.75  *
* Conv. Total (cfs)      *116926.3  * Conv. (cfs)            * 24221.3  * 22695.7  * 70009.2  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  438.75  *   33.99  *  610.21  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.07  *    0.27  *    0.12  *
* Alpha                  *    1.84  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.09  * Cum Volume (acre-ft)   *   93.43  *   20.96  *   52.40  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   28.08  *    2.96  *   17.33  *
*********************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q200
*********************************************************************************************
* E.G. Elev (ft)         *  703.59  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.57  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  700.32  * Flow Area (sq ft)      * 1691.86  *  271.91  * 1793.53  *
* E.G. Slope (ft/ft)     *0.000508  * Area (sq ft)           * 1691.86  *  271.91  * 1793.53  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  920.01  *  496.04  * 1260.95  *
* Top Width (ft)         * 1143.48  * Top Width (ft)         *  645.79  *   31.91  *  465.78  *
* Vel Total (ft/s)       *    0.71  * Avg. Vel. (ft/s)       *    0.54  *    1.82  *    0.70  *
* Max Chl Dpth (ft)      *    9.91  * Hydr. Depth (ft)       *    2.62  *    8.52  *    3.85  *
* Conv. Total (cfs)      *118744.1  * Conv. (cfs)            * 40809.1  * 22002.7  * 55932.3  *
* Length Wtd. (ft)       *  145.31  * Wetted Per. (ft)       *  646.38  *   34.45  *  466.12  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.08  *    0.25  *    0.12  *
* Alpha                  *    1.87  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.06  * Cum Volume (acre-ft)   *   88.21  *   19.89  *   44.44  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   25.97  *    2.83  *   15.23  *
*********************************************************************************************

Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q200
*********************************************************************************************
* E.G. Elev (ft)         *  703.53  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.52  * Reach Len. (ft)        *   40.00  *   40.00  *   40.00  *
* Crit W.S. (ft)         *  699.97  * Flow Area (sq ft)      * 1934.17  *  342.00  * 2020.35  *
* E.G. Slope (ft/ft)     *0.000320  * Area (sq ft)           * 1934.17  *  342.00  * 2020.35  *
```

```
* Q Total (cfs)          * 2586.00  * Flow (cfs)             *  884.30  *  515.68  * 1186.02  *
* Top Width (ft)         * 1202.12  * Top Width (ft)         *  677.57  *   38.05  *  486.50  *
* Vel Total (ft/s)       *    0.60  * Avg. Vel. (ft/s)       *    0.46  *    1.51  *    0.59  *
* Max Chl Dpth (ft)      *   10.66  * Hydr. Depth (ft)       *    2.85  *    8.99  *    4.15  *
* Conv. Total (cfs)      *144527.2  * Conv. (cfs)            * 49422.2  * 28820.6  * 66284.4  *
* Length Wtd. (ft)       *   40.00  * Wetted Per. (ft)       *  677.75  *   40.77  *  486.59  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.06  *    0.17  *    0.08  *
* Alpha                  *    1.89  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.02  * Cum Volume (acre-ft)   *   82.22  *   18.86  *   38.05  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *   23.78  *    2.72  *   13.64  *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120428.0


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  703.47  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.34  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.14  * Reach Len. (ft)        *   25.00  *   25.00  *   25.00  *
* Crit W.S. (ft)         *  699.04  * Flow Area (sq ft)      *   63.91  *  456.17  *  126.17  *
* E.G. Slope (ft/ft)     *0.003713  * Area (sq ft)           *  118.15  *  456.17  *  181.96  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             *  114.06  * 2250.29  *  221.66  *
* Top Width (ft)         *  376.58  * Top Width (ft)         *  161.37  *   55.30  *  159.91  *
* Vel Total (ft/s)       *    4.00  * Avg. Vel. (ft/s)       *    1.78  *    4.93  *    1.76  *
* Max Chl Dpth (ft)      *    9.12  * Hydr. Depth (ft)       *    3.60  *    8.25  *    3.47  *
* Conv. Total (cfs)      * 42436.9  * Conv. (cfs)            *  1871.7  * 36927.8  *  3637.4  *
* Length Wtd. (ft)       *   25.00  * Wetted Per. (ft)       *   18.25  *   57.76  *   36.89  *
* Min Ch El (ft)         *  694.02  * Shear (lb/sq ft)       *    0.81  *    1.83  *    0.79  *
* Alpha                  *    1.35  * Stream Power (lb/ft s) * 1216.84  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   81.27  *   18.50  *   37.04  *
* C & E Loss (ft)        *    0.05  * Cum SA (acres)         *   23.40  *    2.67  *   13.34  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

BRIDGE


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120403


BRIDGE OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. US. (ft)          *     703.47  * Element                *Inside BR US *Inside BR DS *
```

W.S. US. (ft)	703.14	E.G. Elev (ft)	703.36	703.23
Q Total (cfs)	2586.00	W.S. Elev (ft)	702.86	702.64
Q Bridge (cfs)	2586.00	Crit W.S. (ft)	699.27	699.57
Q Weir (cfs)		Max Chl Dpth (ft)	8.13	7.76
Weir Sta Lft (ft)		Vel Total (ft/s)	4.94	5.15
Weir Sta Rgt (ft)		Flow Area (sq ft)	523.68	502.17
Weir Submerg		Froude # Chl	0.37	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	2277.87	2148.17
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	5.91	5.86
Min El Prs (ft)	704.50	W.P. Total (ft)	106.47	104.46
Delta EG (ft)	0.36	Conv. Total (cfs)	62954.0	54422.8
Delta WS (ft)	0.46	Top Width (ft)	88.65	85.63
BR Open Area (sq ft)	671.28	Frctn Loss (ft)	0.10	0.04
BR Open Vel (ft/s)	5.15	C & E Loss (ft)	0.03	0.08
Coef of Q		Shear Total (lb/sq ft)	0.52	0.68
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120339.5

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	703.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.67	Reach Len. (ft)	91.00	82.00	44.00
Crit W.S. (ft)	699.63	Flow Area (sq ft)	81.46	397.00	102.34
E.G. Slope (ft/ft)	0.005757	Area (sq ft)	102.37	397.00	102.34
Q Total (cfs)	2586.00	Flow (cfs)	166.07	2239.15	180.78
Top Width (ft)	158.66	Top Width (ft)	62.71	55.30	40.66
Vel Total (ft/s)	4.45	Avg. Vel. (ft/s)	2.04	5.64	1.77
Max Chl Dpth (ft)	8.59	Hydr. Depth (ft)	3.15	7.18	2.52
Conv. Total (cfs)	34081.3	Conv. (cfs)	2188.7	29510.1	2382.6
Length Wtd. (ft)	79.06	Wetted Per. (ft)	26.47	57.13	41.23
Min Ch El (ft)	694.08	Shear (lb/sq ft)	1.11	2.50	0.89
Alpha	1.41	Stream Power (lb/ft s)	1213.50	0.00	0.00
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	81.13	17.63	36.89
C & E Loss (ft)	0.21	Cum SA (acres)	23.31	2.56	13.26

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120260.1

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.63	Reach Len. (ft)	247.00	260.00	268.00
Crit W.S. (ft)	700.32	Flow Area (sq ft)	2190.00	350.26	1021.57
E.G. Slope (ft/ft)	0.000640	Area (sq ft)	2190.00	350.26	1021.57
Q Total (cfs)	2586.00	Flow (cfs)	1339.28	671.35	575.36
Top Width (ft)	1320.03	Top Width (ft)	833.91	46.01	440.11
Vel Total (ft/s)	0.73	Avg. Vel. (ft/s)	0.61	1.92	0.56
Max Chl Dpth (ft)	9.82	Hydr. Depth (ft)	2.63	7.61	2.32
Conv. Total (cfs)	102205.9	Conv. (cfs)	52932.2	26533.7	22740.0
Length Wtd. (ft)	252.98	Wetted Per. (ft)	834.15	48.99	440.25
Min Ch El (ft)	692.81	Shear (lb/sq ft)	0.10	0.29	0.09
Alpha	2.31	Stream Power (lb/ft s)	1429.54	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	78.74	16.93	36.33
C & E Loss (ft)	0.00	Cum SA (acres)	22.38	2.47	13.02

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.49	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	699.67	Flow Area (sq ft)	2896.13	192.40	550.40
E.G. Slope (ft/ft)	0.000529	Area (sq ft)	2896.13	192.40	550.40
Q Total (cfs)	2586.00	Flow (cfs)	1978.75	326.77	280.48
Top Width (ft)	1073.43	Top Width (ft)	809.38	25.29	238.76
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.68	1.70	0.51
Max Chl Dpth (ft)	8.60	Hydr. Depth (ft)	3.58	7.61	2.31
Conv. Total (cfs)	112429.7	Conv. (cfs)	86028.8	14206.8	12194.2
Length Wtd. (ft)	80.00	Wetted Per. (ft)	809.64	27.96	238.88
Min Ch El (ft)	693.89	Shear (lb/sq ft)	0.12	0.23	0.08
Alpha	1.48	Stream Power (lb/ft s)	1539.10	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	64.32	15.31	31.49
C & E Loss (ft)	0.00	Cum SA (acres)	17.72	2.25	10.93

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.44	Reach Len. (ft)	321.00	321.00	321.00
Crit W.S. (ft)	699.43	Flow Area (sq ft)	2358.36	300.92	750.39
E.G. Slope (ft/ft)	0.000545	Area (sq ft)	2358.36	300.92	750.39
Q Total (cfs)	2586.00	Flow (cfs)	1513.14	539.79	533.07
Top Width (ft)	1027.76	Top Width (ft)	740.12	38.41	249.23
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)	0.64	1.79	0.71
Max Chl Dpth (ft)	8.72	Hydr. Depth (ft)	3.19	7.83	3.01
Conv. Total (cfs)	110801.4	Conv. (cfs)	64833.0	23128.4	22840.0
Length Wtd. (ft)	321.00	Wetted Per. (ft)	740.53	41.18	249.54
Min Ch El (ft)	693.72	Shear (lb/sq ft)	0.11	0.25	0.10
Alpha	1.77	Stream Power (lb/ft s)	1546.28	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	59.49	14.86	30.30
C & E Loss (ft)	0.00	Cum SA (acres)	16.29	2.19	10.49

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	702.28	Reach Len. (ft)	206.00	206.00	206.00
Crit W.S. (ft)	699.19	Flow Area (sq ft)	3012.03	208.46	353.97
E.G. Slope (ft/ft)	0.000454	Area (sq ft)	3012.03	208.46	410.07
Q Total (cfs)	2586.00	Flow (cfs)	2114.21	334.03	137.76
Top Width (ft)	1099.97	Top Width (ft)	836.22	29.08	234.68
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.70	1.60	0.39
Max Chl Dpth (ft)	7.86	Hydr. Depth (ft)	3.60	7.17	1.73
Conv. Total (cfs)	121307.6	Conv. (cfs)	99176.2	15668.9	6462.4
Length Wtd. (ft)	206.00	Wetted Per. (ft)	836.70	29.50	205.36
Min Ch El (ft)	694.42	Shear (lb/sq ft)	0.10	0.20	0.05
Alpha	1.42	Stream Power (lb/ft s)	1676.69	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	39.71	12.98	26.02
C & E Loss (ft)	0.00	Cum SA (acres)	10.49	1.95	8.70

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119398.6

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	702.20	Reach Len. (ft)	162.00	160.00	95.00
Crit W.S. (ft)	698.29	Flow Area (sq ft)	2763.29	235.14	838.12
E.G. Slope (ft/ft)	0.000338	Area (sq ft)	2763.29	235.14	896.34
Q Total (cfs)	2586.00	Flow (cfs)	1784.52	342.83	458.65
Top Width (ft)	986.85	Top Width (ft)	695.86	28.01	262.98
Vel Total (ft/s)	0.67	Avg. Vel. (ft/s)	0.65	1.46	0.55
Max Chl Dpth (ft)	9.87	Hydr. Depth (ft)	3.97	8.40	3.59
Conv. Total (cfs)	140727.3	Conv. (cfs)	97111.5	18656.3	24959.5
Length Wtd. (ft)	150.71	Wetted Per. (ft)	696.13	30.68	233.42
Min Ch El (ft)	692.33	Shear (lb/sq ft)	0.08	0.16	0.08
Alpha	1.37	Stream Power (lb/ft s)	1633.77	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	26.05	11.93	22.93
C & E Loss (ft)	0.00	Cum SA (acres)	6.86	1.81	7.53

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.14	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)	698.27	Flow Area (sq ft)	2335.83	605.27	762.94
E.G. Slope (ft/ft)	0.000363	Area (sq ft)	2335.83	605.27	762.94
Q Total (cfs)	2586.00	Flow (cfs)	1400.31	806.92	378.77
Top Width (ft)	923.01	Top Width (ft)	576.33	97.00	249.68
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.60	1.33	0.50
Max Chl Dpth (ft)	9.36	Hydr. Depth (ft)	4.05	6.24	3.06
Conv. Total (cfs)	135771.3	Conv. (cfs)	73519.5	42365.4	19886.4
Length Wtd. (ft)	778.09	Wetted Per. (ft)	576.40	101.09	249.81
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.09	0.14	0.07
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	16.57	10.39	21.12
C & E Loss (ft)	0.00	Cum SA (acres)	4.50	1.58	6.97

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	701.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.66	Reach Len. (ft)			
Crit W.S. (ft)	699.23	Flow Area (sq ft)	288.49	327.85	1537.24
E.G. Slope (ft/ft)	0.001322	Area (sq ft)	288.49	327.85	1537.24
Q Total (cfs)	2564.00	Flow (cfs)	214.20	903.57	1446.22
Top Width (ft)	690.09	Top Width (ft)	136.12	45.00	508.96
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	0.74	2.76	0.94
Max Chl Dpth (ft)	9.45	Hydr. Depth (ft)	2.12	7.29	3.02
Conv. Total (cfs)	70505.3	Conv. (cfs)	5890.2	24846.6	39768.5
Length Wtd. (ft)		Wetted Per. (ft)	136.26	48.60	509.06
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.17	0.56	0.25
Alpha	2.27	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q200	2677.00	694.58	704.01	700.27	704.02	0.000351	1.51	4247.98	1079.88	0.09
Blackberry Creek	121072.5	Q200	2677.00	694.41	703.82	700.81	703.83	0.000428	1.67	3706.26	931.17	0.10
Blackberry Creek	120885.9	Q200	2677.00	694.92	703.72	700.90	703.74	0.000628	1.85	3331.29	919.27	0.12
Blackberry Creek	120782.5	Q200	2677.00	693.76	703.66	700.55	703.68	0.000524	1.89	3542.98	1079.29	0.11
Blackberry Creek	120612.4	Q200	2677.00	693.66	703.57	700.32	703.59	0.000508	1.82	3757.30	1143.48	0.11
Blackberry Creek	120466.6	Q200	2586.00	692.86	703.52	699.97	703.53	0.000320	1.51	4296.53	1202.12	0.09
Blackberry Creek	120428.0	Q200	2586.00	694.02	703.14	699.04	703.47	0.003713	4.93	646.26	376.58	0.30
Blackberry Creek	120403		Bridge									
Blackberry Creek	120339.5	Q200	2586.00	694.08	702.67	699.63	703.11	0.005757	5.64	580.80	158.66	0.37
Blackberry Creek	120260.1	Q200	2586.00	692.81	702.63	700.32	702.65	0.000640	1.92	3561.83	1320.03	0.12
Blackberry Creek	120001.1	Q200	2586.00	693.89	702.49	699.67	702.50	0.000529	1.70	3638.94	1073.43	0.11
Blackberry Creek	119921.9	Q200	2586.00	693.72	702.44	699.43	702.45	0.000545	1.79	3409.67	1027.76	0.11

* Blackberry Creek	* 119601.5	* Q200	* 2586.00	* 694.42	* 702.28	* 699.19	* 702.29	* 0.000454	* 1.60	* 3574.45	* 1099.97	* 0.11
* Blackberry Creek	* 119398.6	* Q200	* 2586.00	* 692.33	* 702.20	* 698.29	* 702.21	* 0.000338	* 1.46	* 3836.55	* 986.85	* 0.09
* Blackberry Creek	* 119239	* Q200	* 2586.00	* 692.78	* 702.14	* 698.27	* 702.16	* 0.000363	* 1.33	* 3704.04	* 923.01	* 0.09
* Blackberry Creek	* 118239	* Q200	* 2564.00	* 692.21	* 701.66	* 699.23	* 701.71	* 0.001322	* 2.76	* 2153.58	* 690.09	* 0.18

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q200	704.02	704.01	0.01	0.19	0.00	1457.98	448.83	770.19	1079.88
Blackberry Creek	121072.5	Q200	703.83	703.82	0.01	0.10	0.00	730.95	493.20	1452.84	931.17
Blackberry Creek	120885.9	Q200	703.74	703.72	0.01	0.06	0.00	375.69	350.11	1951.19	919.27
Blackberry Creek	120782.5	Q200	703.68	703.66	0.02	0.09	0.00	554.54	519.61	1602.85	1079.29
Blackberry Creek	120612.4	Q200	703.59	703.57	0.01	0.06	0.00	920.01	496.04	1260.95	1143.48
Blackberry Creek	120466.6	Q200	703.53	703.52	0.01	0.02	0.03	884.30	515.68	1186.02	1202.12
Blackberry Creek	120428.0	Q200	703.47	703.14	0.34	0.07	0.05	114.06	2250.29	221.66	376.58
Blackberry Creek	120403		Bridge								
Blackberry Creek	120339.5	Q200	703.11	702.67	0.44	0.25	0.21	166.07	2239.15	180.78	158.66
Blackberry Creek	120260.1	Q200	702.65	702.63	0.02	0.15	0.00	1339.28	671.35	575.36	1320.03
Blackberry Creek	120001.1	Q200	702.50	702.49	0.01	0.04	0.00	1978.75	326.77	280.48	1073.43
Blackberry Creek	119921.9	Q200	702.45	702.44	0.02	0.16	0.00	1513.14	539.79	533.07	1027.76
Blackberry Creek	119601.5	Q200	702.29	702.28	0.01	0.08	0.00	2114.21	334.03	137.76	1099.97
Blackberry Creek	119398.6	Q200	702.21	702.20	0.01	0.05	0.00	1784.52	342.83	458.65	986.85
Blackberry Creek	119239	Q200	702.16	702.14	0.01	0.44	0.00	1400.31	806.92	378.77	923.01
Blackberry Creek	118239	Q200	701.71	701.66	0.05			214.20	903.57	1446.22	690.09

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : DESIGN

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q200
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q200
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120466.6 Profile: Q200
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 120428.0 Profile: Q200
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q200 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q200 Downstream

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     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120339.5     Profile: Q200
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119921.9     Profile: Q200
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q200
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q200
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q200
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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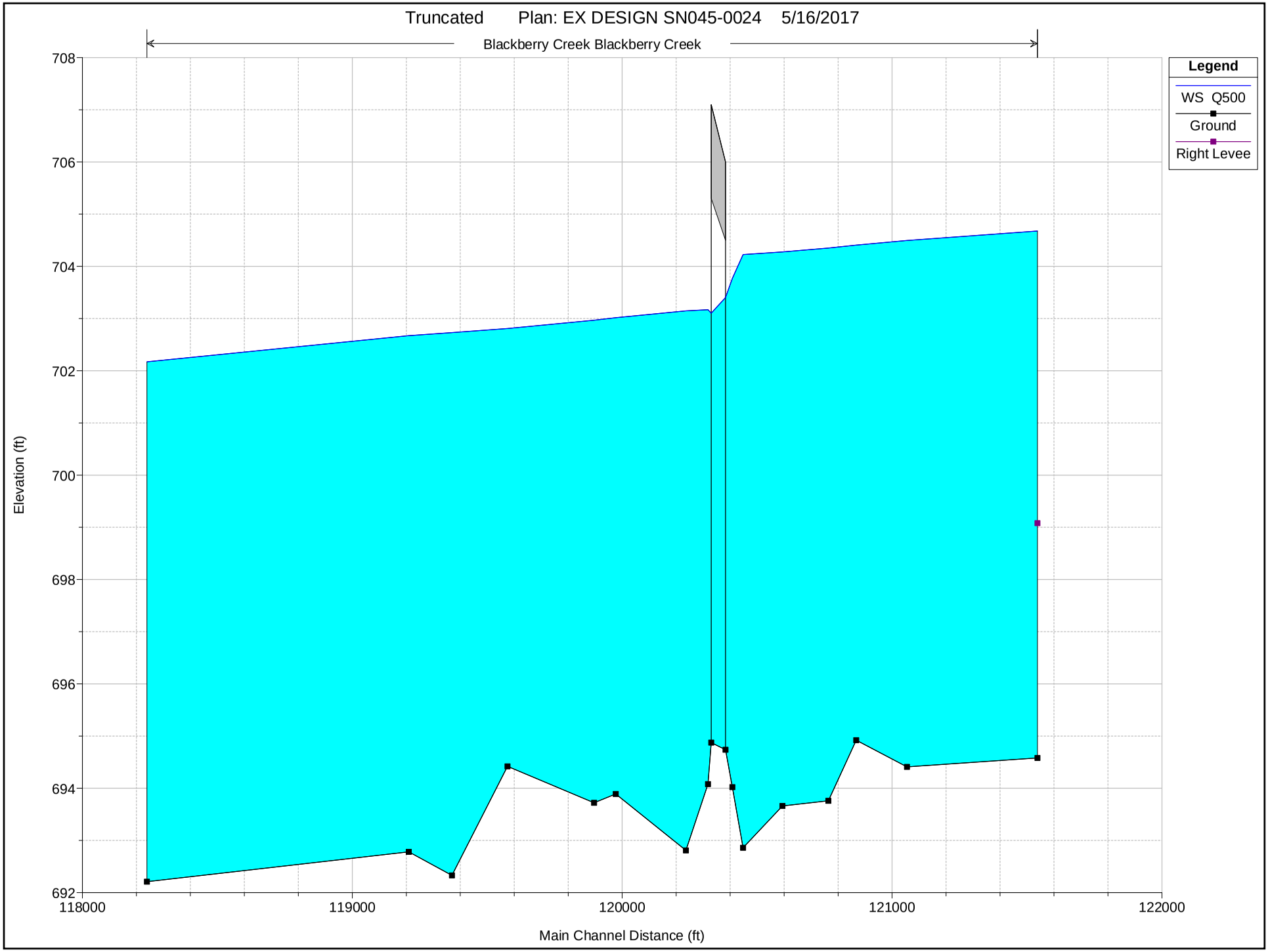
Truncated Plan: EX DESIGN SN045-0024 5/16/2017
Blackberry Creek Blackberry Creek
Legend
WS Q500
Ground
Right Levee
Elevation (ft)
708
706
704
702
700
698
696
694
692
118000
119000
120000
121000
122000
Main Channel Distance (ft)

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                    HEC-RAS Version 4.1.0 Jan 2010
                     U.S. Army Corps of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
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PROJECT DATA
Project Title: Truncated
Project File : Truncated.prj
Run Date and Time: 5/16/2017 4:12:27 PM

Project in English units

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343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
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369.07  708.00
375.00  707.99
381.8
3       707.95
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396.12  702.94
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399.73  702
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400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.


CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121556


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************
* E.G. Elev (ft)         *  704.02  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.120  *   0.070  *   0.120  *
* W.S. Elev (ft)         *  704.01  * Reach Len. (ft)        *  480.00  *  483.50  *  500.00  *
* Crit W.S. (ft)         *  700.27  * Flow Area (sq ft)      * 2609.23  *  296.97  * 1341.78  *
* E.G. Slope (ft/ft)     *0.000351  * Area (sq ft)           * 2609.23  *  296.97  * 1341.78  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             * 1457.98  *  448.83  *  770.19  *
* Top Width (ft)         * 1079.88  * Top Width (ft)         *  698.14  *   37.00  *  344.74  *
* Vel Total (ft/s)       *    0.63  * Avg. Vel. (ft/s)       *    0.56  *    1.51  *    0.57  *
* Max Chl Dpth (ft)      *    9.43  * Hydr. Depth (ft)       *    3.74  *    8.03  *    3.89  *
* Conv. Total (cfs)      *142858.2  * Conv. (cfs)            * 77805.4  * 23951.7  * 41101.1  *
* Length Wtd. (ft)       *  488.92  * Wetted Per. (ft)       *  698.21  *   40.10  *  344.86  *
* Min Ch El (ft)         *  694.58  * Shear (lb/sq ft)       *    0.08  *    0.16  *    0.09  *
* Alpha                  *    1.63  * Stream Power (lb/ft s) * 2609.80  *    0.00  *  886.00  *
* Frctn Loss (ft)        *    0.19  * Cum Volume (acre-ft)   *  120.30  *   25.84  *   88.96  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   35.73  *    3.55  *   26.90  *
*****************************************************************************************

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 121072.5


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************
* E.G. Elev (ft)         *  703.83  * Element                *  Left OB *  Channel * Right OB *
```

Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.82	Reach Len. (ft)	188.00	188.00	188.00
Crit W.S. (ft)	700.81	Flow Area (sq ft)	1153.71	294.83	2257.72
E.G. Slope (ft/ft)	0.000428	Area (sq ft)	1153.71	294.83	2257.72
Q Total (cfs)	2677.00	Flow (cfs)	730.95	493.20	1452.84
Top Width (ft)	931.17	Top Width (ft)	307.78	34.96	588.43
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.63	1.67	0.64
Max Chl Dpth (ft)	9.41	Hydr. Depth (ft)	3.75	8.43	3.84
Conv. Total (cfs)	129444.6	Conv. (cfs)	35344.8	23848.6	70251.2
Length Wtd. (ft)	188.00	Wetted Per. (ft)	307.94	37.37	588.72
Min Ch El (ft)	694.41	Shear (lb/sq ft)	0.10	0.21	0.10
Alpha	1.63	Stream Power (lb/ft s)	1259.12	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	99.56	22.55	68.30
C & E Loss (ft)	0.00	Cum SA (acres)	30.19	3.15	21.55

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120885.9

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	703.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.72	Reach Len. (ft)	130.00	103.00	100.00
Crit W.S. (ft)	700.90	Flow Area (sq ft)	597.89	189.44	2543.96
E.G. Slope (ft/ft)	0.000628	Area (sq ft)	597.89	189.44	2543.96
Q Total (cfs)	2677.00	Flow (cfs)	375.69	350.11	1951.19
Top Width (ft)	919.27	Top Width (ft)	215.42	24.31	679.54
Vel Total (ft/s)	0.80	Avg. Vel. (ft/s)	0.63	1.85	0.77
Max Chl Dpth (ft)	8.80	Hydr. Depth (ft)	2.78	7.79	3.74
Conv. Total (cfs)	106812.9	Conv. (cfs)	14990.3	13969.5	77853.1
Length Wtd. (ft)	105.70	Wetted Per. (ft)	215.55	27.59	680.10
Min Ch El (ft)	694.92	Shear (lb/sq ft)	0.11	0.27	0.15
Alpha	1.44	Stream Power (lb/ft s)	1259.66	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	95.78	21.51	57.94
C & E Loss (ft)	0.00	Cum SA (acres)	29.06	3.02	18.81

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120782.5

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	703.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.66	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	700.55	Flow Area (sq ft)	981.84	275.55	2285.60
E.G. Slope (ft/ft)	0.000524	Area (sq ft)	981.84	275.55	2285.60

```
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  554.54  *  519.61  * 1602.85  *
* Top Width (ft)         * 1079.29  * Top Width (ft)         *  438.46  *   31.30  *  609.53  *
* Vel Total (ft/s)       *    0.76  * Avg. Vel. (ft/s)       *    0.56  *    1.89  *    0.70  *
* Max Chl Dpth (ft)      *    9.90  * Hydr. Depth (ft)       *    2.24  *    8.80  *    3.75  *
* Conv. Total (cfs)      *116926.3  * Conv. (cfs)            * 24221.3  * 22695.7  * 70009.2  *
* Length Wtd. (ft)       *  170.00  * Wetted Per. (ft)       *  438.75  *   33.99  *  610.21  *
* Min Ch El (ft)         *  693.76  * Shear (lb/sq ft)       *    0.07  *    0.27  *    0.12  *
* Alpha                  *    1.84  * Stream Power (lb/ft s) * 1420.55  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.09  * Cum Volume (acre-ft)   *   93.43  *   20.96  *   52.40  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   28.08  *    2.96  *   17.33  *
**********************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120612.4


CROSS SECTION OUTPUT  Profile #Q200
**********************************************************************************************
* E.G. Elev (ft)         *  703.59  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.57  * Reach Len. (ft)        *  144.00  *  146.00  *  146.00  *
* Crit W.S. (ft)         *  700.32  * Flow Area (sq ft)      * 1691.86  *  271.91  * 1793.53  *
* E.G. Slope (ft/ft)     *0.000508  * Area (sq ft)           * 1691.86  *  271.91  * 1793.53  *
* Q Total (cfs)          * 2677.00  * Flow (cfs)             *  920.01  *  496.04  * 1260.95  *
* Top Width (ft)         * 1143.48  * Top Width (ft)         *  645.79  *   31.91  *  465.78  *
* Vel Total (ft/s)       *    0.71  * Avg. Vel. (ft/s)       *    0.54  *    1.82  *    0.70  *
* Max Chl Dpth (ft)      *    9.91  * Hydr. Depth (ft)       *    2.62  *    8.52  *    3.85  *
* Conv. Total (cfs)      *118744.1  * Conv. (cfs)            * 40809.1  * 22002.7  * 55932.3  *
* Length Wtd. (ft)       *  145.31  * Wetted Per. (ft)       *  646.38  *   34.45  *  466.12  *
* Min Ch El (ft)         *  693.66  * Shear (lb/sq ft)       *    0.08  *    0.25  *    0.12  *
* Alpha                  *    1.87  * Stream Power (lb/ft s) * 1378.97  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.06  * Cum Volume (acre-ft)   *   88.21  *   19.89  *   44.44  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   25.97  *    2.83  *   15.23  *
**********************************************************************************************

Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120466.6


CROSS SECTION OUTPUT  Profile #Q200
**********************************************************************************************
* E.G. Elev (ft)         *  703.53  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.52  * Reach Len. (ft)        *   40.00  *   40.00  *   40.00  *
* Crit W.S. (ft)         *  699.97  * Flow Area (sq ft)      * 1934.17  *  342.00  * 2020.35  *
* E.G. Slope (ft/ft)     *0.000320  * Area (sq ft)           * 1934.17  *  342.00  * 2020.35  *
```

```
* Q Total (cfs)          * 2586.00  * Flow (cfs)             *  884.30  *  515.68  * 1186.02  *
* Top Width (ft)         * 1202.12  * Top Width (ft)         *  677.57  *   38.05  *  486.50  *
* Vel Total (ft/s)       *    0.60  * Avg. Vel. (ft/s)       *    0.46  *    1.51  *    0.59  *
* Max Chl Dpth (ft)      *   10.66  * Hydr. Depth (ft)       *    2.85  *    8.99  *    4.15  *
* Conv. Total (cfs)      *144527.2  * Conv. (cfs)            * 49422.2  * 28820.6  * 66284.4  *
* Length Wtd. (ft)       *   40.00  * Wetted Per. (ft)       *  677.75  *   40.77  *  486.59  *
* Min Ch El (ft)         *  692.86  * Shear (lb/sq ft)       *    0.06  *    0.17  *    0.08  *
* Alpha                  *    1.89  * Stream Power (lb/ft s) * 1383.85  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.02  * Cum Volume (acre-ft)   *   82.22  *   18.86  *   38.05  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *   23.78  *    2.72  *   13.64  *
*****************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120428.0


CROSS SECTION OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. Elev (ft)         *  703.47  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.34  * Wt. n-Val.             *   0.117  *   0.073  *   0.117  *
* W.S. Elev (ft)         *  703.14  * Reach Len. (ft)        *   25.00  *   25.00  *   25.00  *
* Crit W.S. (ft)         *  699.04  * Flow Area (sq ft)      *   63.91  *  456.17  *  126.17  *
* E.G. Slope (ft/ft)     *0.003713  * Area (sq ft)           *  118.15  *  456.17  *  181.96  *
* Q Total (cfs)          * 2586.00  * Flow (cfs)             *  114.06  * 2250.29  *  221.66  *
* Top Width (ft)         *  376.58  * Top Width (ft)         *  161.37  *   55.30  *  159.91  *
* Vel Total (ft/s)       *    4.00  * Avg. Vel. (ft/s)       *    1.78  *    4.93  *    1.76  *
* Max Chl Dpth (ft)      *    9.12  * Hydr. Depth (ft)       *    3.60  *    8.25  *    3.47  *
* Conv. Total (cfs)      * 42436.9  * Conv. (cfs)            *  1871.7  * 36927.8  *  3637.4  *
* Length Wtd. (ft)       *   25.00  * Wetted Per. (ft)       *   18.25  *   57.76  *   36.89  *
* Min Ch El (ft)         *  694.02  * Shear (lb/sq ft)       *    0.81  *    1.83  *    0.79  *
* Alpha                  *    1.35  * Stream Power (lb/ft s) * 1216.84  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    0.07  * Cum Volume (acre-ft)   *   81.27  *   18.50  *   37.04  *
* C & E Loss (ft)        *    0.05  * Cum SA (acres)         *   23.40  *    2.67  *   13.34  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

BRIDGE


RIVER: Blackberry Creek
REACH: Blackberry Creek   RS: 120403


BRIDGE OUTPUT  Profile #Q200
*****************************************************************************************************
* E.G. US. (ft)          *     703.47  * Element                *Inside BR US *Inside BR DS *
```

W.S. US. (ft)	703.14	E.G. Elev (ft)	703.36	703.23
Q Total (cfs)	2586.00	W.S. Elev (ft)	702.86	702.64
Q Bridge (cfs)	2586.00	Crit W.S. (ft)	699.27	699.57
Q Weir (cfs)		Max Chl Dpth (ft)	8.13	7.76
Weir Sta Lft (ft)		Vel Total (ft/s)	4.94	5.15
Weir Sta Rgt (ft)		Flow Area (sq ft)	523.68	502.17
Weir Submerg		Froude # Chl	0.37	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	2277.87	2148.17
Min El Weir Flow (ft)	707.11	Hydr Depth (ft)	5.91	5.86
Min El Prs (ft)	704.50	W.P. Total (ft)	106.47	104.46
Delta EG (ft)	0.36	Conv. Total (cfs)	62954.0	54422.8
Delta WS (ft)	0.46	Top Width (ft)	88.65	85.63
BR Open Area (sq ft)	671.28	Frctn Loss (ft)	0.10	0.04
BR Open Vel (ft/s)	5.15	C & E Loss (ft)	0.03	0.08
Coef of Q		Shear Total (lb/sq ft)	0.52	0.68
Br Sel Method	Energy only	Power Total (lb/ft s)	0.00	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120339.5

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	703.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.67	Reach Len. (ft)	91.00	82.00	44.00
Crit W.S. (ft)	699.63	Flow Area (sq ft)	81.46	397.00	102.34
E.G. Slope (ft/ft)	0.005757	Area (sq ft)	102.37	397.00	102.34
Q Total (cfs)	2586.00	Flow (cfs)	166.07	2239.15	180.78
Top Width (ft)	158.66	Top Width (ft)	62.71	55.30	40.66
Vel Total (ft/s)	4.45	Avg. Vel. (ft/s)	2.04	5.64	1.77
Max Chl Dpth (ft)	8.59	Hydr. Depth (ft)	3.15	7.18	2.52
Conv. Total (cfs)	34081.3	Conv. (cfs)	2188.7	29510.1	2382.6
Length Wtd. (ft)	79.06	Wetted Per. (ft)	26.47	57.13	41.23
Min Ch El (ft)	694.08	Shear (lb/sq ft)	1.11	2.50	0.89
Alpha	1.41	Stream Power (lb/ft s)	1213.50	0.00	0.00
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	81.13	17.63	36.89
C & E Loss (ft)	0.21	Cum SA (acres)	23.31	2.56	13.26

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120260.1

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.63	Reach Len. (ft)	247.00	260.00	268.00
Crit W.S. (ft)	700.32	Flow Area (sq ft)	2190.00	350.26	1021.57
E.G. Slope (ft/ft)	0.000640	Area (sq ft)	2190.00	350.26	1021.57
Q Total (cfs)	2586.00	Flow (cfs)	1339.28	671.35	575.36
Top Width (ft)	1320.03	Top Width (ft)	833.91	46.01	440.11
Vel Total (ft/s)	0.73	Avg. Vel. (ft/s)	0.61	1.92	0.56
Max Chl Dpth (ft)	9.82	Hydr. Depth (ft)	2.63	7.61	2.32
Conv. Total (cfs)	102205.9	Conv. (cfs)	52932.2	26533.7	22740.0
Length Wtd. (ft)	252.98	Wetted Per. (ft)	834.15	48.99	440.25
Min Ch El (ft)	692.81	Shear (lb/sq ft)	0.10	0.29	0.09
Alpha	2.31	Stream Power (lb/ft s)	1429.54	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	78.74	16.93	36.33
C & E Loss (ft)	0.00	Cum SA (acres)	22.38	2.47	13.02

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 120001.1

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.49	Reach Len. (ft)	80.00	80.00	80.00
Crit W.S. (ft)	699.67	Flow Area (sq ft)	2896.13	192.40	550.40
E.G. Slope (ft/ft)	0.000529	Area (sq ft)	2896.13	192.40	550.40
Q Total (cfs)	2586.00	Flow (cfs)	1978.75	326.77	280.48
Top Width (ft)	1073.43	Top Width (ft)	809.38	25.29	238.76
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.68	1.70	0.51
Max Chl Dpth (ft)	8.60	Hydr. Depth (ft)	3.58	7.61	2.31
Conv. Total (cfs)	112429.7	Conv. (cfs)	86028.8	14206.8	12194.2
Length Wtd. (ft)	80.00	Wetted Per. (ft)	809.64	27.96	238.88
Min Ch El (ft)	693.89	Shear (lb/sq ft)	0.12	0.23	0.08
Alpha	1.48	Stream Power (lb/ft s)	1539.10	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	64.32	15.31	31.49
C & E Loss (ft)	0.00	Cum SA (acres)	17.72	2.25	10.93

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119921.9

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.44	Reach Len. (ft)	321.00	321.00	321.00
Crit W.S. (ft)	699.43	Flow Area (sq ft)	2358.36	300.92	750.39
E.G. Slope (ft/ft)	0.000545	Area (sq ft)	2358.36	300.92	750.39
Q Total (cfs)	2586.00	Flow (cfs)	1513.14	539.79	533.07
Top Width (ft)	1027.76	Top Width (ft)	740.12	38.41	249.23
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)	0.64	1.79	0.71
Max Chl Dpth (ft)	8.72	Hydr. Depth (ft)	3.19	7.83	3.01
Conv. Total (cfs)	110801.4	Conv. (cfs)	64833.0	23128.4	22840.0
Length Wtd. (ft)	321.00	Wetted Per. (ft)	740.53	41.18	249.54
Min Ch El (ft)	693.72	Shear (lb/sq ft)	0.11	0.25	0.10
Alpha	1.77	Stream Power (lb/ft s)	1546.28	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	59.49	14.86	30.30
C & E Loss (ft)	0.00	Cum SA (acres)	16.29	2.19	10.49

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119601.5

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	702.28	Reach Len. (ft)	206.00	206.00	206.00
Crit W.S. (ft)	699.19	Flow Area (sq ft)	3012.03	208.46	353.97
E.G. Slope (ft/ft)	0.000454	Area (sq ft)	3012.03	208.46	410.07
Q Total (cfs)	2586.00	Flow (cfs)	2114.21	334.03	137.76
Top Width (ft)	1099.97	Top Width (ft)	836.22	29.08	234.68
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.70	1.60	0.39
Max Chl Dpth (ft)	7.86	Hydr. Depth (ft)	3.60	7.17	1.73
Conv. Total (cfs)	121307.6	Conv. (cfs)	99176.2	15668.9	6462.4
Length Wtd. (ft)	206.00	Wetted Per. (ft)	836.70	29.50	205.36
Min Ch El (ft)	694.42	Shear (lb/sq ft)	0.10	0.20	0.05
Alpha	1.42	Stream Power (lb/ft s)	1676.69	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	39.71	12.98	26.02
C & E Loss (ft)	0.00	Cum SA (acres)	10.49	1.95	8.70

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119398.6

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.106	0.073	0.117
W.S. Elev (ft)	702.20	Reach Len. (ft)	162.00	160.00	95.00
Crit W.S. (ft)	698.29	Flow Area (sq ft)	2763.29	235.14	838.12
E.G. Slope (ft/ft)	0.000338	Area (sq ft)	2763.29	235.14	896.34
Q Total (cfs)	2586.00	Flow (cfs)	1784.52	342.83	458.65
Top Width (ft)	986.85	Top Width (ft)	695.86	28.01	262.98
Vel Total (ft/s)	0.67	Avg. Vel. (ft/s)	0.65	1.46	0.55
Max Chl Dpth (ft)	9.87	Hydr. Depth (ft)	3.97	8.40	3.59
Conv. Total (cfs)	140727.3	Conv. (cfs)	97111.5	18656.3	24959.5
Length Wtd. (ft)	150.71	Wetted Per. (ft)	696.13	30.68	233.42
Min Ch El (ft)	692.33	Shear (lb/sq ft)	0.08	0.16	0.08
Alpha	1.37	Stream Power (lb/ft s)	1633.77	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	26.05	11.93	22.93
C & E Loss (ft)	0.00	Cum SA (acres)	6.86	1.81	7.53

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 119239

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	702.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	702.14	Reach Len. (ft)	550.00	970.00	800.00
Crit W.S. (ft)	698.27	Flow Area (sq ft)	2335.83	605.27	762.94
E.G. Slope (ft/ft)	0.000363	Area (sq ft)	2335.83	605.27	762.94
Q Total (cfs)	2586.00	Flow (cfs)	1400.31	806.92	378.77
Top Width (ft)	923.01	Top Width (ft)	576.33	97.00	249.68
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.60	1.33	0.50
Max Chl Dpth (ft)	9.36	Hydr. Depth (ft)	4.05	6.24	3.06
Conv. Total (cfs)	135771.3	Conv. (cfs)	73519.5	42365.4	19886.4
Length Wtd. (ft)	778.09	Wetted Per. (ft)	576.40	101.09	249.81
Min Ch El (ft)	692.78	Shear (lb/sq ft)	0.09	0.14	0.07
Alpha	1.61	Stream Power (lb/ft s)	1304.00	0.00	0.00
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	16.57	10.39	21.12
C & E Loss (ft)	0.00	Cum SA (acres)	4.50	1.58	6.97

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Blackberry Creek
REACH: Blackberry Creek RS: 118239

CROSS SECTION OUTPUT Profile #Q200

E.G. Elev (ft)	701.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	701.66	Reach Len. (ft)			
Crit W.S. (ft)	699.23	Flow Area (sq ft)	288.49	327.85	1537.24
E.G. Slope (ft/ft)	0.001322	Area (sq ft)	288.49	327.85	1537.24
Q Total (cfs)	2564.00	Flow (cfs)	214.20	903.57	1446.22
Top Width (ft)	690.09	Top Width (ft)	136.12	45.00	508.96
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	0.74	2.76	0.94
Max Chl Dpth (ft)	9.45	Hydr. Depth (ft)	2.12	7.29	3.02
Conv. Total (cfs)	70505.3	Conv. (cfs)	5890.2	24846.6	39768.5
Length Wtd. (ft)		Wetted Per. (ft)	136.26	48.60	509.06
Min Ch El (ft)	692.21	Shear (lb/sq ft)	0.17	0.56	0.25
Alpha	2.27	Stream Power (lb/ft s)	1404.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Blackberry Creek	121556	Q200	2677.00	694.58	704.01	700.27	704.02	0.000351	1.51	4247.98	1079.88	0.09
Blackberry Creek	121072.5	Q200	2677.00	694.41	703.82	700.81	703.83	0.000428	1.67	3706.26	931.17	0.10
Blackberry Creek	120885.9	Q200	2677.00	694.92	703.72	700.90	703.74	0.000628	1.85	3331.29	919.27	0.12
Blackberry Creek	120782.5	Q200	2677.00	693.76	703.66	700.55	703.68	0.000524	1.89	3542.98	1079.29	0.11
Blackberry Creek	120612.4	Q200	2677.00	693.66	703.57	700.32	703.59	0.000508	1.82	3757.30	1143.48	0.11
Blackberry Creek	120466.6	Q200	2586.00	692.86	703.52	699.97	703.53	0.000320	1.51	4296.53	1202.12	0.09
Blackberry Creek	120428.0	Q200	2586.00	694.02	703.14	699.04	703.47	0.003713	4.93	646.26	376.58	0.30
Blackberry Creek	120403		Bridge									
Blackberry Creek	120339.5	Q200	2586.00	694.08	702.67	699.63	703.11	0.005757	5.64	580.80	158.66	0.37
Blackberry Creek	120260.1	Q200	2586.00	692.81	702.63	700.32	702.65	0.000640	1.92	3561.83	1320.03	0.12
Blackberry Creek	120001.1	Q200	2586.00	693.89	702.49	699.67	702.50	0.000529	1.70	3638.94	1073.43	0.11
Blackberry Creek	119921.9	Q200	2586.00	693.72	702.44	699.43	702.45	0.000545	1.79	3409.67	1027.76	0.11

* Blackberry Creek	* 119601.5	* Q200	* 2586.00	* 694.42	* 702.28	* 699.19	* 702.29	* 0.000454	* 1.60	* 3574.45	* 1099.97	* 0.11
* Blackberry Creek	* 119398.6	* Q200	* 2586.00	* 692.33	* 702.20	* 698.29	* 702.21	* 0.000338	* 1.46	* 3836.55	* 986.85	* 0.09
* Blackberry Creek	* 119239	* Q200	* 2586.00	* 692.78	* 702.14	* 698.27	* 702.16	* 0.000363	* 1.33	* 3704.04	* 923.01	* 0.09
* Blackberry Creek	* 118239	* Q200	* 2564.00	* 692.21	* 701.66	* 699.23	* 701.71	* 0.001322	* 2.76	* 2153.58	* 690.09	* 0.18

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Blackberry Creek	121556	Q200	704.02	704.01	0.01	0.19	0.00	1457.98	448.83	770.19	1079.88
Blackberry Creek	121072.5	Q200	703.83	703.82	0.01	0.10	0.00	730.95	493.20	1452.84	931.17
Blackberry Creek	120885.9	Q200	703.74	703.72	0.01	0.06	0.00	375.69	350.11	1951.19	919.27
Blackberry Creek	120782.5	Q200	703.68	703.66	0.02	0.09	0.00	554.54	519.61	1602.85	1079.29
Blackberry Creek	120612.4	Q200	703.59	703.57	0.01	0.06	0.00	920.01	496.04	1260.95	1143.48
Blackberry Creek	120466.6	Q200	703.53	703.52	0.01	0.02	0.03	884.30	515.68	1186.02	1202.12
Blackberry Creek	120428.0	Q200	703.47	703.14	0.34	0.07	0.05	114.06	2250.29	221.66	376.58
Blackberry Creek	120403		Bridge								
Blackberry Creek	120339.5	Q200	703.11	702.67	0.44	0.25	0.21	166.07	2239.15	180.78	158.66
Blackberry Creek	120260.1	Q200	702.65	702.63	0.02	0.15	0.00	1339.28	671.35	575.36	1320.03
Blackberry Creek	120001.1	Q200	702.50	702.49	0.01	0.04	0.00	1978.75	326.77	280.48	1073.43
Blackberry Creek	119921.9	Q200	702.45	702.44	0.02	0.16	0.00	1513.14	539.79	533.07	1027.76
Blackberry Creek	119601.5	Q200	702.29	702.28	0.01	0.08	0.00	2114.21	334.03	137.76	1099.97
Blackberry Creek	119398.6	Q200	702.21	702.20	0.01	0.05	0.00	1784.52	342.83	458.65	986.85
Blackberry Creek	119239	Q200	702.16	702.14	0.01	0.44	0.00	1400.31	806.92	378.77	923.01
Blackberry Creek	118239	Q200	701.71	701.66	0.05			214.20	903.57	1446.22	690.09

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : DESIGN

River: Blackberry Creek Reach: Blackberry Creek RS: 120782.5 Profile: Q200
Warning:Divided flow computed for this cross-section.
River: Blackberry Creek Reach: Blackberry Creek RS: 120612.4 Profile: Q200
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120466.6 Profile: Q200
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Blackberry Creek RS: 120428.0 Profile: Q200
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q200 Upstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Blackberry Creek RS: 120403 Profile: Q200 Downstream

```
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 120339.5     Profile: Q200
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119921.9     Profile: Q200
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119601.5     Profile: Q200
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119398.6     Profile: Q200
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Blackberry Creek     RS: 119239     Profile: Q200
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```

EXHIBIT K

SCOUR ANALYSIS

Summary of Bridge Scour Analysis

A. EXISTING CONDITION

Storm Frequency (Year)	Contraction Scour (CS)	Pier Scour (PS)	Abutment Scour (AS) using HIRE or Froehlich's Method		Total Pier Scour (TPS) (= CS + PS)	Total Abutment Scour (TAS) HIRE or Froehlich's Method	
			Left (ASL)	Right (ASR)		Left (TAS_L) (= CS + ASL)	Right (TAS_R) (= CS + ASR)
10	4.13	3.95	5.32	6.62	8.08	9.45	10.75
50	8.83	4.69	7.22	9.11	13.52	16.05	17.94
100	10.94	4.97	10.54	10.22	15.91	21.48	21.16
200	15.11	5.27	11.71	11.41	20.38	26.82	26.52
500	19.68	5.59	13.05	12.96	25.27	32.73	32.64

HEC-RAS Scour Analysis Existing 10-year

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	1.93	6.29	1.84
	Approach Velocity (ft/s):	0.56	1.87	0.54
	Br Average Depth (ft):	2.08	5.78	1.75
	BR Opening Flow (cfs):	12.40	1021.55	7.06
	BR Top WD (ft):	11.63	57.40	9.05
	Grain Size D50 (mm):	0.30	0.30	0.30
	Approach Flow (cfs):	268.40	374.63	427.97
	Approach Top WD (ft):	250.41	31.91	431.37
	K1 Coefficient:	0.640	0.690	0.640
Results				
	Scour Depth Ys (ft):	0.00	4.13	0.00
	Critical Velocity (ft/s):	1.24	1.51	1.23
	Equation:	Clear	Live	Clear

Pier Scour

All piers have the same scour depth

Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	2.84
	Grain Size D50 (mm):	0.30000
	Depth Upstream (ft):	5.83
	Velocity Upstream (ft/s):	2.62
	K1 Nose Shape:	1.00
	Pier Angle:	0.00
	Pier Length (ft):	53.00
	K2 Angle Coef:	1.00
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
Results		
	Scour Depth Ys (ft):	3.95
	Froude #:	0.19
	Equation:	CSU equation

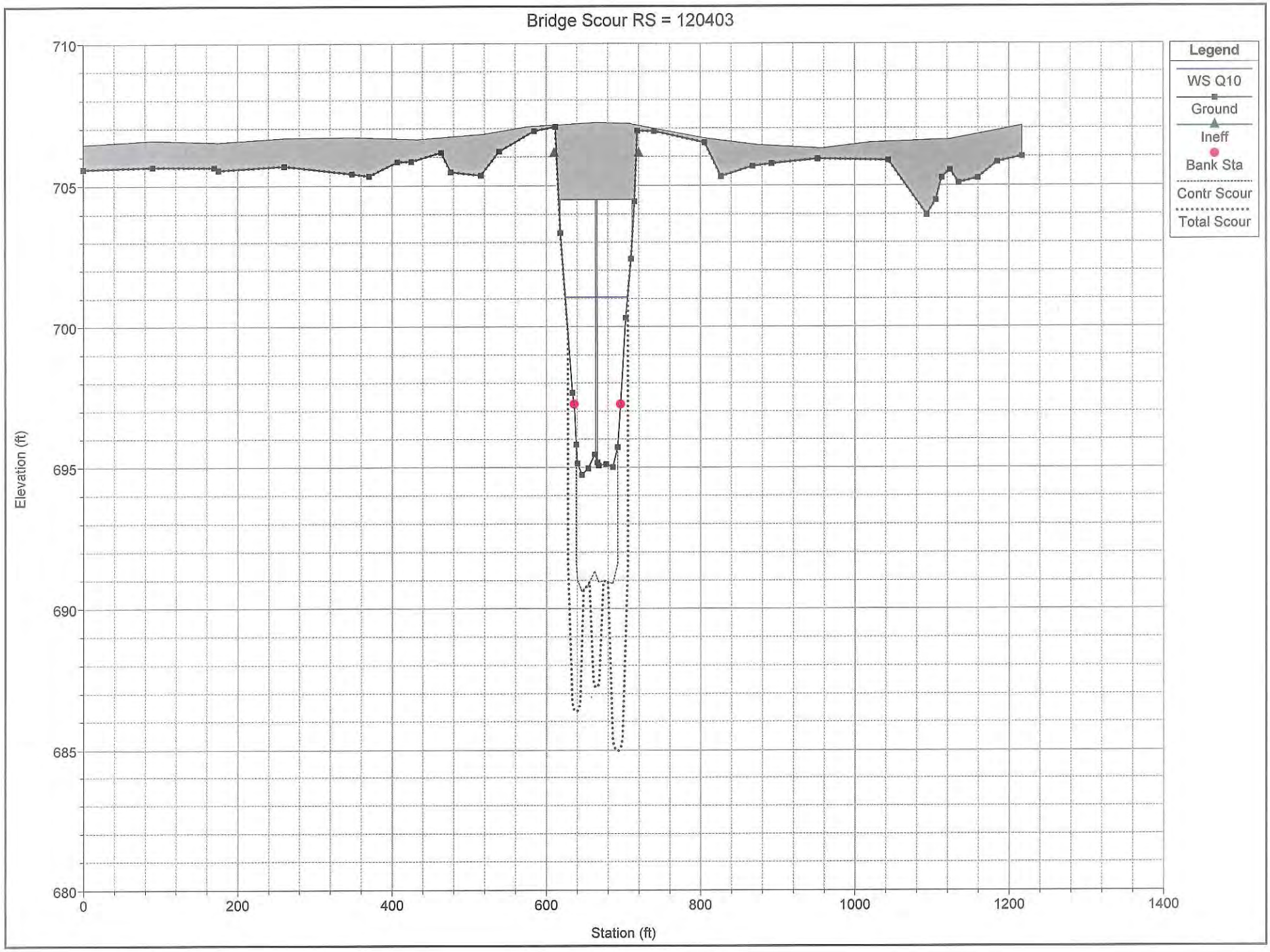
Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	638.86	692.54
	Toe Sta at appr (ft):	720.08	813.08
	Abutment Length (ft):	0	13.68
	Depth at Toe (ft):	5.23	5.32
	K1 Shape Coef:	0.55 - Spill-through abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	219.87	400.82
	Avg Depth Obstructed Ya (ft):	1.8	1.95
	Flow Obstructed Qe (cfs):	212.3	421.1
	Area Obstructed Ae (sq ft):	395.3	779.8
Results			
	Scour Depth Ys (ft):	5.32	6.62
	Qe/Ae = Ve:	0.54	0.54
	Froude #:	0.07	0.07
	Equation:	Froehlich	Froehlich

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

	Channel:	8.08
Left abutment scour + contraction scour (ft):	9.45	
Right abutment scour + contraction scour (ft):	10.75	


Bridge Scour RS = 120403
Legend
WS Q10
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
710
705
700
695
690
685
680
0
200
400
600
800
1000
1200
1400
Station (ft)

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q10

E.G. Elev (ft)	701.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	701.34	Reach Len. (ft)	144.00	146.00	146.00
Crit W.S. (ft)	698.60	Flow Area (sq ft)	483.11	200.69	794.40
E.G. Slope (ft/ft)	0.000798	Area (sq ft)	584.71	200.69	794.40
Q Total (cfs)	1071.00	Flow (cfs)	268.40	374.63	427.97
Top Width (ft)	823.28	Top Width (ft) 250.41	360.00	31.91	431.37
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.56	1.87	0.54
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft) 1.68 OK	1.93	6.29	1.84
Conv. Total (cfs)	37918.0	Conv. (cfs)	9502.5	13263.6	15151.9
Length Wtd. (ft)	145.56	Wetted Per. (ft)	250.65	34.45	431.62
Min Ch El (ft)	693.66	Shear (lb/sq ft)	0.10	0.29	0.09
Alpha	2.69	Stream Power (lb/ft s)	1378.97	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	44.28	14.86	21.03
C & E Loss (ft)	0.00	Cum SA (acres)	22.12	2.83	11.59

10-yr Contraction Input

Note: 360.0' includes ineffective width within Left floodplain

LOB Flow - 268.4 cfs = $Q_{1\ LOB}$

Top Width LOB - 250.41' = $W_{1\ LOB}$ (Effective Flow Only)

Hyd. Depth LOB - 1.93 = $Y_{1\ LOB}$

Avg. Vel. LOB - 0.56 ft/s = $V_{1\ LOB}$

Channel Flow - 374.63 cfs = Q_1

Top Width - 31.91 ft = W_1

Hyd. Depth - 6.29 ft = Y_1

Avg. Vel. - 1.87 ft/s = V_1

ROB Flow - 427.97 cfs = $Q_{1\ ROB}$

Top Width ROB - 431.37' = $W_{1\ ROB}$

Hyd. Depth - 1.84' = $Y_{1\ ROB}$

Avg. Vel. - 0.54 ft/s = $V_{1\ ROB}$

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q10

E.G. Elev (ft)	701.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.117	0.035	0.117
W.S. Elev (ft)	701.04	Reach Len. (ft)	53.00	53.00	53.00
Crit W.S. (ft)	697.44	Flow Area (sq ft)	24.21	331.67	15.81
E.G. Slope (ft/ft)	0.000656	Area (sq ft)	24.21	331.67	15.81
Q Total (cfs)	1041.00	Flow (cfs)	12.40	1021.55	7.06
Top Width (ft)	78.07	Top Width (ft)	11.63	57.40	9.05
Vel Total (ft/s)	2.80	Avg. Vel. (ft/s)	0.51	3.08	0.45
Max Chl Dpth (ft)	6.31	Hydr. Depth (ft)	2.08	5.78	1.75
Conv. Total (cfs)	40630.9	Conv. (cfs)	483.8	39871.7	275.4
Length Wtd. (ft)	53.00	Wetted Per. (ft)	12.26	69.61	9.83
Min Ch El (ft)	694.74	Shear (lb/sq ft)	0.08	0.20	0.07
Alpha	1.19	Stream Power (lb/ft s)	1216.84	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	42.10	13.63	17.59
C & E Loss (ft)	0.01	Cum SA (acres)	20.52	2.64	9.90

10-year Contraction Input

LOB Flow - 12.4 cfs = $Q_{2\ LOB}$

Top Width LOB - 11.63' = $W_{2\ LOB}$

Hydr. Depth LOB - 2.08' = $Y_{0\ LOB}$

Channel Flow - 1021.55 cfs = Q_2

Top Width - 57.4 ft = W_2

Hydr. Depth - 5.78 ft = Y_0

ROB Flow - 7.06 cfs = $Q_{2\ ROB}$

Top Width ROB - 9.05' = $W_{2\ ROB}$

Hydr. Depth ROB - 1.75' = $Y_{0\ ROB}$

10-yr Pier Scour

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120428.0 Profile: Q10

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	610.20	627.96	23.50	28.83	15.48	2.26	1.91	0.82	0.21	0.17
2	Chan	627.96	631.65	40.51	19.21	4.92	3.89	5.21	2.11	0.44	0.92
3	Chan	631.65	635.34	72.53	24.46	3.75	6.97	6.63	2.97	0.73	2.17
4	Chan	635.34	639.02	80.74	25.93	3.70	7.76	7.03	3.11	0.79	2.45
5	Chan	639.02	642.71	81.22	25.99	3.69	7.80	7.05	3.13	0.79	2.47
6	Chan	642.71	646.40	80.45	25.84	3.69	7.73	7.01	3.11	0.79	2.45
7	Chan	646.40	650.09	79.53	25.66	3.69	7.64	6.96	3.10	0.78	2.42
8	Chan	650.09	653.77	78.26	25.42	3.69	7.52	6.89	3.08	0.77	2.38
9	Chan	653.77	657.46	76.87	25.16	3.69	7.38	6.82	3.06	0.76	2.34
10	Chan	657.46	661.15	68.44	23.60	3.75	6.57	6.40	2.90	0.71	2.05
11	Chan	661.15	664.83	56.99	21.14	3.74	5.47	5.73	2.70	0.63	1.71
12	Chan	664.83	668.52	52.40	19.98	3.69	5.03	5.42	2.62	0.61	1.60
13	Chan	668.52	672.21	51.84	19.88	3.70	4.98	5.39	2.61	0.60	1.57
14	Chan	672.21	675.89	59.32	21.72	3.77	5.70	5.89	2.73	0.65	1.76
15	Chan	675.89	679.58	61.01	21.99	3.73	5.86	5.96	2.77	0.66	1.84
16	Chan	679.58	683.27	38.58	18.10	4.56	3.71	4.91	2.13	0.45	0.95
17	ROB	683.27	719.66	38.80	52.73	33.02	3.73	1.62	0.74	0.18	0.13

℄ Pier = Sta. 664.92 / * (Use largest velocity and depth btwn. Sta. 661.15 and 668.52)

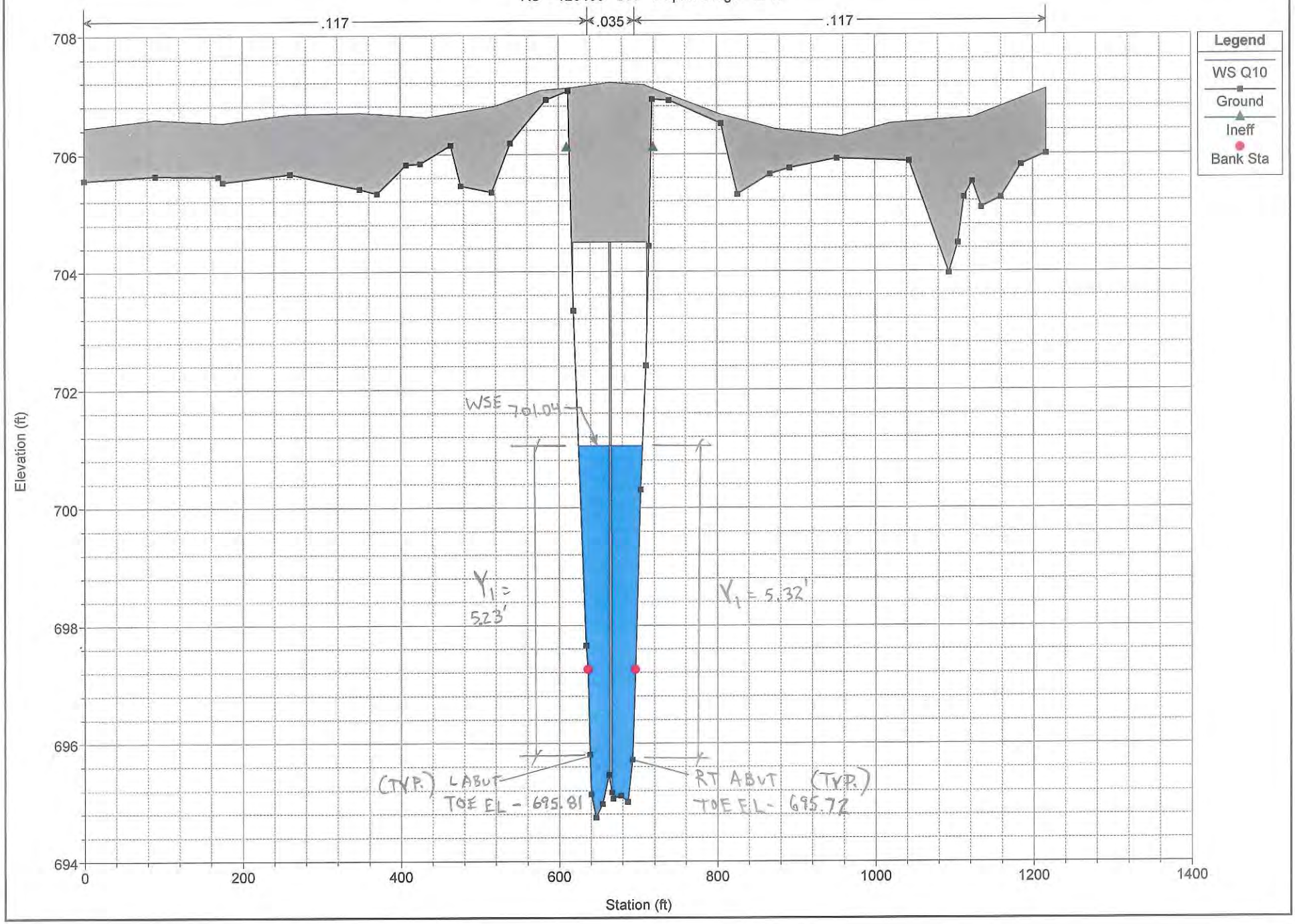
V = 2.7 ft/s

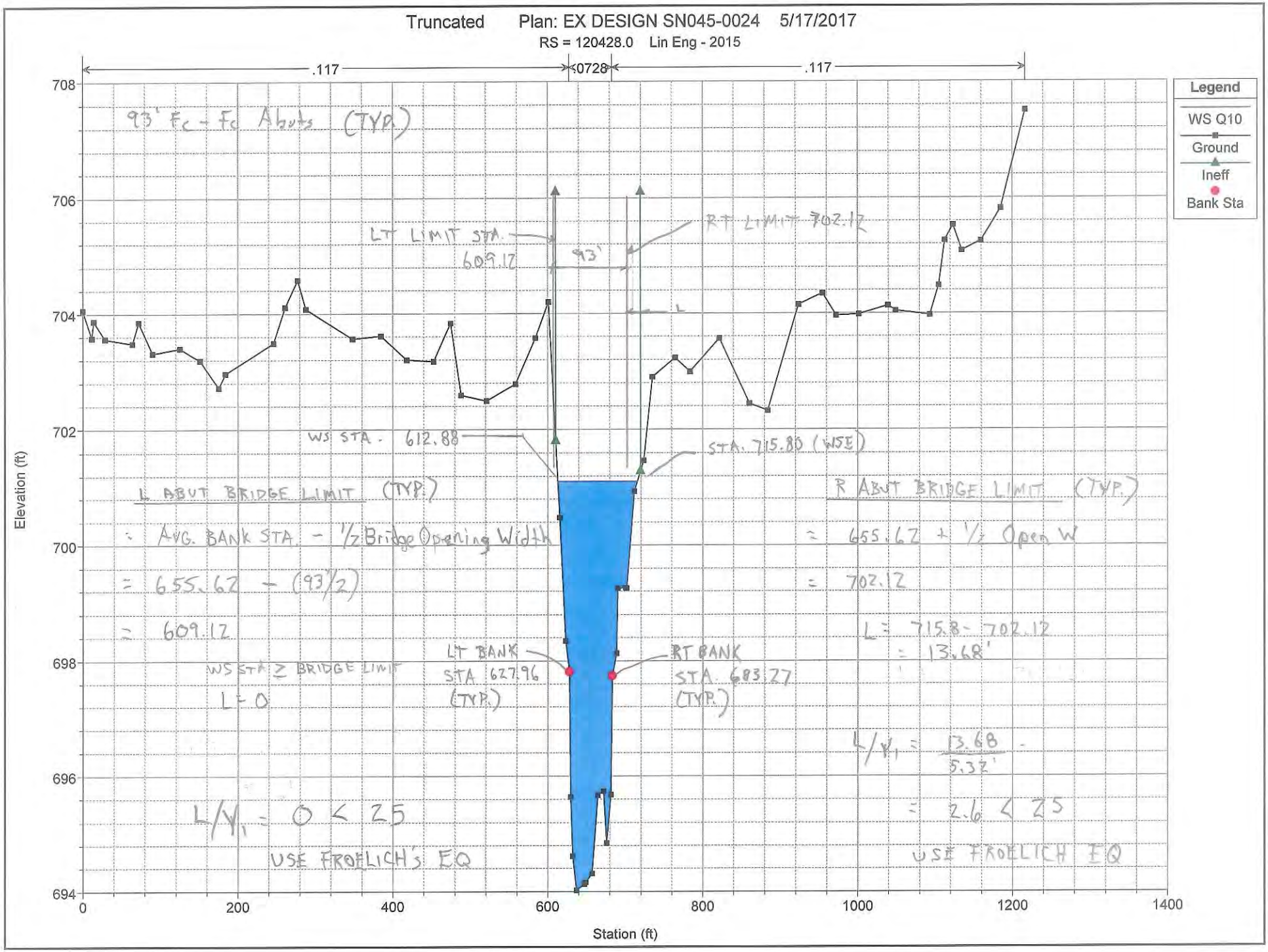
Y_1 = 5.73 ft

* TYP.

Truncated Plan: EX DESIGN SN045-0024 5/17/2017

RS = 120403 BR 2 span bridge - IL 47

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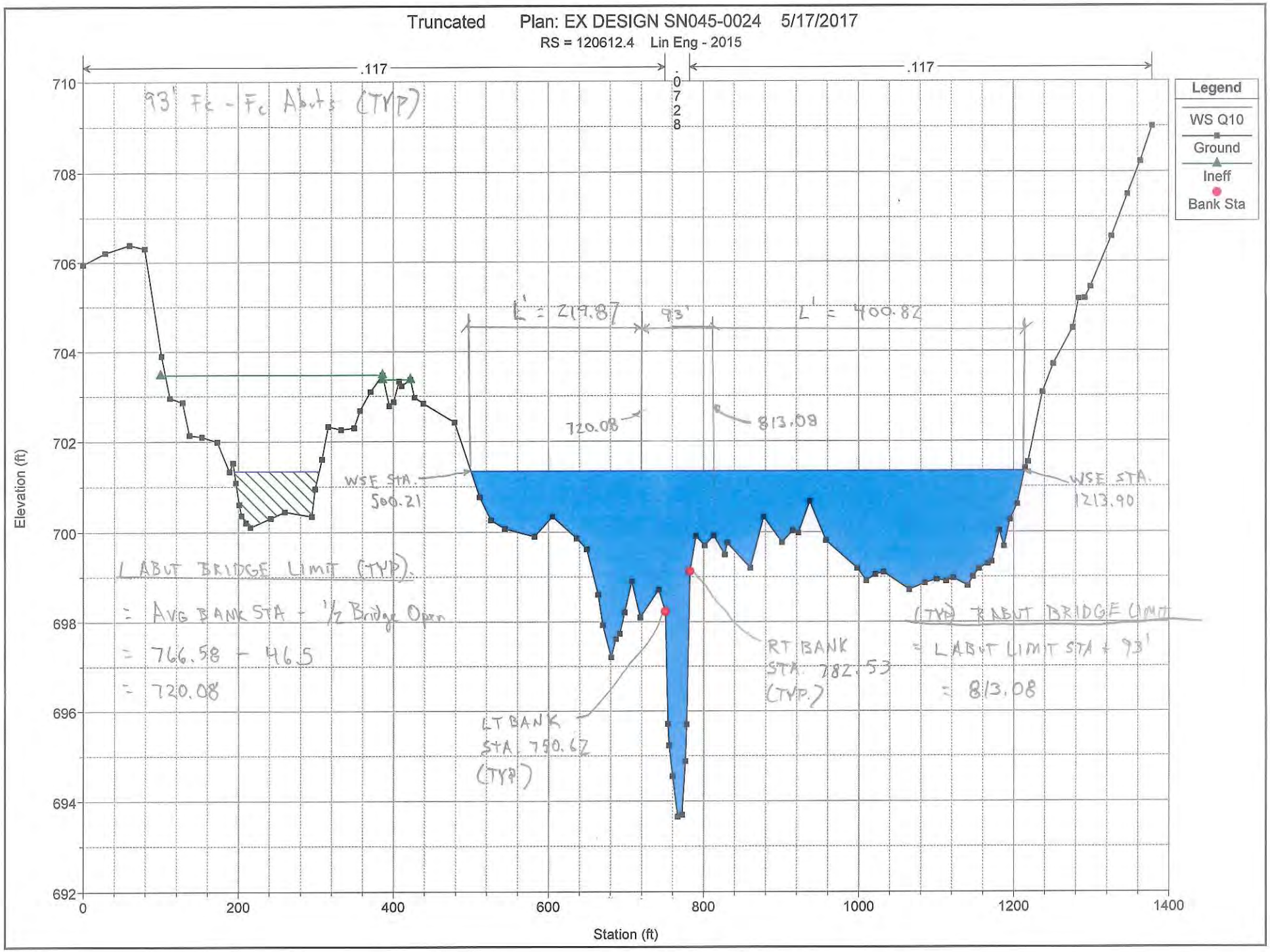
.0728
.117
Legend
WS Q10
Ground
Ineff
Bank Sta
93' Fc - Fc Abuts (TYP.)
LT LIMIT STA. 609.12
93'
RT LIMIT 702.12
L
WS STA. 612.88
STA. 715.80 (WSE)
L ABUT BRIDGE LIMIT (TYP.)
= AVG. BANK STA. - 1/2 Bridge Opening Width
= 655.62 - (93'/2)
= 609.12
R ABUT BRIDGE LIMIT (TYP.)
= 655.62 + 1/2 Open W
= 702.12
L = 715.8 - 702.12
= 13.68'
WS STA ≥ BRIDGE LIMIT
L = 0
LT BANK STA 627.96 (TYP.)
RT BANK STA. 683.27 (TYP.)
L/y1 = 13.68 / 5.32'
= 2.6 < 25
L/y1 = 0 < 25
USE FROELICH'S EQ
USE FROELICH EQ
Elevation (ft)
Station (ft)
708
706
704
702
700
698
696
694
0
200
400
600
800
1000
1200
1400


Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120612.4 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q10
Ground
Ineff
Bank Sta
93' Fc - Fc Abuts (TYP)
L' = 219.87
93'
L' = 400.82
720.08
813.08
WSE STA. 500.21
WSE STA. 1213.90
L ABUT BRIDGE LIMIT (TYP).
= AVG BANK STA - 1/2 Bridge Open
= 766.58 - 46.5
= 720.08
RT BANK STA. 782.53 (TYP.)
LT BANK STA. 750.62 (TYP)
(TYP) R ABUT BRIDGE LIMIT
= L ABUT LIMIT STA + 93'
= 813.08
Elevation (ft)
Station (ft)
710
708
706
704
702
700
698
696
694
692
0
200
400
600
800
1000
1200
1400

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q10

10-yr Abut Scour (Froelich)

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	147.68	195.36	0.00	0.02	0.70	0.00	0.03	0.00	0.00	0.00
2	LOB	195.36	243.04	0.00	48.65	47.73	0.00	1.02	0.00	0.05	0.00
3	LOB	243.04	290.72	0.00	45.02	47.68	0.00	0.94	0.00	0.05	0.00
4	LOB	290.72	338.40	0.00	7.91	13.59	0.00	0.58	0.00	0.03	0.00
5	LOB	338.40	386.08							0.00	0.00
6	LOB	386.08	422.16							0.00	0.00
7	LOB	422.16	469.08							0.00	0.00
8	LOB	469.08	516.01	1.05	6.20	15.81	0.10	0.39	0.17	0.02	0.00
9	LOB	516.01	562.93	19.40	55.18	46.93	1.81	1.18	0.35	0.06	0.02
10	LOB	562.93	609.85	22.24	59.88	46.93	2.08	1.28	0.37	0.06	0.02
11	LOB	609.85	656.77	28.48	69.48	46.95	2.66	1.48	0.41	0.07	0.03
12	LOB	656.77	703.70	110.92	157.21	47.05	10.36	3.35	0.71	0.17	0.12
13	LOB	703.70	750.62	86.30	135.16	46.99	8.06	2.88	0.64	0.14	0.09
14	Chan	750.62	752.75	9.79	8.31	2.64	0.91	3.91	1.18	0.16	0.18
15	Chan	752.75	754.87	17.53	11.52	2.49	1.64	5.41	1.52	0.23	0.35
16	Chan	754.87	757.00	23.99	13.17	2.17	2.24	6.19	1.82	0.30	0.55
17	Chan	757.00	759.13	26.32	13.85	2.15	2.46	6.51	1.90	0.32	0.61
18	Chan	759.13	761.26	28.44	14.51	2.15	2.66	6.82	1.96	0.34	0.66
19	Chan	761.26	763.38	30.47	15.12	2.15	2.84	7.11	2.02	0.35	0.71
20	Chan	763.38	765.51	32.52	15.72	2.15	3.04	7.39	2.07	0.36	0.75
21	Chan	765.51	767.64	34.47	16.25	2.14	3.22	7.64	2.12	0.38	0.80
22	Chan	767.64	769.77	34.80	16.31	2.13	3.25	7.67	2.13	0.38	0.81
23	Chan	769.77	771.89	34.68	16.28	2.13	3.24	7.65	2.13	0.38	0.81
24	Chan	771.89	774.02	32.28	15.80	2.20	3.01	7.43	2.04	0.36	0.73
25	Chan	774.02	776.15	28.04	14.55	2.21	2.62	6.84	1.93	0.33	0.63
26	Chan	776.15	778.28	21.85	12.91	2.38	2.04	6.07	1.69	0.27	0.46
27	Chan	778.28	780.40	13.07	9.94	2.68	1.22	4.67	1.31	0.18	0.24
28	Chan	780.40	782.53	6.38	6.47	2.68	0.60	3.04	0.99	0.12	0.12
29	ROB	782.53	822.29	29.87	63.52	39.81	2.79	1.60	0.47	0.08	0.04
30	ROB	822.29	862.06	38.09	73.47	39.78	3.56	1.85	0.52	0.09	0.05
31	ROB	862.06	901.82	23.58	55.12	39.80	2.20	1.39	0.43	0.07	0.03
32	ROB	901.82	941.58	18.18	47.14	39.79	1.70	1.19	0.39	0.06	0.02
33	ROB	941.58	981.34	27.03	59.80	39.78	2.52	1.50	0.45	0.07	0.03
34	ROB	981.34	1021.11	50.89	87.42	39.77	4.75	2.20	0.58	0.11	0.06
35	ROB	1021.11	1060.87	57.78	94.34	39.76	5.40	2.37	0.61	0.12	0.07
36	ROB	1060.87	1100.63	63.85	100.16	39.76	5.96	2.52	0.64	0.13	0.08
37	ROB	1100.63	1140.39	60.33	96.80	39.76	5.63	2.43	0.62	0.12	0.08
38	ROB	1140.39	1180.16	47.14	83.51	39.79	4.40	2.10	0.56	0.10	0.06
39	ROB	1180.16	1219.92	11.25	33.11	33.81	1.05	0.98	0.34	0.05	0.02

100%
35%

77%
100%

Left Abut L' Limit = (500.21 to 720.08)

Q_e = 212.3 cfs

A_e = 395.3 ft^2

RT Abut L' Limit = (813.08 to 1213.9)

Q_e = 421.1 cfs

A_e = 779.8 ft^2

10-yr Abut Scour (HIRE)

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q10

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	610.20	636.30	12.40	24.21	12.26	1.19	2.08	0.51	0.08	0.04
2	Chan	636.30	640.30	52.42	19.57	4.51	5.04	4.89	2.68	0.18	0.48
3	Chan	640.30	644.30	80.55	24.17	4.02	7.74	6.04	3.33	0.25	0.82
4	Chan	644.30	648.30	85.68	25.05	4.01	8.23	6.26	3.42	0.26	0.88
5	Chan	648.30	652.30	84.19	24.78	4.00	8.09	6.19	3.40	0.25	0.86
6	Chan	652.30	656.30	81.31	24.27	4.01	7.81	6.07	3.35	0.25	0.83
7	Chan	656.30	660.30	76.39	23.39	4.01	7.34	5.85	3.27	0.24	0.78
8	Chan	660.30	664.31	29.99	18.32	8.85	2.88	5.55	1.64	0.08	0.14
9	Chan	664.31	668.31	16.05	12.00	7.85	1.54	5.78	1.34	0.06	0.08
10	Chan	668.31	672.31	79.20	23.89	4.00	7.61	5.97	3.32	0.24	0.81
11	Chan	672.31	676.31	78.77	23.81	4.00	7.57	5.95	3.31	0.24	0.81
12	Chan	676.31	680.31	78.69	23.79	4.00	7.56	5.95	3.31	0.24	0.81
13	Chan	680.31	684.31	79.65	23.97	4.00	7.65	5.99	3.32	0.25	0.82
14	Chan	684.31	688.32	79.17	23.91	4.01	7.60	5.97	3.31	0.24	0.81
15	Chan	688.32	692.32	70.51	22.33	4.03	6.77	5.58	3.16	0.23	0.72
16	Chan	692.32	696.32	48.97	18.42	4.30	4.70	4.60	2.66	0.18	0.47
17	ROB	696.32	719.66	7.06	15.81	9.83	0.68	1.75	0.45	0.07	0.03

Left Abut Sta. 618.15

$V_1 = 0.51$ ft/s

Right Abut Sta. 711.15

$V_1 = 0.45$ ft/s

HEC-RAS Scour Analysis Existing 50-year

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	2.82	7.43	2.89
	Approach Velocity (ft/s):	0.65	1.91	0.67
	Br Average Depth (ft):	2.57	6.73	2.12
	BR Opening Flow (cfs):	28.52	1718.86	17.62
	BR Top WD (ft):	14.22	57.43	12.25
	Grain Size D50 (mm):	0.30	0.30	0.30
	Approach Flow (cfs):	510.19	451.89	861.92
	Approach Top WD (ft):	277.12	31.91	447.52
	K1 Coefficient:	0.640	0.690	0.640
Results				
	Scour Depth Ys (ft):	0.00	8.83	0.00
	Critical Velocity (ft/s):	1.32	1.56	1.33
	Equation:	Clear	Live	Clear

Pier Scour

All piers have the same scour depth

Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	2.84
	Grain Size D50 (mm):	0.30000
	Depth Upstream (ft):	6.86
	Velocity Upstream (ft/s):	3.73
	K1 Nose Shape:	1.00
	Pier Angle:	0.00
	Pier Length (ft):	53.00
	K2 Angle Coef:	1.00
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	
	K4 Armouring Coef:	1.00
Results		
	Scour Depth Ys (ft):	4.69
	Froude #:	0.25
	Equation:	CSU equation

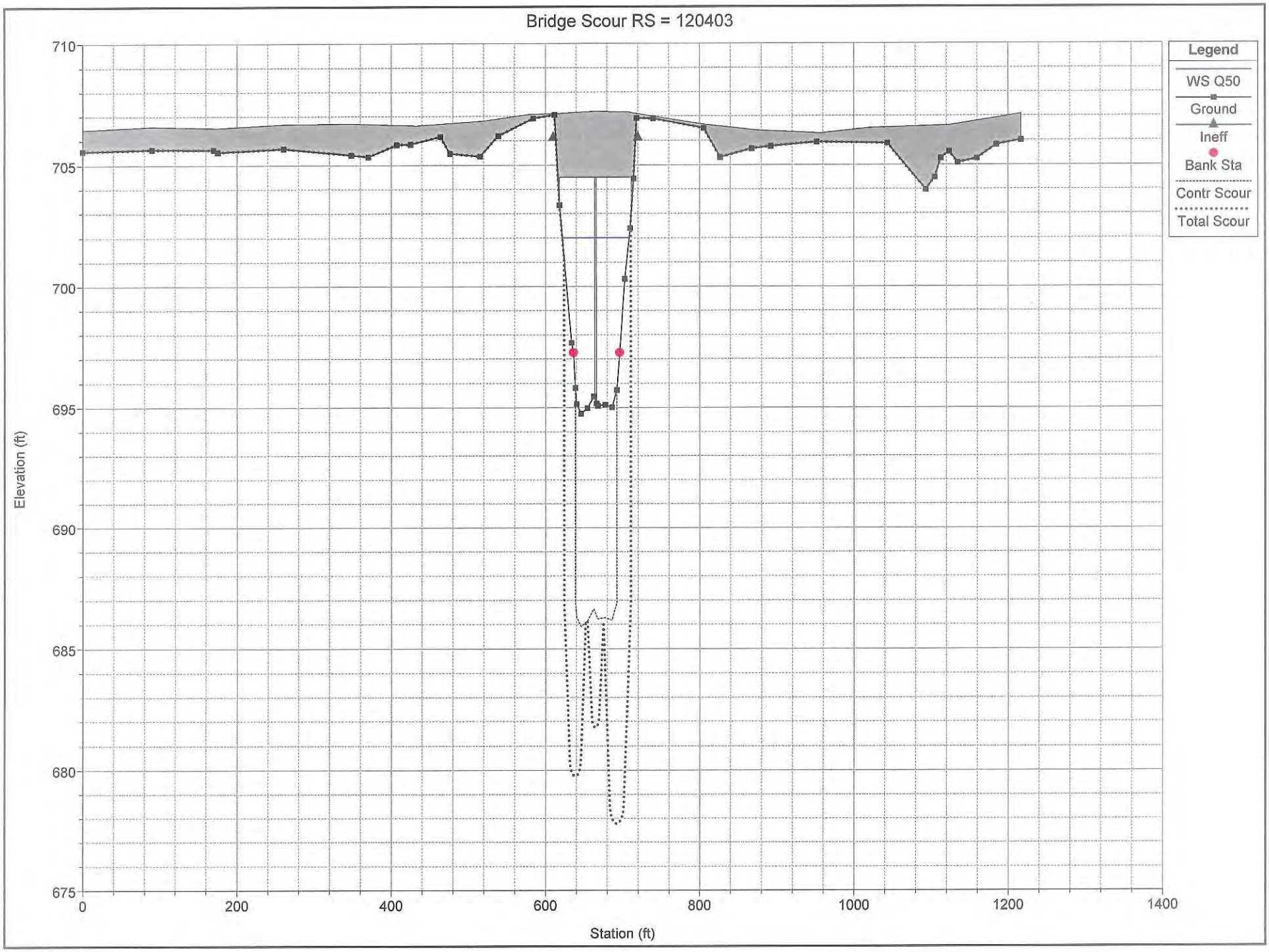
Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	638.86	692.54
	Toe Sta at appr (ft):	720.08	813.08
	Abutment Length (ft):	0.00	4.3
	Depth at Toe (ft):	6.34	6.43
	K1 Shape Coef:	0.55 - Spill-through abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	246.58	416.97
	Avg Depth Obstructed Ya (ft):	2.67	3.03
	Flow Obstructed Qe (cfs):	417.8	845.6
	Area Obstructed Ae (sq ft):	657.8	1265.3
Results			
	Scour Depth Ys (ft):	7.22	9.11
	Qe/Ae = Ve:	0.64	0.67
	Froude #:	0.07	0.07
	Equation:	Froehlich	Froehlich

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

	Channel:	13.53
Left abutment scour + contraction scour (ft):	16.05	
Right abutment scour + contraction scour (ft):	17.95	


Bridge Scour RS = 120403
Legend
WS Q50
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
710
705
700
695
690
685
680
675
0
200
400
600
800
1000
1200
1400
Station (ft)

50-yr Contraction

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q50

E.G. Elev (ft)	702.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	702.48	Reach Len. (ft)	144.00	146.00	146.00
Crit W.S. (ft)	699.85	Flow Area (sq ft)	780.32	236.94	1294.55
E.G. Slope (ft/ft)	0.000667	Area (sq ft)	1054.92	236.94	1294.55
Q Total (cfs)	1824.00	Flow (cfs)	510.19	451.89	861.92
Top Width (ft)	976.51	Top Width (ft) 277.12	497.07	31.91	447.52
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.65	1.91	0.67
Max Chl Dpth (ft)	8.82	Hydr. Depth (ft) ~~[illegible]~~ OK	2.82	7.43	2.89
Conv. Total (cfs)	70603.7	Conv. (cfs)	19748.5	17492.0	33363.3
Length Wtd. (ft)	145.45	Wetted Per. (ft)	277.39	34.45	447.82
Min Ch El (ft)	693.66	Shear (lb/sq ft)	0.12	0.29	0.12
Alpha	1.98	Stream Power (lb/ft s)	1378.97	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	66.54	17.52	32.49
C & E Loss (ft)	0.00	Cum SA (acres)	24.31	2.83	12.80

Note: 497.07' includes ineffective flow width

LOB

Flow - 510.19 cfs = $Q_{1\,LOB}$

width - 277.12' = $W_{1\,LOB}$ (Effective Flow W ONLY)

Hyd. Depth - 2.82' = $Y_{1\,LOB}$

Avg. Vel. - 0.65 ft/s = $V_{1\,LOB}$

Channel

Flow - 451.89 cfs = Q_1

Width - 31.91' = W_1

Hyd Depth - 7.43' = Y_1

Avg. Vel. - 1.91 ft/s - V_1

ROB

Flow - 861.92 cfs = $Q_{1\,ROB}$

width - 447.52' = $W_{1\,ROB}$

Hyd. Depth - 2.89' = $Y_{1\,ROB}$

Velocity - 0.67 ft/s - $V_{1\,ROB}$

50-yr Contraction

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q50

E.G. Elev (ft)	702.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.	0.117	0.035	0.117
W.S. Elev (ft)	702.00	Reach Len. (ft)	53.00	53.00	53.00
Crit W.S. (ft)	698.35	Flow Area (sq ft)	36.50	386.30	25.94
E.G. Slope (ft/ft)	0.001159	Area (sq ft)	36.50	386.30	25.94
Q Total (cfs)	1765.00	Flow (cfs)	28.52	1718.86	17.62
Top Width (ft)	83.91	Top Width (ft)	14.22	57.43	12.25
Vel Total (ft/s)	3.93	Avg. Vel. (ft/s)	0.78	4.45	0.68
Max Chl Dpth (ft)	7.26	Hydr. Depth (ft)	2.57	6.73	2.12
Conv. Total (cfs)	51847.5	Conv. (cfs)	837.8	50492.1	517.6
Length Wtd. (ft)	53.00	Wetted Per. (ft)	15.03	71.51	13.17
Min Ch El (ft)	694.74	Shear (lb/sq ft)	0.18	0.39	0.14
Alpha	1.25	Stream Power (lb/ft s)	1216.84	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	62.18	16.08	27.06
C & E Loss (ft)	0.02	Cum SA (acres)	22.17	2.64	11.01

LOB

Flow - 28.52 cfs = $Q_{2\,LOB}$

Width - 14.22' = $W_{2\,LOB}$

Depth - 2.57' = $Y_{o\,LOB}$

Channel

Flow - 1718.86 cfs = Q_2

Width - 57.43' = W_2

Depth - 6.73' = Y_o

ROB

Flow - 17.62 cfs = $Q_{2\,ROB}$

Width - 12.25' = $W_{2\,ROB}$

Depth - 2.12' = $Y_{o\,ROB}$

50yr Pier Scour

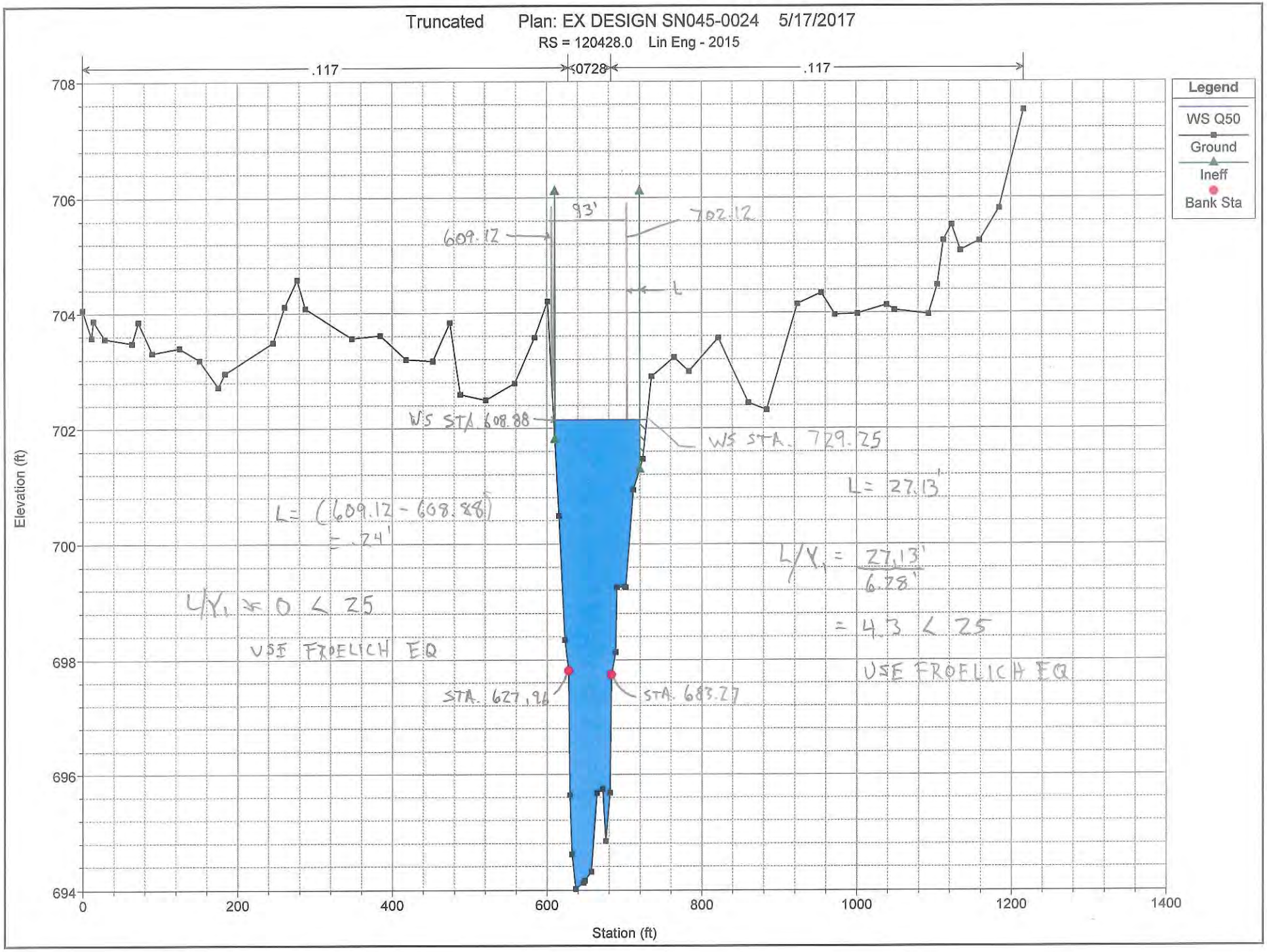
Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120428.0 Profile: Q50

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	569.52	610.20	0.00	0.23	1.37	0.00	0.17	0.00	0.03	0.00
2	LOB	610.20	627.96	58.49	46.29	18.25	3.31	2.61	1.26	0.45	0.57
3	Chan	627.96	631.65	69.32	23.03	4.92	3.93	6.25	3.01	0.84	2.52
4	Chan	631.65	635.34	116.84	28.28	3.75	6.62	7.67	4.13	1.35	5.56
5	Chan	635.34	639.02	128.40	29.75	3.70	7.27	8.07	4.32	1.44	6.20
6	Chan	639.02	642.71	129.10	29.80	3.69	7.31	8.08	4.33	1.44	6.25
7	Chan	642.71	646.40	128.04	29.66	3.69	7.25	8.04	4.32	1.44	6.20
8	Chan	646.40	650.09	126.76	29.48	3.69	7.18	8.00	4.30	1.43	6.14
9	Chan	650.09	653.77	125.01	29.23	3.69	7.08	7.93	4.28	1.42	6.06
10	Chan	653.77	657.46	123.05	28.98	3.69	6.97	7.86	4.25	1.40	5.95
11	Chan	657.46	661.15	111.16	27.42	3.75	6.30	7.44	4.05	1.31	5.30
12	Chan	661.15	664.83	95.08	24.96	3.74	5.39	6.77	3.81	1.19	4.54
13	Chan	664.83	668.52	88.71	23.80	3.69	5.03	6.45	3.73	1.15	4.30
14	Chan	668.52	672.21	87.88	23.69	3.70	4.98	6.43	3.71	1.14	4.24
15	Chan	672.21	675.89	98.29	25.54	3.77	5.57	6.93	3.85	1.21	4.65
16	Chan	675.89	679.58	100.77	25.81	3.73	5.71	7.00	3.90	1.24	4.82
17	Chan	679.58	683.27	67.13	21.92	4.56	3.80	5.94	3.06	0.86	2.63
18	ROB	683.27	719.66	110.97	90.08	36.89	6.29	2.48	1.23	0.44	0.54
19	ROB	719.66	755.17	0.00	5.07	9.64	0.00	0.53	0.00	0.09	0.00

℄ Pier = Sta. 664.92

$V = 3.81$ ft/s

$Y_1 = 6.77$ ft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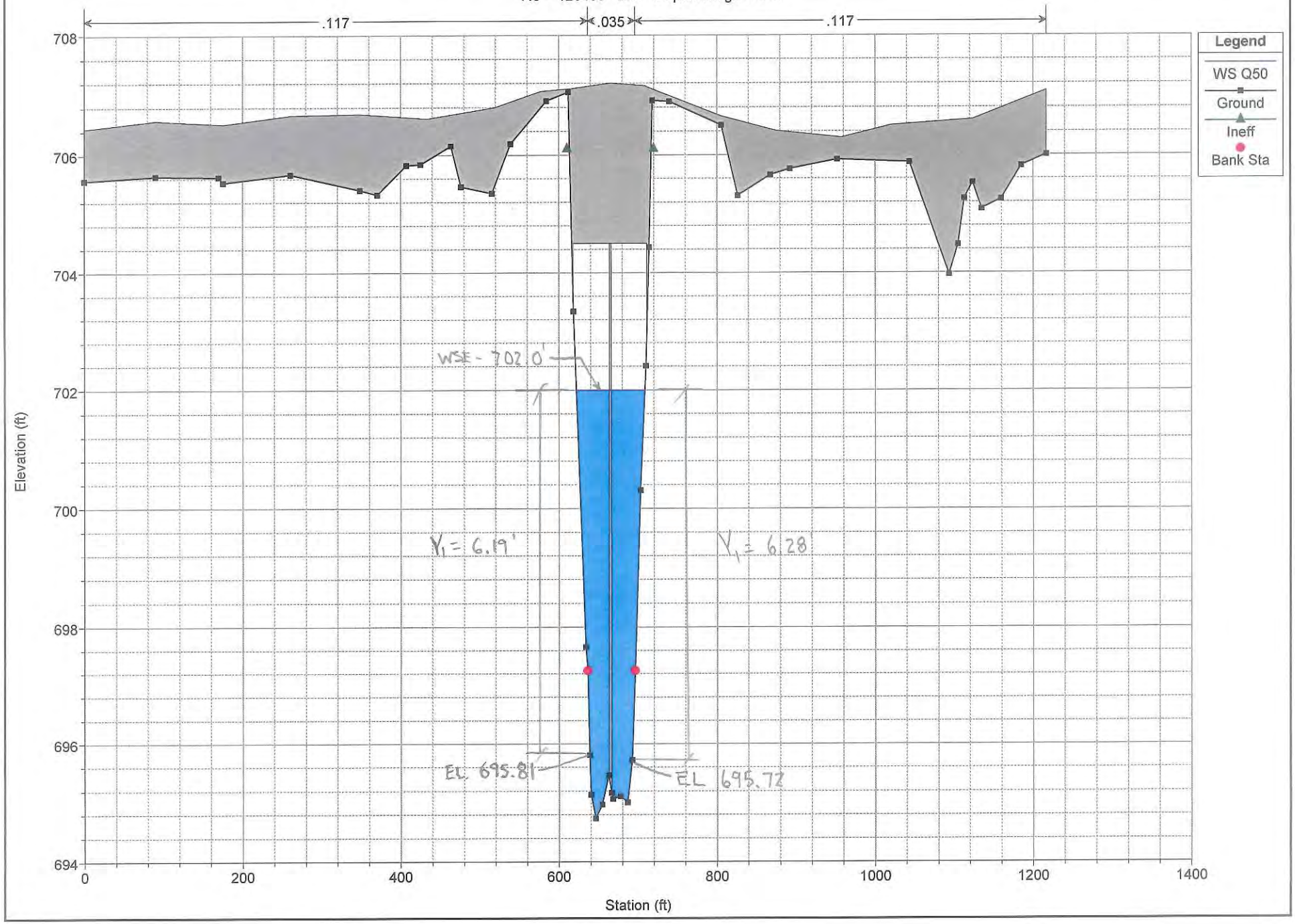
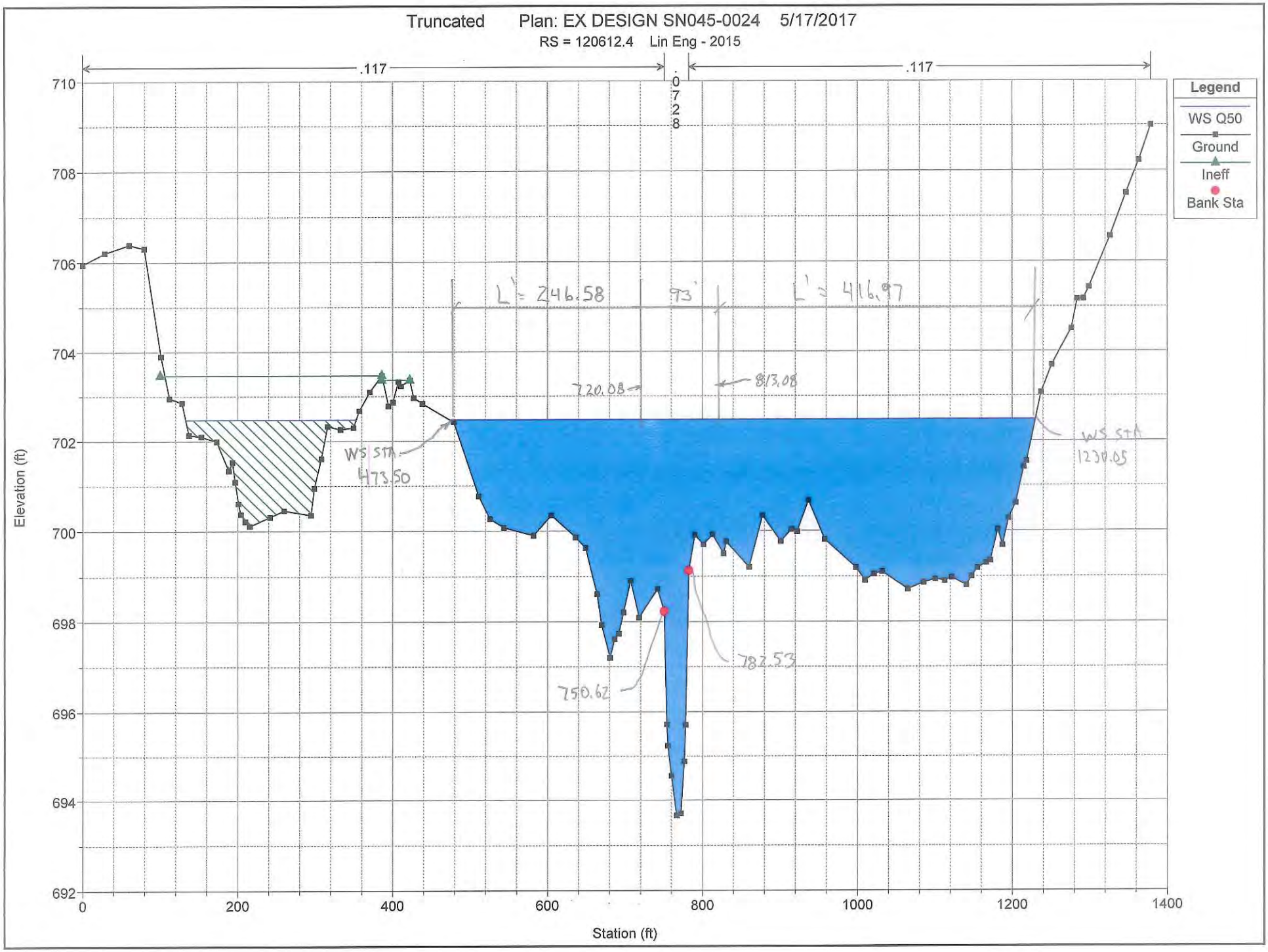
RS = 120428.0 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q50
Ground
Ineff
Bank Sta
93'
609.12
702.12
L
WS STA. 608.88
WS STA. 729.25
L = 27.13'
L = (609.12 - 608.88)
= .24'
L/Y1 = 27.13' / 6.28'
= 4.3 < 25
L/Y1 = 0 < 25
USE FROELICH EQ
USE FROELICH EQ
STA. 627.96
STA. 683.27
Elevation (ft)
Station (ft)
708
706
704
702
700
698
696
694
0
200
400
600
800
1000
1200
1400

Truncated Plan: EX DESIGN SN045-0024 5/17/2017

RS = 120403 BR 2 span bridge - IL 47




Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120612.4 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q50
Ground
Ineff
Bank Sta
L' = 246.58
93'
L' = 416.97
720.08
813.08
WS STA 473.50
WS STA 1230.05
750.62
782.53
Elevation (ft)
Station (ft)
710
708
706
704
702
700
698
696
694
692
0
200
400
600
800
1000
1200
1400

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q50

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	100.00	147.68	0.00	4.37	14.66	0.00	0.30	0.00	0.01	0.00
2	LOB	147.68	195.36	0.00	30.47	47.71	0.00	0.64	0.00	0.03	0.00
3	LOB	195.36	243.04	0.00	102.81	47.73	0.00	2.16	0.00	0.09	0.00
4	LOB	243.04	290.72	0.00	99.18	47.68	0.00	2.08	0.00	0.09	0.00
5	LOB	290.72	338.40	0.00	35.34	47.78	0.00	0.74	0.00	0.03	0.00
6	LOB	338.40	386.08	0.00	2.43	14.60	0.00	0.17	0.00	0.01	0.00
7	LOB	386.08	422.16							0.00	0.00
8	LOB	422.16	469.08							0.00	0.00
9	LOB	469.08	516.01	10.03	36.90	42.55	0.55	0.87	0.27	0.04	0.01
10	LOB	516.01	562.93	56.67	108.48	46.93	3.11	2.31	0.52	0.10	0.05
11	LOB	562.93	609.85	60.83	113.18	46.93	3.34	2.41	0.54	0.10	0.05
12	LOB	609.85	656.77	69.65	122.78	46.95	3.82	2.62	0.57	0.11	0.06
13	LOB	656.77	703.70	170.82	210.52	47.05	9.37	4.49	0.81	0.19	0.15
14	LOB	703.70	750.62	142.18	188.46	46.99	7.79	4.02	0.75	0.17	0.13
15	Chan	750.62	752.75	13.84	10.73	2.64	0.76	5.04	1.29	0.17	0.22
16	Chan	752.75	754.87	22.26	13.93	2.49	1.22	6.55	1.60	0.23	0.37
17	Chan	754.87	757.00	29.36	15.58	2.17	1.61	7.33	1.88	0.30	0.56
18	Chan	757.00	759.13	31.79	16.27	2.15	1.74	7.65	1.95	0.32	0.62
19	Chan	759.13	761.26	33.97	16.92	2.15	1.86	7.96	2.01	0.33	0.66
20	Chan	761.26	763.38	36.05	17.53	2.15	1.98	8.24	2.06	0.34	0.70
21	Chan	763.38	765.51	38.13	18.13	2.15	2.09	8.52	2.10	0.35	0.74
22	Chan	765.51	767.64	40.13	18.67	2.14	2.20	8.78	2.15	0.36	0.78
23	Chan	767.64	769.77	40.48	18.73	2.13	2.22	8.80	2.16	0.37	0.79
24	Chan	769.77	771.89	40.36	18.70	2.13	2.21	8.79	2.16	0.37	0.79
25	Chan	771.89	774.02	37.82	18.21	2.20	2.07	8.56	2.08	0.35	0.72
26	Chan	774.02	776.15	33.47	16.96	2.21	1.84	7.97	1.97	0.32	0.63
27	Chan	776.15	778.28	26.87	15.32	2.38	1.47	7.20	1.75	0.27	0.47
28	Chan	778.28	780.40	17.35	12.36	2.68	0.95	5.81	1.40	0.19	0.27
29	Chan	780.40	782.53	10.00	8.88	2.68	0.55	4.18	1.13	0.14	0.16
30	ROB	782.53	822.29	67.66	108.69	39.81	3.71	2.73	0.62	0.11	0.07
31	ROB	822.29	862.06	78.33	118.64	39.78	4.29	2.98	0.66	0.12	0.08
32	ROB	862.06	901.82	59.18	100.29	39.80	3.24	2.52	0.59	0.10	0.06
33	ROB	901.82	941.58	51.56	92.31	39.79	2.83	2.32	0.56	0.10	0.05
34	ROB	941.58	981.34	63.88	104.97	39.78	3.50	2.64	0.61	0.11	0.07
35	ROB	981.34	1021.11	94.29	132.58	39.77	5.17	3.33	0.71	0.14	0.10
36	ROB	1021.11	1060.87	102.64	139.50	39.76	5.63	3.51	0.74	0.15	0.11
37	ROB	1060.87	1100.63	109.88	145.32	39.76	6.02	3.65	0.76	0.15	0.12
38	ROB	1100.63	1140.39	105.69	141.97	39.76	5.79	3.57	0.74	0.15	0.11
39	ROB	1140.39	1180.16	89.67	128.67	39.79	4.92	3.24	0.70	0.13	0.09
40	ROB	1180.16	1219.92	38.40	77.40	39.84	2.11	1.95	0.50	0.08	0.04
41	ROB	1219.92	1259.68	0.74	4.19	10.17	0.04	0.41	0.18	0.02	0.00

100%
35%

77%
100%

← Negligible 0%

L Abut Limit L' = (Sta. 473.5 to 720.08)

Q_e = 417.8 cfs

A_e = 657.8 ft^2

R Abut L' Limit = (813.08 to 1230.5)

Q_e = 845.6

A_e = 1265.3 ft^2

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q50

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	610.20	636.30	28.52	36.50	15.03	1.62	2.57	0.78	0.18	0.14
2	Chan	636.30	640.30	92.43	23.37	4.51	5.24	5.84	3.95	0.37	1.48
3	Chan	640.30	644.30	134.79	27.97	4.02	7.64	6.99	4.82	0.50	2.43
4	Chan	644.30	648.30	142.22	28.86	4.01	8.06	7.21	4.93	0.52	2.57
5	Chan	648.30	652.30	140.08	28.59	4.00	7.94	7.14	4.90	0.52	2.53
6	Chan	652.30	656.30	135.92	28.08	4.01	7.70	7.02	4.84	0.51	2.45
7	Chan	656.30	660.30	128.79	27.20	4.01	7.30	6.80	4.74	0.49	2.32
8	Chan	660.30	664.31	47.86	21.47	9.80	2.71	6.47	2.23	0.16	0.35
9	Chan	664.31	668.31	25.16	13.98	8.80	1.43	6.68	1.80	0.11	0.21
10	Chan	668.31	672.31	132.89	27.69	4.00	7.53	6.92	4.80	0.50	2.40
11	Chan	672.31	676.31	132.26	27.61	4.00	7.49	6.90	4.79	0.50	2.39
12	Chan	676.31	680.31	132.14	27.60	4.00	7.49	6.90	4.79	0.50	2.39
13	Chan	680.31	684.31	133.52	27.77	4.00	7.57	6.94	4.81	0.50	2.41
14	Chan	684.31	688.32	132.79	27.72	4.01	7.52	6.93	4.79	0.50	2.39
15	Chan	688.32	692.32	120.19	26.14	4.03	6.81	6.53	4.60	0.47	2.16
16	Chan	692.32	696.32	87.81	22.23	4.30	4.98	5.56	3.95	0.37	1.48
17	ROB	696.32	719.66	17.62	25.94	13.17	1.00	2.12	0.68	0.14	0.10

Left Abut Sta. 618.15
$V_1 = 0.78$ ft/s

Right Abut Sta. 711.15
$V_1 = 0.68$ ft/s

HEC-RAS Scour Analysis Existing 100-year

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	2.90	7.95	3.37
Approach Velocity (ft/s):	0.65	1.95	0.72
Br Average Depth (ft):	2.78	7.15	2.30
BR Opening Flow (cfs):	38.66	2070.54	24.80
BR Top WD (ft):	15.38	57.45	13.66
Grain Size D50 (mm):	0.30	0.30	0.30
Approach Flow (cfs):	610.77	494.25	1101.98
Approach Top WD (ft):	323.83	31.91	453.95
K1 Coefficient:	0.640	0.690	0.640
Results			
Scour Depth Ys (ft):	0.00	10.94	0.00
Critical Velocity (ft/s):	1.33	1.57	1.36
Equation:	Clear	Live	Clear

Pier Scour

All piers have the same scour depth

Input Data	
Pier Shape:	Round nose
Pier Width (ft):	2.84
Grain Size D50 (mm):	0.30000
Depth Upstream (ft):	7.34
Velocity Upstream (ft/s):	4.17
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	53.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Results	
Scour Depth Ys (ft):	4.97
Froude #:	0.27
Equation:	CSU equation

Abutment Scour

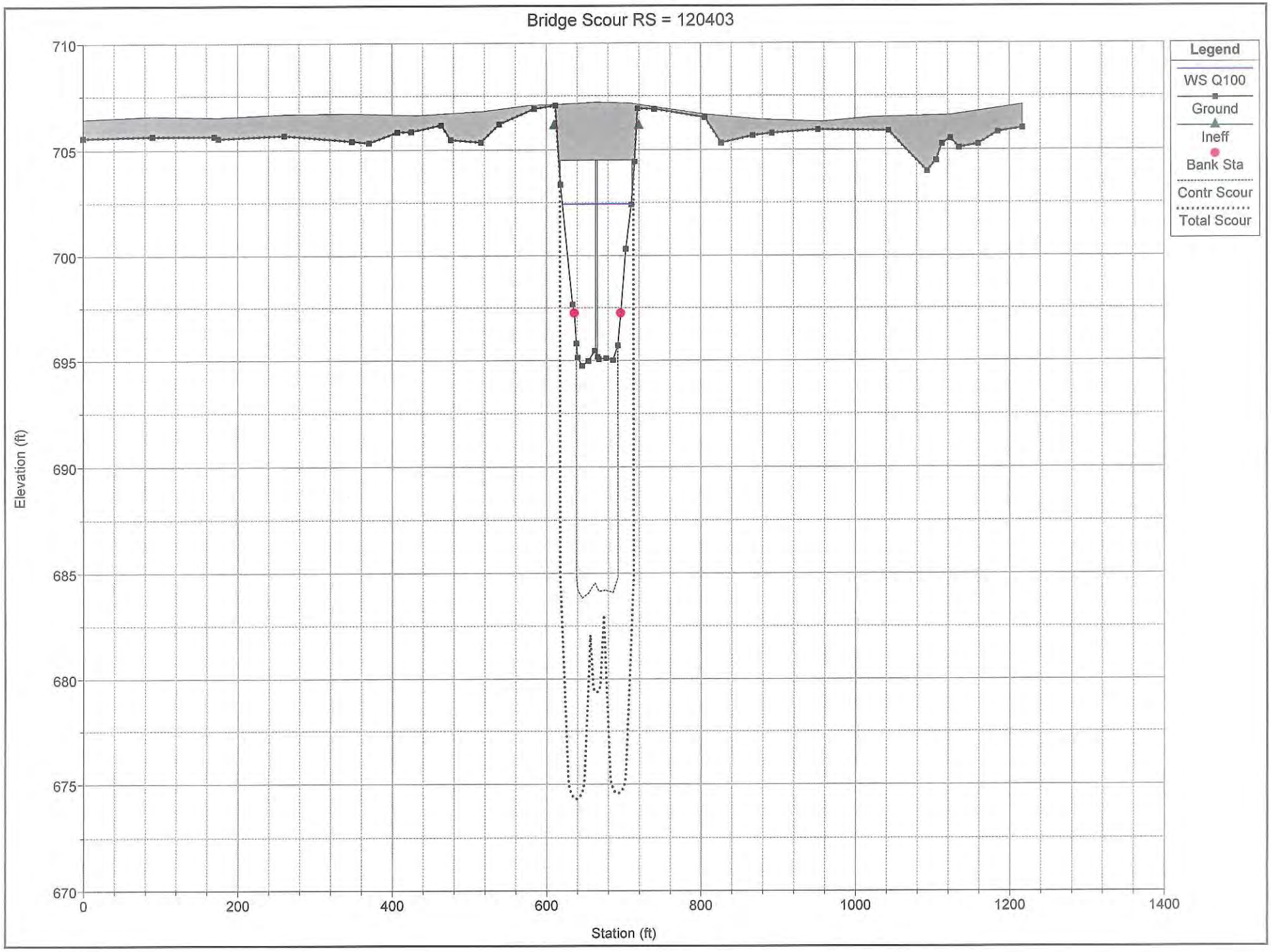
	Left	Right
Input Data		
Station at Toe (ft):	638.86	692.54
Toe Sta at appr (ft):	720.08	813.08
Abutment Length (ft):	121.11	188.49
Depth at Toe (ft):	6.61	6.70
K1 Shape Coef:	0.55 - Spill-through abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	293.29	423.4
Avg Depth Obstructed Ya (ft):	2.73	3.54
Flow Obstructed Qe (cfs):	506.1	1081.6
Area Obstructed Ae (sq ft):	800.1	1500.9
Results		
Scour Depth Ys (ft):	10.54	10.22
Froude #:	0.06	0.05
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel: 15.91

Left abutment scour + contraction scour (ft):	21.48
Right abutment scour + contraction scour (ft):	21.15


Bridge Scour RS = 120403
Legend
WS Q100
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
710
705
700
695
690
685
680
675
670
0
200
400
600
800
1000
1200
1400
Station (ft)

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q100

E.G. Elev (ft)	703.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.00	Reach Len. (ft)	144.00	146.00	146.00
Crit W.S. (ft)	700.14	Flow Area (sq ft)	938.55	253.66	1530.67
E.G. Slope (ft/ft)	0.000636	Area (sq ft)	1336.27	253.66	1530.67
Q Total (cfs)	2207.00	Flow (cfs)	610.77	494.25	1101.98
Top Width (ft)	1076.15	Top Width (ft) 323.83	590.29	31.91	453.95
Vel Total (ft/s)	0.81	Avg. Vel. (ft/s)	0.65	1.95	0.72
Max Chl Dpth (ft)	9.34	Hydr. Depth (ft)	2.90	7.95	3.37
Conv. Total (cfs)	87505.6	Conv. (cfs)	24216.6	19596.8	43692.3
Length Wtd. (ft)	145.41	Wetted Per. (ft)	324.11	34.45	454.27
Min Ch El (ft)	693.66	Shear (lb/sq ft)	0.11	0.29	0.13
Alpha	1.87	Stream Power (lb/ft s)	1378.97	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	77.04	18.70	38.13
C & E Loss (ft)	0.00	Cum SA (acres)	25.32	2.83	14.16

Note: 590.29' includes Ineff Flow width

LOB

Flow – 610.77 cfs = $Q_{1\ LOB}$

Width – 323.83 = $W_{1\ LOB}$ (Eff. flow width Only)

Hyd. Depth – 2.9' = $Y_{1\ LOB}$

Avg. Vel. – 0.65 ft/s $V_{1\ LOB}$

Channel

Flow – 494.25 cfs = Q_1

Width – 31.91' = W_1

Hyd. Depth – 7.95' = Y_1

Avg. Vel. – 1.95 ft/s = V_1

ROB

Flow – 1101.98 cfs = $Q_{1\ ROB}$

Width – 453.95' = $W_{1\ ROB}$

Hyd. Depth – 3.37' = $Y_{1\ ROB}$

Avg. Vel. – 0.72 ft/s = $V_{1\ ROB}$

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q100

E.G. Elev (ft)	702.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.117	0.035	0.117
W.S. Elev (ft)	702.42	Reach Len. (ft)	53.00	53.00	53.00
Crit W.S. (ft)	698.78	Flow Area (sq ft)	42.79	410.68	31.44
E.G. Slope (ft/ft)	0.001393	Area (sq ft)	42.79	410.68	31.44
Q Total (cfs)	2134.00	Flow (cfs)	38.66	2070.54	24.80
Top Width (ft)	86.49	Top Width (ft)	15.38	57.45	13.66
Vel Total (ft/s)	4.40	Avg. Vel. (ft/s)	0.90	5.04	0.79
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft)	2.78	7.15	2.30
Conv. Total (cfs)	57177.8	Conv. (cfs)	1035.7	55477.4	664.6
Length Wtd. (ft)	53.00	Wetted Per. (ft)	16.26	72.36	14.65
Min Ch El (ft)	694.74	Shear (lb/sq ft)	0.23	0.49	0.19
Alpha	1.27	Stream Power (lb/ft s)	1216.84	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	71.50	17.15	31.74
C & E Loss (ft)	0.02	Cum SA (acres)	22.92	2.64	12.31

LOB

Flow - 38.66 cfs = $Q_{2\ LOB}$

Width - 15.38' = $W_{2\ LOB}$

Depth - 2.78' = $Y_{0\ LOB}$

Channel

Flow - 2070.54 cfs = Q_2

Width - 57.45' = W_2

Depth - 7.15' = Y_0

ROB

Flow - 24.8 cfs = $Q_{2\ ROB}$

Width - 13.66' = $W_{2\ ROB}$

Depth - 2.3' = $Y_{0\ ROB}$

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120428.0 Profile: Q100

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	488.16	528.84	0.00	3.46	40.68	0.00	0.09	0.00	0.02	0.00
2	LOB	528.84	569.52	0.00	0.32	9.15	0.00	0.04	0.00	0.01	0.00
3	LOB	569.52	610.20	0.00	1.30	3.27	0.00	0.41	0.00	0.08	0.00
4	LOB	610.20	627.96	82.57	54.77	18.25	3.87	3.08	1.51	0.61	0.92
5	Chan	627.96	631.65	83.68	24.79	4.92	3.92	6.72	3.38	1.02	3.46
6	Chan	631.65	635.34	137.97	30.04	3.75	6.47	8.15	4.59	1.63	7.47
7	Chan	635.34	639.02	150.89	31.51	3.70	7.07	8.55	4.79	1.73	8.29
8	Chan	639.02	642.71	151.69	31.56	3.69	7.11	8.56	4.81	1.74	8.36
9	Chan	642.71	646.40	150.51	31.42	3.69	7.05	8.52	4.79	1.73	8.30
10	Chan	646.40	650.09	149.09	31.24	3.69	6.99	8.47	4.77	1.72	8.22
11	Chan	650.09	653.77	147.14	30.99	3.69	6.89	8.41	4.75	1.71	8.11
12	Chan	653.77	657.46	144.96	30.74	3.69	6.79	8.34	4.72	1.69	7.98
13	Chan	657.46	661.15	131.65	29.18	3.75	6.17	7.91	4.51	1.58	7.14
14	Chan	661.15	664.83	113.73	26.72	3.74	5.33	7.25	4.26	1.45	6.18
15	Chan	664.83	668.52	106.69	25.55	3.69	5.00	6.93	4.17	1.41	5.88
16	Chan	668.52	672.21	105.74	25.45	3.70	4.95	6.90	4.15	1.40	5.81
17	Chan	672.21	675.89	117.27	27.30	3.77	5.50	7.40	4.30	1.47	6.32
18	Chan	675.89	679.58	120.10	27.57	3.73	5.63	7.48	4.36	1.50	6.54
19	Chan	679.58	683.27	81.53	23.67	4.56	3.82	6.42	3.44	1.06	3.64
20	ROB	683.27	719.66	158.79	107.44	36.89	7.44	2.95	1.48	0.59	0.87
21	ROB	719.66	755.17	0.00	10.55	13.45	0.00	0.79	0.00	0.16	0.00
22	ROB	755.17	790.69							0.00	0.00
23	ROB	790.69	826.20							0.00	0.00
24	ROB	826.20	861.71	0.00	0.80	7.53	0.00	0.11	0.00	0.02	0.00
25	ROB	861.71	897.22	0.00	6.45	28.91	0.00	0.22	0.00	0.05	0.00

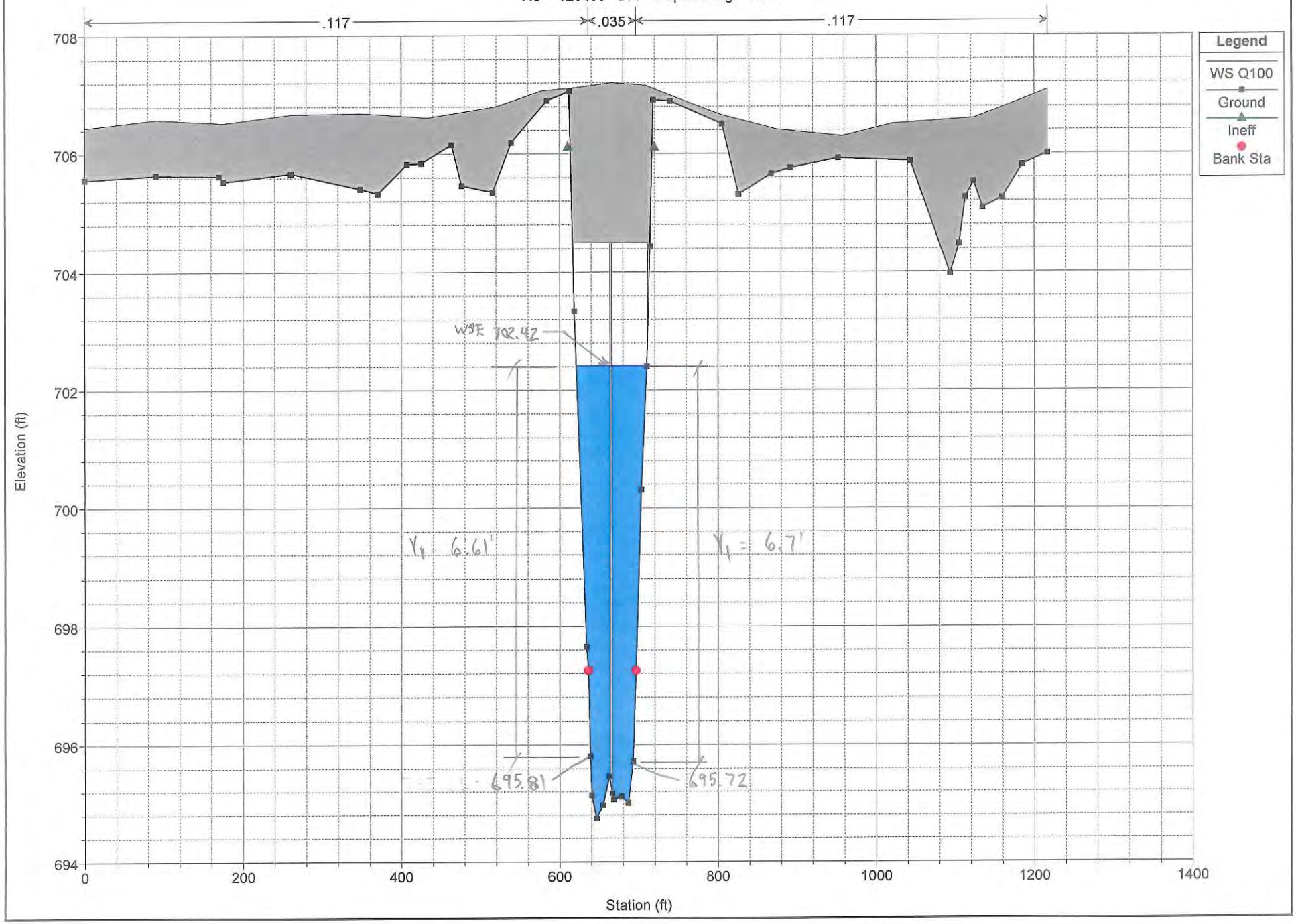
℄ Pier = Sta. 664.92

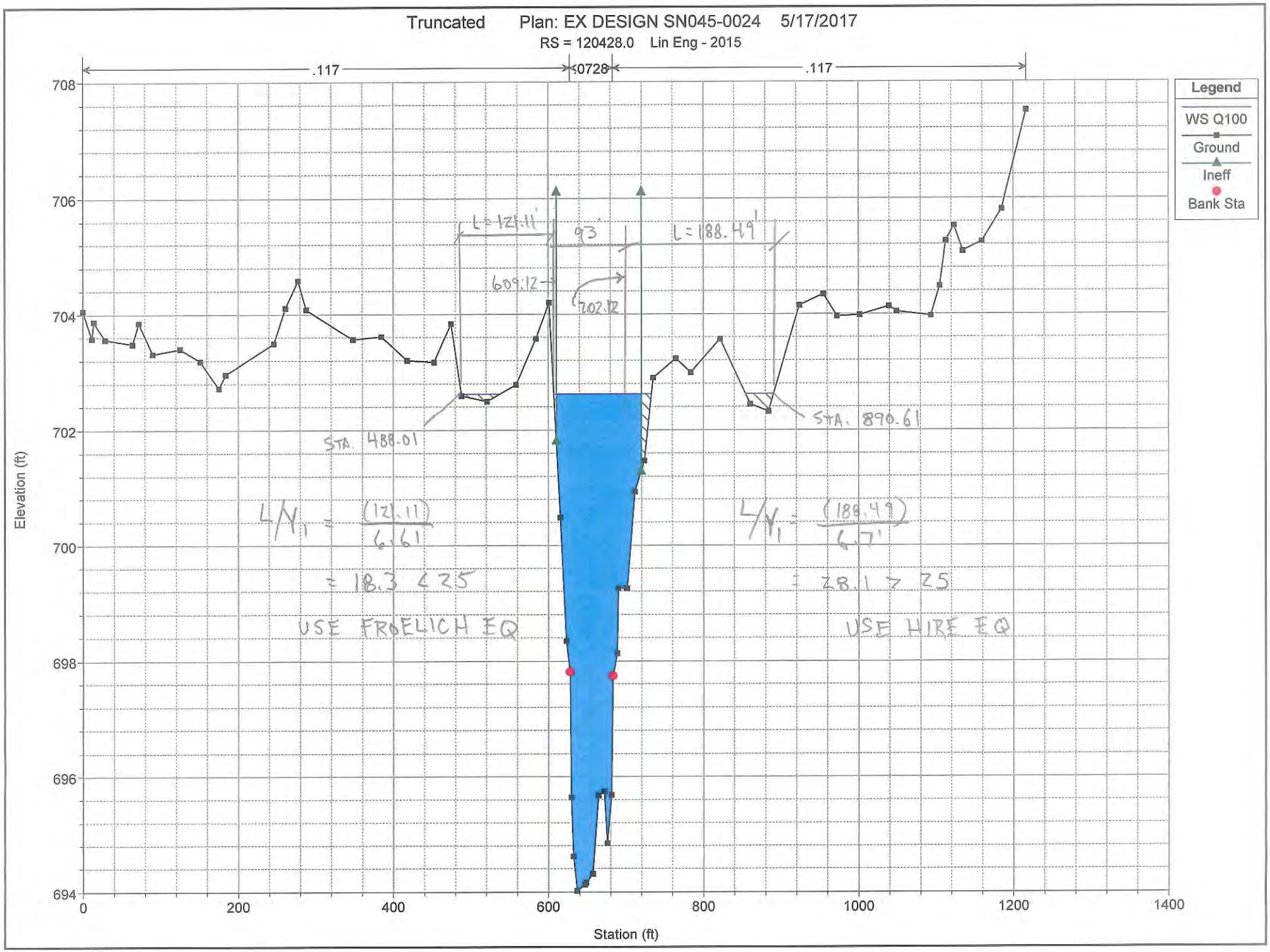
$V = 4.26$ ft/s

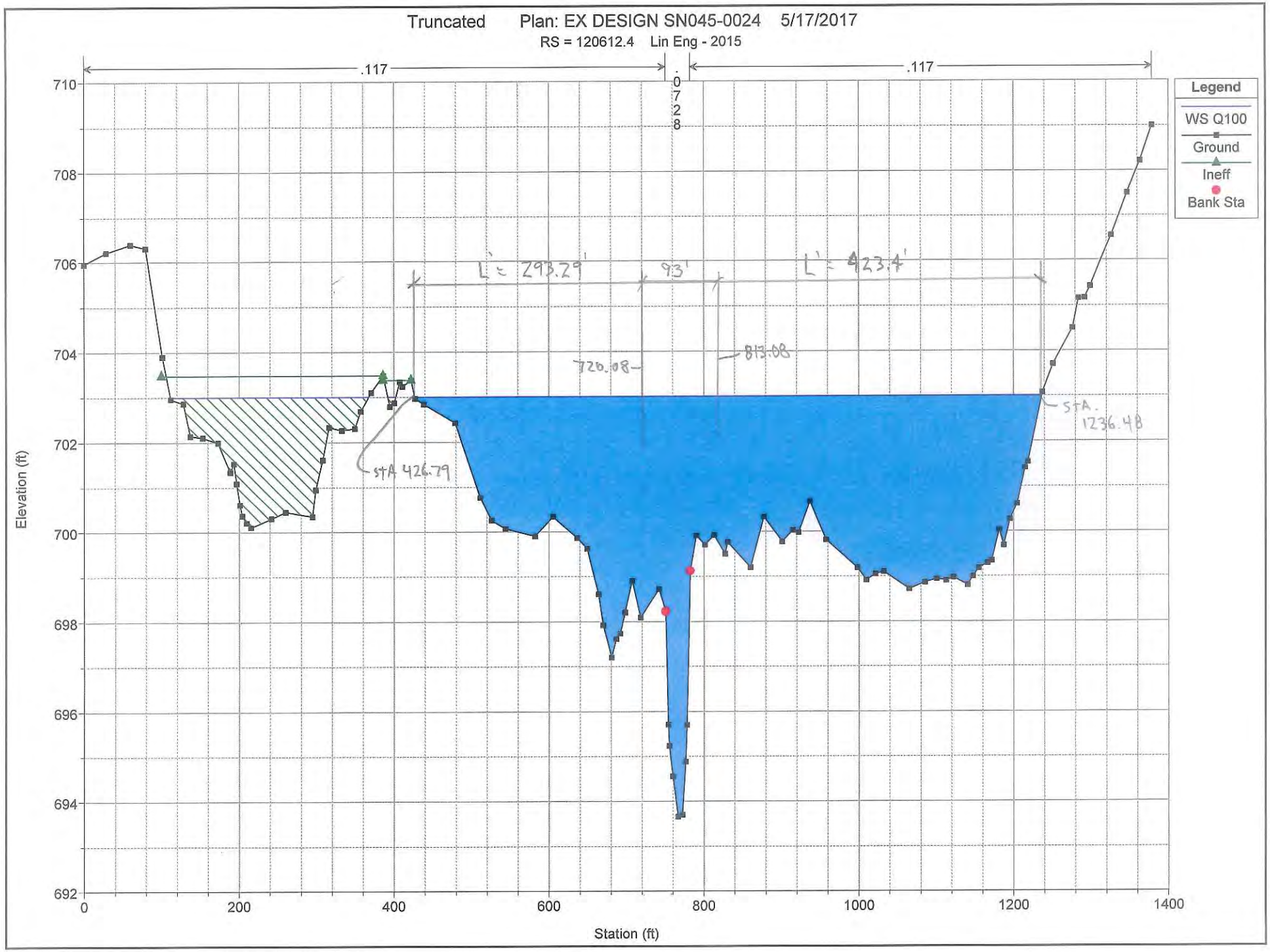
$Y_1 = 7.25'$

Truncated Plan: EX DESIGN SN045-0024 5/17/2017

RS = 120403 BR 2 span bridge - IL 47




Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120428.0 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q100
Ground
Ineff
Bank Sta
L = 121.11'
93'
L = 188.49'
609.12
702.12
STA. 488.01
STA. 890.61
L/Y1 = (121.11) / 6.61'
= 18.3 < 25
USE FROELICH EQ
L/Y1 = (188.49) / 6.7'
= 28.1 > 25
USE HIRE EQ
Elevation (ft)
Station (ft)
708
706
704
702
700
698
696
694
0
200
400
600
800
1000
1200
1400


Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120612.4 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q100
Ground
Ineff
Bank Sta
L' = 293.29'
93'
L' = 423.4'
720.08
813.08
STA 426.79
STA. 1236.48
Elevation (ft)
Station (ft)
710
708
706
704
702
700
698
696
694
692
0
200
400
600
800
1000
1200
1400

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q100

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)	Shear (lb/sq ft)	Power (lb/ft s)	
1	LOB	100.00	147.68	0.00	15.15	36.31	0.00	0.42	0.00	0.02	0.00	
2	LOB	147.68	195.36	0.00	55.45	47.71	0.00	1.16	0.00	0.05	0.00	
3	LOB	195.36	243.04	0.00	127.79	47.73	0.00	2.68	0.00	0.11	0.00	
4	LOB	243.04	290.72	0.00	124.16	47.68	0.00	2.60	0.00	0.10	0.00	
5	LOB	290.72	338.40	0.00	60.32	47.78	0.00	1.26	0.00	0.05	0.00	
6	LOB	338.40	386.08	0.00	13.46	29.11	0.00	0.46	0.00	0.02	0.00	
7	LOB	386.08	422.16	0.00	1.39	10.37	0.00	0.13	0.00	0.01	0.00	
8	LOB	422.16	469.08	1.21	10.85	42.30	0.05	0.26	0.11	0.01	0.00	
9	LOB	469.08	516.01	20.25	61.38	46.97	0.92	1.31	0.33	0.05	0.02	
10	LOB	516.01	562.93	73.55	133.06	46.93	3.33	2.84	0.55	0.11	0.06	
11	LOB	562.93	609.85	77.94	137.77	46.93	3.53	2.94	0.57	0.12	0.07	
12	LOB	609.85	656.77	87.17	147.36	46.95	3.95	3.14	0.59	0.12	0.07	
13	LOB	656.77	703.70	189.60	235.10	47.05	8.59	5.01	0.81	0.20	0.16	100%
14	LOB	703.70	750.62	161.05	213.04	46.99	7.30	4.54	0.76	0.18	0.14	35%
15	Chan	750.62	752.75	15.98	11.84	2.64	0.72	5.57	1.35	0.18	0.24	
16	Chan	752.75	754.87	24.79	15.05	2.49	1.12	7.07	1.65	0.24	0.40	
17	Chan	754.87	757.00	32.27	16.70	2.17	1.46	7.85	1.93	0.30	0.59	
18	Chan	757.00	759.13	34.78	17.39	2.15	1.58	8.17	2.00	0.32	0.64	
19	Chan	759.13	761.26	37.01	18.04	2.15	1.68	8.48	2.05	0.33	0.68	
20	Chan	761.26	763.38	39.13	18.65	2.15	1.77	8.76	2.10	0.35	0.72	
21	Chan	763.38	765.51	41.26	19.25	2.15	1.87	9.05	2.14	0.36	0.76	
22	Chan	765.51	767.64	43.31	19.78	2.14	1.96	9.30	2.19	0.37	0.80	
23	Chan	767.64	769.77	43.66	19.84	2.13	1.98	9.33	2.20	0.37	0.82	
24	Chan	769.77	771.89	43.54	19.81	2.13	1.97	9.31	2.20	0.37	0.81	
25	Chan	771.89	774.02	40.90	19.33	2.20	1.85	9.08	2.12	0.35	0.74	
26	Chan	774.02	776.15	36.46	18.08	2.21	1.65	8.50	2.02	0.33	0.66	
27	Chan	776.15	778.28	29.59	16.44	2.38	1.34	7.73	1.80	0.27	0.49	
28	Chan	778.28	780.40	19.63	13.48	2.68	0.89	6.33	1.46	0.20	0.29	
29	Chan	780.40	782.53	11.93	10.00	2.68	0.54	4.70	1.19	0.15	0.18	
30	ROB	782.53	822.29	88.54	129.52	39.81	4.01	3.26	0.68	0.13	0.09	77%
31	ROB	822.29	862.06	100.22	139.47	39.78	4.54	3.51	0.72	0.14	0.10	100%
32	ROB	862.06	901.82	79.19	121.12	39.80	3.59	3.05	0.65	0.12	0.08	
33	ROB	901.82	941.58	70.71	113.14	39.79	3.20	2.85	0.62	0.11	0.07	
34	ROB	941.58	981.34	84.39	125.80	39.78	3.82	3.16	0.67	0.13	0.08	
35	ROB	981.34	1021.11	117.49	153.41	39.77	5.32	3.86	0.77	0.15	0.12	
36	ROB	1021.11	1060.87	126.47	160.33	39.76	5.73	4.03	0.79	0.16	0.13	
37	ROB	1060.87	1100.63	134.21	166.15	39.76	6.08	4.18	0.81	0.17	0.13	
38	ROB	1100.63	1140.39	129.73	162.80	39.76	5.88	4.09	0.80	0.16	0.13	
39	ROB	1140.39	1180.16	112.51	149.51	39.79	5.10	3.76	0.75	0.15	0.11	
40	ROB	1180.16	1219.92	55.82	98.23	39.84	2.53	2.47	0.57	0.10	0.06	
41	ROB	1219.92	1259.68	2.67	11.18	16.61	0.12	0.68	0.24	0.03	0.01	

Left Abut L' Limit (426.79 to 720.08)

Q_e = 506.1 cfs

A_e = 800.1 ft^2

Right Abut Limit L' (813.08 to 1236.48)

Q_e = 1,081.6 cfs

A_e = 1500.9 ft^2

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q100

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	610.20	636.30	38.66	42.79	16.26	1.81	2.78	0.90	0.23	0.21
2	Chan	636.30	640.30	113.22	25.07	4.51	5.31	6.27	4.52	0.48	2.18
3	Chan	640.30	644.30	162.05	29.67	4.02	7.59	7.42	5.46	0.64	3.51
4	Chan	644.30	648.30	170.48	30.56	4.01	7.99	7.64	5.58	0.66	3.70
5	Chan	648.30	652.30	168.07	30.29	4.00	7.88	7.57	5.55	0.66	3.65
6	Chan	652.30	656.30	163.35	29.78	4.01	7.65	7.44	5.49	0.65	3.55
7	Chan	656.30	660.30	155.26	28.90	4.01	7.28	7.22	5.37	0.63	3.37
8	Chan	660.30	664.31	56.36	22.88	10.22	2.64	6.88	2.46	0.19	0.48
9	Chan	664.31	668.31	29.45	14.87	9.23	1.38	7.08	1.98	0.14	0.28
10	Chan	668.31	672.31	159.92	29.39	4.00	7.49	7.34	5.44	0.64	3.48
11	Chan	672.31	676.31	159.21	29.31	4.00	7.46	7.33	5.43	0.64	3.46
12	Chan	676.31	680.31	159.08	29.30	4.00	7.45	7.32	5.43	0.64	3.46
13	Chan	680.31	684.31	160.64	29.47	4.00	7.53	7.37	5.45	0.64	3.49
14	Chan	684.31	688.32	159.79	29.42	4.01	7.49	7.35	5.43	0.64	3.46
15	Chan	688.32	692.32	145.47	27.84	4.03	6.82	6.96	5.23	0.60	3.14
16	Chan	692.32	696.32	108.19	23.93	4.30	5.07	5.98	4.52	0.48	2.19
17	ROB	696.32	719.66	24.80	31.44	14.65	1.16	2.30	0.79	0.19	0.15

Left Abut Sta. 618.15
$V_1 = 0.9$ ft/s

Right Abut Sta. 711.15
$V_1 = 0.79$ ft/s

HEC-RAS Scour Analysis Existing 200-year

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	2.62	8.52	3.85
Approach Velocity (ft/s):	0.54	1.82	0.70
Br Average Depth (ft):	3.01	7.59	2.58
BR Opening Flow (cfs):	52.19	2498.51	35.29
BR Top WD (ft):	16.59	57.46	14.59
Grain Size D50 (mm):	0.30	0.30	0.30
Approach Flow (cfs):	920.01	496.04	1260.95
Approach Top WD (ft):	645.79	31.91	465.78
K1 Coefficient:	0.640	0.690	0.640
Results			
Scour Depth Ys (ft):	0.00	15.11	0.00
Critical Velocity (ft/s):	1.31	1.59	1.39
Equation:	Clear	Live	Clear

Pier Scour

All piers have the same scour depth

Input Data	
Pier Shape:	Round nose
Pier Width (ft):	2.84
Grain Size D50 (mm):	0.30000
Depth Upstream (ft):	7.85
Velocity Upstream (ft/s):	4.68
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	53.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Results	
Scour Depth Ys (ft):	5.27
Froude #:	0.29
Equation:	CSU equation

Abutment Scour

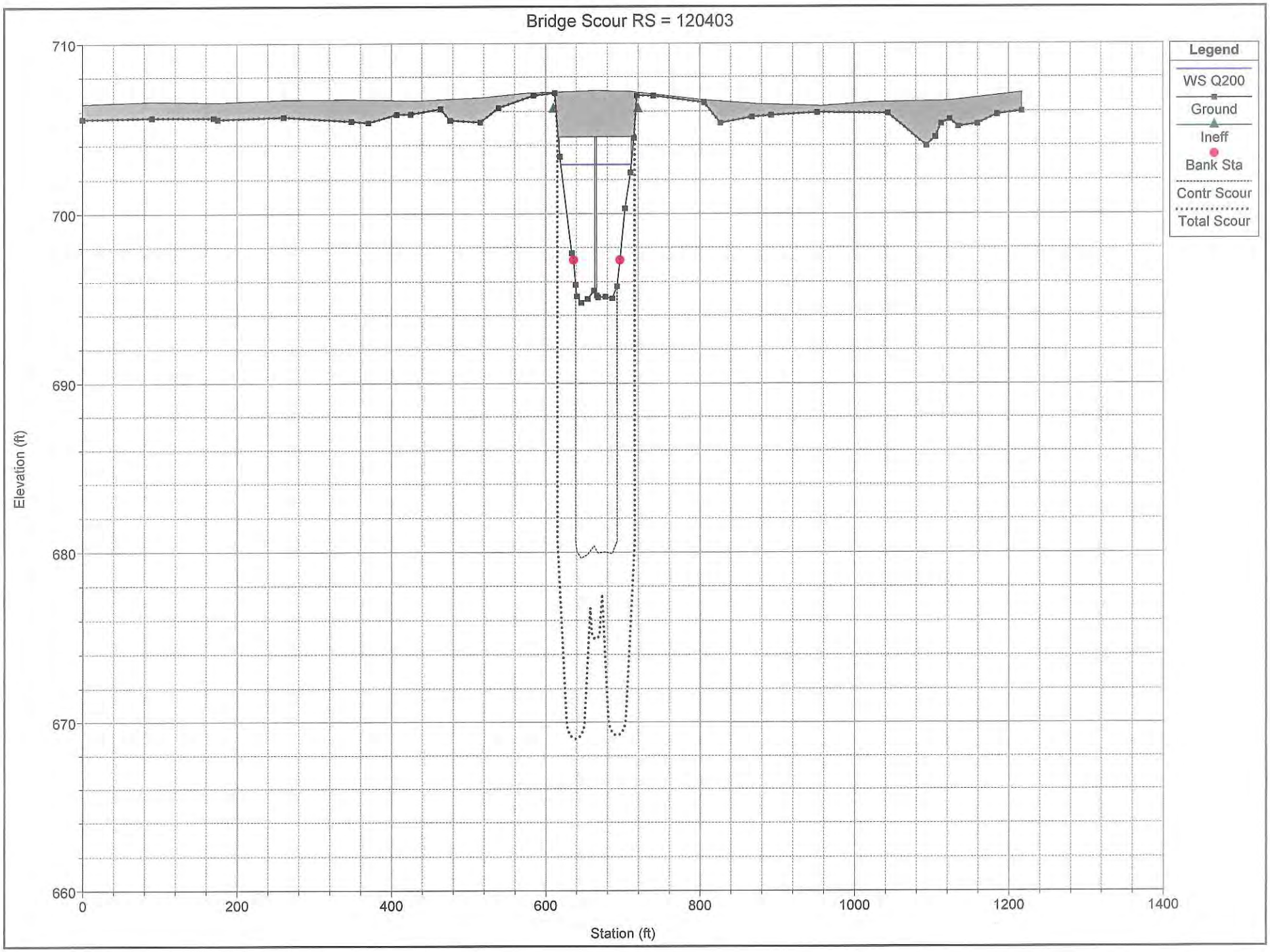
	Left	Right
Input Data		
Station at Toe (ft):	638.86	692.54
Toe Sta at appr (ft):	720.08	813.08
Abutment Length (ft):	455.16	199.76
Depth at Toe (ft):	7.05	7.14
K1 Shape Coef:	0.55 - Spill-through abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	615.25	435.23
Avg Depth Obstructed Ya (ft):	2.5	4.04
Flow Obstructed Qe (cfs):	810	1237.3
Area Obstructed Ae (sq ft):	1536	1758.5
Results		
Scour Depth Ys (ft):	11.71	11.41
Froude #:	0.07	0.06
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel:	20.38

Left abutment scour + contraction scour (ft):	26.81
Right abutment scour + contraction scour (ft):	26.51


Bridge Scour RS = 120403
Legend
WS Q200
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
710
700
690
680
670
660
0
200
400
600
800
1000
1200
1400
Station (ft)

Contraction Scour Ex 200-yr

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q200

E.G. Elev (ft)	703.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	703.57	Reach Len. (ft)	144.00	146.00	146.00
Crit W.S. (ft)	700.32	Flow Area (sq ft)	1691.86	271.91	1793.53
E.G. Slope (ft/ft)	0.000508	Area (sq ft)	1691.86	271.91	1793.53
Q Total (cfs)	2677.00	Flow (cfs)	920.01	496.04	1260.95
Top Width (ft)	1143.48	Top Width (ft)	645.79	31.91	465.78
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.54	1.82	0.70
Max Chl Dpth (ft)	9.91	Hydr. Depth (ft)	2.62	8.52	3.85
Conv. Total (cfs)	118744.1	Conv. (cfs)	40809.1	22002.7	55932.3
Length Wtd. (ft)	145.31	Wetted Per. (ft)	646.38	34.45	466.12
Min Ch El (ft)	693.66	Shear (lb/sq ft)	0.08	0.25	0.12
Alpha	1.87	Stream Power (lb/ft s)	1378.97	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	88.21	19.89	44.44
C & E Loss (ft)	0.00	Cum SA (acres)	25.97	2.83	15.23

LOB

Flow - 920.01 cfs = $Q_{1\ LOB}$

width - 645.79' = $W_{1\ LOB}$

Depth - 2.62' = $Y_{1\ LOB}$

Avg Vel - 0.54 ft/s = $V_{1\ LOB}$

Channel

Flow - 496.04 cfs = Q_1

width - 31.91' = W_1

Depth - 8.52' = Y_1

Avg. Vel - 1.82 ft/s = V_1

ROB

Flow - 1260.95 cfs = $Q_{1\ ROB}$

width - 465.78' = $W_{1\ ROB}$

Depth - 3.85' = $Y_{1\ ROB}$

Avg. Vel. - 0.70 ft/s = $V_{1\ ROB}$

Contraction Scour
Exist 200-yr

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q200

E.G. Elev (ft)	703.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.	0.117	0.035	0.117
W.S. Elev (ft)	702.86	Reach Len. (ft)	53.00	53.00	53.00
Crit W.S. (ft)	699.27	Flow Area (sq ft)	49.87	436.12	37.70
E.G. Slope (ft/ft)	0.001687	Area (sq ft)	49.87	436.12	37.70
Q Total (cfs)	2586.00	Flow (cfs)	52.19	2498.51	35.29
Top Width (ft)	88.65	Top Width (ft)	16.59	57.46	14.59
Vel Total (ft/s)	4.94	Avg. Vel. (ft/s)	1.05	5.73	0.94
Max Chl Dpth (ft)	8.13	Hydr. Depth (ft)	3.01	7.59	2.58
Conv. Total (cfs)	62954.0	Conv. (cfs)	1270.6	60824.2	859.2
Length Wtd. (ft)	53.00	Wetted Per. (ft)	17.55	73.25	15.68
Min Ch El (ft)	694.74	Shear (lb/sq ft)	0.30	0.63	0.25
Alpha	1.30	Stream Power (lb/ft s)	1216.84	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	81.23	18.24	36.97
C & E Loss (ft)	0.03	Cum SA (acres)	23.35	2.64	13.29

LOB

Flow – 52.19 cfs = $Q_{2\ LOB}$
Width – 16.59' = $W_{2\ LOB}$
Depth – 3.01' = $Y_{o\ LOB}$

Channel

Flow – 2498.51 cfs = Q_2
Width – 57.46' = W_2
Depth – 7.59' = Y_o

ROB

Flow – 35.29 cfs = $Q_{2\ ROB}$
Width – 14.59' = $W_{2\ ROB}$
Depth – 2.58' = $Y_{o\ ROB}$

Pier Scour 200-yr

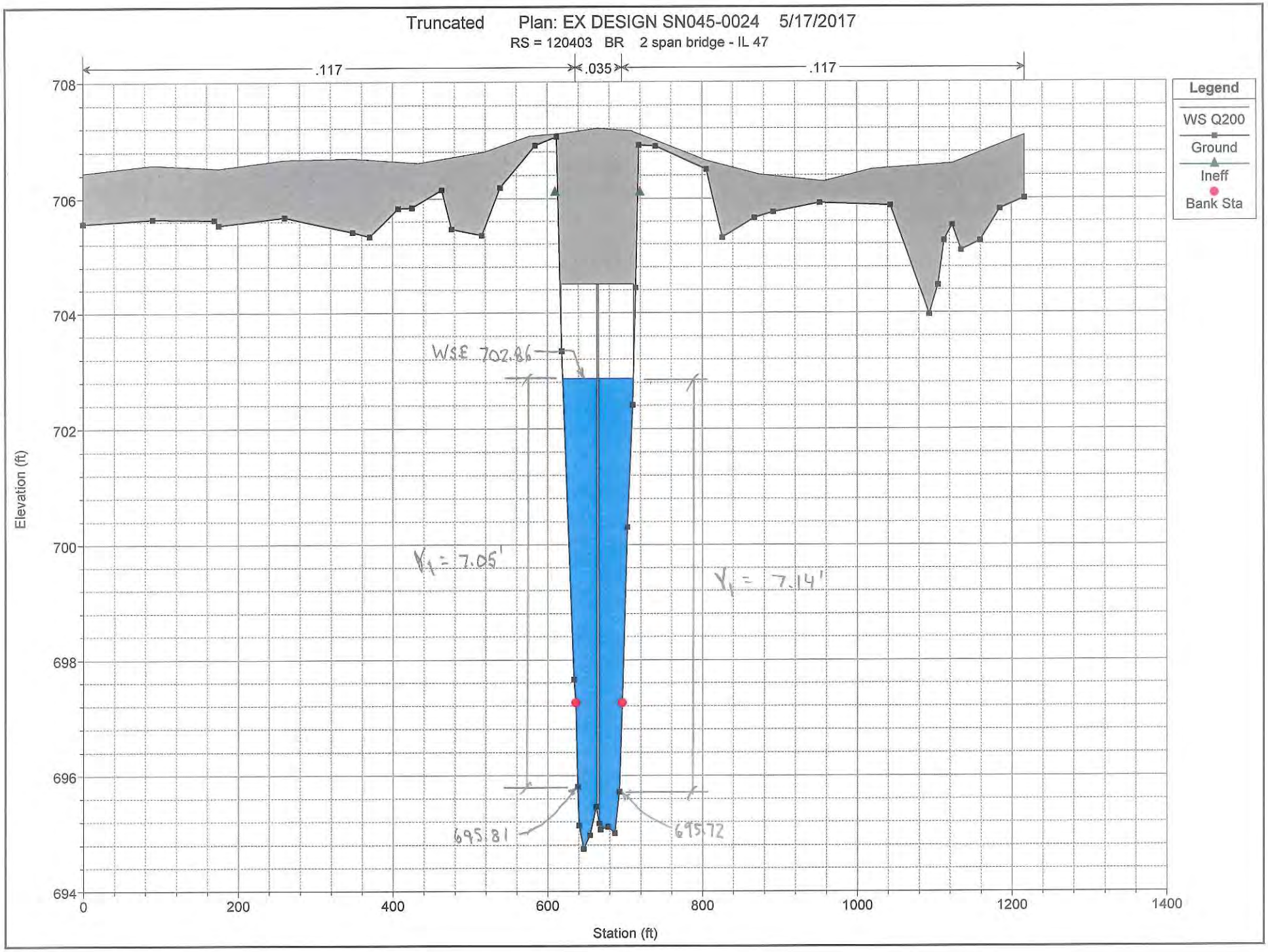
Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120428.0 Profile: Q200

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	122.04	162.72	0.00	0.75	8.79	0.00	0.09	0.00	0.02	0.00
2	LOB	162.72	203.40	0.00	8.09	40.69	0.00	0.20	0.00	0.05	0.00
3	LOB	203.40	244.08	0.00	0.01	1.27	0.00	0.01	0.00	0.00	0.00
4	LOB	244.08	284.76							0.00	0.00
5	LOB	284.76	325.44							0.00	0.00
6	LOB	325.44	366.12							0.00	0.00
7	LOB	366.12	406.80							0.00	0.00
8	LOB	406.80	447.48							0.00	0.00
9	LOB	447.48	488.16	0.00	1.53	5.82	0.00	0.26	0.00	0.06	0.00
10	LOB	488.16	528.84	0.00	24.40	40.68	0.00	0.60	0.00	0.14	0.00
11	LOB	528.84	569.52	0.00	16.02	40.69	0.00	0.39	0.00	0.09	0.00
12	LOB	569.52	610.20	0.00	3.44	5.88	0.00	0.60	0.00	0.14	0.00
13	LOB	610.20	627.96	114.06	63.91	18.25	4.41	3.60	1.78	0.81	1.45
14	Chan	627.96	631.65	101.15	26.68	4.92	3.91	7.24	3.79	1.26	4.77
15	Chan	631.65	635.34	163.32	31.93	3.75	6.32	8.66	5.11	1.97	10.08
16	Chan	635.34	639.02	177.79	33.40	3.70	6.88	9.06	5.32	2.09	11.14
17	Chan	639.02	642.71	178.70	33.46	3.69	6.91	9.08	5.34	2.10	11.24
18	Chan	642.71	646.40	177.40	33.31	3.69	6.86	9.04	5.33	2.09	11.15
19	Chan	646.40	650.09	175.81	33.14	3.69	6.80	8.99	5.31	2.08	11.05
20	Chan	650.09	653.77	173.65	32.89	3.69	6.71	8.92	5.28	2.07	10.92
21	Chan	653.77	657.46	171.21	32.63	3.69	6.62	8.85	5.25	2.05	10.75
22	Chan	657.46	661.15	156.30	31.08	3.75	6.04	8.43	5.03	1.92	9.67
23	Chan	661.15	664.83	136.29	28.61	3.74	5.27	7.76	4.76	1.77	8.44
24	Chan	664.83	668.52	128.49	27.45	3.69	4.97	7.45	4.68	1.73	8.08
25	Chan	668.52	672.21	127.41	27.35	3.70	4.93	7.42	4.66	1.71	7.98
26	Chan	672.21	675.89	140.21	29.20	3.77	5.42	7.92	4.80	1.79	8.61
27	Chan	675.89	679.58	143.44	29.46	3.73	5.55	7.99	4.87	1.83	8.91
28	Chan	679.58	683.27	99.10	25.57	4.56	3.83	6.94	3.88	1.30	5.04
29	ROB	683.27	719.66	221.66	126.17	36.89	8.57	3.47	1.76	0.79	1.39
30	ROB	719.66	755.17	0.00	20.73	35.61	0.00	0.58	0.00	0.13	0.00
31	ROB	755.17	790.69	0.00	1.52	19.67	0.00	0.08	0.00	0.02	0.00
32	ROB	790.69	826.20	0.00	0.06	2.83	0.00	0.02	0.00	0.00	0.00
33	ROB	826.20	861.71	0.00	9.26	25.35	0.00	0.37	0.00	0.08	0.00
34	ROB	861.71	897.22	0.00	23.73	35.53	0.00	0.67	0.00	0.15	0.00
35	ROB	897.22	932.74	0.00	0.50	4.66	0.00	0.11	0.00	0.02	0.00

℄ Pier = Sta. 664.92

$V = 4.76$ ft/s

$Y_1 = 7.76$ ft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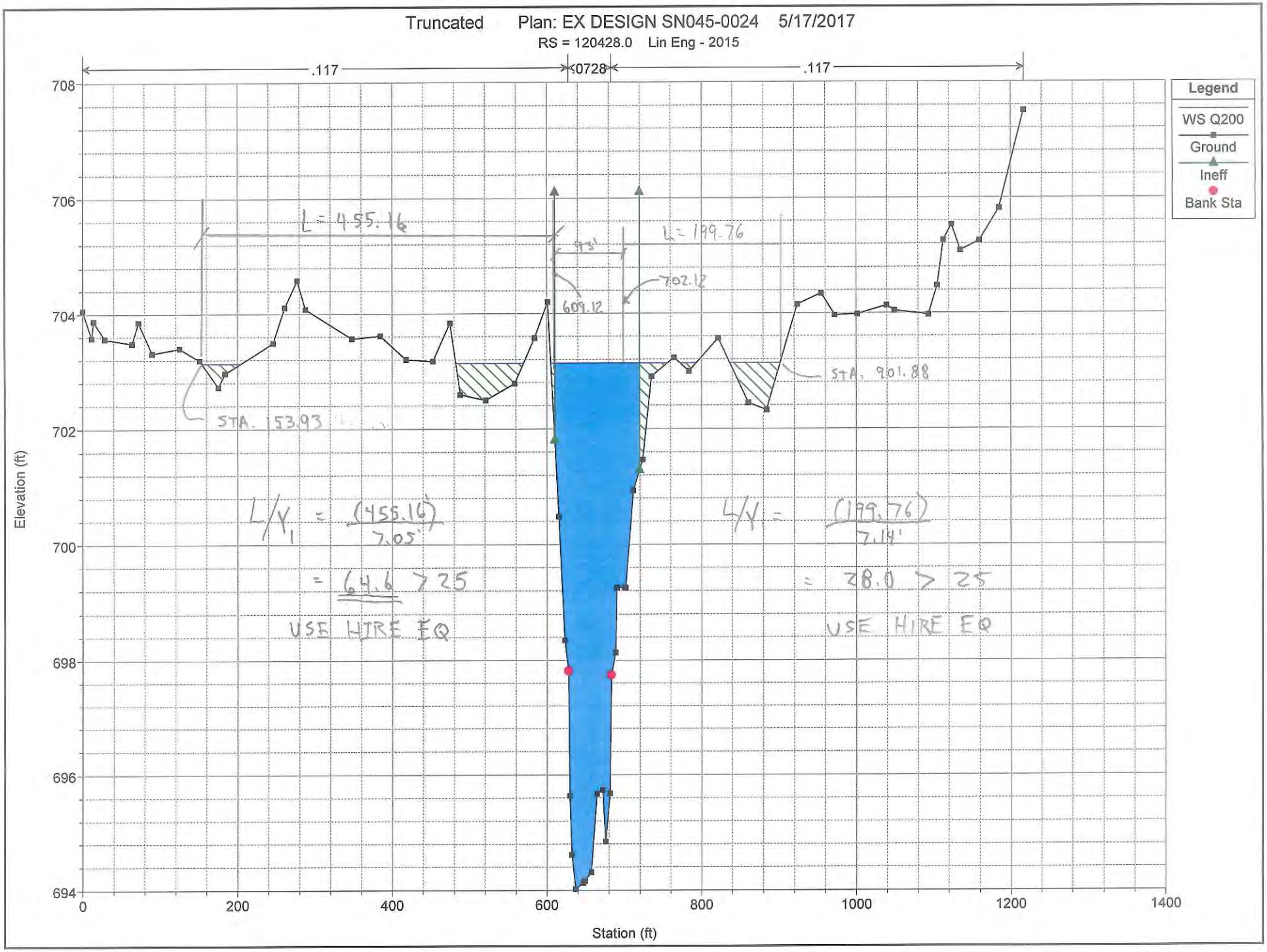
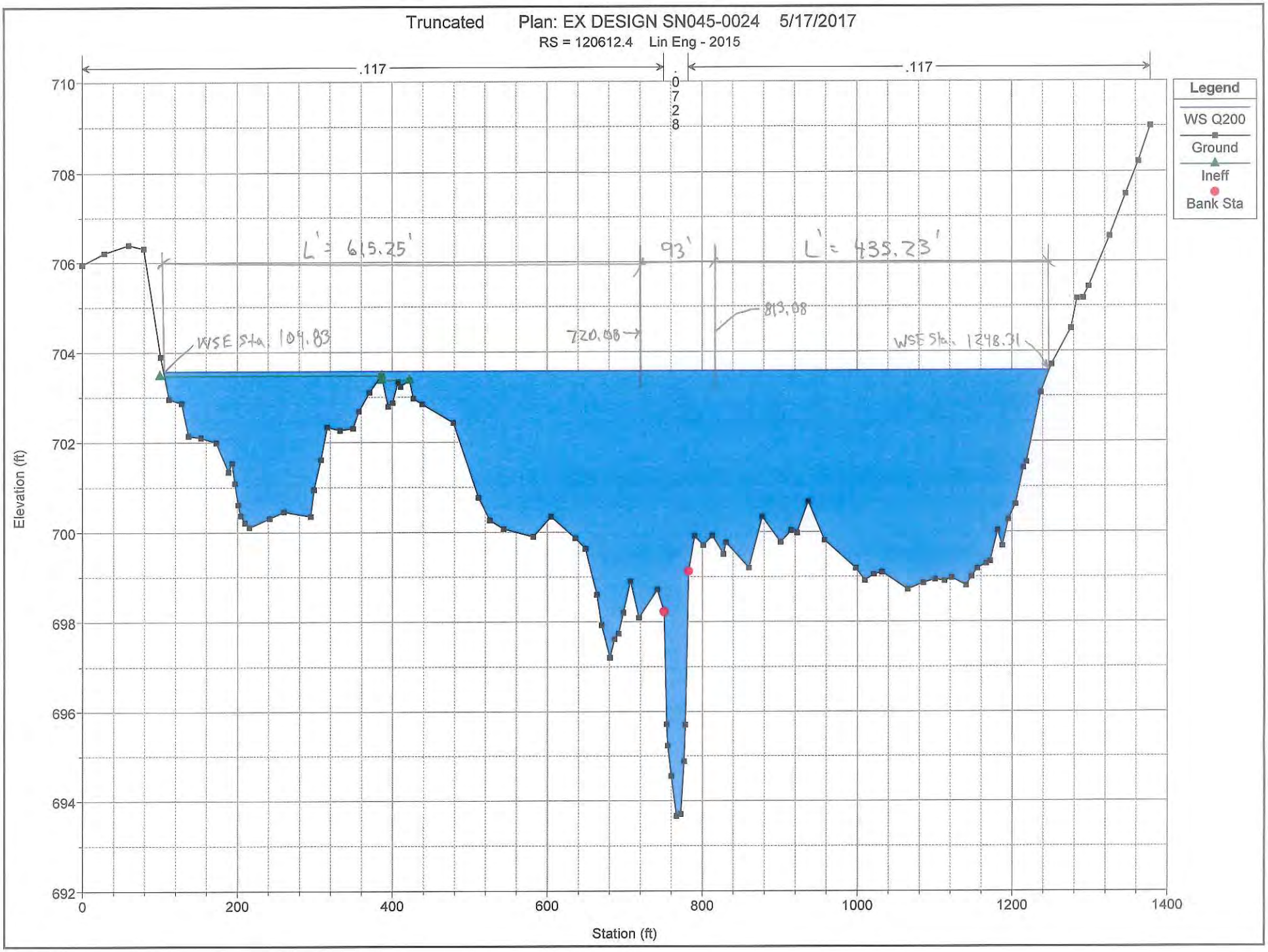
RS = 120403 BR 2 span bridge - IL 47
.117
.035
.117
Legend
WS Q200
Ground
Ineff
Bank Sta
WSE 702.86
Y1 = 7.05'
Y1 = 7.14'
695.81
695.72
Elevation (ft)
Station (ft)
708
706
704
702
700
698
696
694
0
200
400
600
800
1000
1200
1400


Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120428.0 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q200
Ground
Ineff
Bank Sta
L = 455.16
L = 199.76
93'
609.12
702.12
STA. 153.93
STA. 901.88
L/Y1 = (455.16) / 7.05'
= 64.6 > 25
USE HIRE EQ
L/Y1 = (199.76) / 7.14'
= 28.0 > 25
USE HIRE EQ
Elevation (ft)
Station (ft)
708
706
704
702
700
698
696
694
0
200
400
600
800
1000
1200
1400


Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120612.4 Lin Eng - 2015
.117
.0728
.117
L' = 615.25'
93'
L' = 435.23'
WSE Sta. 104.83
720.08
813.08
WSE Sta. 1248.31
Legend
WS Q200
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
710
708
706
704
702
700
698
696
694
692
0
200
400
600
800
1000
1200
1400

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q200

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)	Shear (lb/sq ft)	Power (lb/ft s)	
1	LOB	100.00	147.68	8.29	37.78	42.90	0.31	0.88	0.22	0.03	0.01	
2	LOB	147.68	195.36	28.52	82.72	47.71	1.07	1.73	0.34	0.06	0.02	
3	LOB	195.36	243.04	81.26	155.06	47.73	3.04	3.25	0.52	0.10	0.05	
4	LOB	243.04	290.72	78.17	151.43	47.68	2.92	3.18	0.52	0.10	0.05	
5	LOB	290.72	338.40	31.34	87.59	47.78	1.17	1.84	0.36	0.06	0.02	
6	LOB	338.40	386.08	7.20	36.22	47.70	0.27	0.76	0.20	0.02	0.00	
7	LOB	386.08	422.16	2.10	15.49	36.12	0.08	0.43	0.14	0.01	0.00	
8	LOB	422.16	469.08	7.49	36.84	46.94	0.28	0.79	0.20	0.02	0.01	
9	LOB	469.08	516.01	32.09	88.22	46.97	1.20	1.88	0.36	0.06	0.02	
10	LOB	516.01	562.93	86.50	159.90	46.93	3.23	3.41	0.54	0.11	0.06	
11	LOB	562.93	609.85	90.79	164.60	46.93	3.39	3.51	0.55	0.11	0.06	
12	LOB	609.85	656.77	99.75	174.20	46.95	3.73	3.71	0.57	0.12	0.07	
13	LOB	656.77	703.70	196.57	261.93	47.05	7.34	5.58	0.75	0.18	0.13	100%
14	LOB	703.70	750.62	169.93	239.88	46.99	6.35	5.11	0.71	0.16	0.11	35%
15	Chan	750.62	752.75	16.87	13.06	2.64	0.63	6.14	1.29	0.16	0.20	
16	Chan	752.75	754.87	25.30	16.26	2.49	0.95	7.65	1.56	0.21	0.32	
17	Chan	754.87	757.00	32.53	17.91	2.17	1.22	8.42	1.82	0.26	0.47	
18	Chan	757.00	759.13	34.91	18.60	2.15	1.30	8.74	1.88	0.27	0.52	
19	Chan	759.13	761.26	37.00	19.26	2.15	1.38	9.05	1.92	0.28	0.55	
20	Chan	761.26	763.38	38.99	19.86	2.15	1.46	9.34	1.96	0.29	0.58	
21	Chan	763.38	765.51	40.98	20.46	2.15	1.53	9.62	2.00	0.30	0.61	
22	Chan	765.51	767.64	42.89	21.00	2.14	1.60	9.87	2.04	0.31	0.64	
23	Chan	767.64	769.77	43.23	21.06	2.13	1.61	9.90	2.05	0.31	0.64	
24	Chan	769.77	771.89	43.12	21.03	2.13	1.61	9.88	2.05	0.31	0.64	
25	Chan	771.89	774.02	40.60	20.54	2.20	1.52	9.66	1.98	0.30	0.59	
26	Chan	774.02	776.15	36.44	19.29	2.21	1.36	9.07	1.89	0.28	0.52	
27	Chan	776.15	778.28	29.89	17.65	2.38	1.12	8.30	1.69	0.24	0.40	
28	Chan	778.28	780.40	20.33	14.69	2.68	0.76	6.91	1.38	0.17	0.24	
29	Chan	780.40	782.53	12.96	11.21	2.68	0.48	5.27	1.16	0.13	0.15	
30	ROB	782.53	822.29	103.04	152.26	39.81	3.85	3.83	0.68	0.12	0.08	77%
31	ROB	822.29	862.06	114.56	162.21	39.78	4.28	4.08	0.71	0.13	0.09	100%
32	ROB	862.06	901.82	93.75	143.86	39.80	3.50	3.62	0.65	0.11	0.07	
33	ROB	901.82	941.58	85.27	135.88	39.79	3.19	3.42	0.63	0.11	0.07	
34	ROB	941.58	981.34	98.93	148.54	39.78	3.70	3.74	0.67	0.12	0.08	
35	ROB	981.34	1021.11	131.47	176.16	39.77	4.91	4.43	0.75	0.14	0.10	
36	ROB	1021.11	1060.87	140.20	183.08	39.76	5.24	4.60	0.77	0.15	0.11	
37	ROB	1060.87	1100.63	147.71	188.90	39.76	5.52	4.75	0.78	0.15	0.12	
38	ROB	1100.63	1140.39	143.36	185.55	39.76	5.36	4.67	0.77	0.15	0.11	
39	ROB	1140.39	1180.16	126.60	172.25	39.79	4.73	4.33	0.73	0.14	0.10	
40	ROB	1180.16	1219.92	70.19	120.98	39.84	2.62	3.04	0.58	0.10	0.06	
41	ROB	1219.92	1259.68	5.87	23.87	28.46	0.22	0.84	0.25	0.03	0.01	

Left Abut L' Limit = (104.83 to 720.08)

Q_e = 810 cfs

A_e = 1536 ft^2

Right Abut L' Limit (813.08 to 1248.31)

Q_e = 1237.3 cfs

A_e = 1758.5 ft^2

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q200

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	610.20	636.30	52.19	49.87	17.55	2.02	3.01	1.05	0.30	0.31
2	Chan	636.30	640.30	138.74	26.84	4.51	5.37	6.71	5.17	0.63	3.24
3	Chan	640.30	644.30	195.19	31.45	4.02	7.55	7.86	6.21	0.82	5.12
4	Chan	644.30	648.30	204.80	32.33	4.01	7.92	8.08	6.33	0.85	5.38
5	Chan	648.30	652.30	202.07	32.06	4.00	7.81	8.01	6.30	0.84	5.32
6	Chan	652.30	656.30	196.70	31.55	4.01	7.61	7.89	6.23	0.83	5.17
7	Chan	656.30	660.30	187.50	30.67	4.01	7.25	7.66	6.11	0.81	4.93
8	Chan	660.30	664.31	66.48	24.35	10.67	2.57	7.31	2.73	0.24	0.66
9	Chan	664.31	668.31	34.54	15.81	9.67	1.34	7.49	2.19	0.17	0.38
10	Chan	668.31	672.31	192.80	31.16	4.00	7.46	7.79	6.19	0.82	5.08
11	Chan	672.31	676.31	192.00	31.08	4.00	7.42	7.77	6.18	0.82	5.05
12	Chan	676.31	680.31	191.85	31.07	4.00	7.42	7.76	6.17	0.82	5.05
13	Chan	680.31	684.31	193.63	31.24	4.00	7.49	7.81	6.20	0.82	5.10
14	Chan	684.31	688.32	192.64	31.19	4.01	7.45	7.79	6.18	0.82	5.05
15	Chan	688.32	692.32	176.31	29.61	4.03	6.82	7.40	5.95	0.77	4.61
16	Chan	692.32	696.32	133.27	25.70	4.30	5.15	6.42	5.19	0.63	3.26
17	ROB	696.32	719.66	35.29	37.70	15.68	1.36	2.58	0.94	0.25	0.24

Left Abut Sta. 618.15
$V_1 = 1.05$ ft/s

Right Abut Sta. 711.15
$V_1 = 0.94$ ft/s

HEC-RAS Scour Analysis Existing 500-yr

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	3.29	9.22	4.37
Approach Velocity (ft/s):	0.58	1.77	0.70
Br Average Depth (ft):	3.29	8.13	3.08
BR Opening Flow (cfs):	71.87	3032.59	52.54
BR Top WD (ft):	18.00	57.48	14.84
Grain Size D50 (mm):	0.30	0.30	0.30
Approach Flow (cfs):	1250.70	520.70	1497.59
Approach Top WD (ft):	652.91	31.91	486.67
K1 Coefficient:	0.640	0.690	0.640
Results			
Scour Depth Ys (ft):	0.00	19.68	0.00
Critical Velocity (ft/s):	1.36	1.61	1.42
Equation:	Clear	Live	Clear

Pier Scour

All piers have the same scour depth

Input Data	
Pier Shape:	Round nose
Pier Width (ft):	2.84
Grain Size D50 (mm):	0.30000
Depth Upstream (ft):	8.49
Velocity Upstream (ft/s):	5.23
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	53.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Results	
Scour Depth Ys (ft):	5.59
Froude #:	0.32
Equation:	CSU equation

Abutment Scour

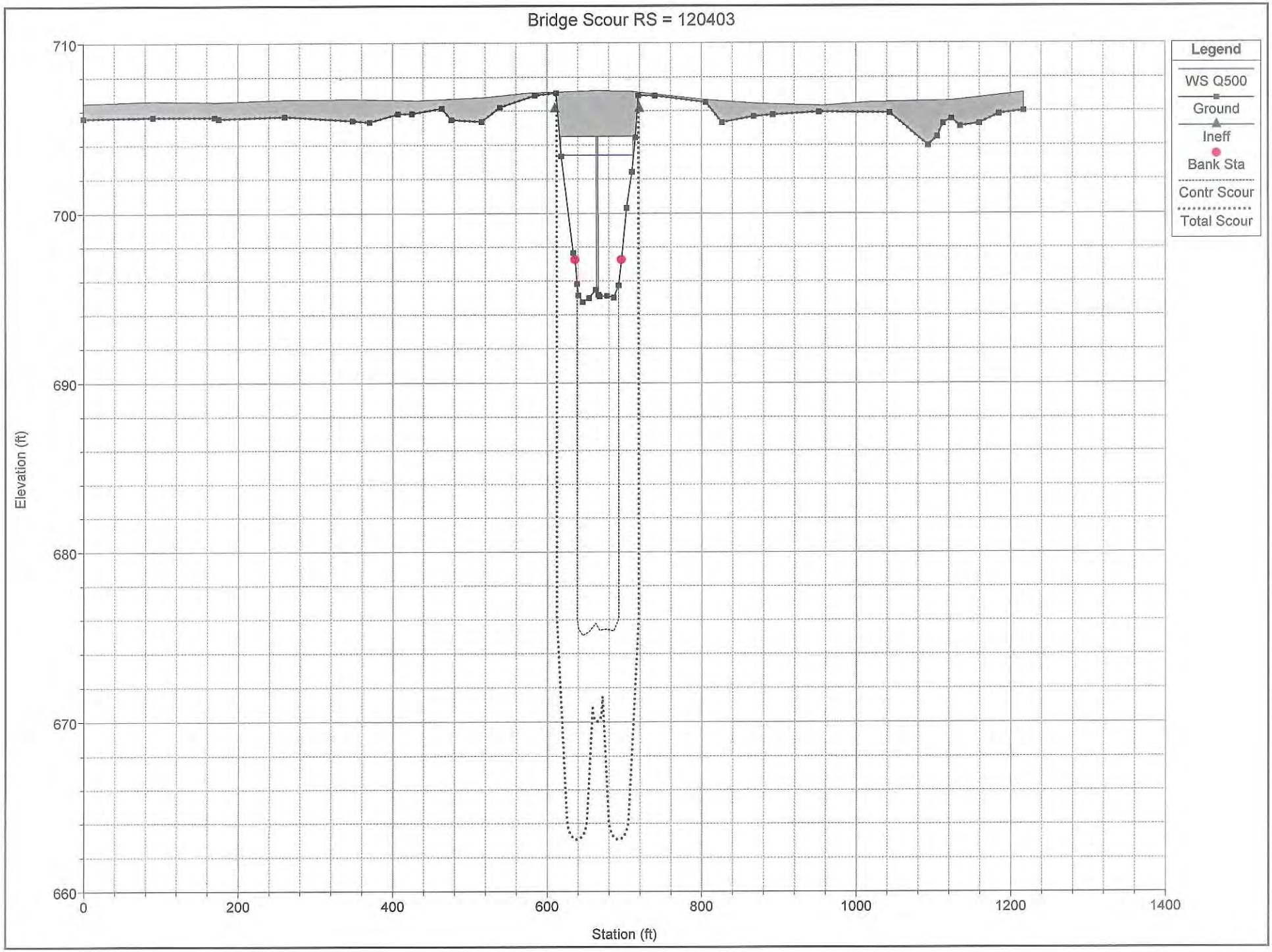
	Left	Right
Input Data		
Station at Toe (ft):	638.86	692.54
Toe Sta at appr (ft):	720.08	813.08
Abutment Length (ft):	602.11	213.61
Depth at Toe (ft):	7.59	7.68
K1 Shape Coef:	0.55 - Spill-through abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	622.37	456.12
Avg Depth Obstructed Ya (ft):	3.17	4.57
Flow Obstructed Qe (cfs):	1117	1469
Area Obstructed Ae (sq ft):	1970.4	2084.7
Results		
Scour Depth Ys (ft):	13.05	12.96
Froude #:	0.08	0.07
Equation:	HIRE	HIRE

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Channel: 25.26

Left abutment scour + contraction scour (ft):	32.73
Right abutment scour + contraction scour (ft):	32.64


Bridge Scour RS = 120403
Legend
WS Q500
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
710
700
690
680
670
660
0
200
400
600
800
1000
1200
1400
Station (ft)

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q500

Contraction Scour
500-year

E.G. Elev (ft)	704.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.117	0.073	0.117
W.S. Elev (ft)	704.28	Reach Len. (ft)	144.00	146.00	146.00
Crit W.S. (ft)	700.63	Flow Area (sq ft)	2148.03	294.32	2127.62
E.G. Slope (ft/ft)	0.000430	Area (sq ft)	2148.03	294.32	2127.62
Q Total (cfs)	3269.00	Flow (cfs)	1250.70	520.70	1497.59
Top Width (ft)	1171.49	Top Width (ft)	652.91	31.91	486.67
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.58	1.77	0.70
Max Chl Dpth (ft)	10.62	Hydr. Depth (ft)	3.29	9.22	4.37
Conv. Total (cfs)	157624.9	Conv. (cfs)	60306.5	25107.3	72211.1
Length Wtd. (ft)	145.25	Wetted Per. (ft)	653.54	34.45	487.02
Min Ch El (ft)	693.66	Shear (lb/sq ft)	0.09	0.23	0.12
Alpha	1.67	Stream Power (lb/ft s)	1378.97	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	102.62	21.40	53.04
C & E Loss (ft)	0.00	Cum SA (acres)	27.12	2.83	16.47

LOB

Flow - 1250.70 cfs = $Q_{1\ LOB}$
Width - 652.91' = $W_{1\ LOB}$
Depth - 3.29' = $Y_{1\ LOB}$
Avg. Vel - 0.58 ft/s = $V_{1\ LOB}$

Channel

Flow - 520.7 cfs = Q_1
Width - 31.91' = W_1
Depth - 9.22' = Y_1
Avg. Vel - 1.77 ft/s = V_1

ROB

Flow - 1497.59 cfs = $Q_{1\ ROB}$
Width - 486.67' = $W_{1\ ROB}$
Depth - 4.37' = $Y_{1\ ROB}$
Avg. Vel - 0.70 ft/s = $V_{1\ ROB}$

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q500

E.G. Elev (ft)	704.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.63	Wt. n-Val.	0.117	0.035	0.117
W.S. Elev (ft)	703.40	Reach Len. (ft)	53.00	53.00	53.00
Crit W.S. (ft)	699.81	Flow Area (sq ft)	59.20	467.07	45.67
E.G. Slope (ft/ft)	0.002017	Area (sq ft)	59.20	467.07	45.67
Q Total (cfs)	3157.00	Flow (cfs)	71.87	3032.59	52.54
Top Width (ft)	90.32	Top Width (ft)	18.00	57.48	14.84
Vel Total (ft/s)	5.52	Avg. Vel. (ft/s)	1.21	6.49	1.15
Max Chl Dpth (ft)	8.66	Hydr. Depth (ft)	3.29	8.13	3.08
Conv. Total (cfs)	70299.6	Conv. (cfs)	1600.5	67529.2	1169.9
Length Wtd. (ft)	53.00	Wetted Per. (ft)	19.06	74.32	15.95
Min Ch El (ft)	694.74	Shear (lb/sq ft)	0.39	0.79	0.36
Alpha	1.33	Stream Power (lb/ft s)	1216.84	0.00	0.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	93.66	19.62	44.17
C & E Loss (ft)	0.04	Cum SA (acres)	24.13	2.64	14.41

Contraction Scour
500-year

LOB

Flow - 71.87 cfs = $Q_{2\ LOB}$

Width - 18.0' = $W_{2\ LOB}$

Depth - 3.29' = $Y_{0\ LOB}$

Channel

Flow - 3032.59 cfs = Q_2

Width - 57.48' = W_2

Depth - 8.13' = Y_0

ROB

Flow - 52.54 cfs = $Q_{2\ ROB}$

Width - 14.84' = $W_{2\ ROB}$

Depth - 3.08' = $Y_{0\ ROB}$

Pier Scour 500-year

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120428.0 Profile: Q500

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	0.00	40.68	0.00	4.27	28.03	0.00	0.15	0.00	0.04	0.00
2	LOB	40.68	81.36	0.00	7.68	36.22	0.00	0.21	0.00	0.05	0.00
3	LOB	81.36	122.04	0.00	16.25	40.68	0.00	0.40	0.00	0.10	0.00
4	LOB	122.04	162.72	0.00	21.48	40.68	0.00	0.53	0.00	0.14	0.00
5	LOB	162.72	203.40	0.00	33.85	40.69	0.00	0.83	0.00	0.22	0.00
6	LOB	203.40	244.08	0.00	19.13	40.68	0.00	0.47	0.00	0.12	0.00
7	LOB	244.08	284.76	0.00	1.53	8.81	0.00	0.17	0.00	0.04	0.00
8	LOB	284.76	325.44	0.00	0.01	1.52	0.00	0.01	0.00	0.00	0.00
9	LOB	325.44	366.12	0.00	6.07	40.68	0.00	0.15	0.00	0.04	0.00
10	LOB	366.12	406.80	0.00	9.72	40.68	0.00	0.24	0.00	0.06	0.00
11	LOB	406.80	447.48	0.00	22.77	40.68	0.00	0.56	0.00	0.14	0.00
12	LOB	447.48	488.16	0.00	16.56	38.06	0.00	0.44	0.00	0.11	0.00
13	LOB	488.16	528.84	0.00	50.15	40.68	0.00	1.23	0.00	0.32	0.00
14	LOB	528.84	569.52	0.00	41.77	40.69	0.00	1.03	0.00	0.27	0.00
15	LOB	569.52	610.20	0.00	14.23	27.82	0.00	0.52	0.00	0.13	0.00
16	LOB	610.20	627.96	157.88	75.16	18.25	5.00	4.23	2.10	1.07	2.24
17	Chan	627.96	631.65	123.01	29.02	4.92	3.90	7.87	4.24	1.53	6.47
18	Chan	631.65	635.34	194.27	34.27	3.75	6.15	9.29	5.67	2.36	13.39
19	Chan	635.34	639.02	210.43	35.74	3.70	6.67	9.69	5.89	2.50	14.72
20	Chan	639.02	642.71	211.46	35.79	3.69	6.70	9.71	5.91	2.51	14.84
21	Chan	642.71	646.40	210.02	35.65	3.69	6.65	9.67	5.89	2.50	14.74
22	Chan	646.40	650.09	208.27	35.47	3.69	6.60	9.62	5.87	2.49	14.62
23	Chan	650.09	653.77	205.87	35.22	3.69	6.52	9.55	5.84	2.47	14.45
24	Chan	653.77	657.46	203.16	34.97	3.69	6.44	9.48	5.81	2.45	14.24
25	Chan	657.46	661.15	186.50	33.41	3.75	5.91	9.06	5.58	2.31	12.88
26	Chan	661.15	664.83	164.26	30.95	3.74	5.20	8.39	5.31	2.14	11.36
27	Chan	664.83	668.52	155.68	29.79	3.69	4.93	8.08	5.23	2.09	10.93
28	Chan	668.52	672.21	154.44	29.68	3.70	4.89	8.05	5.20	2.08	10.80
29	Chan	672.21	675.89	168.55	31.53	3.77	5.34	8.55	5.35	2.16	11.56
30	Chan	675.89	679.58	172.24	31.80	3.73	5.46	8.62	5.42	2.21	11.95
31	Chan	679.58	683.27	121.22	27.91	4.56	3.84	7.57	4.34	1.58	6.88
32	ROB	683.27	719.66	309.72	149.21	36.89	9.81	4.10	2.08	1.05	2.17
33	ROB	719.66	755.17	0.00	43.21	35.61	0.00	1.22	0.00	0.31	0.00
34	ROB	755.17	790.69	0.00	23.26	35.52	0.00	0.65	0.00	0.17	0.00
35	ROB	790.69	826.20	0.00	14.96	35.52	0.00	0.42	0.00	0.11	0.00
36	ROB	826.20	861.71	0.00	30.25	35.53	0.00	0.85	0.00	0.22	0.00
37	ROB	861.71	897.22	0.00	46.22	35.53	0.00	1.30	0.00	0.34	0.00
38	ROB	897.22	932.74	0.00	7.83	18.53	0.00	0.42	0.00	0.11	0.00

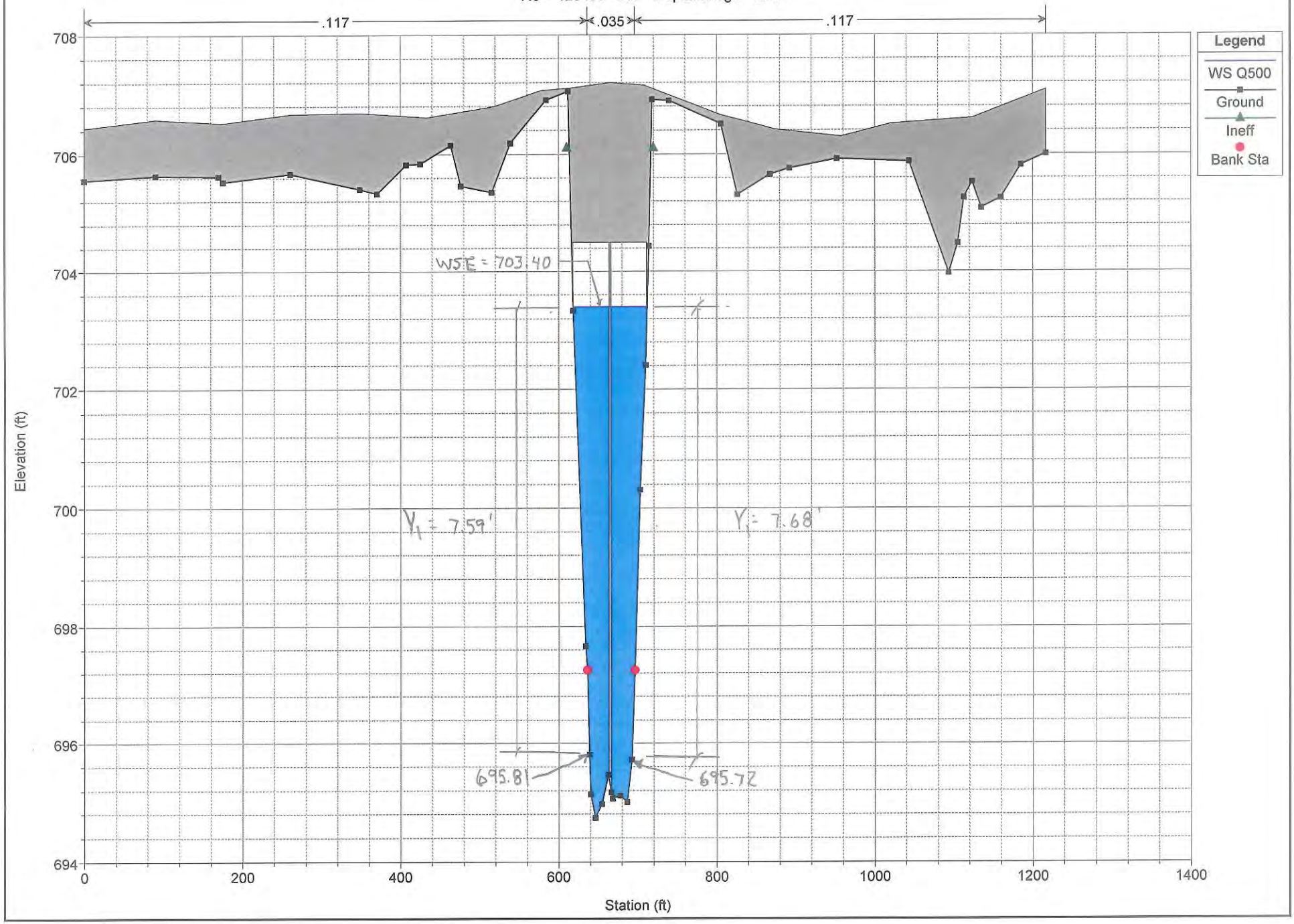
℄ Pier = Sta. 664.92

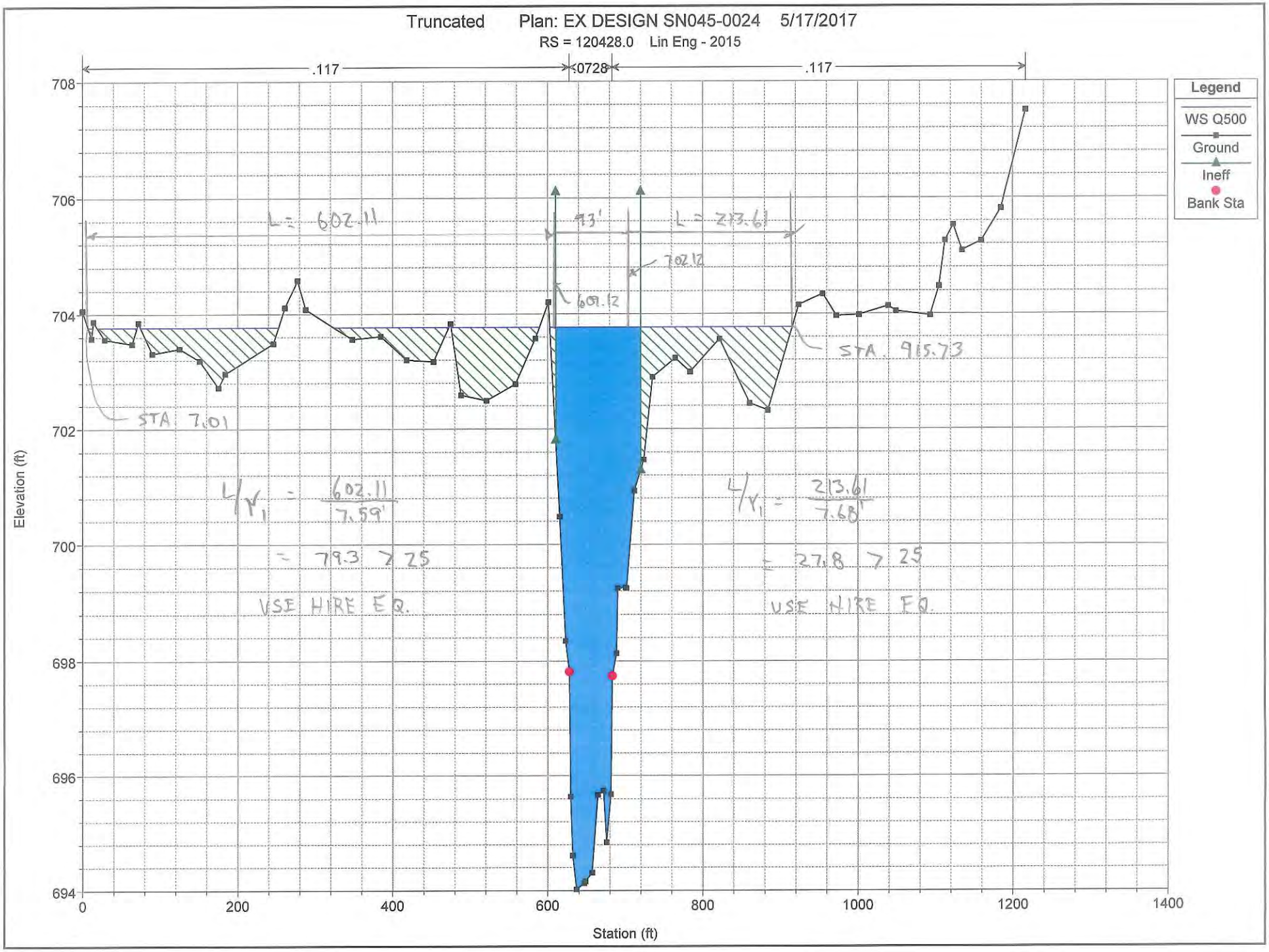
$V = 5.31$ ft/s

$Y_1 = 8.39$ ft.

Truncated Plan: EX DESIGN SN045-0024 5/17/2017

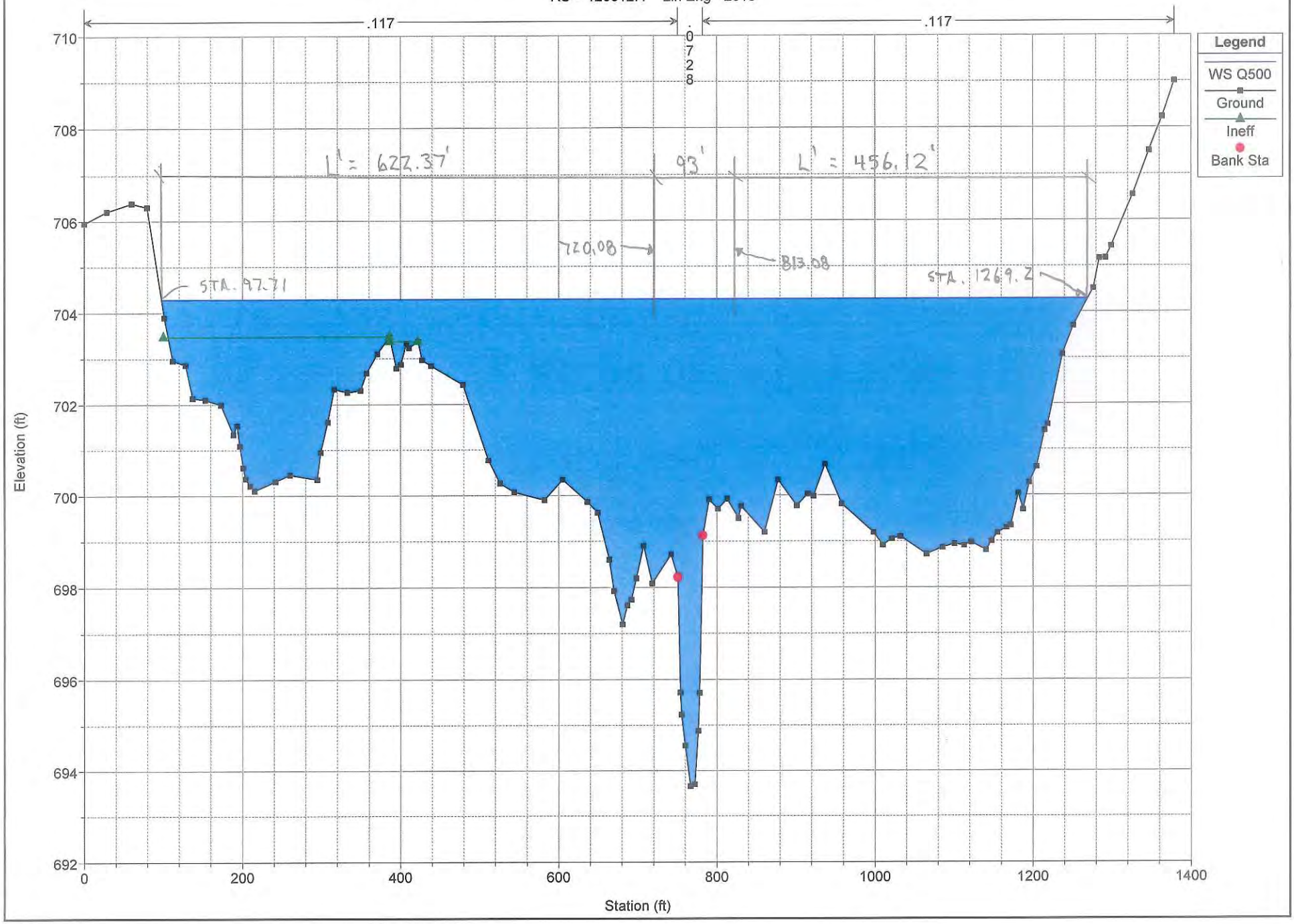
RS = 120403 BR 2 span bridge - IL 47




Truncated Plan: EX DESIGN SN045-0024 5/17/2017
RS = 120428.0 Lin Eng - 2015
.117
.0728
.117
Legend
WS Q500
Ground
Ineff
Bank Sta
L = 602.11
73'
L = 213.61
702.12
609.12
STA. 7.01
STA. 915.73
L/Y1 = 602.11 / 7.59'
= 79.3 > 25
USE HIRE EQ.
L/Y1 = 213.61 / 7.68'
= 27.8 > 25
USE HIRE EQ.
Elevation (ft)
Station (ft)
708
706
704
702
700
698
696
694
0
200
400
600
800
1000
1200
1400

Truncated Plan: EX DESIGN SN045-0024 5/17/2017

RS = 120612.4 Lin Eng - 2015



Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120612.4 Profile: Q500

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)	Shear (lb/sq ft)	Power (lb/ft s)	
1	LOB	50.00	100.00	0.02	0.29	2.30	0.00	0.13	0.06	0.00	0.00	
2	LOB	100.00	147.68	21.20	70.24	47.76	0.65	1.47	0.30	0.04	0.01	
3	LOB	147.68	195.36	49.11	116.21	47.71	1.50	2.44	0.42	0.07	0.03	
4	LOB	195.36	243.04	109.99	188.54	47.73	3.36	3.95	0.58	0.11	0.06	
5	LOB	243.04	290.72	106.55	184.91	47.68	3.26	3.88	0.58	0.10	0.06	
6	LOB	290.72	338.40	52.53	121.07	47.78	1.61	2.54	0.43	0.07	0.03	
7	LOB	338.40	386.08	20.95	69.71	47.70	0.64	1.46	0.30	0.04	0.01	
8	LOB	386.08	422.16	10.34	40.83	36.12	0.32	1.13	0.25	0.03	0.01	
9	LOB	422.16	469.08	21.22	69.79	46.94	0.65	1.49	0.30	0.04	0.01	
10	LOB	469.08	516.01	53.21	121.17	46.97	1.63	2.58	0.44	0.07	0.03	
11	LOB	516.01	562.93	115.50	192.85	46.93	3.53	4.11	0.60	0.11	0.07	
12	LOB	562.93	609.85	120.24	197.56	46.93	3.68	4.21	0.61	0.11	0.07	
13	LOB	609.85	656.77	130.09	207.15	46.95	3.98	4.41	0.63	0.12	0.07	
14	LOB	656.77	703.70	234.00	294.89	47.05	7.16	6.28	0.79	0.17	0.13	100%
15	LOB	703.70	750.62	205.76	272.83	46.99	6.29	5.81	0.75	0.16	0.12	35%
16	Chan	750.62	752.75	18.64	14.55	2.64	0.57	6.84	1.28	0.15	0.19	
17	Chan	752.75	754.87	27.03	17.76	2.49	0.83	8.35	1.52	0.19	0.29	
18	Chan	754.87	757.00	34.31	19.41	2.17	1.05	9.12	1.77	0.24	0.42	
19	Chan	757.00	759.13	36.64	20.10	2.15	1.12	9.45	1.82	0.25	0.46	
20	Chan	759.13	761.26	38.68	20.75	2.15	1.18	9.75	1.86	0.26	0.48	
21	Chan	761.26	763.38	40.60	21.36	2.15	1.24	10.04	1.90	0.27	0.51	
22	Chan	763.38	765.51	42.53	21.96	2.15	1.30	10.32	1.94	0.27	0.53	
23	Chan	765.51	767.64	44.39	22.49	2.14	1.36	10.57	1.97	0.28	0.56	
24	Chan	767.64	769.77	44.72	22.55	2.13	1.37	10.60	1.98	0.28	0.56	
25	Chan	769.77	771.89	44.62	22.52	2.13	1.36	10.59	1.98	0.28	0.56	
26	Chan	771.89	774.02	42.12	22.04	2.20	1.29	10.36	1.91	0.27	0.51	
27	Chan	774.02	776.15	38.08	20.79	2.21	1.16	9.77	1.83	0.25	0.46	
28	Chan	776.15	778.28	31.58	19.15	2.38	0.97	9.00	1.65	0.22	0.36	
29	Chan	778.28	780.40	22.04	16.19	2.68	0.67	7.61	1.36	0.16	0.22	
30	Chan	780.40	782.53	14.73	12.71	2.68	0.45	5.97	1.16	0.13	0.15	
31	ROB	782.53	822.29	123.80	180.18	39.81	3.79	4.53	0.69	0.12	0.08	77%
32	ROB	822.29	862.06	135.47	190.14	39.78	4.14	4.78	0.71	0.13	0.09	100%
33	ROB	862.06	901.82	114.35	171.79	39.80	3.50	4.32	0.67	0.12	0.08	
34	ROB	901.82	941.58	105.67	163.81	39.79	3.23	4.12	0.65	0.11	0.07	
35	ROB	941.58	981.34	119.64	176.47	39.78	3.66	4.44	0.68	0.12	0.08	
36	ROB	981.34	1021.11	152.46	204.08	39.77	4.66	5.13	0.75	0.14	0.10	
37	ROB	1021.11	1060.87	161.19	211.00	39.76	4.93	5.31	0.76	0.14	0.11	
38	ROB	1060.87	1100.63	168.67	216.82	39.76	5.16	5.45	0.78	0.15	0.11	
39	ROB	1100.63	1140.39	164.34	213.47	39.76	5.03	5.37	0.77	0.14	0.11	
40	ROB	1140.39	1180.16	147.58	200.17	39.79	4.51	5.03	0.74	0.14	0.10	
41	ROB	1180.16	1219.92	90.04	148.90	39.84	2.75	3.74	0.60	0.10	0.06	
42	ROB	1219.92	1259.68	14.30	49.36	39.84	0.44	1.24	0.29	0.03	0.01	
43	ROB	1259.68	1299.45	0.10	1.44	9.52	0.00	0.15	0.07	0.00	0.00	

Left Abut L' Limit = (97.71 to 720.08)

Q_e = 1117 cfs

A_e = 1970.4 ft^2

Right Abut L' Limit (813.08 to 1269.2)

Q_e = 1489 cfs

A_e = 2084.7 ft^2

Plan: DESIGN Blackberry Creek Blackberry Creek RS: 120403 BR U Profile: Q500

	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity	Shear	Power
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)	(lb/sq ft)	(lb/ft s)
1	LOB	610.20	636.30	71.87	59.20	19.06	2.28	3.29	1.21	0.39	0.47
2	Chan	636.30	640.30	171.17	29.00	4.51	5.42	7.25	5.90	0.81	4.77
3	Chan	640.30	644.30	236.48	33.60	4.02	7.49	8.40	7.04	1.05	7.41
4	Chan	644.30	648.30	247.39	34.48	4.01	7.84	8.62	7.17	1.08	7.77
5	Chan	648.30	652.30	244.30	34.21	4.00	7.74	8.55	7.14	1.08	7.68
6	Chan	652.30	656.30	238.22	33.71	4.01	7.55	8.42	7.07	1.06	7.49
7	Chan	656.30	660.30	227.77	32.82	4.01	7.21	8.20	6.94	1.03	7.15
8	Chan	660.30	664.31	78.58	26.15	11.21	2.49	7.82	3.01	0.29	0.88
9	Chan	664.31	668.31	40.59	16.95	10.21	1.29	7.99	2.40	0.21	0.50
10	Chan	668.31	672.31	233.81	33.32	4.00	7.41	8.33	7.02	1.05	7.36
11	Chan	672.31	676.31	232.89	33.24	4.00	7.38	8.31	7.01	1.05	7.33
12	Chan	676.31	680.31	232.72	33.23	4.00	7.37	8.30	7.00	1.05	7.32
13	Chan	680.31	684.31	234.74	33.40	4.00	7.44	8.35	7.03	1.05	7.39
14	Chan	684.31	688.32	233.58	33.34	4.01	7.40	8.33	7.01	1.05	7.33
15	Chan	688.32	692.32	215.02	31.77	4.03	6.81	7.94	6.77	0.99	6.72
16	Chan	692.32	696.32	165.33	27.86	4.30	5.24	6.96	5.93	0.82	4.84
17	ROB	696.32	719.66	52.54	45.67	15.95	1.66	3.08	1.15	0.36	0.41

Left Abut Sta. 618.15
$V_1 = 1.21$ ft/s

Right Abut Sta. 711.15
$V_1 = 1.15$ ft/s

EXHIBIT L

CORRESPONDENCE

FILE COPY

Illinois Department of Transportation

Memorandum

To:	James Stumpner	Attn:	Mike Eurkaitis (St. Charles #129 - Kane)
From:	Peter E. Harmet		Sarah Wilson
Subject:	*Drainage Study		
Date:	April 18, 2014		

*Route: IL 47
Limits: at I-88 (Ronald Regan Memorial Tollway)
County: Kane

We are in the process of collecting information from the various sources that pertain to flooding or erosion at the subject location. (Please refer to the attached location map for study limits.)

We have reviewed the Pavement Flooding Prioritization listing and

☐ The area is identified to have pavement flooding.

√ The area is not included in the listing.

Please review your records and provide any additional information you may have regarding flooding, drainage complaints and/or erosion and siltation problems for the concerned area.

Because of the major drainage structures (SN: 045-0024, 045-2001, 045-3057, 045-0270) located within the project limits, please also have your Bridge Maintenance Section check their records for any flooding occurrences or drainage related problems such as debris and/or icing at the subject structure.

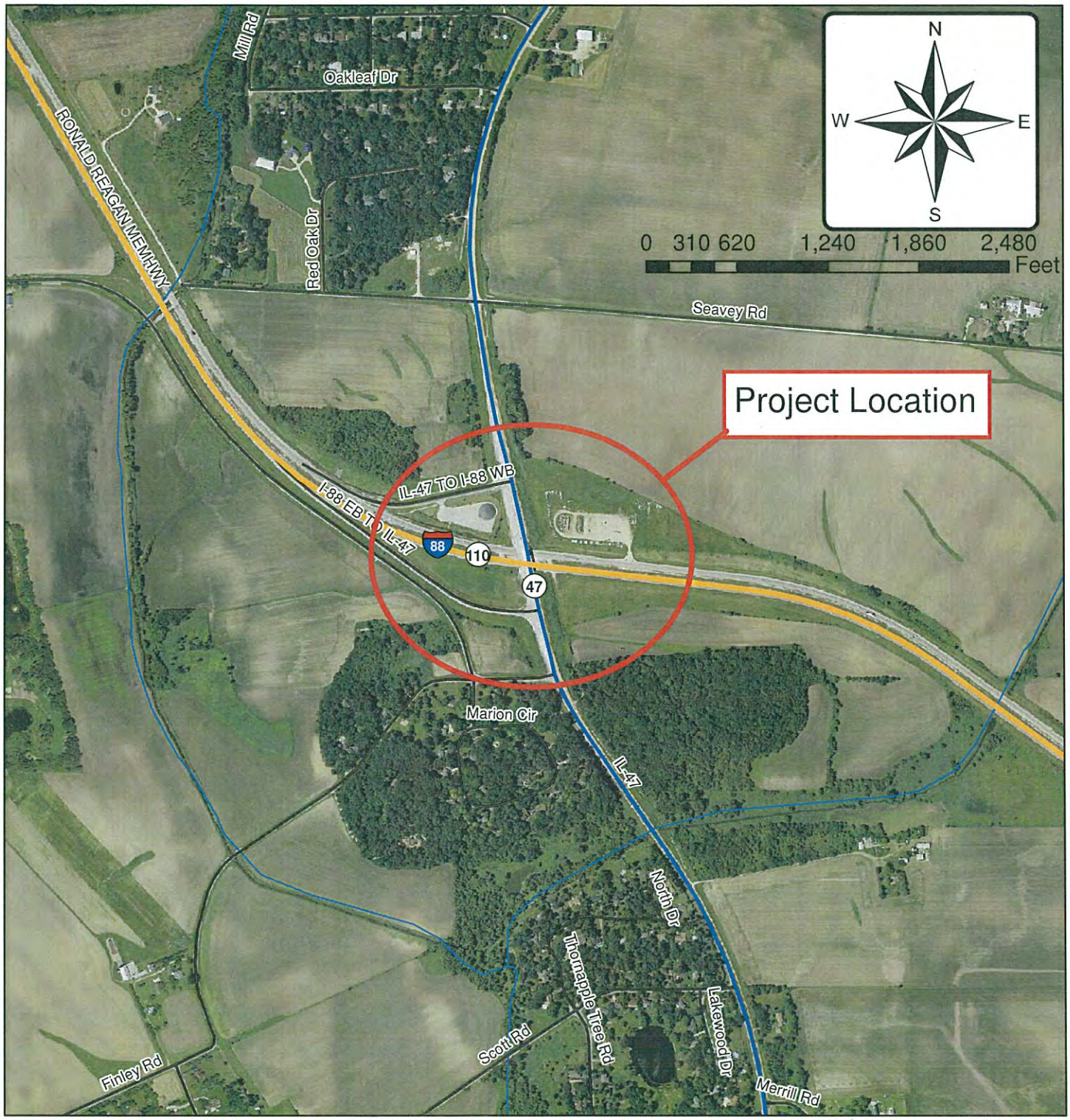
Your early consideration of this request is greatly appreciated.

If you have any questions, or need additional information, please contact Jorge Jimenez, Hydraulics Analysis Engineer, at (847) 705-4711

By: Richard F. Wojcik
Richard F. Wojcik, P.E.
Hydraulics Section Chief

S:\Gen\WP\HYD\H&H\JJ\I-88 @ IL 47\1Flood memo to MTN.docx

General Location Map



I-88 at IL 47
Sugar Grove, IL
Kane County

Jimenez, Jorge L.

From: Mastny, Steve C
Sent: Monday, May 12, 2014 7:57 AM
To: Jimenez, Jorge L.; Burnell, Bryant A; Wilson, Sarah M
Cc: Shirani, Agar B; Valentine, Michael A
Subject: Re: Drainage Investigation IL 47 at I-88

We also do not have any records or recollection of flooding issues in that area, or at the specific structures 045-0082, 045-2001, and 045-0024.

Steve Mastny
Area Bridge Inspection Engineer

----- Original Message -----
From: Jimenez, Jorge L.
Sent: Monday, May 12, 2014 07:17 AM Central Standard Time
To: Burnell, Bryant A; Wilson, Sarah M; Mastny, Steve C
Cc: Shirani, Agar B
Subject: RE: Drainage Investigation IL 47 at I-88

Thank you very much for the speedy response. I will incorporate the information below into the Location's drainage study.

-Jorge Jimenez

-----Original Message-----
From: Burnell, Bryant A
Sent: Monday, May 12, 2014 7:12 AM
To: Wilson, Sarah M; Mastny, Steve C
Cc: Jimenez, Jorge L.
Subject: RE: Drainage Investigation IL 47 at I-88

No flooding issues exist at this location.

Bryant Burnell
Operations Supervisor II
Woodstock Office (815) 338-4680
St. Charles Office (630) 584-4360
Cell (847) 715-8423
· Please consider the environment before printing this e-mail.

-----Original Message-----
From: Wilson, Sarah M
Sent: Thursday, May 08, 2014 12:03 PM
To: Mastny, Steve C; Burnell, Bryant A
Cc: Jimenez, Jorge L.
Subject: Drainage Investigation IL 47 at I-88

Steve / Bryant - please check to see if you have drainage issues to share with Hydraulics on IL 47 in the vicinity of I-88.

Jorge - for your information, Seavy Road is not an IDOT route, so the Bureau of Maintenance has no knowledge of any problems along Seavey Road..

Sarah

Krystian Ustupski

From: Johnston, Peter <peter.johnston@graef-usa.com>
Sent: Monday, July 27, 2015 2:32 PM
To: Geoffrey Elfers
Cc: Bahr, Jon; Sikes, Ryan; Fred Lin; Zhengzhong Zhang
Subject: FW: Rt. 47 @ I-88, files for Lin
Attachments: RE: Drainage Investigation IL 47 at I-88; Re: Drainage Investigation IL 47 at I-88; Drainage Investigation IL 47 at I-88

Per your request. Per below, we can coordinate directly with Hydraulics provided we cc the IDOT PM.

Thanks

From: Bochte, Kyle [mailto:Kyle.Bochte@Illinois.gov]
Sent: Monday, July 27, 2015 2:28 PM
To: Johnston, Peter
Cc: Baldauf, John E.
Subject: FW: Rt. 47 @ I-88, files for Lin

Good Afternoon Pete,

Please see the below response by Jorge (IDOT – Hydraulics Engineer) and attachments pertaining to your below request.

Also, in the future please feel free to coordinate with our Hydraulics Section directly.

- Agar Shirani (Agar.Shirani@illinois.gov)
- Jorge Jimenez (Jorge.Jimenez@Illinois.gov)

Please be sure to CC us on this coordination so we can track its progress.

Thanks,
Kyle

From: Jimenez, Jorge L.
Sent: Monday, July 27, 2015 2:18 PM
To: Bochte, Kyle
Cc: Shirani, Agar B; Baldauf, John E.
Subject: RE: Rt. 47 @ I-88, files for Lin

Hello Kyle,

We do not have any flooding records for the project location here in hydraulics and it looks like maintenance did not have any problems or records either. Please see attached emails for correspondence. They will need these emails to include in the HR.

There is no problem if Graef wants to coordinate with us directly. We would actually prefer it that way. Let me know if there are any other requests submitted by Graef regarding any hydraulic items. I did not know they were waiting for these flooding memos and I never received the request. I feel like some of these requests got lost in transit over to our section.

As always, please let me know if I can do anything to help this project along.

-Jorge

From: Bochte, Kyle
Sent: Monday, July 27, 2015 1:38 PM
To: Jimenez, Jorge L.
Cc: Shirani, Agar B; Baldauf, John E.
Subject: FW: Rt. 47 @ I-88, files for Lin

Good Afternoon Jorge,

Below is a question from our consultant regarding the IL 47 at I-88 Phase 1 project. Can you shed some light on this situation? Also, in the future are you okay if we tell Graef (prime consultant) to directly coordinate with you regarding hydraulics? If so, we will ask them that we are still CCed.

Thanks,
Kyle

From: Johnston, Peter [mailto:peter.johnston@graef-usa.com]
Sent: Monday, July 27, 2015 1:25 PM
To: Bochte, Kyle; Baldauf, John E.
Subject: FW: Rt. 47 @ I-88, files for Lin

Kyle/John,

See below. Do you know if anything was recd. regarding flooding records for the two waterway crossings south of the interchange?

Thanks
Pete

From: Geoffrey Elfers [mailto:gelfers@lineng.com]
Sent: Monday, July 27, 2015 11:42 AM
To: Johnston, Peter
Cc: Bahr, Jon; Fred Lin; Sikes, Ryan; Zhengzhong Zhang
Subject: RE: Rt. 47 @ I-88, files for Lin

Pete,

Regarding the IL 47 creek crossings, were the IDOT maintenance and flooding reports ever provided? We had previously mentioned them and a request was sent to IDOT but I don't believe we received anything back.

Thank you,

Geoffrey Elfers, P.E.
gelfers@lineng.com

Lin Engineering, Ltd.
576 Oakmont Lane, Westmont, IL 60559
Phone: (630)323-5168 ext. 621
Fax: (630)323-5174
www.lineng.com

From: Sikes, Ryan [mailto:Ryan.Sikes@graef-usa.com]
Sent: Friday, February 27, 2015 1:23 PM
To: Geoffrey Elfers
Cc: Johnston, Peter; Bahr, Jon; Fred Lin
Subject: RE: Rt. 47 @ I-88, files for Lin

Hi Geoff,

Pete said he touched base with you, but I wanted to complete the list of questions you had.

Please see my answers below in red. Let me know if you need anything else.

-Ryan

Ryan Sikes
GRAEF
8501 W. Higgins Road
Suite #280
Chicago, IL 60631
(773) 399-5453

From: Geoffrey Elfers <gelfers@lineng.com>
Date: February 26, 2015 at 11:51:47 AM CST
To: "Johnston, Peter" <peter.johnston@graef-usa.com>
Cc: Fred Lin <flin@lineng.com>
Subject: RE: Rt. 47 @ I-88, files for Lin

Pete,

I am working on the hydraulic report for Rt. 47 over Blackberry Creek and there are a few questions/ bits of information I was hoping you could help me with:

- Are photographs of the stream/bridges available from the survey? I would like to add the photographs to the appendices and use them to support roughness coefficients. (I was able to locate two pictures taken during the feasibility study of the bridges/stream, hopefully this will suffice)
- Does GRAEF have aerial-imagery base files and Kane County contour files? I believe these are online but I wanted to check to see if you already had them and if they could be uploaded to the ftp if so. (I was able to locate aerial images we had saved in our directory. I am having the GIS group create a contour map of the project area, and I will upload that to the FTP once it is available. I did upload a larger scale USGS map with contours for the time being)
- We will need correspondence from IDOT maintenance and Kane County regarding any flooding reports they may have on file. Does GRAEF already have correspondence along these lines or do we need to make these requests? Please let me know if you would like me to make these requests and if you have already established contacts for these requests. (We have requested these files and are just waiting on IDOT staff to send them over to us)
- The creek cross sections dgn that GRAEF provided has creek cross sections cut every 25'. I was going to abridge the number of cross sections in the hydraulic model to only those cross sections that were surveyed as part of the stream survey. I wanted to check with you though, were these other cross sections just interpolated from the stream survey and did GRAEF want us to use all of the cross sections in the dgn provided? (Please re-cut the cross sections at the surveyed locations and use those)

Thanks, feel free to give me a call if you think it would be easier to discuss these over the phone.

Geoffrey Elfers, P.E.
gelfers@lineng.com

Lin Engineering, Ltd.
576 Oakmont Lane, Westmont, IL 60559
Phone: (630)323-5168 ext. 621
Fax: (630)323-5174
www.lineng.com

From: Johnston, Peter [mailto:peter.johnston@graef-usa.com]
Sent: Friday, February 13, 2015 3:44 PM
To: Fred Lin
Subject: Rt. 47 @ I-88, files for Lin

Fred,

We have uploaded files to the Lin – In folder, and the following files should be available to you now:

- topo.dgn (Rte 47 Survey)
- CreekTopo.dgn (Blackberry Creek Survey)
- T_00_50CreekAlign000.dgn (Alignments for both Blackberry Creek and Tributary C)
- T_00_XSCreek000.dgn" (Cross Sections for both Blackberry Creek and Tributary C)
- T_00_Existing_BBCreekProf000.dgn (Existing Blackberry Creek profile along existing alignment)
- T_00_Existing_TribCCreekProf000.dgn (Existing Tributary C profile along existing alignment)

Please let us know if you need anything else. We are currently working on inserting the existing ROW.

Thanks
Pete

Krystian Ustupski

From: Burnell, Bryant A <Bryant.Burnell@illinois.gov>
Sent: Monday, May 12, 2014 7:12 AM
To: Wilson, Sarah M; Mastny, Steve C
Cc: Jimenez, Jorge L.
Subject: RE: Drainage Investigation IL 47 at I-88

No flooding issues exist at this location.

Bryant Burnell
Operations Supervisor II
Woodstock Office (815) 338-4680
St. Charles Office (630) 584-4360
Cell (847) 715-8423
 Please consider the environment before printing this e-mail.

-----Original Message-----
From: Wilson, Sarah M
Sent: Thursday, May 08, 2014 12:03 PM
To: Mastny, Steve C; Burnell, Bryant A
Cc: Jimenez, Jorge L.
Subject: Drainage Investigation IL 47 at I-88

Steve / Bryant - please check to see if you have drainage issues to share with Hydraulics on IL 47 in the vicinity of I-88.

Jorge - for your information, Seavy Road is not an IDOT route, so the Bureau of Maintenance has no knowledge of any problems along Seavey Road..

Sarah

EXHIBIT M

CD OF HEC-RAS MODELS AND PDF OF REPORT

HYDRAULIC REPORT

ROUTE:	F.A.P. Route 326/Illinois Route 47 over Seavey Road Run (Tributary C of Blackberry Creek)
COUNTY:	Kane County
STRUCTURE NUMBER:	Existing: 045-2001, Proposed: TBD
PTB/ITEM #:	N/A
JOB NO.:	P-91-015-14

Prepared for:

Illinois Department of Transportation
Division of Highways – District 1
Bureau of Programming
Hydraulic Section

Prepared By:

LIN ENGINEERING, LTD
Consulting Engineers

576 Oakmont Lane
Westmont, IL 60559
Phone: (630) 323-5168
Fax: (630) 323-5174

September 2017

HYDRAULIC REPORT

IL. RTE. OVER SEAVEY ROAD RUN (TRIBUTARY C)

JOB NO. P-91-015-14

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II. WATERWAY INFORMATION TABLES

III. HYDRAULIC REPORT DATA SHEETS (BBS 2800)

IV. EXHIBITS

Exhibit A General Location Map

Exhibit B Photographs of the Structure and Surrounding Area

Exhibit C Hydrology
- FIRM, Kane County, IL; Map #17089C0315J
- FIRM, Kane County, IL; Map #17089C0305J
- Excerpts from Flood Insurance Study
- StreamStats Drainage Area

Exhibit D Cross Sections
- Aerial Topography with Cross Section Locations
- Ineffective Area Offset Calculations
- Surveyed Cross-Sections

Exhibit E Streambed Profile

Exhibit F Roadway Plan and Profile

Exhibit G Existing Structure Plan & Opening Plot

Exhibit H Survey Notes

Exhibit I HEC-RAS Model Report Printout (Permit)
- Natural Condition (Water Surface Profile, Standard Tables, Report Printout)
- Existing Condition (Water Surface Profile, Standard Tables, Report Printout)

Exhibit J HEC-RAS Model Report Printout (Design)
- Natural Condition (Water Surface Profile, Standard Tables, Report Printout)
- Existing Condition (Water Surface Profile, Standard Tables, Report Printout)

Exhibit K Correspondence

Exhibit L CD / Flash Drive of the Following Information:
- HEC-RAS Model Files
- PDF of Current Hydraulic Report
- PDF of the FEMA FIS for Kane County: August 3, 2009
- PDF of USGS Scientific Investigations Report 2005-5270: 2005
- PDF of Blackberry Creek Watershed Management Plan: September, 1999

I. NARRATIVE

HYDRAULIC REPORT
EX S.N. 045-2001

PROJECT DESCRIPTION

This hydraulic report has been prepared for the Illinois Department of Transportation (IDOT) in order to evaluate the hydraulic performance of the existing structure (S.N. 045-2001) on Illinois Route 47 over Seavey Road Run, 0.4 miles south of I-88 in Kane County, Illinois. Seavey Road Run is also referred to as Tributary C of Blackberry Creek in previous Flood Insurance Studies.

The proposed work is expected to include widening of IL 47 from one lane in each direction to two lanes in each direction. In addition, a median will be added in the center, a multi-use path accommodation will be added on the east side and a sidewalk accommodation will be added on the west side. Due to the increased width of IL 47, a replacement culvert or bridge has been considered; however, an extension of the existing 3 barrel box culvert is the most likely preferred alternative at this time. The project location map is shown in **EXHIBIT A.**

DESCRIPTION OF EXISTING STRUCTURE AND FLOODPLAIN

The existing structure S.N. 045-2001 over Seavey Road Run (Tributary C) is a three celled 7' (W) x 8' (H) concrete box culvert, approx. 90' in length, and was built as F.A. Route 64 (Illinois Route 47), Section 107, in 1971. The centerline of structure and streambed alignment has zero skew relative to the centerline of IL 47. The subject structure is located in low-urban area within the Blackberry Creek watershed. See the attachment in **EXHIBIT F** for the existing roadway plan and profile.

Seavey Road Run (Tributary C) is a tributary to Blackberry Creek that flows from north to south. FEMA has designated floodplains and floodways along Blackberry Creek and its' tributaries including Tributary C as illustrated on the Flood Insurance Rate Map in **EXHIBIT C**. The observed/surveyed water surface elevation at the upstream section of the structure is approximately 704.40 as recorded in August of 2014. The FEMA Floodway and Floodplain boundaries are also scaled onto **EXHIBIT D** (cross section locations), which shows a plan view of the cross section locations relative to the computed 100-year floodplain and ineffective area offsets.

Analysis on the existing subject structure has indicated that a 3' freeboard from the lowest edge of the pavement within the floodplain boundary is met for the 50 year storm HWE. The existing culvert geometry is detailed in the survey notes provided in **EXHIBIT H**; as well as in the culvert opening plot and existing culvert plans shown in **EXHIBIT G**. The low roadway elevation in the floodplain is located at roadway station (Illinois Route 47) 143+57 at elevation 714.90 as taken at the upstream edge of pavement. The existing IL 47 consists of two 12' asphalt lanes, 4' asphalt shoulders and 5' agg. shoulders on both sides of the roadway. The subject structure, S.N. 045-2001, is located at the sag of a vertical curve. The existing roadway crown can be classified as normal within the project limits. See EXHIBIT F for the existing roadway plan and profile.

HYDRAULIC REPORT
EX S.N. 045-2001

The Seavey Road Run (Tributary C) upstream drainage basin is 6.6 square miles at the Illinois Route 47 crossing according to StreamStats delineation tools, which correlates with the Flood Insurance Study (**EXHIBIT L**). Upstream of the study culvert, the stream channel is approximately 10 feet wide from toe to toe of slope, and 20-25' wide from top to top of banks. The channel bottom is muddy and slightly vegetated within some segments, while the channel banks are grassy and heavily vegetated. Some debris consisting of fallen branches, tree saplings, and brush is present in the channel, especially near the upstream section of the existing IL 47 culvert. Downstream of the study structure, the channel width and shape is similar to the upstream sections. The channel is bounded by residential area to the south and forested area to the north. The bottom of the streambed is muddy, and the banks of the channel are grassy on both sides, with trees on the right over bank as well. Sporadic debris is present in the downstream channel segment similar to the upstream section. A large amount of brush, branches and removed concrete were found approximately 300' downstream of Illinois Route 47.

There are also 3 small pedestrian bridges located approximately 300', 650' and 1000' downstream of the existing structure, measured along the stream centerline. The origin of these bridges is unknown, and they are inundated by floods in excess of the 5-year storm. The pedestrian bridges are not included in the FIS Regulatory Model. Due to their small size and insignificant impact on flood profiles, they are not included in the surveyed/updated data entered into the FIS Regulatory Model.

Past IDOT structure reports have not indicated the presence of scour at the structure, and there are no indications of aggradation or degradation. See **EXHIBIT B** for a visual description of the project site.

The nearest upstream structure is the I-88 box culvert, located approximately 3057' upstream of subject structure S.N. 045-2001. The nearest major downstream structure is the Scott Road Bridge, located 2300' downstream of subject structure and approximately 250' downstream of the Seavey Road Run (Tributary C) and Blackberry Creek junction.

FIELD OBSERVATIONS

Hydraulic survey of the stream was performed on August 2014, and it consisted of a total of eight floodplain cross sections, seven additional stream cross sections, three pedestrian bridges and one major existing hydraulic structure. The edges of the reach banks consist of well vegetated grasslands and forested areas. The streambed is muddy with some vegetation. Upstream of the Illinois Route 47 culvert crossing, there is a large amount of debris and brush between the wing walls of the box culvert. This debris can be seen in the photographs included in **EXHIBIT B**, which have been taken during the August 2015 field inspection.

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HISTORICAL OBSERVATIONS/RECORDS

There are no records of water overtopping the existing IL 47 culvert or roadway pavement, and no high water marks have been observed at the IL 47 and Trib. C crossing. A flood of October 1954 has been documented in the Hydrologic Investigations Atlas HA-229 (**EXHIBIT A**). Based on Figure 5 of HA-229 the water elevation of Seavey Road Run at Illinois Route 47 was approximately 710.00. A storm recorded in July 1996 caused widespread flooding in Aurora and Montgomery, which are located approximately 6 miles downstream of the subject culvert. This event has been documented in the USGS Scientific Investigations Report 2005-5270 (**EXHIBIT L**). The overflow of Jericho Lake is the cause of the flooding of the Montgomery Overflow and the US-30 pavement. The Jericho Lake Overflow does not impact Blackberry Creek upstream; therefore, it should not be a concern at this location.

Any improvements to the subject structure should not exacerbate the flooding issues along Blackberry Creek in Aurora or Montgomery. See **EXHIBIT K** for the correspondence in regards to historical data.

OTHER STUDIES AND AFFECTED AGENCIES

The development of the studies related to Blackberry Creek and its' tributaries is described in the most recent flood insurance study published for Kane County in 2009. Studies that predate the FEMA county wide studies include the FIS reports dated March 1, 1982, March 4, 1988, and June 4, 1996 prepared by the USACE. The latest Federal Emergency Management Agency Flood Insurance Rate Maps for the location of the subject structure were released in 2012. The FIS Regulatory Model used to perform the hydraulic analysis for this report was obtained from FEMA

Scientific Investigation Report 2005-5270: Continuous Hydrologic Simulation and Flood-Frequency, Hydraulic, and Flood-Hazard Analysis of the Blackberry Creek Watershed were developed by USGS in 2005. This report was developed in coordination with IDNR-OWR, and all affected villages and counties based on recommendations of the Blackberry Creek Watershed Management Plan.

The Blackberry Creek Watershed Management Plan was drafted by the Blackberry Creek Watershed Resource Planning Committee in coordination with the Kane-DuPage Soil and Water Conservation District in 1999. These previous studies are attached as appendices with this hydraulic report.

The pdfs of these previous studies, in their entirety, are copied on the CD / flash drive attached in **EXHIBIT L**

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Background Data:
The following documents were utilized in developing this report:
• Flood Insurance Rate Map, Kane County, Illinois and Incorporated Areas, Map No. 17089C0315J, Panel 315 of 410; Map Revised: July 17, 2012. (**EXHIBIT C**).
• Flood Insurance Rate Map, Kane County, Illinois and Incorporated Areas, Map No. 17089C0305J, Panel 305 of 410; Map Revised: July 17, 2012. (**EXHIBIT C**).
• Hydrologic Investigations Atlas HA-229: 1966. (**EXHIBIT A**).
• Federal Emergency Management Agency – Flood Insurance Study for Kane County, Illinois and Incorporated Areas, Flood Insurance Study Number 17089CV001C, Revised: August 3, 2009. (Excerpts in **EXHIBIT C** and full volume in **EXHIBIT L**).
• USGS Scientific Investigations Report 2005-5270, created in cooperation with the Kane County Department of Environmental Management, Illinois Department of Natural Resources-Office of Water Resources, and the Federal Emergency Management Agency: 2005. (**EXHIBIT L**).
• Blackberry Creek Watershed Management Plan: September 1999. (**EXHIBIT L**).

DATUM CORRELATION
Hydraulic surveys of the stream profiles and floodplain cross sections were performed in August of 2014. The topographic and hydraulic survey elevations are correlated with the North American Vertical Datum of 1988 (NAVD88). Previous cross section information included in the USGS and FEMA hydraulic models also reference the NAVD 88 datum.

SENSITIVE FLOOD RECEPTORS
Based on a review of available aerial photography, site photos, and survey notes, there are no sensitive flood receptors within the FEMA defined floodplain. There are no residential, commercial or industrial buildings immediately adjacent to the floodplain upstream of the subject structure S.N. 045-2001. Downstream of the subject structure Seavey Road Run passed through a residential area, but all buildings are located outside the FEMA defined floodplain based on aerials and existing contours.

HYDROLOGIC METHODOLOGY
The FEMA FIS study for Kane County and the USGS SIR 2005-5270 describe the methods used to compute the peak discharges along the Blackberry Creek watershed. Both reports reference a Hydrologic Simulation Program – FORTRAN (HSPF) model being used to compute the peak discharges along the Blackberry Creek. The FORTRAN (HSPF) model uses a 71.16 square mile drainage area of the Blackberry Creek watershed that is divided into 49 sub basins. Both studies (FEMA and USGS) seem to reference/use the same FORTRAN model. Peak flow rates for the 10, 50, 100, and 500 year storms were computed at various crossings along the Blackberry Creek Watershed. It should be noted that the FEMA FIS study shows hydrologic and hydraulic analysis of every watershed in

Kane County while the USGS SIR 2005-5270 focuses only on the Blackberry Creek watershed.

All of the hydrologic data used for this report has been taken directly from the FEMA FIS Regulatory HEC-RAS model that was purchased from the FEMA Library. It should be noted that the Steady Flow Data File used in the HEC-RAS Regulatory Model is entitled '2005Flows', which confirms the connection between the peak flows computed in the 2005 study and the peak flows used in the 2009 FEMA FIS Regulatory Model.

Excerpts from the Flood Insurance Study for Kane County are shown in **EXHIBIT C**. Also, **EXHIBIT C** (page 12 of 12) shows a comparison of the FIS Regulatory Model peak flow rates at IL-47 to the peak flow rates generated by USGS StreamStats Version 3. Although the flow rates were very similar between Steamstats and the Regulatory model, the Regulatory model flows are used in the hydraulic analysis at this site.

HYDRAULIC METHODOLOGY

All hydraulic analyses were performed using HEC-RAS Version 4.1.0 hydraulic modeling software. As mentioned in the preceding section, the FEMA Regulatory model produced for the Flood Insurance Study for Kane County, 2009 (**EXHIBIT L**) was purchased from the FEMA Engineering Library. This FIS model included hydraulic data and river reaches for the entire Blackberry Creek watershed.

Since the model was created in HEC-RAS, it was easy to get the model to run and recreate the regulatory flood profiles. Also, there wasn't any need to recreate the regulatory model from different software such as HEC-2, WSP2, or WSPRO.

There is a vast amount of data in the original FIS Regulatory Model since it covers the entire Blackberry Creek Watershed. It would be unnecessary to use and show the entire Blackberry Creek Watershed model for the hydraulic analysis at IL-47 over Seavey Run Rd. (Tributary C to Blackberry Creek). A more desirable scenario includes creating a truncated model which only consists of the reach that contains the subject crossing. This reach is known as "Trib C Before CA". In the full model, the downstream boundary condition for this reach (Trib C Before CA) depended on the flow optimization of the junctions along all of the downstream reaches. For the truncated model, the FIS water surface elevations for the 10, 50, 100, and 500 year flood profiles at Sta. 931 were used as the downstream boundary condition. Supercritical was selected as the upstream boundary condition, and the truncated model was run under a mixed flow regime. The results showed that the truncated model matched exactly to the original full FIS Regulatory Model within the "Trib C Before CA" reach; therefore, the truncated model is carried forward as the "recreation" of the FIS Regulatory Model.

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The following are the HEC-RAS plan titles for the Regulatory Models:

1. Original FIS Regulatory Model – Plan: Original_FIS_REG_Model
2. Truncated FIS Regulatory Model – Plan: FIS_REG_Trunc

After the truncated model was created, the culvert length shown in the regulatory model at IL-47 had to be edited to match the surveyed culvert length and culvert length shown on the 1971 culvert plan (see **Exhibit F**). The culvert length shown in the original FIS Regulatory Model was only 70'; however, the surveyed length and length shown on the existing plan indicate that it should be 90' from outside of headwall to outside of headwall. The revision was made by changing the length of the culverts 1-3 at RS 2050 to 90' instead of 70', and the distance to the upstream XS was revised to 2.5' instead of 10'. The data in the Deck/Roadway Data Editor was left alone.

The change in culvert length did not have much of an impact on the flood profiles as they remained within 0.01' of the Truncated FIS Regulatory Model. The corrected model with the 90' culvert length under IL-47 is now the current regulatory model for the purposes of this hydraulic analysis. This model has a plan entitled: FIS_REG_Trunc_90'culv.

The next step was to insert the updated, surveyed data into the original FIS Regulatory model. The area of focus (study limits) is from station 931 to station 3851 within the Trib C Before CA reach. The goal was to run the model with the updated data and match the flood profiles for every FIS cross section to within 0.1'. Table A shows the results of the comparison.

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Station	Flood	Original FIS Reg. Model Truncated	FIS Reg. Model - Trunc 90' Culvert	Reg. FIS Model w/ surveyed data	Elev. Difference
		Elev. (ft)	Elev. (ft)	Elev. (ft)	(ft)
		A	B	C	C - B
3851	10	708.53	708.53	708.71	0.18
3851	50	709.40	709.40	709.63	0.23
3851	100	709.81	709.81	710.10	0.29
3851	500	710.91	710.93	711.08	0.15
2422	10	707.57	707.57	707.63	0.06
2422	50	708.63	708.63	708.71	0.08
2422	100	709.09	709.10	709.19	0.09
2422	500	710.36	710.40	710.44	0.04
2139	10	707.52	707.53	707.56	0.03
2139	50	708.58	708.59	708.64	0.05
2139	100	709.05	709.06	709.12	0.06
2139	500	710.33	710.36	710.38	0.02
2094	10	707.42	707.43		
2094	50	708.38	708.39		
2094	100	708.79	708.80		
2094	500	709.91	709.95		
2050					
1999	10	707.28	707.28		
1999	50	708.06	708.06		
1999	100	708.35	708.35		
1999	500	709.08	709.08		
1903	10	707.22	707.22	707.15	-0.07
1903	50	708.01	708.01	707.96	-0.05
1903	100	708.31	708.31	708.29	-0.02
1903	500	709.02	709.02	709.05	0.03
931	10	706.25	706.25	706.25	0.00
931	50	707.21	707.21	707.21	0.00
931	100	707.54	707.54	707.54	0.00
931	500	708.26	708.26	708.26	0.00

Table A: Original FIS Regulatory Model Vs. FIS Regulatory Model with Updated data

As the original model was updated with surveyed data, measures were taken to try and replicate the flood profiles of the original model. These measures included the following:

1. The channel and overbank Manning's n values for the surveyed sections match the values of the FIS sections within the study limits; 0.12 overbank and 0.7 channel, and 0.4 channel at the next upstream and next downstream sections from IL-47 culvert. This was done in an attempt to match flood profiles and also because the Manning's values used in the FIS model appear to be correct, or at least close enough.
2. The surveyed section 2101 replaced FIS section 2094 at the upstream face of IL47 and the surveyed section 1992 replaced section 1999 at the downstream section. This was done for the sake of clarity and because surveyed openings needed to replace the FIS openings as part of updating the entire IL-47 crossing with surveyed data. This note explains why sections 1999 and 2094 are not shown for the updated model in Table A.
3. Initially, ineffective area offsets were only used at the next upstream (station 2101) and next downstream (station 1992) to match the use of IAOs shown in the original model. When the match in profiles was not achieved by the first run, the IAOs were computed and entered into the model using a 1:1 contraction and 1:2 expansion rates. IAOs were used from surveyed station 1517 to FIS station 2139. As a result, the profiles of the updated model were closer in value to the profiles of the original FIS.

The updated and original models matched from station 931 to station 2422; however, not within tolerance (0.1') for the last FIS section at Station 3851 (See Table A). As a result, two separate models and two waterway information tables WITS will be used in the hydraulic analysis.

The first model will be the Original FIS Regulatory Model with the surveyed IL 47 culvert and profile data used at the IL 47 culvert crossing at Seavey Road Run (Trib C to Blackberry Creek). This includes the IL 47 surveyed profile and culvert, the upstream and downstream surveyed openings, and the next upstream (2101) and downstream (1992) sections, respectively. This model and WIT will be used for permitting purposes and will be referred to as the PERMIT model.

The second model will be the Original FIS Regulatory model with all of the surveyed/updated cross sections and IL 47 crossing data included, as shown in Table A. This model and WIT will be used for design purposes and will be referred to as the DESIGN model.

As mentioned in note 3 of the preceding text, the limits of ineffective flow were calculated using a contraction ratio of 1:1 and an expansion ratio of 1:2. The elevation for ineffective flow, upstream, was set at the overtopping elevation of 715.28. The

contraction and expansion coefficients were set to 0.3 and 0.5, respectively, for sections that were within the expansion and contraction cones. It should be noted that some sections were supplemented with LiDAR data to extend the floodplain limits. It should also be noted that the center, thalweg, or average point between bank stations was shifted to cross section station 1000 for each surveyed and FIS section within the study limits. This shift in reference point for each section does not impact the computed flood profiles of the models.

See **EXHIBIT D** for location and elevation views of all cross-sections. The surveyed cross sections were imported into HEC-RAS using GEO-PAK.

Manning's Roughness Coefficient

The analysis of the roughness coefficients is based on the origination of the FIS model, and followed the procedures outlined in the IDOT D.M., Chapter 5 - Open Channel Flow. The following is an independent calculation using IDOT procedures to check and validate the numbers used in the Original Regulatory Model.

The photographs (**EXHIBIT B**) of Seavey Road Run (Tributary C) taken in August of 2015 were referenced for general channel and floodplain descriptions. Additional visual resources used in the analysis included aerial photography and previous floodplain reports compiled by USGS SI Report 2005-5270 (**EXHIBIT L**).

Seavey Road Run (Tributary C) is a well-defined channel with highly vegetated banks. The creek and surrounding area is flat with stream waters that are not visibly flowing when there has not been a recent storm event. Majority of the land use within the project limits, adjacent to the channel can be classified as grassland and forested area, as well as some residential upstream of Illinois Route 47. The following is the Manning's "n" Roughness Coefficient computation for Seavey Road Run (Tributary C):

Channel Roughness Coefficient

-Using Modified Channel Method

$n_{fp} = (n_b + n_1 + n_2 + n_3 + n_4)m$

n_b = Base Value = firm muddy soil (range .025-.032) use 0.032

n_1 = Degree of channel irregularity – Minor; generally water is contained within a well-defined channel with clear bank locations. The sides of the channel do not appear to be eroded and the banks are stabilized with vegetation. (Range 0.001 to 0.005) use 0.005

n_2 = Alternating occasionally; the size and shape of channel cross-sections is mostly consistent although sections do occasionally shift from side to side, (Range 0.001-0.005) use 0.005

n_3 = Effect of obstruction – Negligible; the creek does not contain boulders or trees and debris within the channel section. (Range 0.000 – 0.004) use 0.004

n_4 = Amount of vegetation = Medium to Large; the creek bed and flow area is generally muddy with no vegetation. The depth of flow is generally high when compared to minor vegetation that may be occasionally present at the bottom of the creek. The banks are well vegetated from toe of slope to top of bank. (range 0.01 – 0.05) use 0.025
m = Degree of meandering = Minor, use 1.0

$n = (n_b + n_1 + n_2 + n_3 + n_4)m$
n_{fb} = (0.032 + 0.005 + 0.005 + 0.004 + 0.025)1.0 = **0.071; use .07**

Floodplain Roughness Coefficient
-Using Modified Channel Method
$n_{fp} = (n_b + n_1 + n_2 + n_3 + n_4)m$

n_b = Base Value = firm soil (range .025-.032) use 0.032
n_1 = Degree of floodplain irregularity – Minor; the banks are stabilized with vegetation although there are minor rises and dips. (Range 0.001 to 0.005) use 0.005
n_2 = Not applicable
n_3 = Effect of obstruction – Minor; trees line the channel banks. (Range 0.005 – 0.019) use 0.019
n_3 = Effect of obstruction – Appreciable (west of Illinois Route 47, north river bank); trees line large areas within the floodplain. (Range 0.020 – 0.030) use 0.030 for the floodplain north of Seavey Road Run, downstream of S.N. 045-2001
n_4 = Amount of vegetation = Large; the floodplains and overbanks are well vegetated with tall grasses, shrubs, and brush. (Range 0.025 – 0.050) use 0.050
m = Degree of meandering = Not applicable, use 1.00

$n = (n_b + n_1 + n_2 + n_3 + n_4)m$
n_{fb} = (0.032 + 0.005 + 0.000 + 0.019 + 0.050)1.00 = **0.106**
n_{fb} = (0.032 + 0.005 + 0.000 + 0.030 + 0.050)1.00 = **0.117** (downstream, north river bank).

The FIS Regulatory Model uses 0.04-0.07 and 0.12 for the channel and floodplain roughness coefficients for the Seavey Road Run (Trib C) watershed within the hydraulic study limits. Ranges of Manning's 'n' Coefficients varied from .060 to .070 and 0.060-0.140 for the channel and overbank roughness coefficients for the remainder FIS study beyond Illinois Route 47.

SUMMARY OF NATURAL AND EXISTING HYDRAULIC ANALYSES

The analysis of created head depends on establishing the natural high water elevation NHWE at the upstream face of the existing culvert. The natural model is a copy of the

existing model with the IL 47 crossing removed, including the effects of the road's embankment on cross sections such as the next upstream and next downstream section. The next upstream (2101) downstream (1992) cross sections in both DESIGN and PERMIT models were removed because the shapes of the channel and overbanks reflected the presence of the IL 47 crossing. Existing expansion and contraction cones are removed as well, resulting in the removal of all ineffective area offsets from the study limits. Also, the contraction and expansion coefficients for sections with IAOs are reset to 0.1 and 0.3, respectively.

For the purposes of the existing analysis, the NHWE is computed at the existing upstream face, river station 2091, which is only 10' downstream from the existing culvert face. The cross sections used to linearly interpolate the NHWE are Sta 2136 and Sta 1947 (See WIT Back-up Calcs Tables 1.2 and 1.4). It should be noted that once the proposed condition is established and a replacement structure is selected, the NHWE will be shifted to the station of the upstream face of the proposed structure.

Waterway opening areas are measured / computed by estimating the cross-sectional area of water that passes through the existing culvert opening. The NHWE is used as the water surface for each flood profile, and a back-up exhibit can be found after the WITs in **Section II**. All elevations used in the opening area calculations are shown on the Effective Waterway Opening Exhibit.

Created Head is added to the computed NHWE elevations to get the existing headwater elevations at the IL 47 culvert. Created head values are determined from the largest elevation difference between existing and natural flood profiles in the upstream cross sections within the study limits (Sta 2136 to Sta 3851). The largest change in computed water surface elevation occurs at Section 2139 in the DESIGN and PERMIT analyses (See WIT Back-up Calcs Tables 1.2, 1.3, 1.5, and 1.6).
Created head values for the existing DESIGN model were calculated as 0.2', 0.5', 0.7', and 1.2' for the 10-, 50-, 100-, and 500-year profiles, respectively. Similarly, created head values for the existing PERMIT model were calculated as 0.1', 0.3', 0.5', and 0.9'.

The 'PERMIT' and 'DESIGN' HEC-RAS model results for natural and existing conditions are attached to **EXHIBIT I** and **EXHIBIT J,** respectively. The output summaries include Standard Tables 1 and 2 as well as the list of common warnings and notes associated with each model. These warnings indicate that in some cases the cross sections may be spaced too far apart, divided flow may be present, or multiple solutions may existing for critical depth. The models contain no errors and the hydraulic results appear to be reasonable, so no action was taken to eliminate the warning messages as the same warning messages were present in the Original FIS Regulatory Model.

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The following is a list of the HEC-RAS plan names used in the "PERMIT" and "DESIGN" analyses:

- PERMIT – Natural: TribC_0452001_Permit_Natural
- PERMIT – Existing: TribC_0452001_Permit_Exist
- DESIGN – Natural: TribC_0452001_Design_Natural
- DESIGN – Existing: TribC_0452001_Design_Exist

COMPENSATORY STORAGE

Proposed geometry and scope of work has not been finalized. Compensatory storage calculations and exhibit to be provided if determined to be necessary.

PERMIT REQUIREMENTS

Proposed geometry and scope of work has not been finalized. Any construction within Regulatory Floodways of Cook, DuPage, Kane, Lake, McHenry, and Will Counties will require a Floodway Part 3708 permit. The permit criteria for bridge construction include:

A. Backwater increase limited to 0.1 ft. over existing 100 year flood profile.

B. If damages occur for existing conditions backwater must be reduced to point of non-damage or to 0.1 ft. over natural conditions.

C. Compensatory storage must be provided for fill placed between the normal water and the 10 year and between the 10 year and 100 year flood profile.

FREEBOARD / CLEARANCE

IDOT design requirements state that a minimum freeboard of three feet be established between the design 50-year headwater elevation and the low edge of pavement within the floodplain. The existing low edge of pavement elevation does not occur within the culvert structure itself but is instead located approximately 150' south of the structure's centerline, IL 47 Sta. 144+00. The computed design headwater elevation does meet the minimum three foot freeboard requirement for the existing structure. Table B illustrates the freeboard required and provided by the existing structure.

Design 50-year H.W.E.	Existing Pavement Elevation	Freeboard Required	Freeboard Provided
708.58'	714.96'	3'	6.38'

Table B: Existing Structure Freeboard Requirements

CONCLUSIONS

The results from the hydraulic analysis indicate that existing culvert (S.N. 045-2001) is fully functional, meets IDOT's freeboard criteria, and does not overtop or appear in poor condition. The proposed condition is still to be determined and will add to the conclusion at that time.

II. WATERWAY INFORMATION TABLES

Illinois Department of Transportation

Table 1.1 (Design)

Culvert Waterway Information Table

Route:	IL Route 47	Existing SN:	045-2001		
Waterway:	Seavey Road Run (Tributary C)	Proposed SN:	T.B.D		
Section:	107	Prepared by:	KU	Date:	12/8/2016
County:	Kane	Checked by:	SGL	Date:	9/18/2017

Drainage Area = 6.6 square miles

Existing Overtopping Elev. = 715.28 at Sta. 144+00
Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	363	126		707.3	0.2		707.5	
Design	50	623	142		708.1	0.5		708.6	
Base	100	755	149		708.4	0.7		709.1	
Scour Design Check									
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	1115	165		709.1	1.2		710.3	

Datum:

All-Time H.W.E. & Date: 710.00 (1954) ft

Surveyed Normal Water Level: 704.40 ft

10-Year Velocity through Existing Structure = 2.82 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 150 ft^3/s

EXISTING STRUCTURE		PROPOSED STRUCTURE	
Type:	Box Culvert	Culvert Type:	
Length/Width:	90' / 22.2' (3 cell total)	Length Of Span:	
# Spans/Cells:	3 - 7' (W) X 8' (H)	# Cells:	
Low Chord:		Top Of Crown Elev.: Beam:	
Skew:	0 (relative to road)	Skew:	(relative to road)
Clearance:		Culvert Invert Elev.:	(u/s) (d/s)
Bridge Flow Line:	(u/s) (d/s)	Low E.O.P:	
Low E.O.P:	714.96	Freeboard:	
Freeboard:	6.38		
Culvert Inverts:	701.26 (u/s) 701.15 (d/s)		

EXISTING EMBEDMENT		PROPOSED EMBEDMENT	
Depth:	0.0	Depth:	
U/S Streambed Elev.:	701.26	U/S Streambed Elev.:	
D/S Streambed Elev.:	701.15	D/S Streambed Elev.:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

BACK-UP CALCULATIONS FOR WIT - Table 1.2 (DESIGN)

Route: IL. Rte. 47
Waterway: Seavey Road Run (Tributary C)

Computed: KU Date: 12/8/2016
Checked: SGL Date: 12/8/2016
Revised: SGL **Date:** 9/18/2017

CALCULATE CREATED HEAD

Frequency	Natural H.W.E. (ft)			Exist. Headwater Elev. (ft)		Prop. Headwater Elev. (ft)		Created Head (ft) @ Approach Sta 2139	
	Approach Sect. (45' U/S) 2136	Depart Sect. (54' D/S) 1947	U/S Face of Structure	U/S Face of Structure	Approach Sect. Sta 2139	U/S Face of Structure	Approach Sect. Sta 2139	Existing	Proposed
10-Year	707.32	707.14	707.28	707.52	707.62	N/A	N/A	0.24	N/A
50-Year	708.10	707.91	708.05	708.58	708.70	N/A	N/A	0.53	N/A
100-Year	708.42	708.23	708.37	709.06	709.18	N/A	N/A	0.69	N/A
500-Year	709.17	708.95	709.12	710.33	710.44	N/A	N/A	1.21	N/A

Upstream Face of Existing Structure taken at Sta. 20+91

All opening areas were measured in Microstation using Natural H.W.E.

CALCULATE FREEBOARD

Low Edge of Pavement Elevation (ft)			
Existing	**Station**	**Proposed**	**Station**
714.96	144+00	N/A	N/A
Existing Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
7.44	6.38	5.90	4.63
Proposed Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

EFFECTIVE WATERWAY OPENING

Frequency	Area (sq ft)
10-Year	126
50-Year	142
100-Year	149
500-Year	165

CREATED HEAD CALCULATIONS - Table 1.3

S.N. 045-2001

Route: IL. Rte. 47
Waterway: Seavey Road Run (Tributary C)

Computed: KU Date: 12/8/2016
Checked: SGL Date: 12/8/2016
Revised: SGL **Date:** 9/18/2017

10-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	708.67	708.71		0.04	
31+39.00	708.01	708.11		0.10	
28+80.00	707.76	707.90		0.14	
26+47.00	707.55	707.74		0.19	
24+22.00	707.40	707.63		0.23	
24+15.00	707.39	707.62		0.23	
21+39.00	707.32	707.56		0.24	
21+36.00	707.32	707.55		0.23	

50-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	709.49	709.63		0.14	
31+39.00	708.84	709.12		0.28	
28+80.00	708.57	708.93		0.36	
26+47.00	708.35	708.79		0.44	
24+22.00	708.20	708.71		0.51	
24+15.00	708.19	708.70		0.51	
21+39.00	708.11	708.64		0.53	
21+36.00	708.10	708.63		0.53	

100-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	709.82	710.10		0.28	
31+39.00	709.17	709.60		0.43	
28+80.00	708.89	709.40		0.51	
26+47.00	708.67	709.27		0.60	
24+22.00	708.52	709.19		0.67	
24+15.00	708.51	709.18		0.67	
21+39.00	708.43	709.12		0.69	
21+36.00	708.42	709.11		0.69	

500-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	710.62	711.08		0.46	
31+39.00	709.93	710.71		0.78	
28+80.00	709.64	710.58		0.94	
26+47.00	709.42	710.50		1.08	
24+22.00	709.27	710.44		1.17	
24+15.00	709.26	710.44		1.18	
21+39.00	709.17	710.38		1.21	
21+36.00	709.17	710.38		1.21	

Illinois Department of Transportation

Table 1.4 (Permit)

Culvert Waterway Information Table

Route:	IL Route 47	Existing SN:	045-2001		
Waterway:	Seavey Road Run (Tributary C)	Proposed SN:	T.B.D		
Section:	107	Prepared by:	KU	Date:	12/8/2016
County:	Kane	Checked by:	SGL	Date:	9/18/2017

Drainage Area = 6.6 square miles

Existing Overtopping Elev. = 715.28 at Sta. 144+00
Proposed Overtopping Elev. = at Sta.

Flood Event	Freq. Yr.	Discharge ft^3/s	Waterway Opening - ft^2		Natural H.W.E. - ft	Head - ft		Headwater Elevation – ft	
			Existing	Proposed		Existing	Proposed	Existing	Proposed
	10	363	128		707.4	0.1		707.5	
Design	50	623	145		708.2	0.3		708.5	
Base	100	755	151		708.5	0.5		709.0	
Scour Design Check									
Overtop Existing									
Overtop Proposed									
Max. Calc.	500	1115	167		709.2	0.9		710.1	

Datum: NAVD88

All-Time H.W.E. & Date: 710.00 (1954) ft

Surveyed Normal Water Level: 704.40 ft

10-Year Velocity through Existing Structure = 2.84 ft/s

10-Year Velocity through Proposed Structure = ft/s

2-Yr. Flow Rate = 150 ft^3/s

EXISTING STRUCTURE

Type:	Box Culvert
Length/Width:	90' / 22.2' (3 cell total)
# Spans/Cells:	3 - 7' (W) X 8' (H)
Low Chord:	
Skew:	0 (relative to road)
Clearance:	
Bridge Flow Line:	(u/s) (d/s)
Low E.O.P:	714.96
Freeboard:	6.45
Culvert Inverts:	701.26 (u/s) 701.15 (d/s)

PROPOSED STRUCTURE

Culvert Type:	
Length Of Span:	
# Cells:	
Top Of Crown Elev.: Beam:	
Skew:	(relative to road)
Culvert Invert Elev.:	(u/s) (d/s)
Low E.O.P:	
Freeboard:	

EXISTING EMBEDMENT

Depth:	0.0
U/S Streambed Elev.:	701.26
D/S Streambed Elev.:	701.15

PROPOSED EMBEDMENT

Depth:	
U/S Streambed Elev.:	
D/S Streambed Elev.:	

NOTE: Proposed Structure Details Are Preliminary; Subject To Refinement In TSL Stage.

BACK-UP CALCULATIONS FOR WIT - Table 1.5 (PERMIT)

Route: IL. Rte. 47
Waterway: Seavey Road Run (Tributary C)

Computed: KU Date: 12/7/2016
Checked: SGL Date: 12/7/2016
Checked: SGL **Date:** 9/18/2017

CALCULATE CREATED HEAD

Frequency	Natural H.W.E. (ft)			Exist. Headwater Elev. (ft)		Prop. Headwater Elev. (ft)		Created Head (ft) @ Approach Section	
	Approach Sect. (48' U/S) 2139	Depart Sect. (98' D/S) 1903	U/S Face of Structure	U/S Face of Structure	Approach Sect. (48' U/S) 2139	U/S Face of Structure	Approach Sect. Sta. 2139	Existing	Proposed
10-Year	707.41	707.22	707.37	707.47	707.51	N/A	N/A	0.10	N/A
50-Year	708.22	708.01	708.18	708.51	708.55	N/A	N/A	0.33	N/A
100-Year	708.54	708.31	708.49	708.95	709.00	N/A	N/A	0.46	N/A
500-Year	709.27	709.02	709.22	710.10	710.15	N/A	N/A	0.88	N/A

Upstream Face of Existing Structure taken at Sta. 2091

All opening areas were measured in Microstation using Natural H.W.E.

CALCULATE FREEBOARD

Low Edge of Pavement Elevation (ft)			
Existing	**Station**	**Proposed**	**Station**
714.96	144+00	N/A	N/A
Existing Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
7.49	6.45	6.01	4.86
Proposed Freeboard (ft)			
10-Year	**50-Year**	**100-Year**	**500-Year**
N/A	N/A	N/A	N/A

EFFECTIVE WATERWAY OPENING

Frequency	Area (sq ft)
10-Year	128
50-Year	145
100-Year	151
500-Year	167

Route: IL. Rte. 47
Waterway: Seavey Road Run (Tributary C)

Computed: KU Date: 12/7/2016
Checked: SGL Date: 12/7/2016
Checked: SGL **Date:** 9/18/2017

10-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	708.50	708.53		0.03	
24+22.00	707.46	707.55		0.09	
21+39.00	707.41	707.51		0.10	

50-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	709.26	709.38		0.12	
24+22.00	708.28	708.59		0.31	
21+39.00	708.22	708.55		0.33	

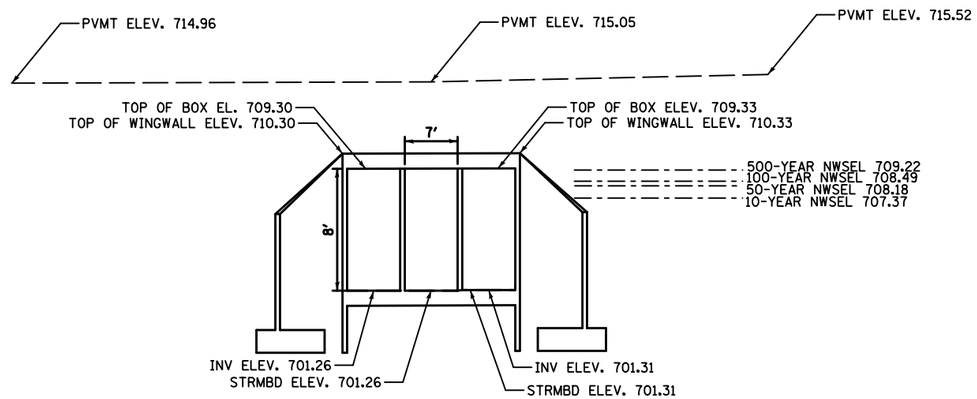
100-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	709.58	709.78		0.20	
24+22.00	708.60	709.05		0.45	
21+39.00	708.54	709.00		0.46	

500-Year Frequency

River Sta.	*Natural WSE*	*Existing WSE*	*Proposed WSE*	*Existing Created Head*	*Proposed Created Head*
38+51.00	710.34	710.80		0.46	
24+22.00	709.35	710.19		0.84	
21+39.00	709.27	710.15		0.88	

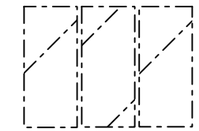
EXISTING BRIDGE STRUCTURE (SN 045-2001)
(PERMIT)



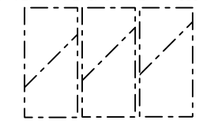
UPSTREAM FACE (LOOKING DOWNSTREAM)

PERMIT

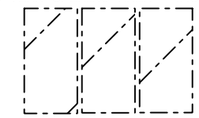
500-YEAR OPENING AREA = 167 SF



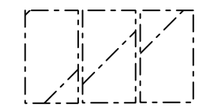
100-YEAR OPENING AREA = 151 SF



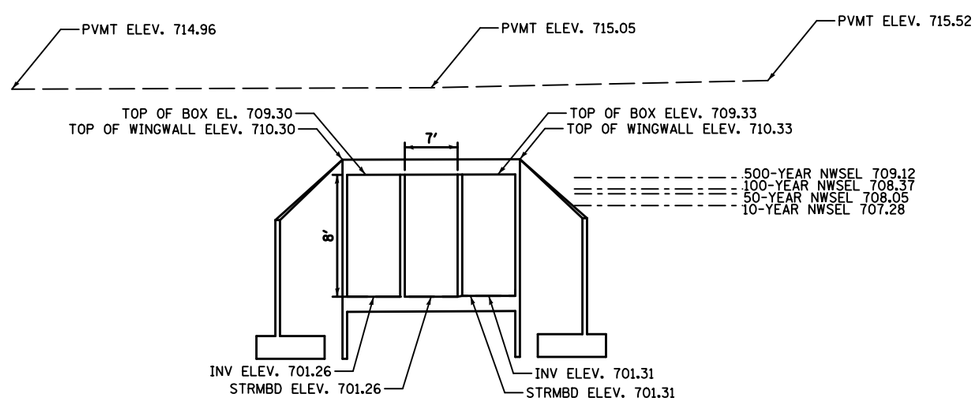
50-YEAR OPENING AREA = 145 SF



10-YEAR OPENING AREA = 128 SF



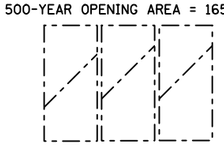
EXISTING BRIDGE STRUCTURE (SN 045-2001)
(DESIGN)



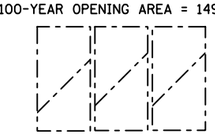
UPSTREAM FACE (LOOKING DOWNSTREAM)

DESIGN

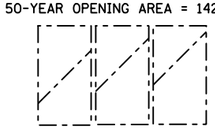
500-YEAR OPENING AREA = 165 SF



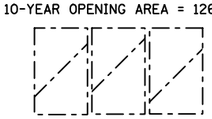
100-YEAR OPENING AREA = 149 SF



50-YEAR OPENING AREA = 142 SF



10-YEAR OPENING AREA = 126 SF



FILE NAME = $FILEL$	USER NAME = $USER$	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	IL 47 OVER SEAVEY ROAD RUN (BLACKBERRY CREEK TRIBUTARY C) EFFECTIVE WATERWAY OPENING	F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS / SHEET NO.
		DRAWN -	REVISED -						
	PLOT SCALE = $SCALE$	CHECKED -	REVISED -					CONTRACT NO.	
$MODELNAME$	PLOT DATE = $DATE$	DATE -	REVISED -		SCALE: SHEET OF SHEETS STA. TO STA.			ILLINOIS FED. AID PROJECT	

III. HYDRAULIC REPORT DATA SHEETS (BBS 2800)

Illinois Department of Transportation

Hydraulic Report Data Sheets

Route	F.A.P. 326/Illinois Route 47	P or D #	P-91-015-14
Section	107	PTB #	
County	Kane		
Exist SN	045-2001		
Prop SN	T.B.D		

General Information

1. Stream name: Seavey Run Road (Trib C to Blackberry Creek)

2. Structure location: NW ¼ of the SE ¼ of Section 32, Township 39N, Range 7E of the 3rd P.M.

3. Hydraulic Report Prepared By: ☒ Consultant ☐ District — Lin Engineering — ☐ Prime ☒ Sub

4. Hydraulic Report Approval Authority:
   ☒ District – Post PDF of HR to BBS Hydraulics SharePoint Server
   ☐ BBS Hydraulics - Submit 2 hard copies of HR to BBS Hydraulics

Site Design Data

5. Drainage Area (sq. mi.): 6.58 sq. miles

6. Highway Classification:
   ☐ Rural ☒ Urban ☐ Other
   ☒ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local

7. Design Frequency: ☐ 30 yr ☒ 50 Yr. ☐ Other

8. Number of Waterway Information Tables (WIT): 2
   If more than one, explain:
   PERMIT WIT - FIS geo w/ updated crossing at IL47
   DESIGN WIT - FIS geo and w/ updated survey data

Hydrologic & Hydraulic Analysis

9. Hydrology Modeling (check all that apply): ☒ USGS/Stream Stats ☒ FIS ☐ Gage Data ☐ Other

10. Hydraulic Modeling (check all that apply):
    a. Method: ☒ HEC-RAS ☐ WSPRO ☐ Other
    b. Manning's "n" values determined per IDOT Drainage Manual Chap. 5? ☒ Yes ☐ No
       If no, explain:
    c. Source of Starting WSE: FEMA base flood
    d. Non- IDOT encroachments in Survey? ☐ Yes ☒ No
       If yes, are they accounted for? ☐ Yes ☐ No
    e. Does a Tailwater Control exist? ☒ Yes ☐ No
       If yes, list: Blackberry Creek
    f. Were the Expansion/Contraction cones properly addressed? ☒ Yes ☐ No ☐ N/A
       If No or N/A, explain:

g. What Expansion and Contraction Rates were used? Expansion: 2 (X:1)
Contraction 1 (X:1)

IDNR – OWR Floodway Permit

11. Is area experiencing urbanization or expected to urbanize within 10 years? ☒ Yes ☐ No (Rural)

12. Are there any sensitive flood receptors located upstream within possible backwater influence? ☐ Yes ☒ No
If yes, list and describe critical upstream flood damageable properties and their elevations.

13. Is there any History of Flooding or Overtopping problems? ☐ Yes ☒ No
Sources & dates of Observed Highwater:

14. Is the structure hydraulically connected to or within the floodway of an IDNR-OWR designated Public Body of Water? ☒ No ☐ Yes. OWR 3704 Rules apply.

15. Required IDNR - OWR Permit type:
☐ Individual 3700 ☐ SWP #2 ☐ SWP #12 ☒ Floodway 3708
☐ None ☐ Other

Proposed Structure Data

16. Project Scope (check all that apply):
a. ☐ Complete Replacement
b. ☐ Superstructure Replacement
c: ☐ Superstructure Widening; Length of Pier Extension in the water:
U/S D/S
d. ☐ Bridge ☐ Culvert ☐ Three-sided Bridge
e. ☐ New Alignment
f. Work Planned Below Q_{100} HWE? ☐ Yes ☐ No
g. ☐ Profile Raise

17. If a bridge is proposed, supply:
Flow line elevation (ft): Abutment type:
Preliminary low beam elevation (ft): Skew (degrees):
Width of deck (ft): Number of spans:
Total length from face to face of abutment (ft)

18. If a culvert is proposed, supply:
Type and size: Length (ft):
Upstream invert elevation (ft): Entrance type:
Downstream invert elevation (ft): Skew (degrees):
Note: Upstream and downstream elevations should reflect the elevations before the standard 3" drop (or other embedment) is applied

19. If a three-sided structure is proposed, supply:
U/S Flow line elevation (ft): Skew (degrees):
Span (ft): Length (ft):
Height (ft): Number of spans:

20. a. Is the IDOT Clearance Policy met? ☐ Yes ☐ No ☐ NA Value (ft):
b. Is the IDOT Freeboard Policy met? ☐ Yes ☐ No ☐ NA Value (ft):

21. Type of streambed soil : ☒ Clay ☐ Silt ☐ Sand ☒ Loam ☐

22. Scour/ Migration Problems: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Ice Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments:

Debris Concerns: ☒ None/Minimal ☐ Significant ☐ Severe
Comments: Some debris build up at the upstream end of the structure

Proposed or Identified Countermeasures:

Existing Structure Data

		Structure U/S	Subject Structure	Structure D/S
23.	Distance from proposed (subject) structure: (ft.)	3057	N\A	2300
24.	Type of structure:	2 cell (8'x8') box culvert	3 cell 7'(W) x 8'(H) box culvert	3 span bridge
25.	Low beam elevation:	N/A	N/A	704.93
26.	Flow line elevation:	704.40	701.26	699.19
27.	Maximum known high water elevation:	N/A	N/A	708.48
28.	Date of maximum high water:	N/A	N/A	July 1996
29.	Cause (backwater, headwater, etc.):	N/A	N/A	N/A
30.	Does structure carry entire design flood flow?	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
	If not, state area of additional waterway opening: (ft^2)			
31.	Type and size of existing overflow structures:			
32.	Has adverse scour occurred under or adjacent to the structure?	N/A	No	N/A
33.	Classify type of scour and/or aggradation / degradation:	N/A	None	N/A

Required Additional Data

34. Deviations from the General Procedures presented in IDOT Drainage Manual CH. 2, CH.6, and CH.7:
No deviations

35. Information regarding high water from other streams, reservoirs, flood control projects, proposed channel changes, or other controls affecting proposed waterway area:
Scientific Investigations Report 2005-5270; HA-227

36. Site Inspection made by: Krystian Ustupski Date: 8/7/2015
Remarks:

37. Prepared by: Krystian Ustupski Date 12/8/2015

Signed (QA/QC): _____ Date _____

Hydraulic Report Checklist

The District or Consultant should complete the following checklist before submitting the Hydraulic Report for approval.

1. ☒ Title Page
2. ☒ Table of Contents
3. ☒ Narrative - (as outlined in Section 2-601.01 Item #3)
4. ☒ Waterway Information Table (WIT) - (as outlined in Section 2-601.01 Item #4)
5. ☒ Hydraulic Report Data Sheets
6. ☒ Location Map - should show the subject structure along with nearby location defining landmarks (cities, roads, highways, nearby structures over same stream, etc.)
7. ☒ USGS Hydrologic Atlas (historical data available on selected streams- District 1 only)
8. ☒ Photographs - (Minimum: U/S & D/S structure faces, U/S & D/S channel, U/S & D/S roadway across structure)
9. ☒ Hydrology (map, calculations and related exhibits)
10. ☒ Streambed Profile
11. ☒ Roadway Profile (existing and proposed)
12. ☒ Cross Section Plots - with plan layout preferably overlayed upon an aerial photo with the contours
13. ☒ Bridge Opening Plots
14. ☒ Natural Condition Analysis
15. ☒ Existing Condition Analysis
16. ☐ Proposed Condition Analysis

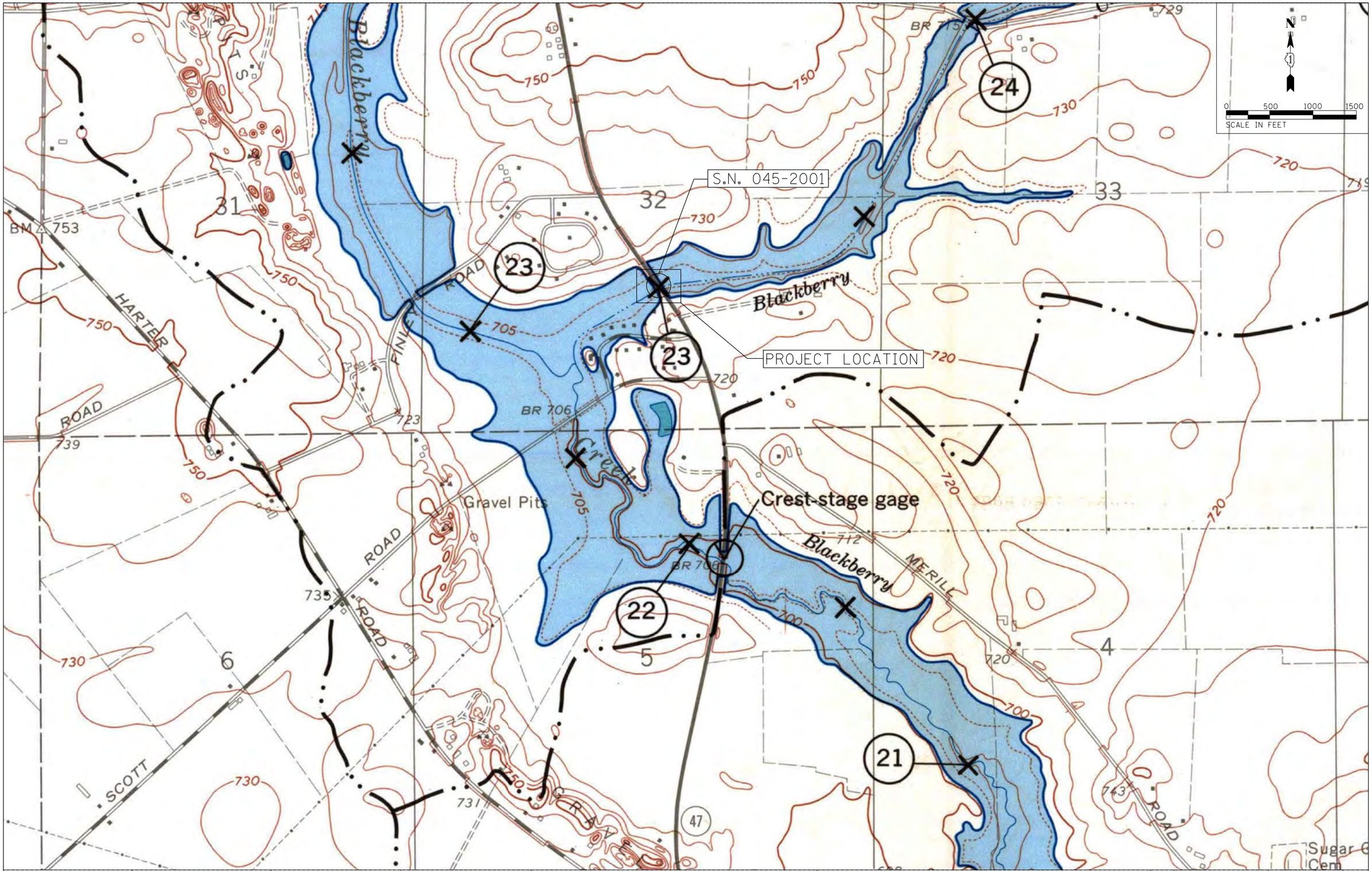
When HEC-RAS modeling is being used, ALL Plans (Natural, Existing, & Proposed) shall be included in ONE Project File.

17. ☐ Scour Analysis – Existing and Proposed Conditions
18. ☐ Compensatory Storage Calculations (if required- District 1 only. Include permit summary form and related attachments.)
19. ☒ Survey Notes (if available, CADD plot of survey points. No Electronic Point Files)
20. ☐ EWSE Data - (per Section 2-402.06)
21. ☒ Correspondence Notes
22. ☒ CD with Project Files (Include pdf copy of the Hydraulic Report and working files for the hydrology and hydraulic analyses.)

IV. EXHIBITS

EXHIBIT A

LOCATION MAP



LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT A – PROJECT LOCATION MAP
HYDROLOGIC INVESTIGATION ATLAS 227

SCALE: 1"=500'

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326		KANE		
		JOB NO. P-91-015-14		

FED. ROAD DIST. NO. 1 | ILLINOIS | FED. AID PROJECT

EXHIBIT B

PHOTOGRAPHS

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

1) 1500’ D/S OF S.N. 045-2001 LOOKING U/S

2) 1500’ D/S OF S.N. 045-2001 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

3) 1500' D/S OF S.N. 045-2001 LOOKING WEST

4) 1500' D/S OF S.N. 045-2001 LOOKING EAST

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

5) 1300’ D/S OF S.N. 045-2001 LOOKING U/S

6) 1000’ D/S OF S.N. 045-2001 LOOKING U/S, PEDESTRIAN BRIDGE #1

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

6) 1000’ D/S OF S.N. 045-2001 LOOKING D/S

7) 1000’ D/S OF S.N. 045-2001 LOOKING NORTHWEST

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

8) 1000’ D/S OF S.N. 045-2001 LOOKING SOUTHEAST

9) 900’ D/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

10) 700' D/S OF S.N. 045-2001 LOOKING U/S, PEDESTRIAN BRIDGE #2

11) 700' D/S OF S.N. 045-2001 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

12) 700’ D/S OF S.N. 045-2001 LOOKING U/S

13) 500’ D/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

14) 500’ D/S OF S.N. 045-2001 LOOKING D/S

15) 500’ D/S OF S.N. 045-2001 LOOKING NORTHWEST

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

16) 500' D/S OF S.N. 045-2001 LOOKING SOUTHEAST

17) 350' D/S OF S.N. 045-2001 LOOKING U/S, PEDESTRIAN BRIDGE #3

18) 350’ D/S OF S.N. 045-2001 LOOKING NORTHWEST, PEDESTRIAN BRIDGE #3

19) 350’ D/S OF S.N. 045-2001 LOOKING D/S, PEDESTRIAN BRIDGE #3

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

20) 350’ D/S OF S.N. 045-2001 LOOKING U/S, PEDESTRIAN BRIDGE #3

21) 300’ D/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

22) 300’ D/S OF S.N. 045-2001 LOOKING D/S

23) 300’ D/S OF S.N. 045-2001 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

24) 300’ D/S OF S.N. 045-2001 LOOKING SOUTH

25) 150’ D/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

26) 150’ D/S OF S.N. 045-2001 LOOKING D/S

27) D/S FACE OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

28) D/S FACE OF S.N. 045-2001 LOOKING U/S

29) D/S FACE OF S.N. 045-2001 LOOKING D/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

30) D/S FACE OF S.N. 045-2001 LOOKING NORTH

31) STANDING ON ILLINOIS ROUTE 47 LOOKING WEST

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

32) STANDING ON ILLINOIS ROUTE 47 LOOKING SOUTH

33) STANDING ON ILLINOIS ROUTE 47 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

34) STANDING ON ILLINOIS ROUTE 47 LOOKING EAST

35) U/S FACE OF S.N. 045-2001 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

36) U/S FACE OF S.N. 045-2001 LOOKING U/S

37) U/S FACE OF S.N. 045-2001 LOOKING SOUTHEAST

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

38) U/S FACE OF S.N. 045-2001 LOOKING NORTHEAST

39) 300’ U/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

40) 300’ U/S OF S.N. 045-2001 LOOKING D/S

41) 300’ U/S OF S.N. 045-2001 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

42) 300' U/S OF S.N. 045-2001 LOOKING SOUTHEAST

43) 500' U/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

44) 500’ U/S OF S.N. 045-2001 LOOKING D/S

45) 500’ U/S OF S.N. 045-2001 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

46) 500' U/S OF S.N. 045-2001 LOOKING SOUTH

47) 1000' U/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

48) 1000' U/S OF S.N. 045-2001 LOOKING D/S

49) 1000' U/S OF S.N. 045-2001 LOOKING NORTH

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

50) 1000’ U/S OF S.N. 045-2001 LOOKING SOUTH

51) 1500’ U/S OF S.N. 045-2001 LOOKING U/S

EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

52) 1500' U/S OF S.N. 045-2001 LOOKING D/S

53) 1500' U/S OF S.N. 045-2001 LOOKING NORTH

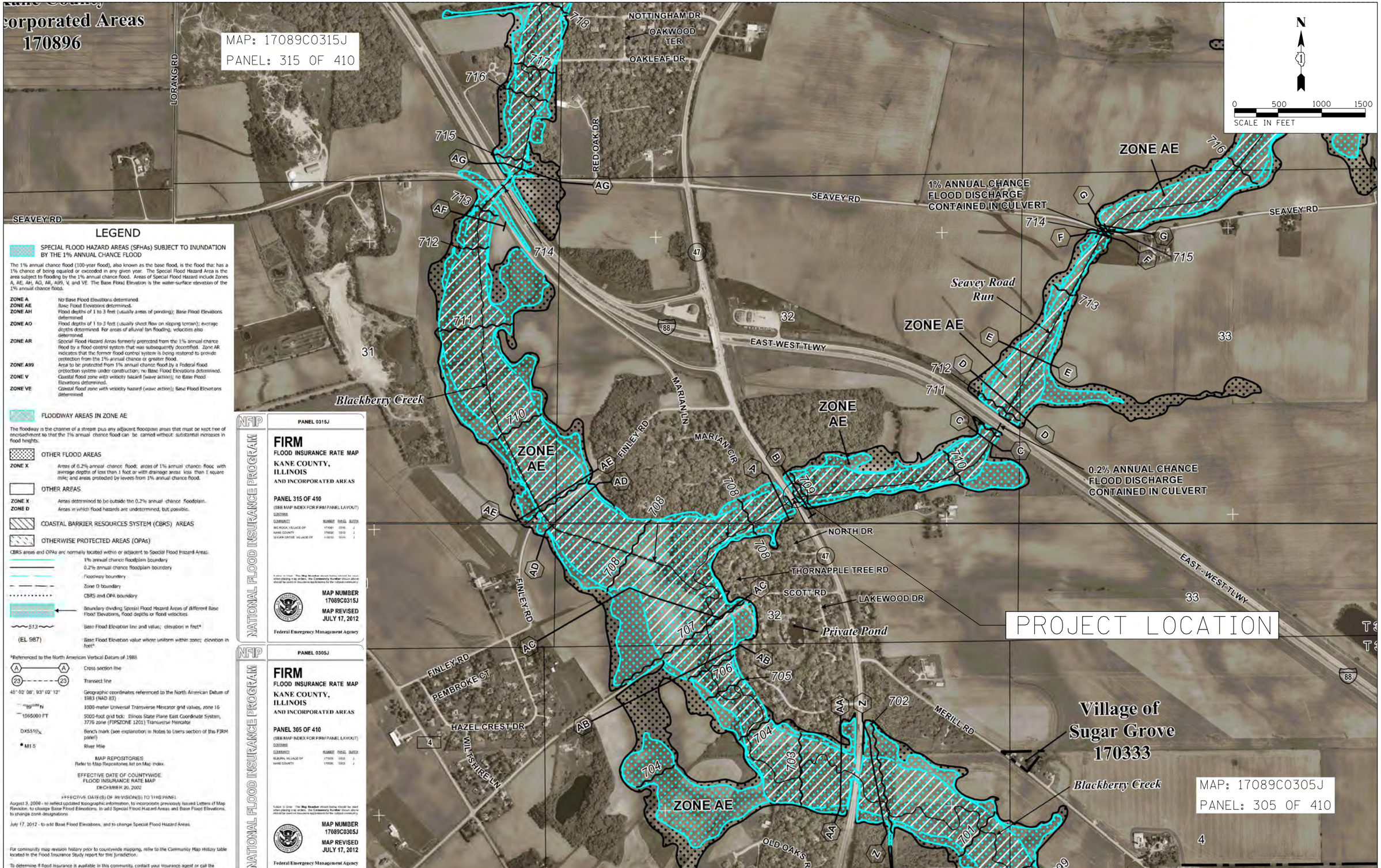
EXHIBIT B

PHOTOGRAPHY LOG
IL ROUTE 47
OVER SEAVEY ROAD RUN (TRIBUTARY C)
S.N. 045-2001

54) 1500’ U/S OF S.N. 045-2001 LOOKING SOUTH

EXHIBIT C

HYDROLOGY



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line
23 - - - - - 23 Transect line
45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
9980000 N 1000-meter Universal Transverse Mercator grid values, zone 16
1565000 FT 5000-foot grid tick: Illinois State Plane East Coordinate System, 3776 zone (FIPSZONE 1201) Transverse Mercator
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 20, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 3, 2009 - to reflect updated topographic information, to incorporate previously issued Letters of Map Revision, to change Base Flood Elevations, to add Special Flood Hazard Areas and Base Flood Elevations, to change zone designations.
July 17, 2012 - to add Base Flood Elevations, and to change Special Flood Hazard Areas.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0315J

FIRM
FLOOD INSURANCE RATE MAP
KANE COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 315 OF 410
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
BIG ROCK, VILLAGE OF	170861	0315	J
KANE COUNTY	170896	0315	J
SUGAR GROVE, VILLAGE OF	170333	0315	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17089C0315J
MAP REVISED
JULY 17, 2012

Federal Emergency Management Agency

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0305J

FIRM
FLOOD INSURANCE RATE MAP
KANE COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 305 OF 410
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
ELBURN, VILLAGE OF	170508	0305	J
KANE COUNTY	170896	0305	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17089C0305J
MAP REVISED
JULY 17, 2012

Federal Emergency Management Agency

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -
	DRAWN - KU	REVISED -
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT C – FLOOD INSURANCE RATE MAP
IL. RTE. 47 OVER SEAVEY ROAD RUN (TRIBUTARY C)

SCALE: 1"=500'

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326		KANE		
		JOB NO. P-91-015-14		

FED. ROAD DIST. NO. 1 | ILLINOIS | FED. AID PROJECT

FLOOD INSURANCE STUDY

KANE COUNTY, ILLINOIS
AND INCORPORATED AREAS

Volume 1 of 3

COMMUNITY NAME	COMMUNITY NUMBER
ALGONQUIN, VILLAGE OF	170474
AURORA, CITY OF	170320
BARRINGTON HILLS, VILLAGE OF	170058
BARTLETT, VILLAGE OF	170059
BATAVIA, CITY OF	170321
BIG ROCK, VILLAGE OF	171081
* BURLINGTON, VILLAGE OF	171077
CAMPTON HILLS, VILLAGE OF	171396
CARPENTERSVILLE, VILLAGE OF	170322
EAST DUNDEE, VILLAGE OF	170323
ELBURN, VILLAGE OF	171026
ELGIN, CITY OF	170087
GENEVA, CITY OF	170325
GILBERTS, VILLAGE OF	170326
HAMPSHIRE, VILLAGE OF	170327
* HOFFMAN ESTATES, VILLAGE OF	170107
HUNTLEY, VILLAGE OF	170480
KANE COUNTY (UNINCORPORATED AREAS)	170896
* KANEVILLE, VILLAGE OF	171388
LILY LAKE, VILLAGE OF	171023
MAPLE PARK, VILLAGE OF	171018
MONTGOMERY, VILLAGE OF	170328
NORTH AURORA, VILLAGE OF	170329
PINGREE GROVE, VILLAGE OF	171078
SLEEPY HOLLOW, VILLAGE OF	170331
SOUTH ELGIN, VILLAGE OF	170332
ST. CHARLES, CITY OF	170330
SUGAR GROVE, VILLAGE OF	170333
VIRGIL, VILLAGE OF	171024
WAYNE, VILLAGE OF	170865
WEST DUNDEE, VILLAGE OF	170335

* NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED IN KANE COUNTY

Revised August 3, 2009

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

17089CV001C

December 20, 2002
Countywide FIS

The hydrology for Tyler Creek, Pingree Creek, and a portion of Sandy Creek was revised to define the peak flows in the area being studied. The revisions consisted of subdividing the watershed into smaller areas, adding channel and reservoir routings, using the State of Illinois Bulletin 70 precipitation amounts, and incorporating interbasin flow between Tyler Creek and Eakin Creek. The USACE HEC-1 computer program was used in the hydrologic modeling. The SCS Curve Number and Unit Hydrograph methods were used.

A HEC-1 model was used to compute discharges on Eakin Creek (Reference 64).

November 16, 2006
Revised Countywide FIS

No new or revised hydrologic studies were incorporated into the Kane County and unincorporated areas FIS dated November 16, 2006.

August 3, 2009
Revised Countywide FIS

Information on the methods used to determine peak discharge-frequency relationships for the streams restudied as part of this countywide FIS is shown below.

The hydrologic analysis for the streams located within the Blackberry Creek watershed (Aurora Chain of Lakes, Aurora Chain of Lakes Cherry Hills Diversion, Blackberry Creek, East Run, East Run North Branch, East Run North Loop, Elburn Run, Lake Run, Lake Run Main Street Branch, Lake Run Nelson Lake Branch, Lake Run North of I-88 Overflow, Lake Run North of I-88 Overflow East Branch, Lake Run South of I-88 Diversion, Prestbury Branch, Route 38 Branch, Seavey Road Run, Seavey Road Run Green Road Branch, Seavey Road Run Main Street Branch) was revised by the USGS (Reference 44) to define peak flows. The 71.16 square mile drainage area of the Blackberry Creek watershed was divided into 49 subbasins. Flood-hazard analyses were performed for only the Kane County portion of the watershed.

The Hydrological Simulation Program - FORTRAN (HSPF) (Reference 65) was used to perform the hydrologic modeling for the Blackberry Creek watershed. Streamflow data was available at two locations in the watershed: the USGS streamflow-gaging station at Blackberry Creek near Yorkville (station 0551700), located close to the downstream end of the watershed; and the USGS streamflow gaging station at Blackberry Creek near Montgomery (station 05551675), located at the Jericho Road Bridge crossing. Utilizing the annual maximum series (AMS) determined from simulated streamflow records at various locations in the watershed from the hydrologic model, flood-frequency analysis was used to

Table 8 - Summary of Discharges (Continued)

Flooding Source and Location	*Drainage Area (square miles)*	*Peak Discharges (cubic feet per second)* 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
ROUTE 38 BRANCH					
At confluence with Blackberry Creek (approximately 1500 feet downstream of Pouley Road and southeastern to the intersection of Illinois Route 38 and Pouley Road)	0.6	58	92	107	143
SANDY CREEK					
At confluence with Tyler Creek	2.5	320	560	720	1,050
At Randall Road	2.3	225	361	550	829
At U.S. Route 20	0.2	21	46	69	112
SEAVEY ROAD RUN					
Approximately 1650 feet downstream of Illinois Route 47	7.0	364	625	758	1,122
Approximately 920 feet upstream of Interstate 88	5.3	347	587	705	1,020
At confluence of Seavey Road Run and Main Street Branch (approximately 1850 feet upstream of a road to a golf course)	1.9	159	289	357	549
On Seavey Road Run approximately 780 feet upstream of the junction 2820 feet downstream of the bridge on Main Street	*	48	87	108	166
SEAVEY ROAD RUN GREEN ROAD BRANCH					
Approximately 2700 feet downstream (east) of Green Road bridge and approximately 380 feet upstream of the junction with Seavey Road Run	*	95	173	214	329
SEAVEY ROAD RUN MAIN STREET BRANCH					
At confluence of Seavey Road Run and Main Street Branch (approximately 1850 feet upstream of a road to a golf course)	3.5	220	417	522	824

*Data not available

Table 10 - Roughness Coefficients (Manning's "n" Values) (Continued)

Stream	Channel "n"	Overbank "n"
Otter Creek West	0.035-0.055	0.070-0.085
Pingree Creek	0.055-0.065	0.05-0.08
Poplar Creek	0.015-0.040	0.060-0.080
Prestbury Branch	0.045-0.06	0.115-0.165
Route 38 Branch	0.04-0.06	0.085-0.105
Sandy Creek	0.04-0.09	0.07-0.12
Seavey Road Run	0.05-0.07	0.09-0.12
Seavey Road Run Green Road Branch	0.05-0.063	0.08-0.12
Seavey Road Run Main St. Branch	0.045-0.06	0.105-0.125
Selmarten Creek	0.015-0.059	0.030-0.100
Sleepy Creek	0.05-0.10	0.1
South Tributary	0.035-0.060	0.060-0.150
State Street Creek	*	*
State Street Creek Tributary	*	*
Stony Creek	0.030-0.072	0.060-0.110
Sugar Grove Branch	0.045-0.090	0.050-0.090
Sugar Grove Branch East	0.045-0.090	0.050-0.090
Sugar Grove Branch North	*	*
Tollway Tributary	*	*
Tyler Creek	0.045-0.07	0.05-0.1
Tyler Creek Unnamed Tributary	*	*
Union Ditch No. 2	*	*
Waubonsee Creek	0.035-0.055	0.050-0.070

*Data not available

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Sandy Creek (Continued)								
L	11,517[28]	37	142	3.3	847.4	847.4	847.4	0.0
M	13,176[28]	431	378	1.0	848.3	848.3	848.3	0.0
N	13,783[28]	386	209	1.8	852.6	852.6	852.5	0.1
O	14,598[28]	70	124	3.1	859.7	859.7	859.7	0.0
P	15,107[28]	132	116	1.5	862.8	862.8	862.8	0.0
Q	15,616[28]	122	136	1.3	865.7	865.7	865.7	0.0
R	16,185[28]	21	47	3.8	872.6	872.6	872.6	0.0
S	16,936[28]	41	52	3.4	882.6	882.6	882.6	0.0
T	17,490[28]	82	102	1.8	886.5	886.5	886.5	0.0
U	17,918[28]	109	112	0.6	888.4	888.4	888.4	0.0
Seavey Road Run								
A	1,812[3]	307	818	2.1	708.3	708.3	708.4	0.1
B	2,198[3]	340	1,613	1.0	709.1	709.1	709.1	0.1
C	4,470[3]	198	441	3.1	710.8	710.8	710.8	0.0
D	4,972[3]	484	1,987	0.7	712.2	712.2	712.2	0.0
E	5,580[3]	390	1,239	1.4	712.3	712.3	712.4	0.0
F	7,070[3]	129	452	2.7	713.5	713.5	713.4	0.0
G	7,384[3]	250	746	2.4	715.1	715.1	715.0	0.0
H	11,386[3]	365	868	2.2	717.8	717.8	717.7	0.0
I	13,407[3]	174	486	2.6	720.0	720.0	720.0	0.0
J	13,683[3]	240	893	1.6	721.2	721.2	721.2	0.1
K	19,650[3]	155	203	3.0	724.1	724.1	724.1	0.0

[3]Feet above confluence with Blackberry Creek
[28]Feet above mouth

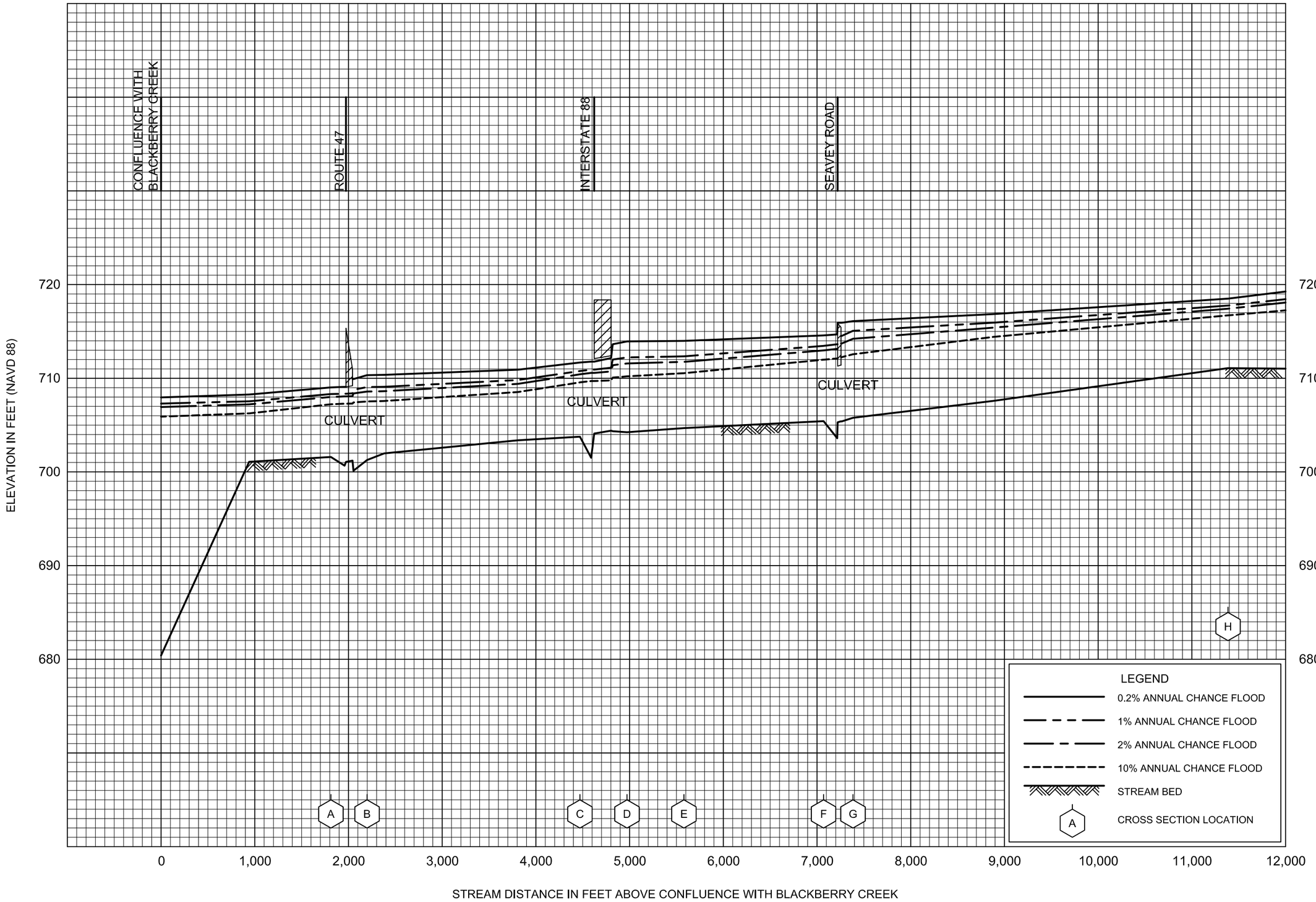
TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

KANE COUNTY, IL
AND INCORPORATED AREAS

FLOODWAY DATA

SANDY CREEK - SEAVEY ROAD RUN



FLOOD PROFILES

SEAVEY ROAD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

KANE COUNTY, IL

AND INCORPORATED AREAS

145P

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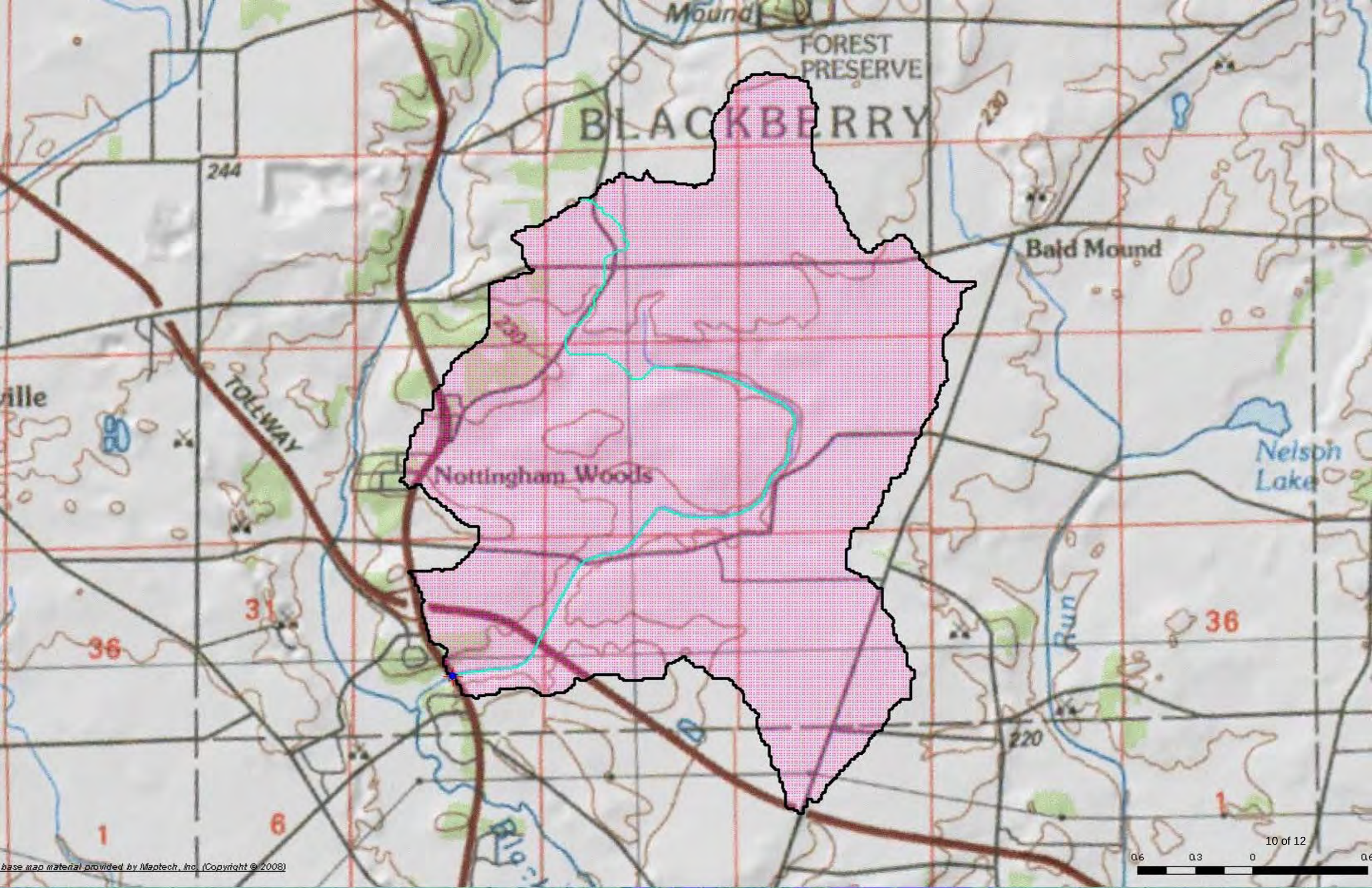
87. *Flood Insurance Study: McHenry County, Illinois and Incorporated Areas*. Federal Emergency Management Agency. Washington, D.C.: November 16, 2006.


Mound
FOREST
PRESERVE
BLACKBERRY
244
230
Bald Mound
TOLLWAY
Nottingham Woods
Nelson
Lake
Run
31
36
36
1
6
1
220
0.6
0.3
0
0.6
base map material provided by Maptech, Inc. (Copyright © 2008)

Flow Statistics Ungaged Site Report

Date: Fri Aug 28, 2015 8:37:25 AM GMT-5
Site Location: Illinois
NAD 1983 Latitude: 41.8133 (41 48 48)
NAD 1983 Longitude: -88.4632 (-88 27 48)
Drainage Area: 6.58 mi2

Peak Flow Basin Characteristics			
100% Region 2 AMS (6.58 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	6.58	0.03	9554
Stream Slope 10 and 85 Method (feet per mi)	10.984	0.81	317
Percent Open Water AND Herb Wetland (percent)	0.100	0	8

Peak Flow Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	227	ft3/s	40	2.6	120	429
PK5	380	ft3/s	41	3.1	200	721
PK10	486	ft3/s	42	3.8	251	941
PK25	615	ft3/s	45	4.6	306	1240
PK50	715	ft3/s	47	5.2	345	1480
PK100	805	ft3/s	49	5.6	376	1720
PK500	1020	ft3/s	55	6.2	439	2360

http://il.water.usgs.gov/pubs/sir2004-5103.pdf (http://il.water.usgs.gov/pubs/sir2004-5103.pdf)
Soong_ D.T._ Ishii_ A.L._ Sharpe_ J.B._ and Avery_ C.F._ 2004_ Estimating Flood-Peak Discharge Magnitudes and Frequencies for Rural Streams in Illinois_ U.S. Geological Survey Scientific Investigations Report 2004-5103. 147 p.

Route: IL. Rte. 47
Waterway: Seavey Road Run (Tributary C)

Peak Flow Comparison: FIS Study vs StreamStats

Flow (cfs)	FIS Study	StreamStats
Q10	363	486
Q50	623	715
Q100	755	805
Q500	1115	1020

* Flows used in HEC RAS-Model

* FIS Study Flow taken at upstream section 2094

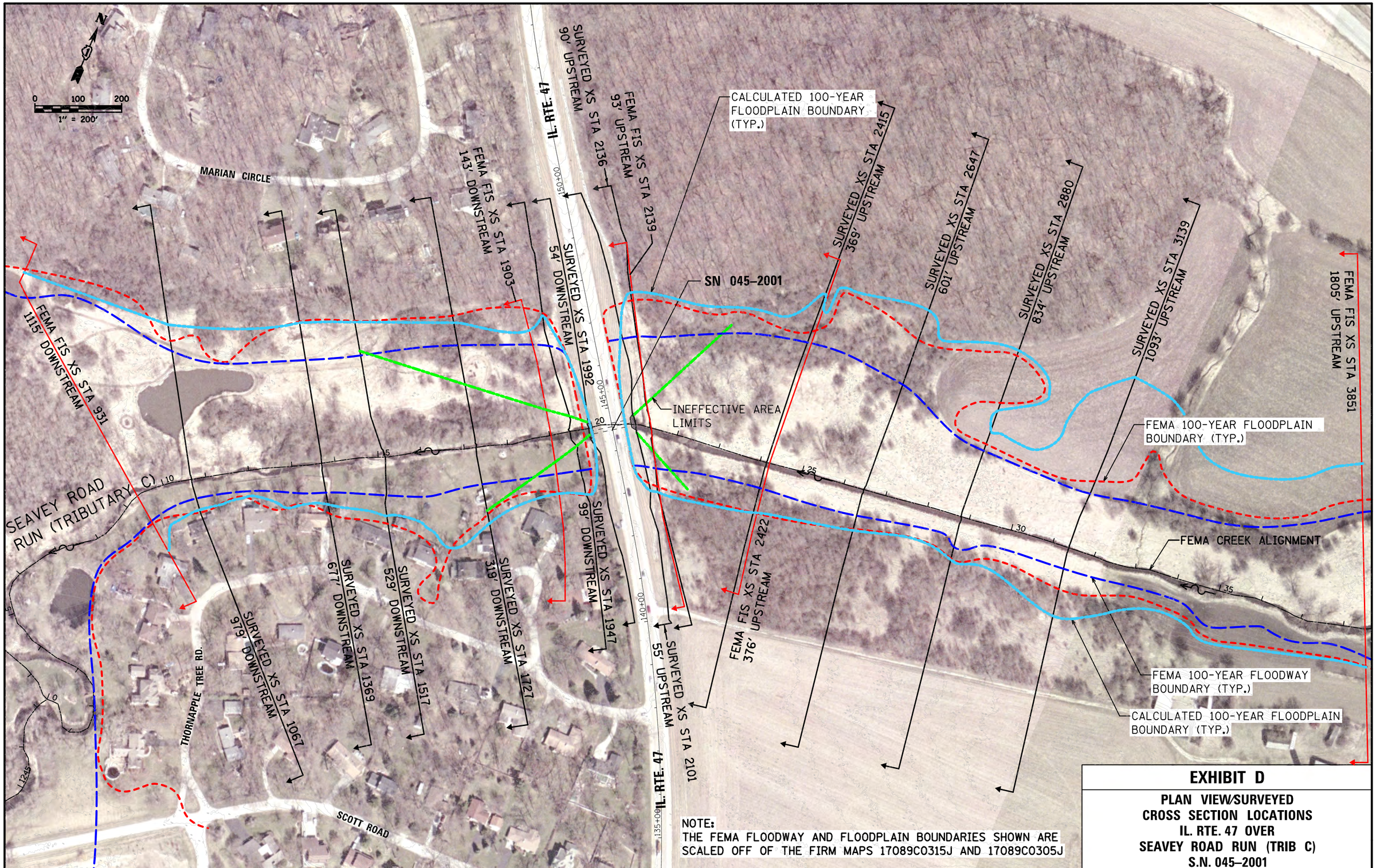
Steady Flow Distribution data from HEC-RAS Model

HEC-RAS Plan: PERMIT EXIST. Locations: User Defined

River	Reach	River Sta	Profile	Q Total
				(cfs)
Blackberry Creek	Tributary C	2094	Q10	363.00
Blackberry Creek	Tributary C	2094	Q50	623.00
Blackberry Creek	Tributary C	2094	Q100	755.00
Blackberry Creek	Tributary C	2094	Q500	1115.00

EXHIBIT D

CROSS SECTIONS



NOTE:
THE FEMA FLOODWAY AND FLOODPLAIN BOUNDARIES SHOWN ARE SCALED OFF OF THE FIRM MAPS 17089C0315J AND 17089C0305J

EXHIBIT D

PLAN VIEW/SURVEYED CROSS SECTION LOCATIONS IL. RTE. 47 OVER SEAVEY ROAD RUN (TRIB C) S.N. 045–2001

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	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

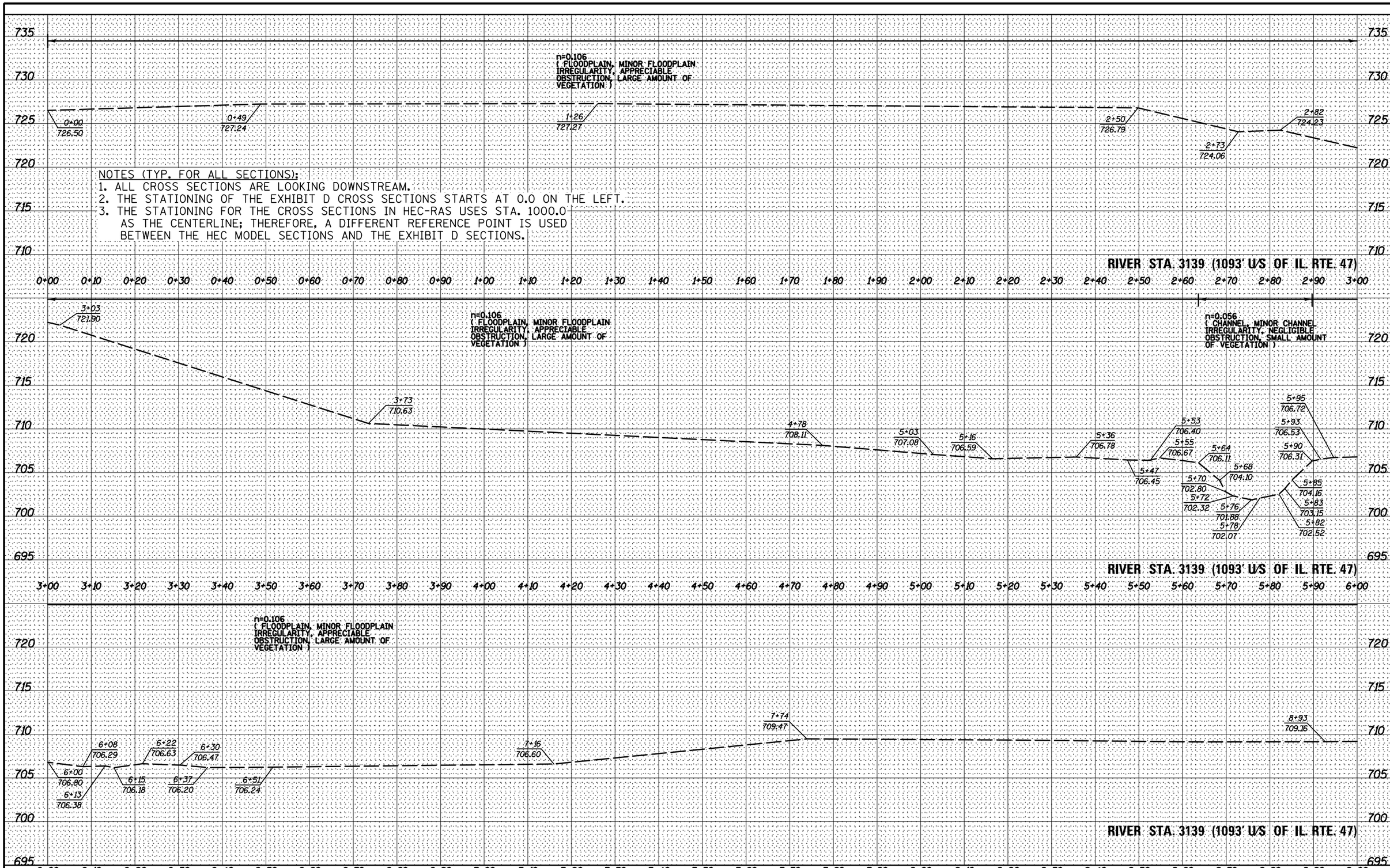
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SURVEYED CROSS SECTION LOCATIONS
IL. RTE. 47 OVER SEAVEY ROAD RUN (TRIB C)

SCALE: 1"=200'

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	———	KANE		
		JOB NO. P-91-015-14		

FED. ROAD DIST. NO. 1 | ILLINOIS | FED. AID PROJECT



NOTES (TYP. FOR ALL SECTIONS):
1. ALL CROSS SECTIONS ARE LOOKING DOWNSTREAM.
2. THE STATIONING OF THE EXHIBIT D CROSS SECTIONS STARTS AT 0.0 ON THE LEFT.
3. THE STATIONING FOR THE CROSS SECTIONS IN HEC-RAS USES STA. 1000.0 AS THE CENTERLINE; THEREFORE, A DIFFERENT REFERENCE POINT IS USED BETWEEN THE HEC MODEL SECTIONS AND THE EXHIBIT D SECTIONS.

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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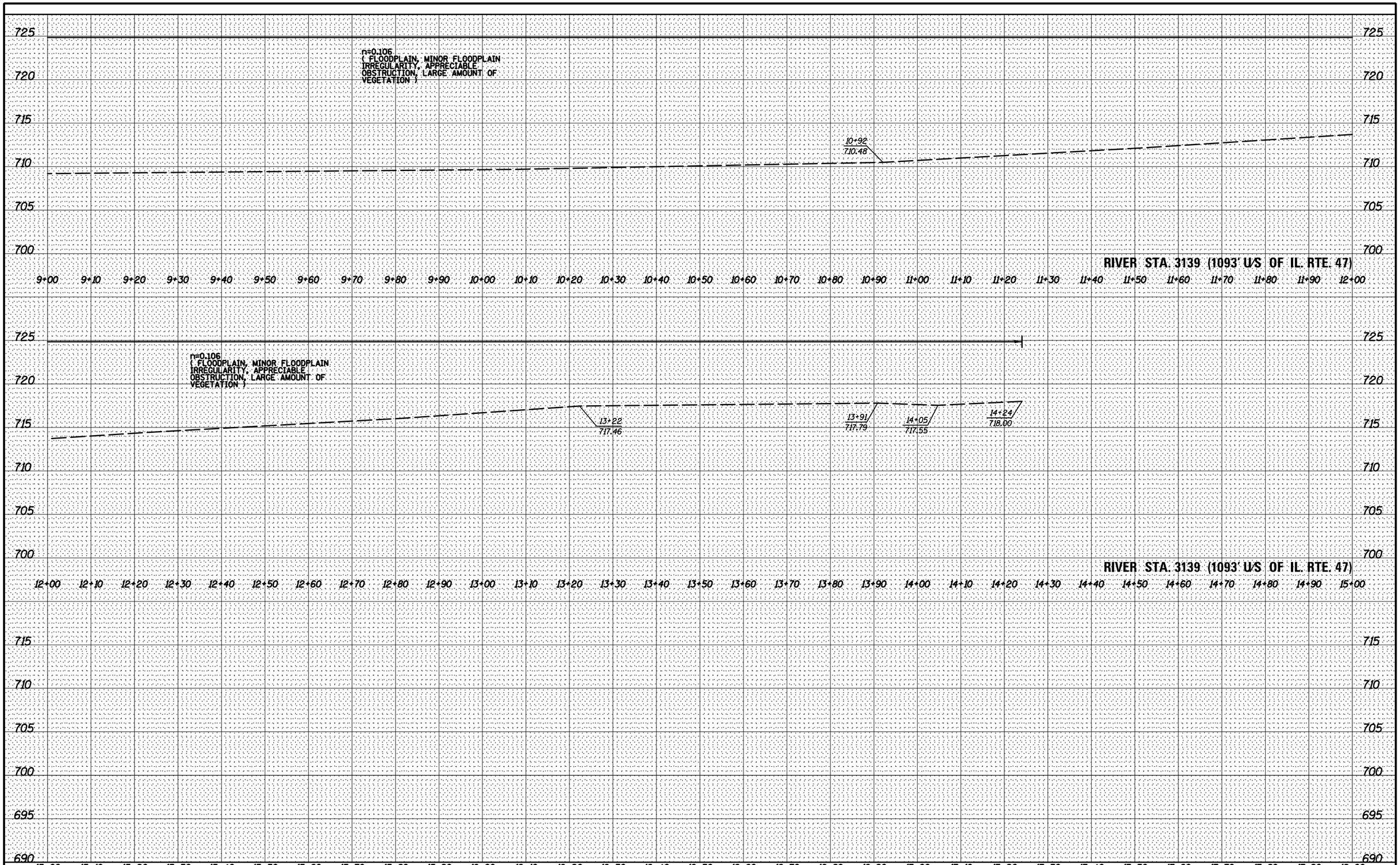
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - BLACKBERRY CREEK
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 1 OF 24 SHEETS | STA. 3139 TO STA. 3139

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	1
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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	DRAWN - KU	REVISED -	
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PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 2 OF 24 SHEETS | STA. 3139 TO STA. 3139

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	2

JOB NO. P-91-015-14

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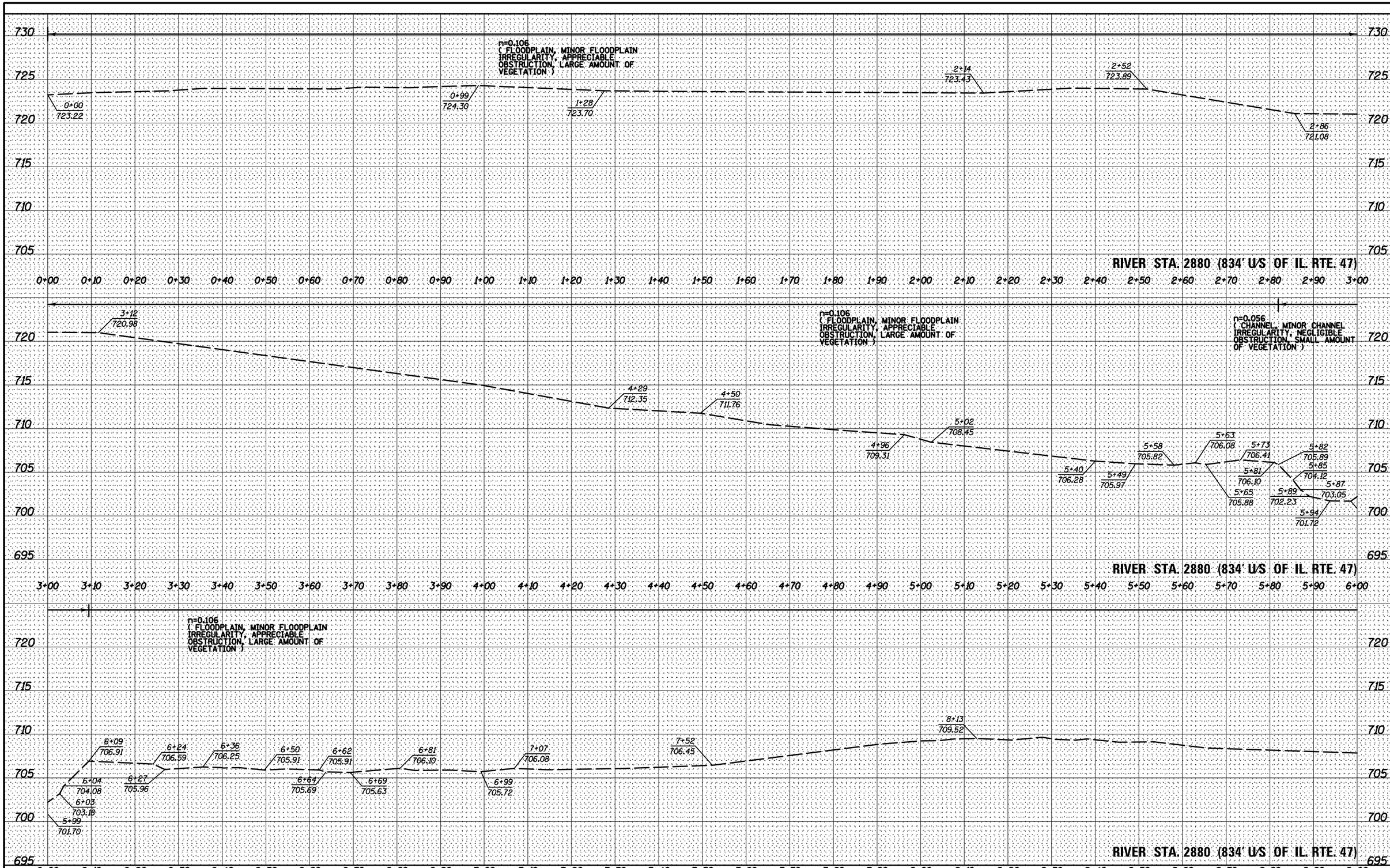

FINAL SURVEY		BY	DATE
SURVEYED			
PLOTTED			
TEMPLATE			
AREAS			
AREAS CHECKED			
NOTE BOOK			
NO.			

ORIGINAL SURVEY		BY	DATE
SURVEYED			
PLOTTED			
TEMPLATE			
AREAS			
AREAS CHECKED			
NOTE BOOK			
NO.			

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	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 3 OF 24 SHEETS | STA. 2880 TO STA. 2880

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	3

JOB NO. P-91-015-14

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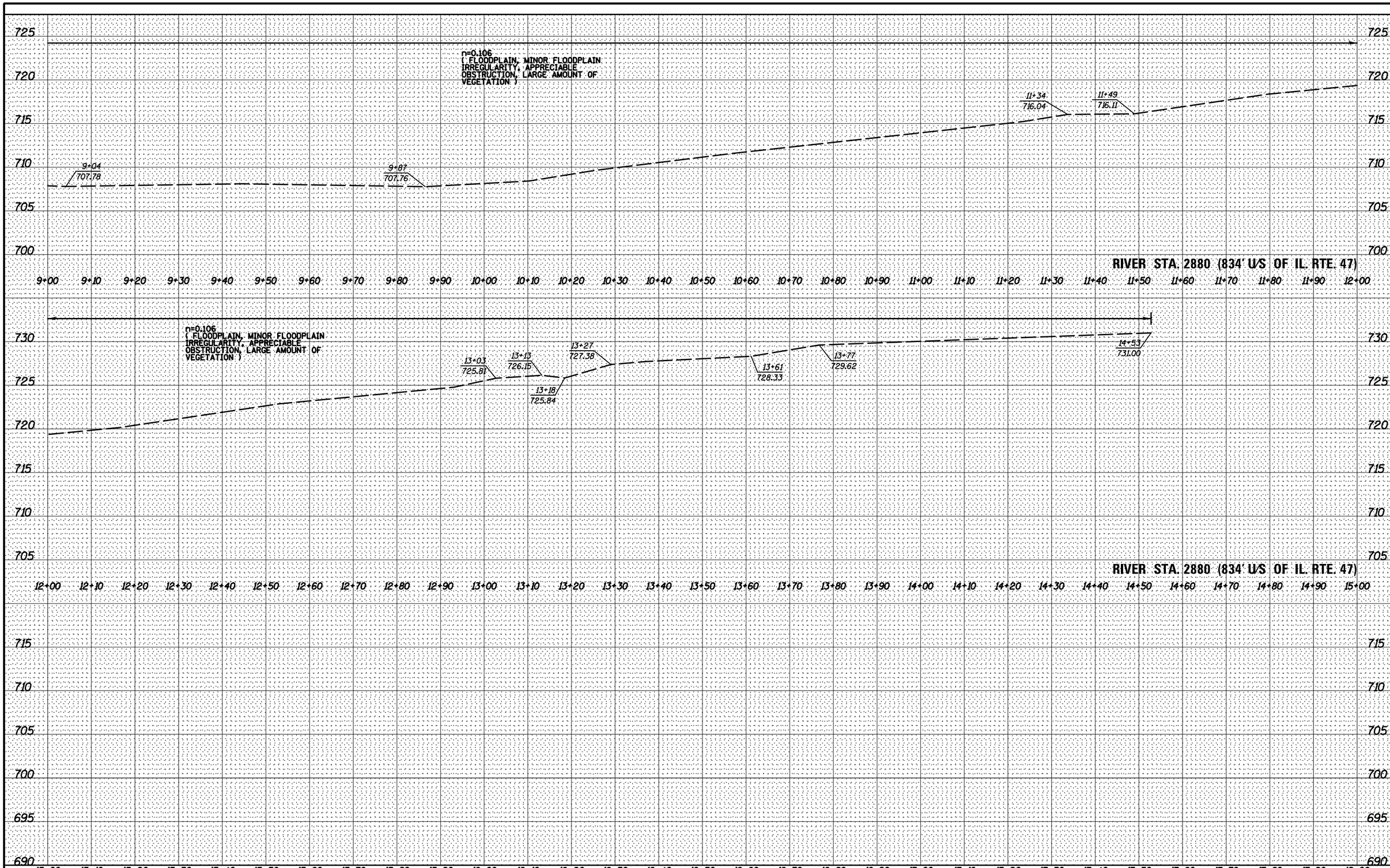

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NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

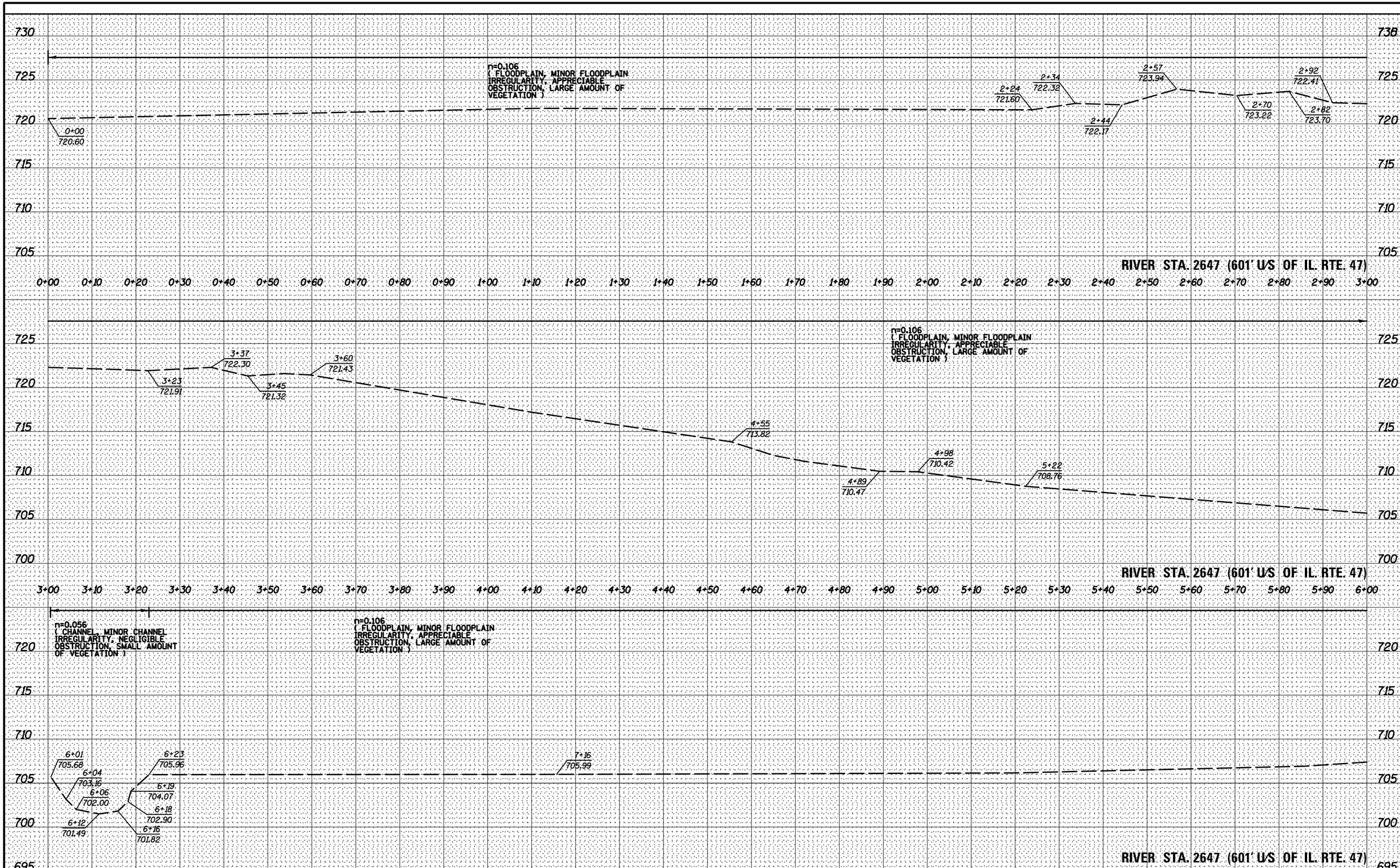
EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 4 OF 24 SHEETS | STA. 2880 TO STA. 2880

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	4

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

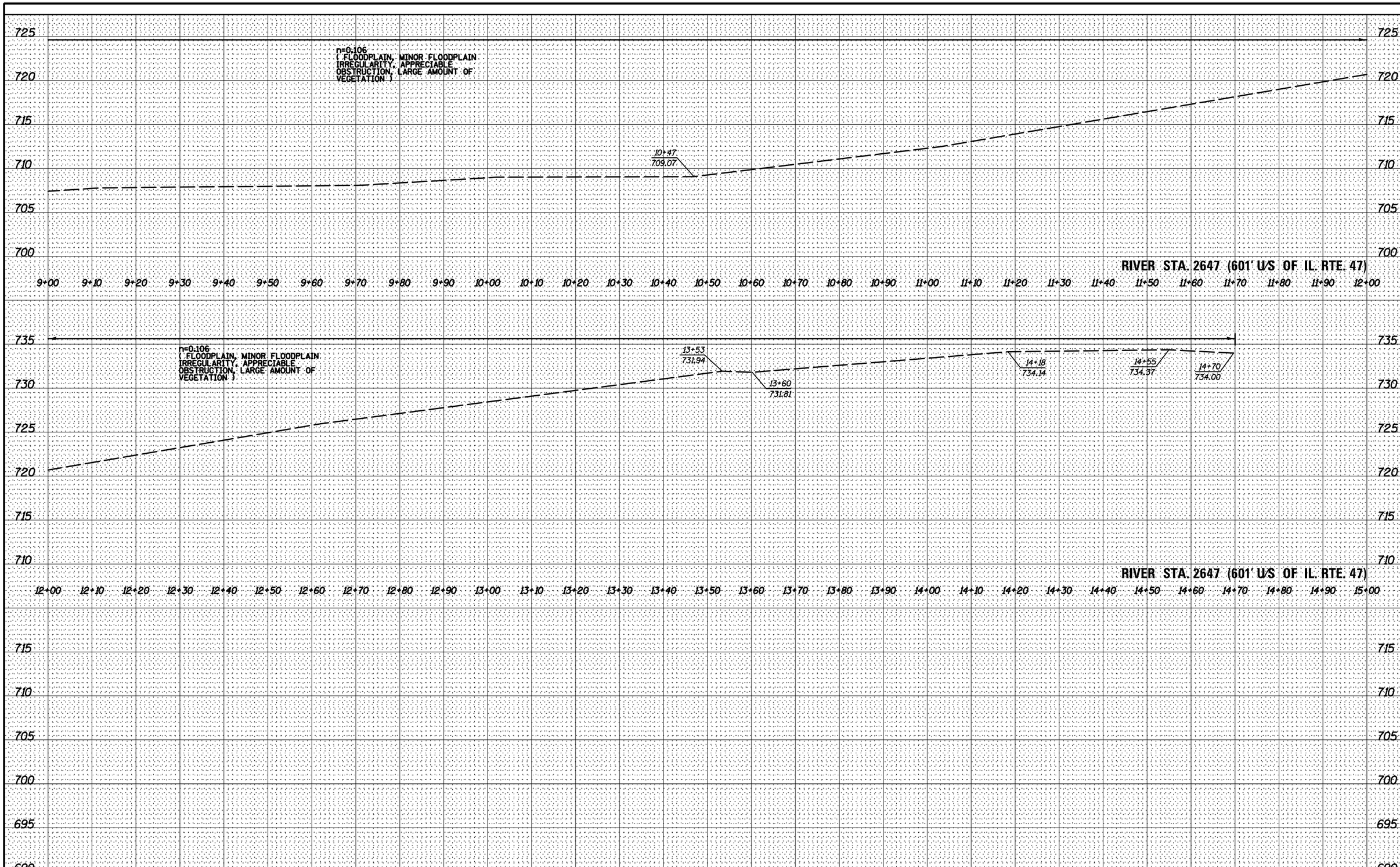
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 5 OF 24 SHEETS | STA. 2647 TO STA. 2647

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	5
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

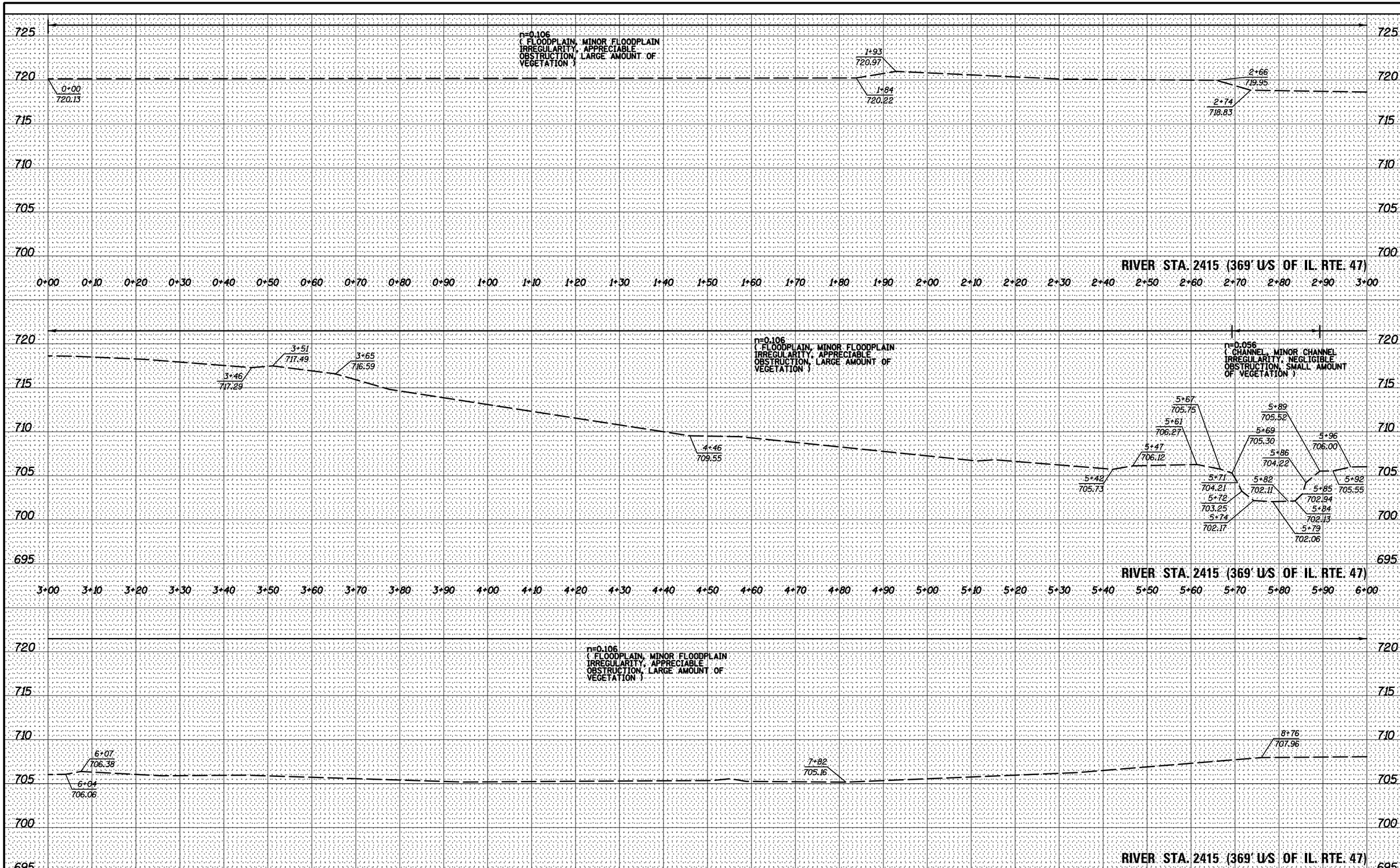
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 6 OF 24 SHEETS | STA. 2647 TO STA. 2647

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	6
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



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NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 7 OF 24 SHEETS | STA. 2415 TO STA. 2415

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	7
		JOB NO. P-91-015-14		

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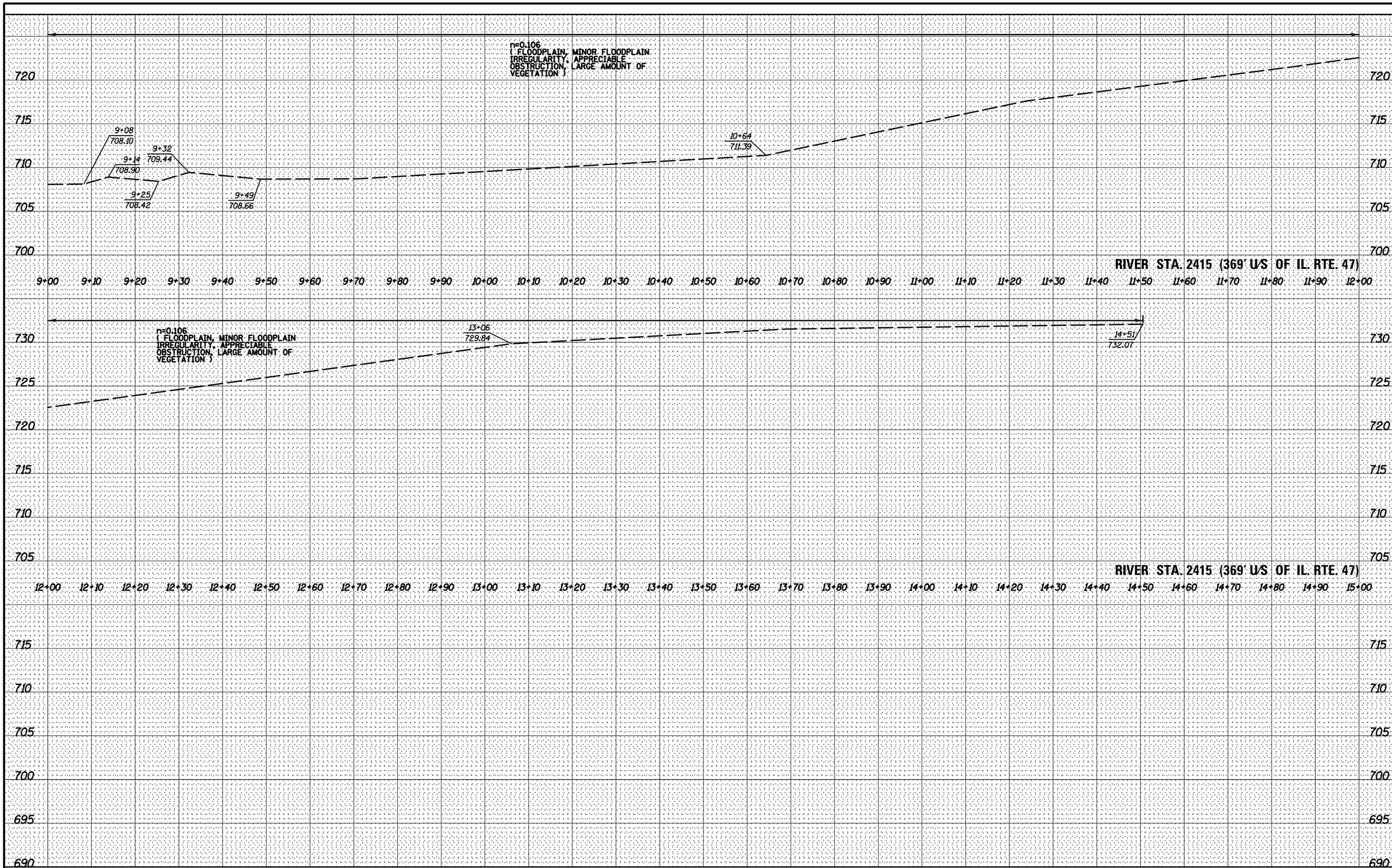

FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 8 OF 24 SHEETS | STA. 2415 TO STA. 2415

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	8

JOB NO. P-91-015-14

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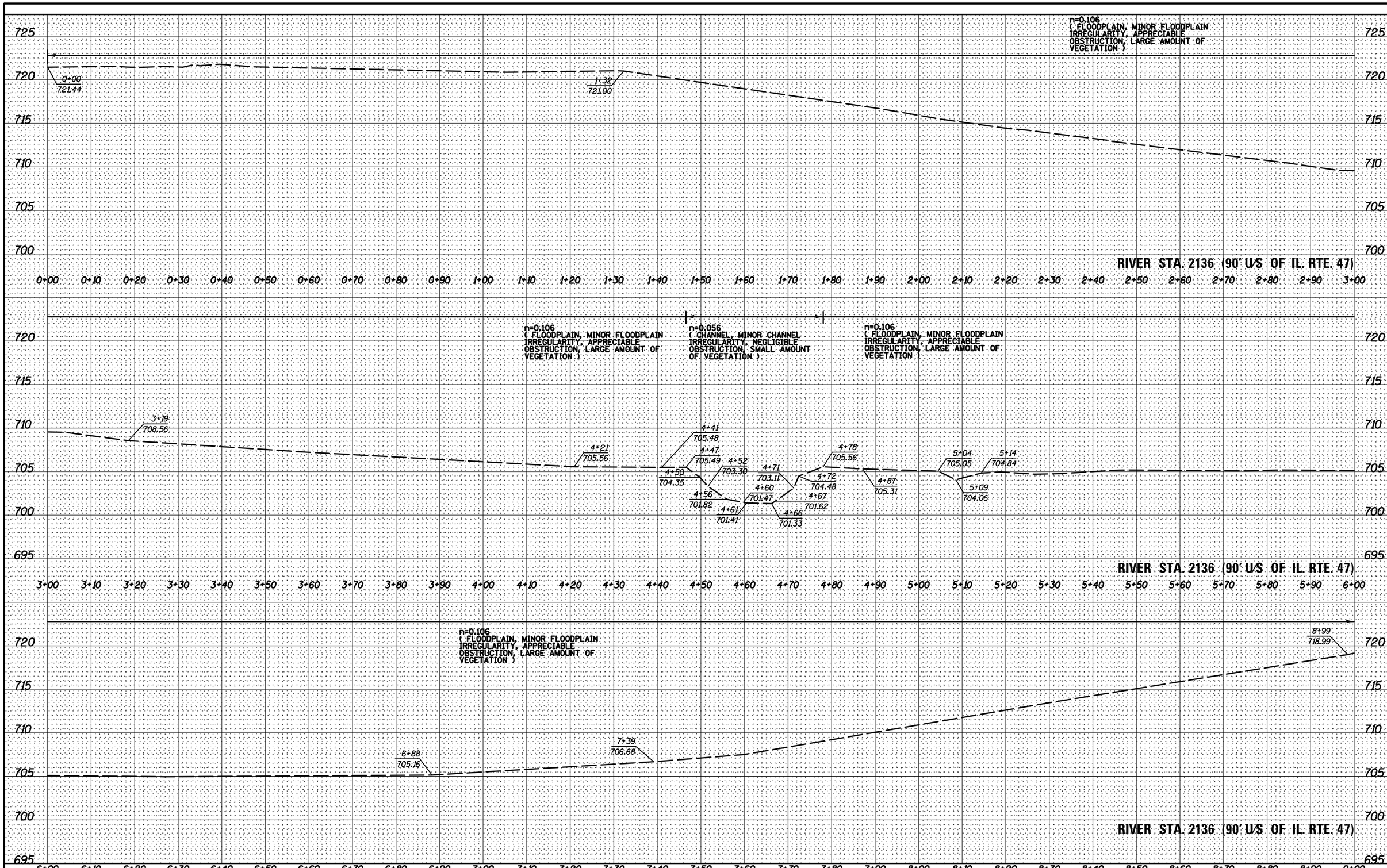

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NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 9 OF 24 SHEETS | STA. 2136 TO STA. 2136

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	9

JOB NO. P-91-015-14

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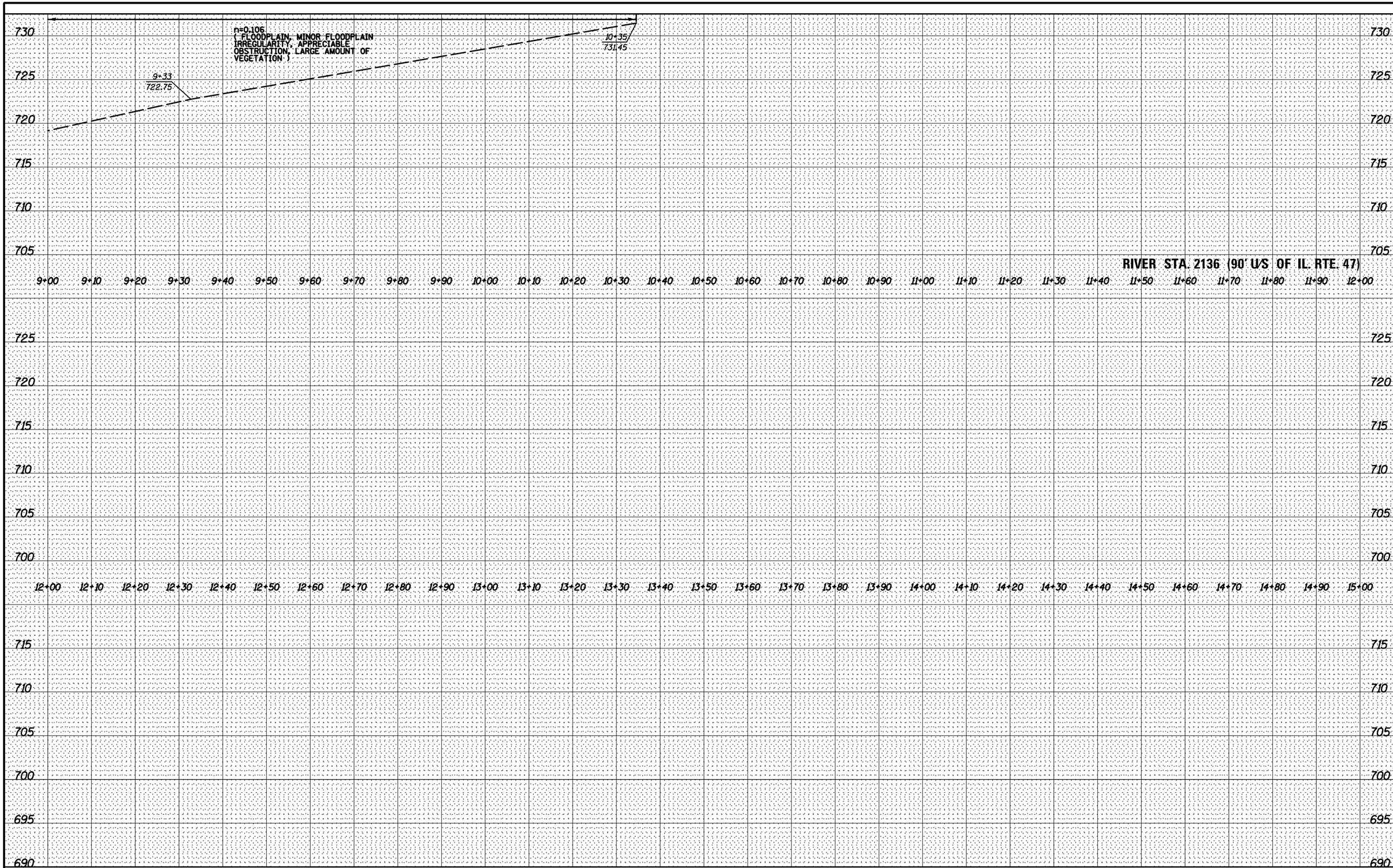

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	TEMPLATE		
NOTE BOOK	AREAS		
	AREAS CHECKED		
NO.			

ORIGINAL SURVEY		BY	DATE
	SURVEYED		
	PLOTTED		
	TEMPLATE		
NOTE BOOK	AREAS		
	AREAS CHECKED		
NO.			

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PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

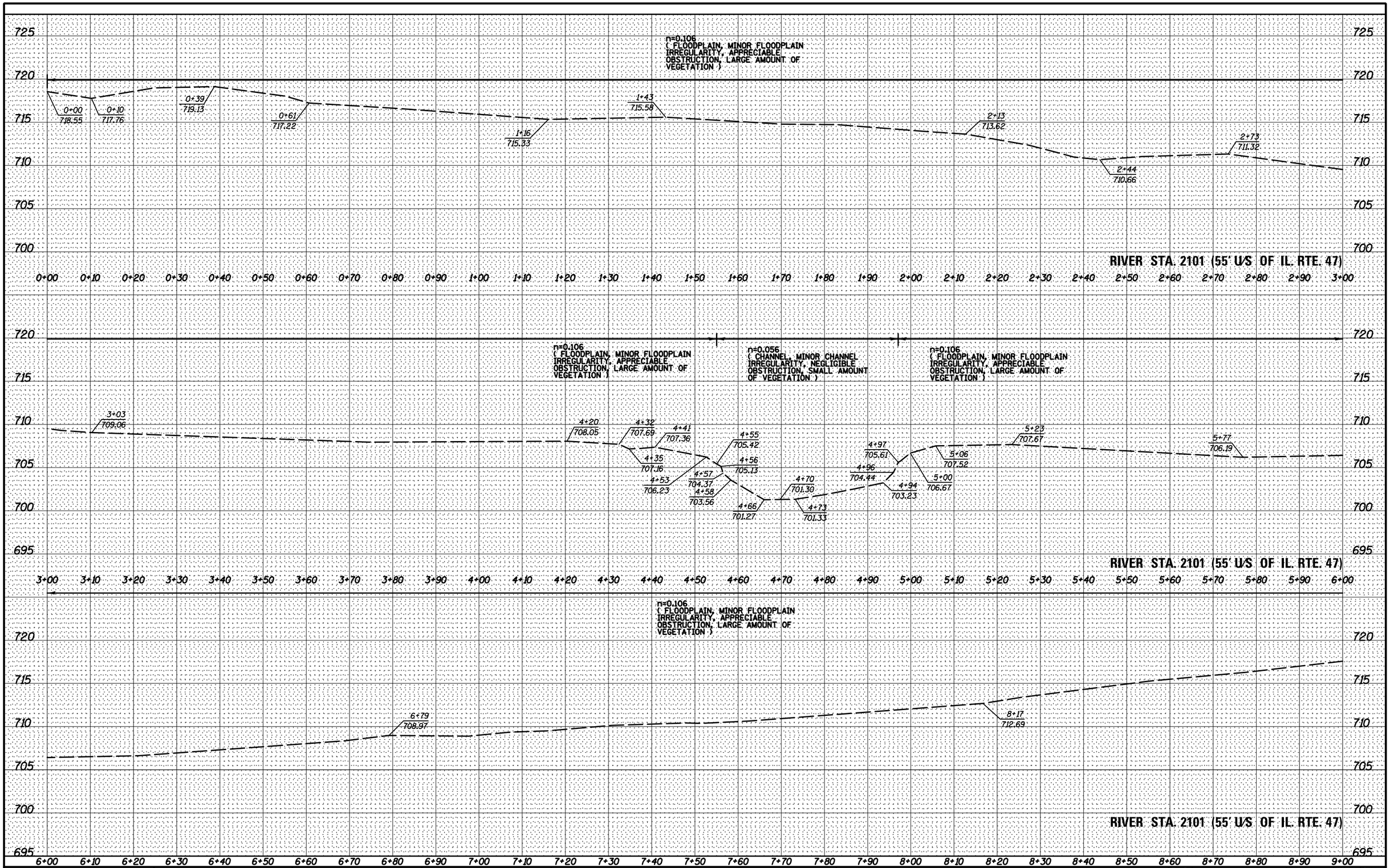
EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 10 OF 24 SHEETS | STA. 2136 TO STA. 2136

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	10

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



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NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
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ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

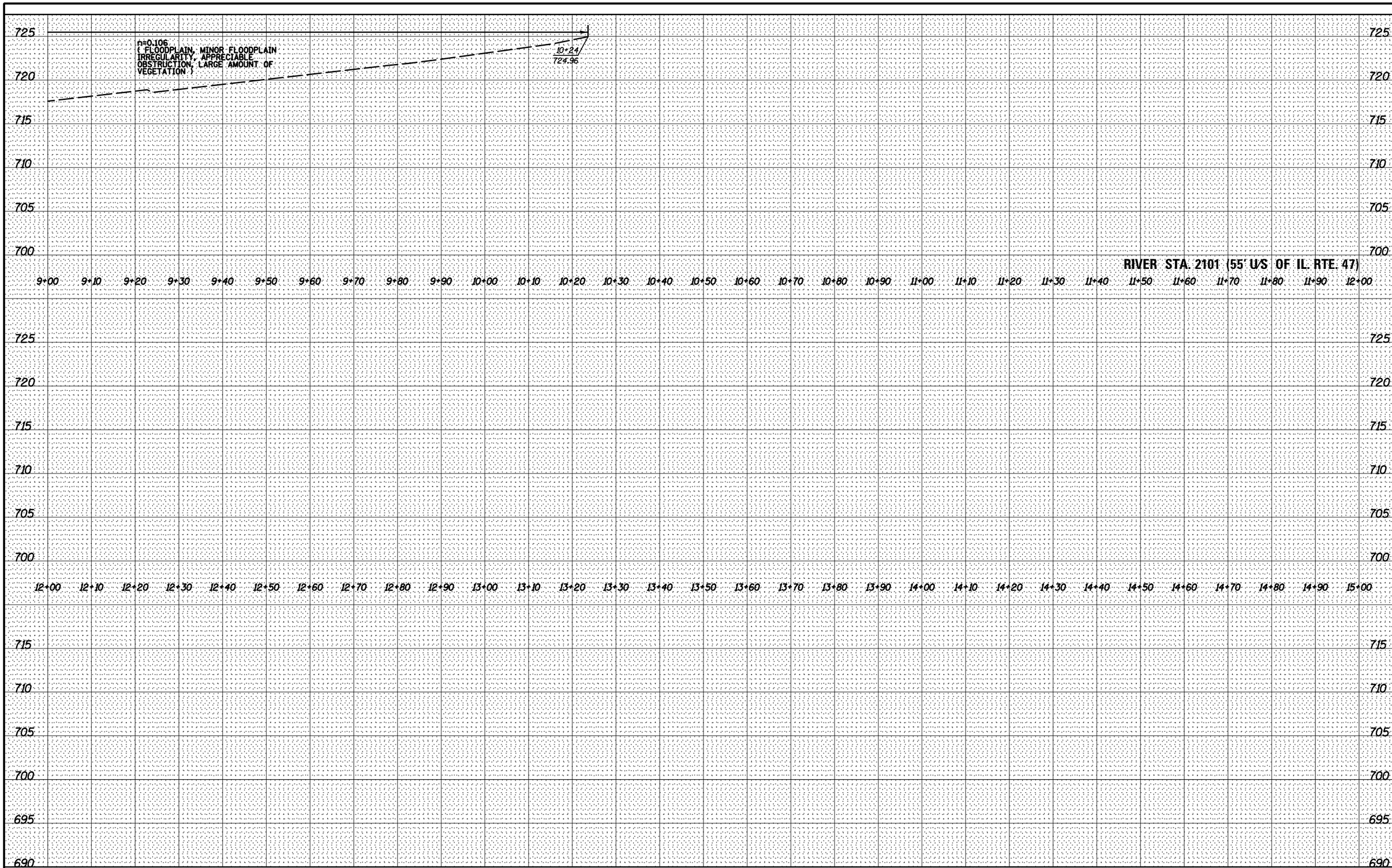
EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 11 OF 24 SHEETS | STA. 2101 TO STA. 2101

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	11

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

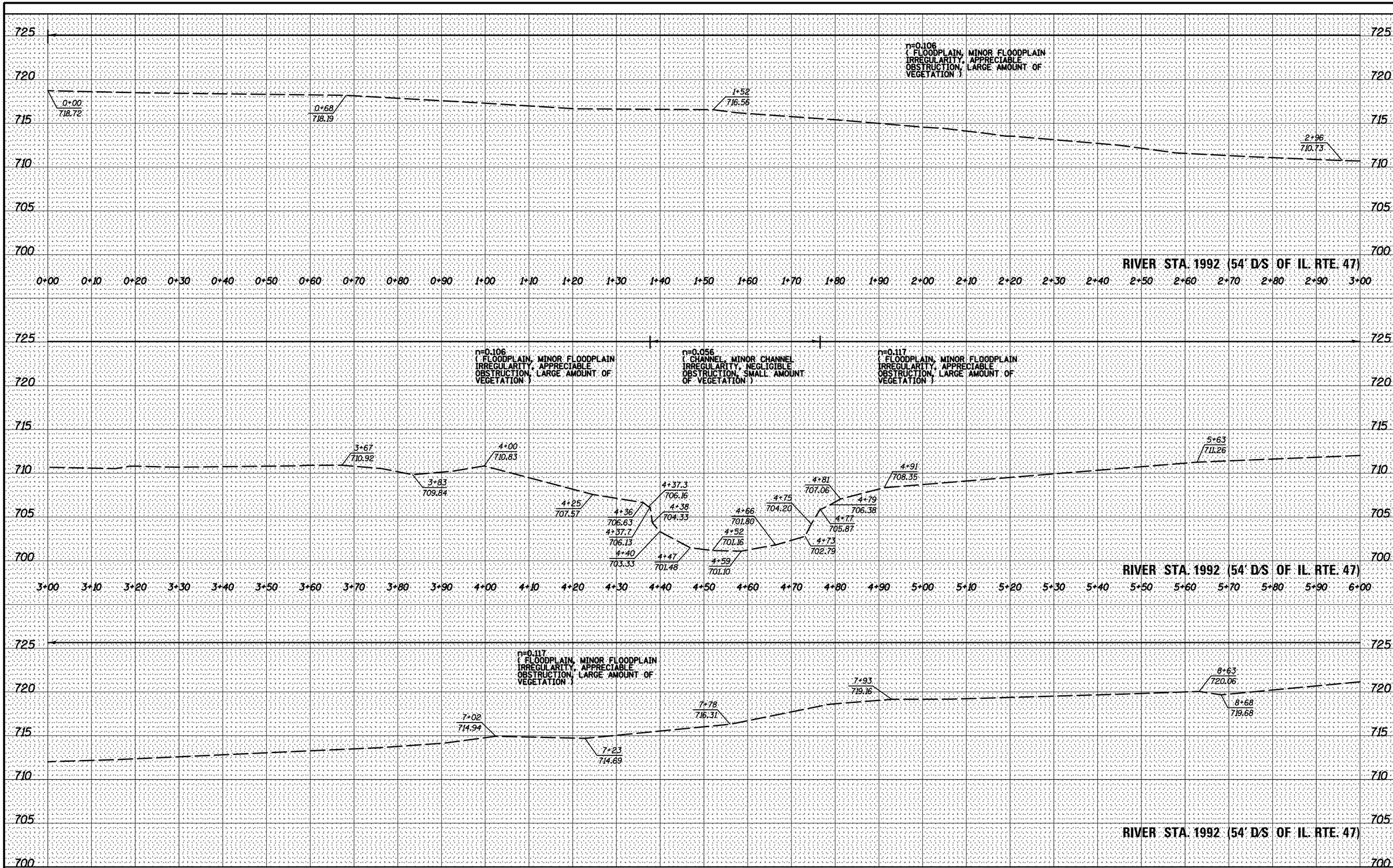
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 12 OF 24 SHEETS | STA. 2101 TO STA. 2101

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	12
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

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PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
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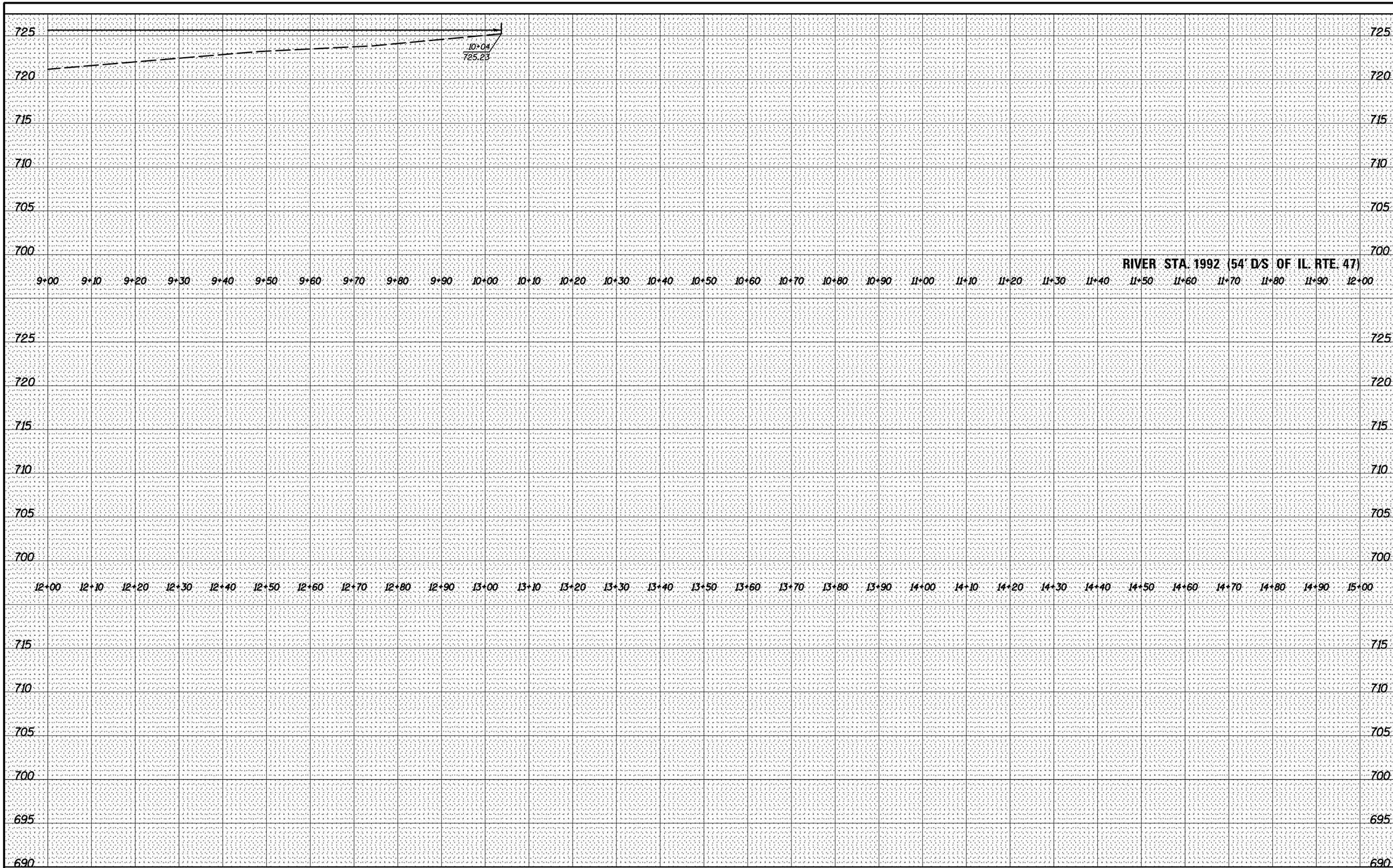
EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 13 OF 24 SHEETS | STA. 1992 TO STA. 1992

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	13
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
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	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
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	AREAS		
NO.	AREAS CHECKED		

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Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

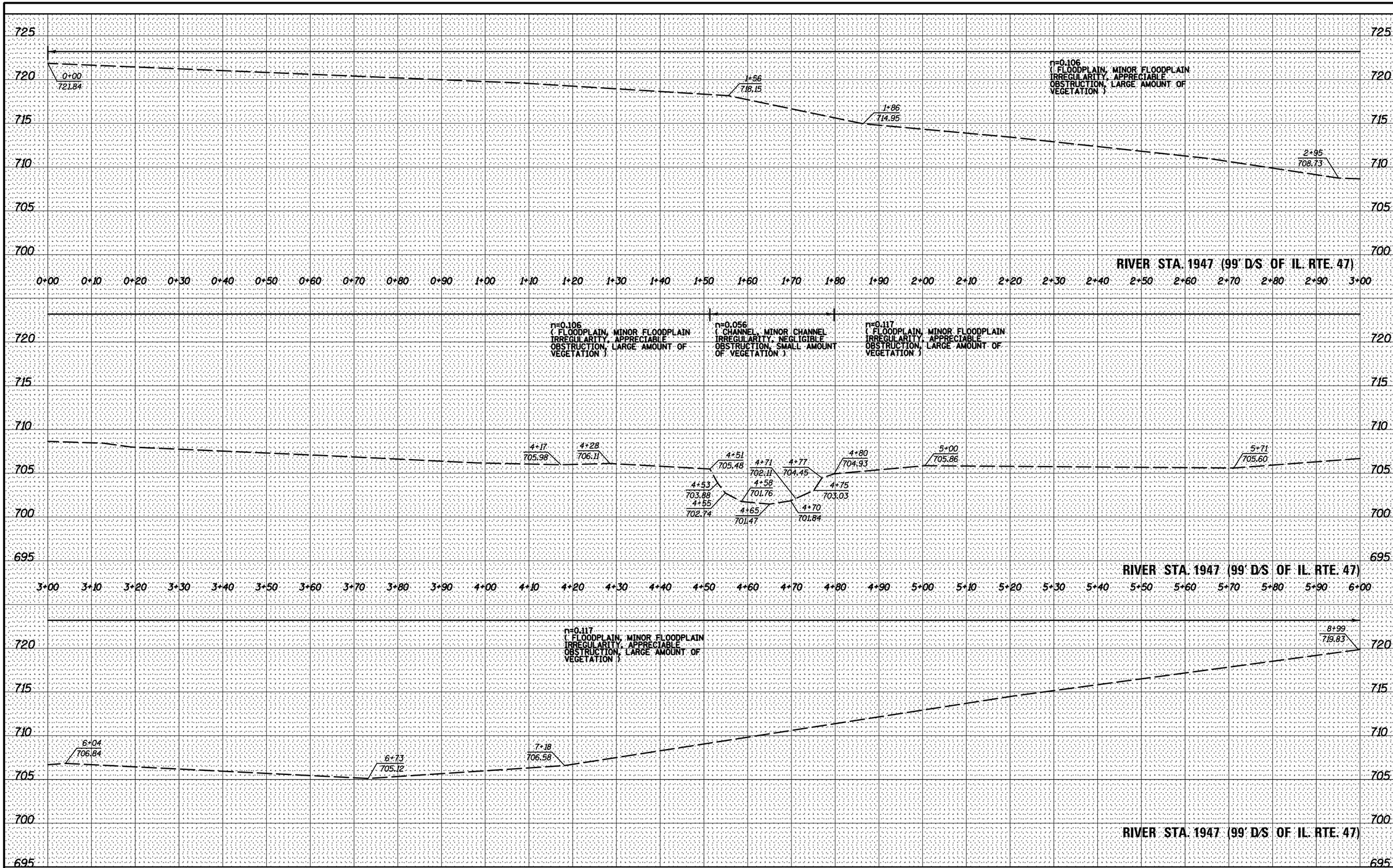
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 14 OF 24 SHEETS | STA. 1992 TO STA. 1992

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	14
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
	SURVEYED		
	PLOTTED		
	TEMPLATE		
NOTE BOOK	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
	SURVEYED		
	PLOTTED		
	TEMPLATE		
NOTE BOOK	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

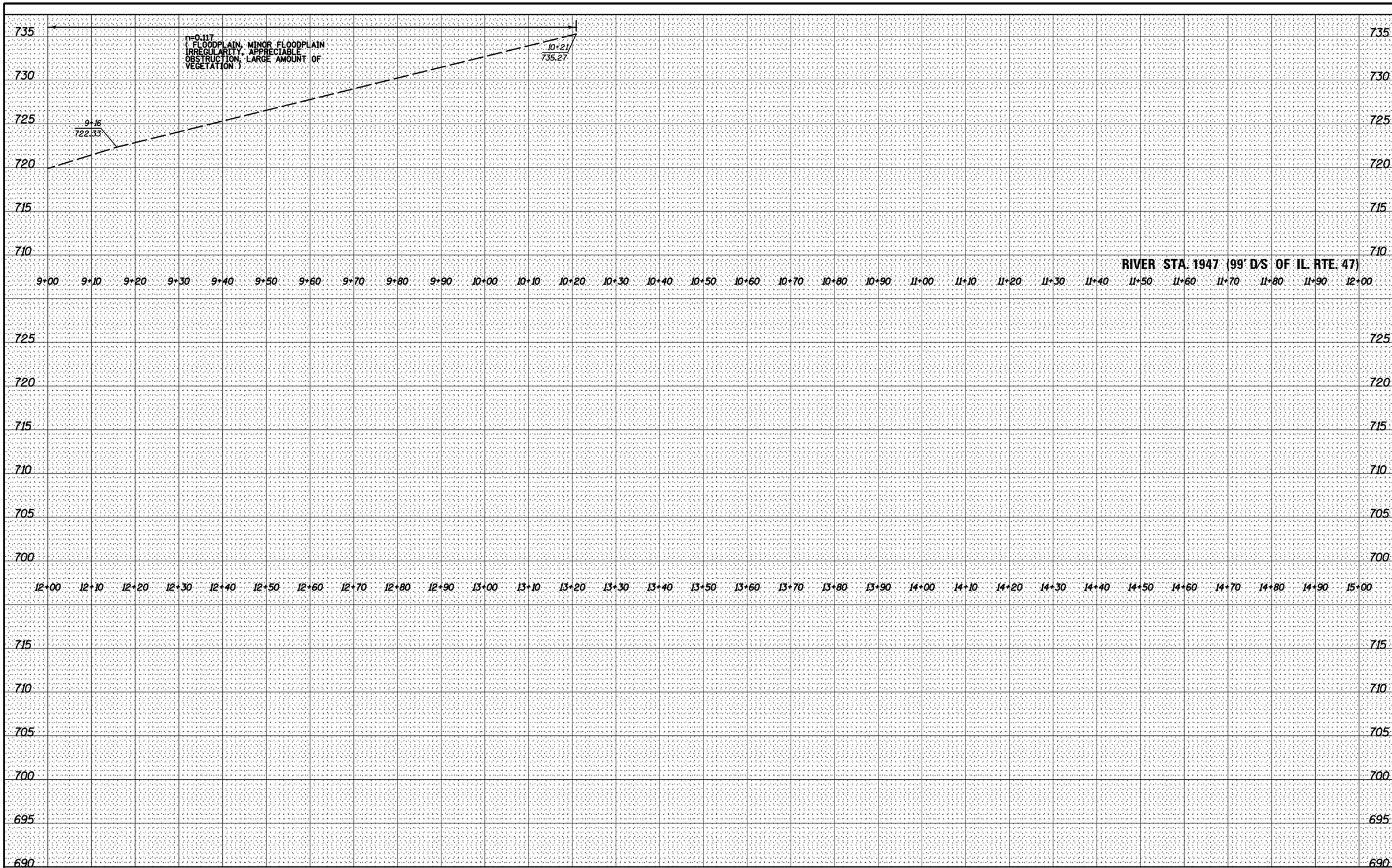
USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 15 OF 24 SHEETS | STA. 1947 TO STA. 1947

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	15
		JOB NO. P-91-015-14		
		ILLINOIS	FED. AID PROJECT	



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

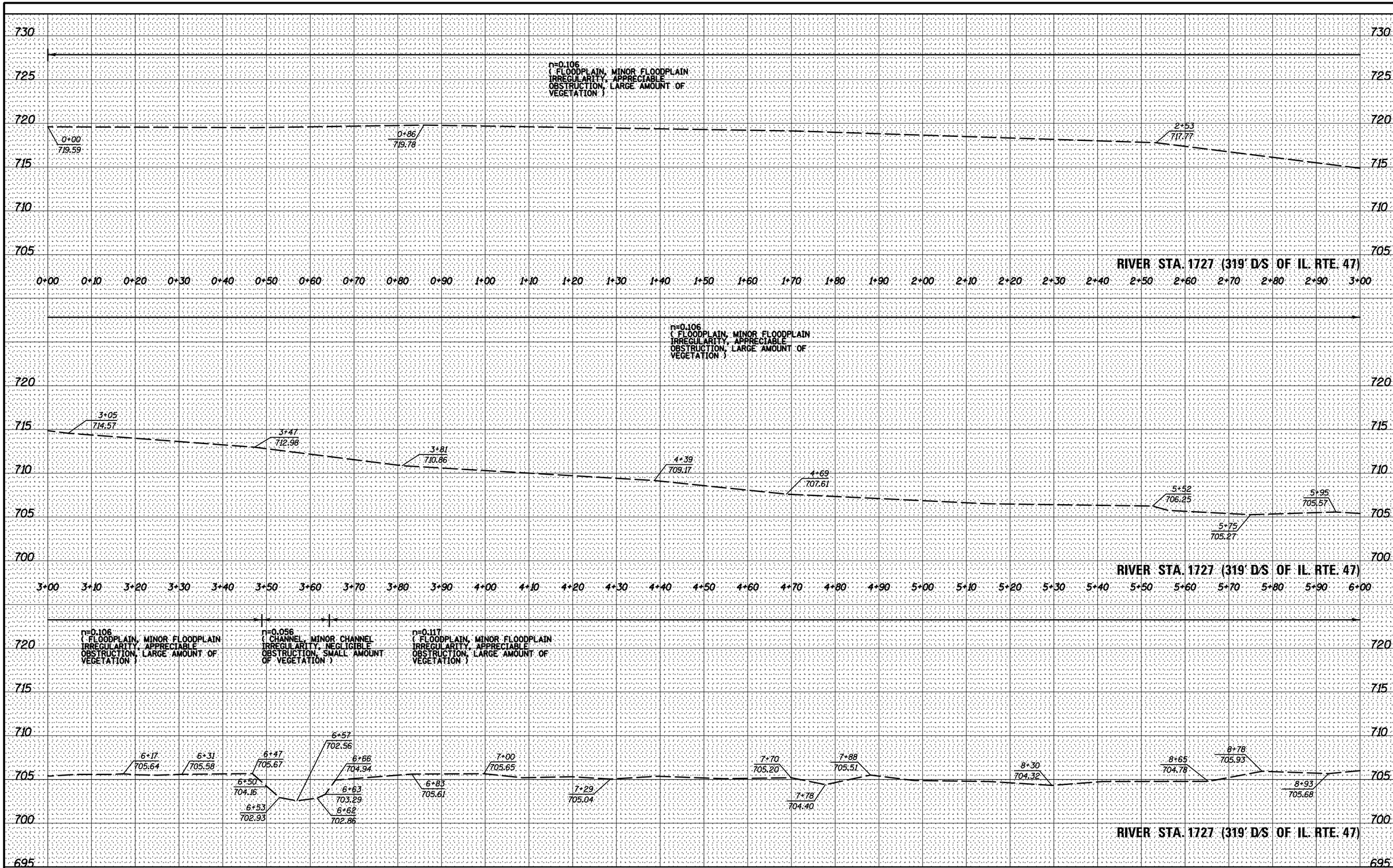
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 16 OF 24 SHEETS | STA. 1947 TO STA. 1947

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	16
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

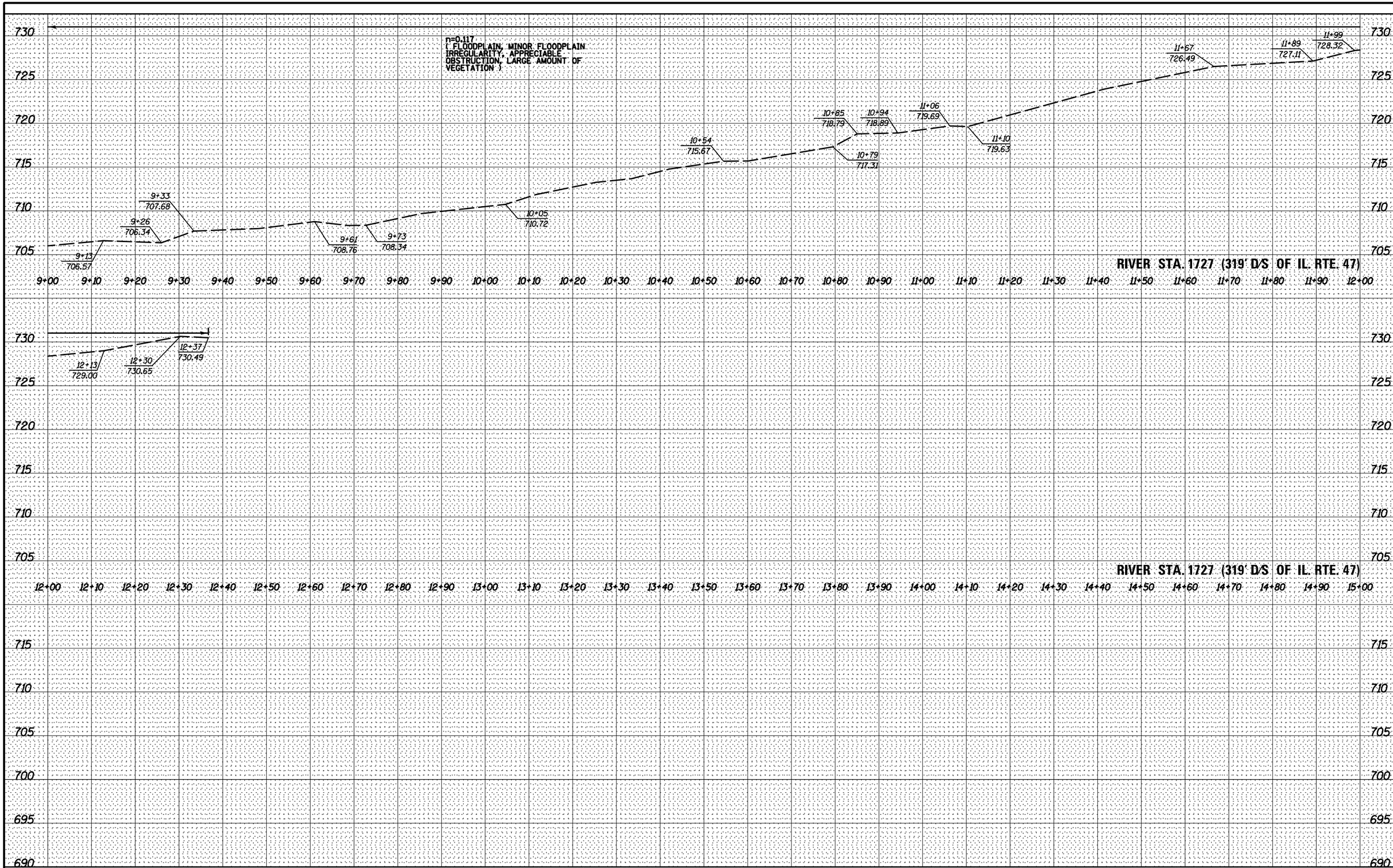
USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 17 OF 24 SHEETS | STA. 1727 TO STA. 1727

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	17
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



FINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK		
NO.		

ORIGINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK		
NO.		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

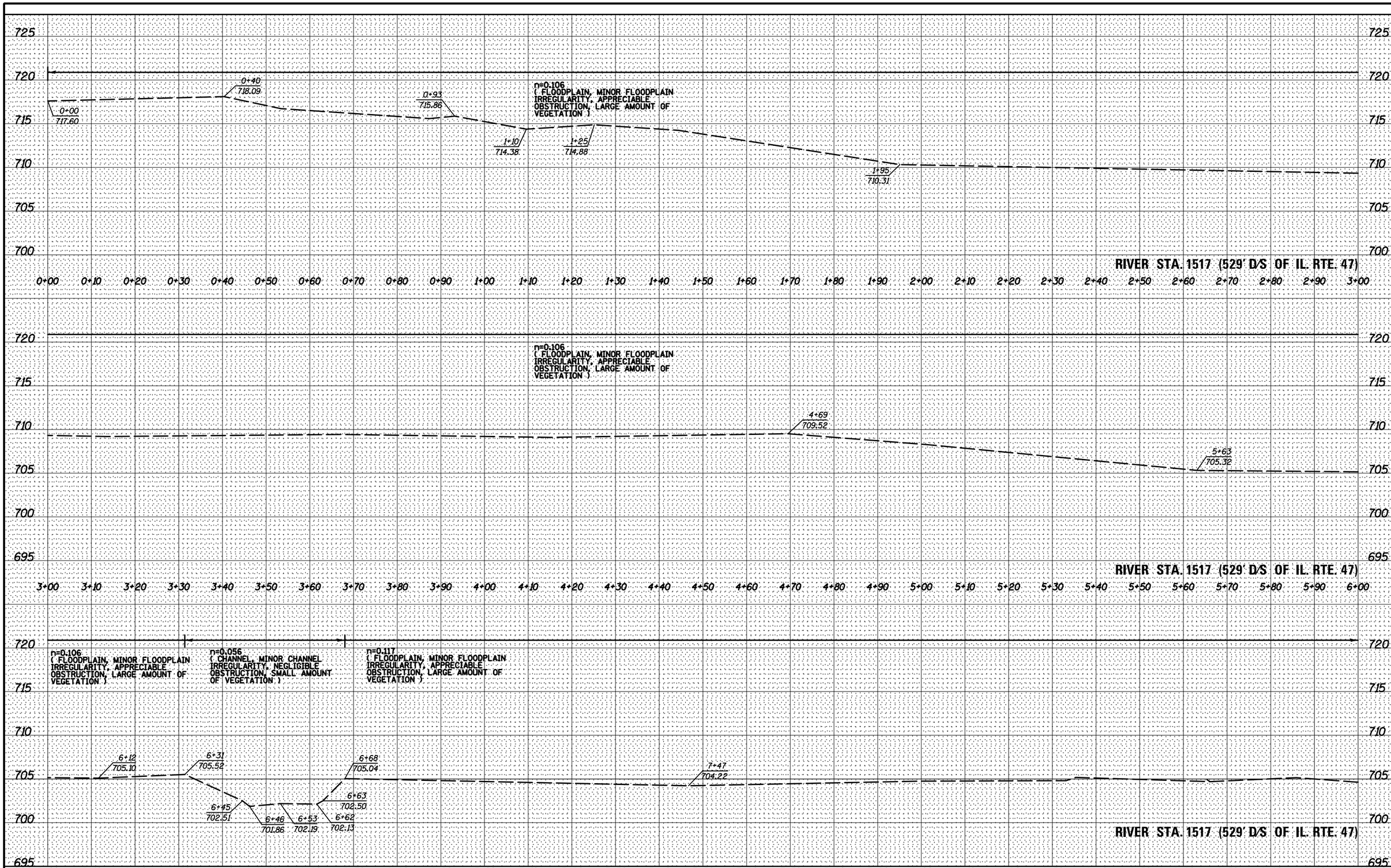
EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 18 OF 24 SHEETS | STA. 1727 TO STA. 1727

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	18

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

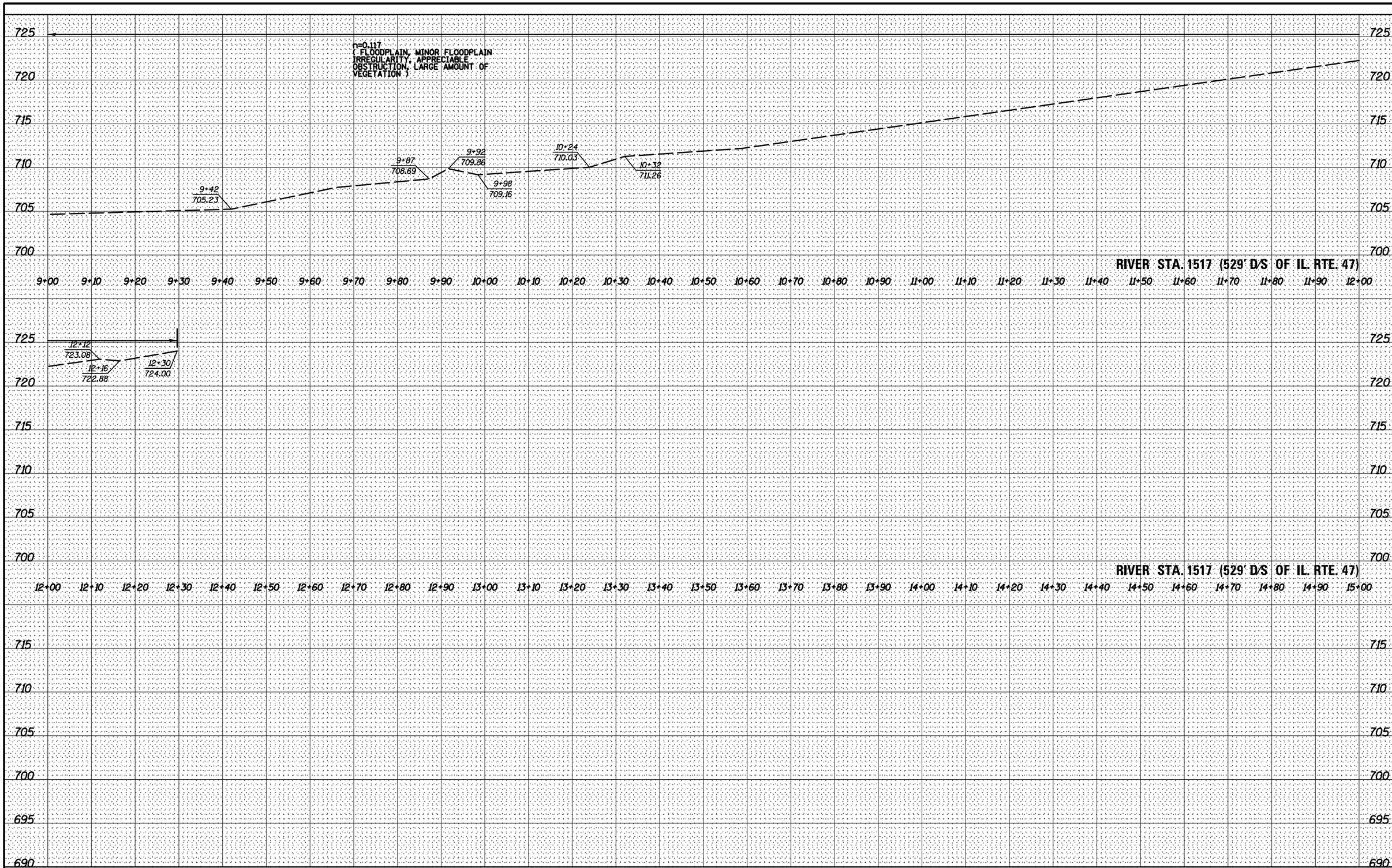
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 19 OF 24 SHEETS | STA. 1517 TO STA. 1517

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	19
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

ORIGINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

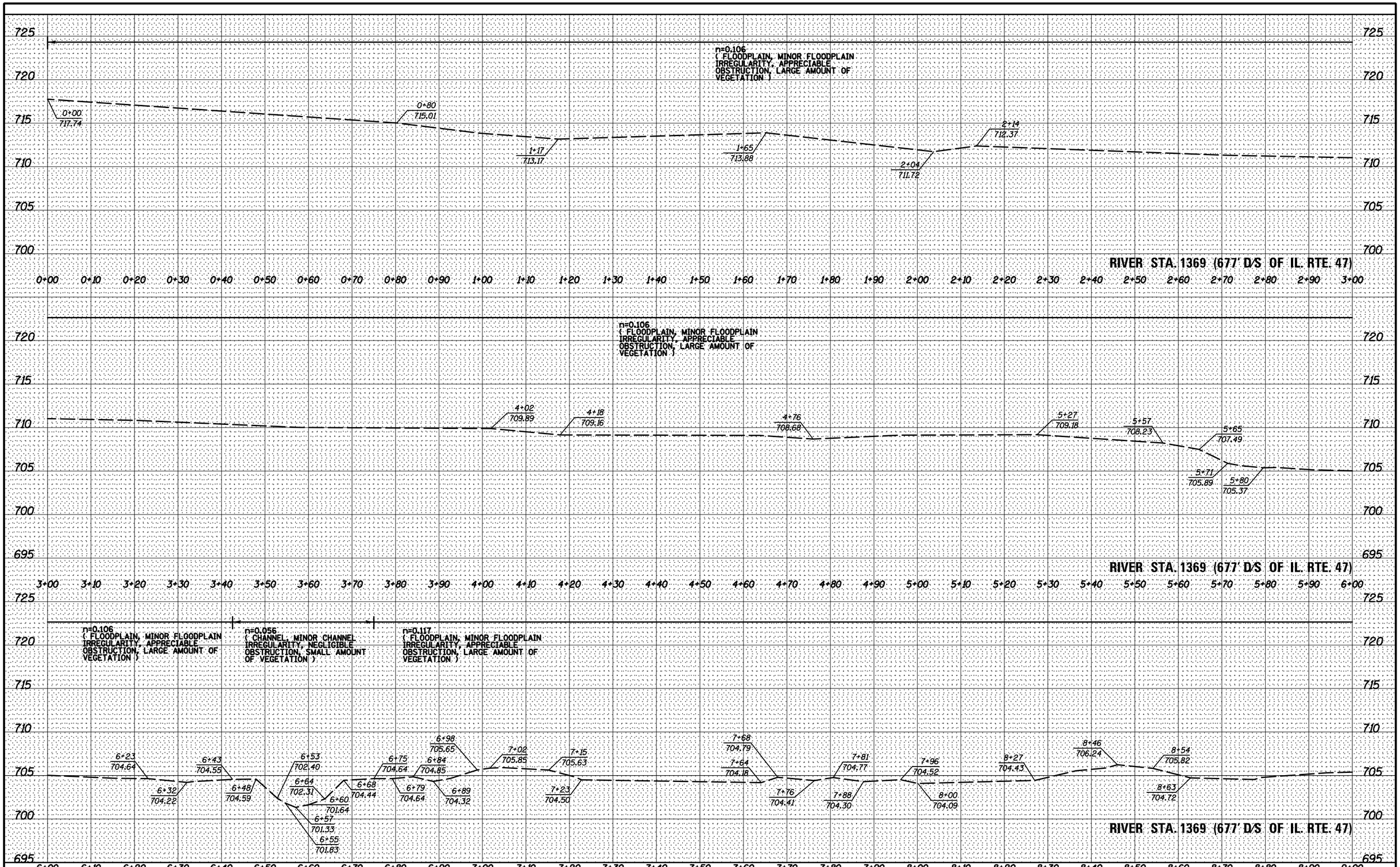
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 20 OF 24 SHEETS | STA. 1517 TO STA. 1517

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	20
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

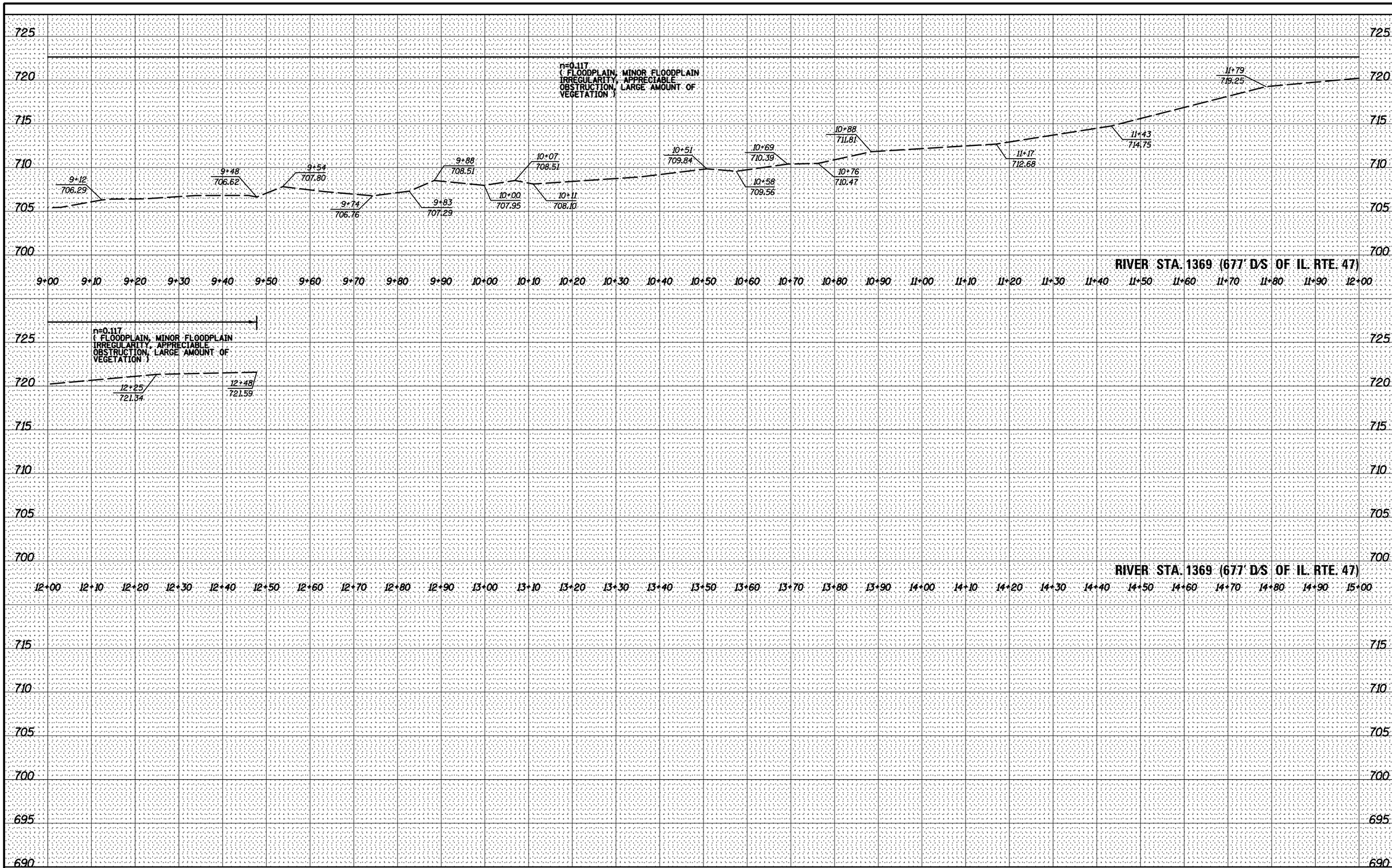
USER NAME = $USER$	DESIGNED - KU	REVISED -
	DRAWN - KU	REVISED -
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D - SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 21 OF 24 SHEETS | STA. 1369 TO STA. 1369

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	21
		JOB NO. P-91-015-14		
		ILLINOIS FED. AID PROJECT		



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

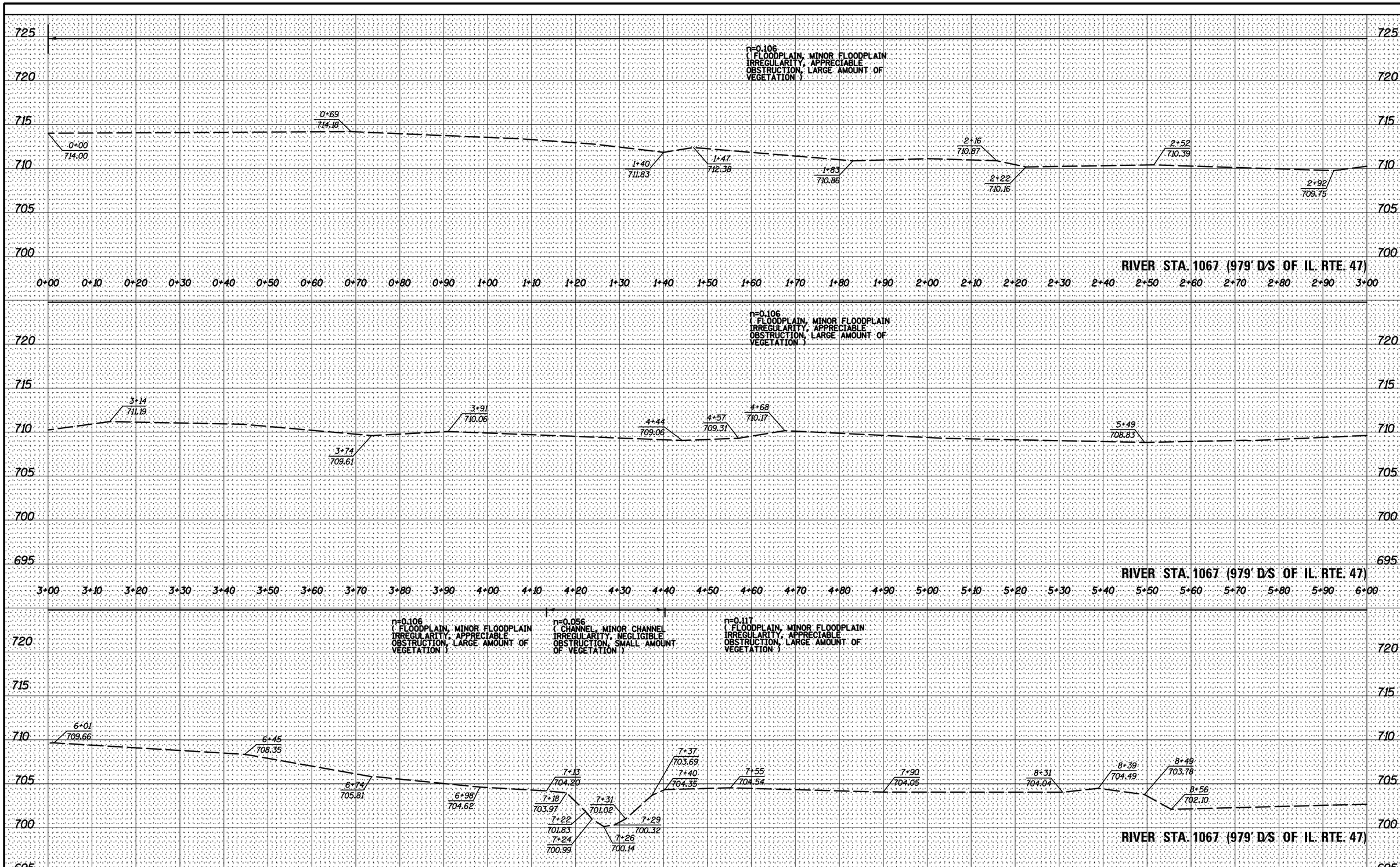
EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 22 OF 24 SHEETS | STA. 1369 TO STA. 1369

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	22

JOB NO. P-91-015-14

ILLINOIS FED. AID PROJECT



FINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

ORIGINAL SURVEY		BY	DATE
NOTE BOOK	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
NO.	AREAS CHECKED		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

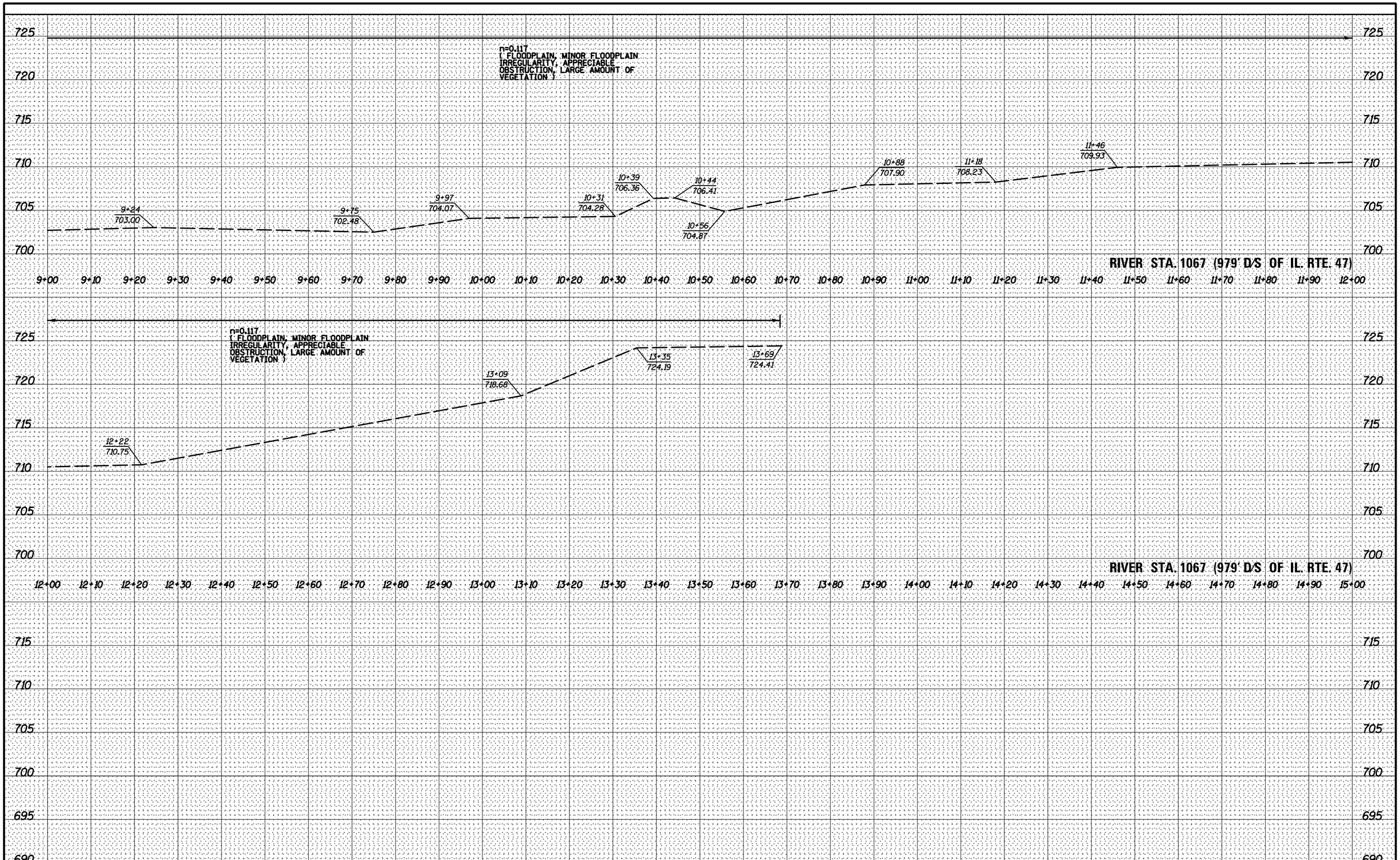
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 23 OF 24 SHEETS | STA. 1067 TO STA. 1067

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	23
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT



FINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

ORIGINAL SURVEY	BY	DATE
SURVEYED		
PLOTTED		
TEMPLATE		
AREAS		
AREAS CHECKED		
NOTE BOOK NO.		

LIN ENGINEERING, LTD.
Consulting Engineers
Westmont, Illinois

USER NAME = $USER$	DESIGNED - KU	REVISED -	
	DRAWN - KU	REVISED -	
PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -	
PLOT DATE = $DATE$	DATE - 11/2015	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT D – SEAVEY ROAD RUN
CROSS SECTIONS

SCALE: 1"=10'H, 5'V | SHEET 24 OF 24 SHEETS | STA. 1067 TO STA. 1067

F.A.P RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	-	KANE	24	24
		JOB NO. P-91-015-14		

ILLINOIS FED. AID PROJECT

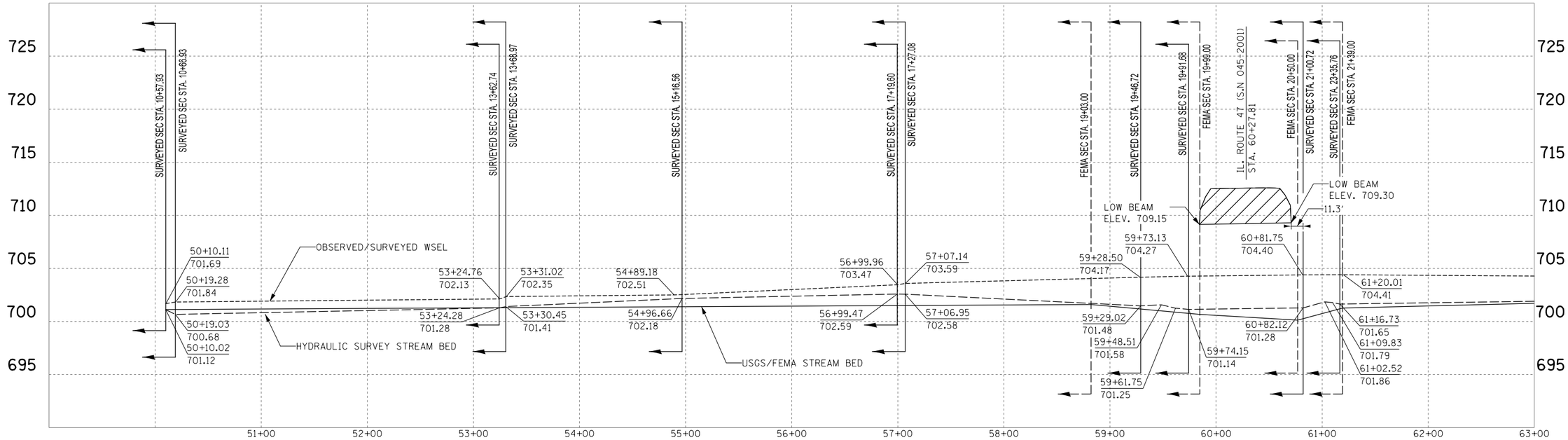
EXHIBIT E

STREAMBED PROFILE

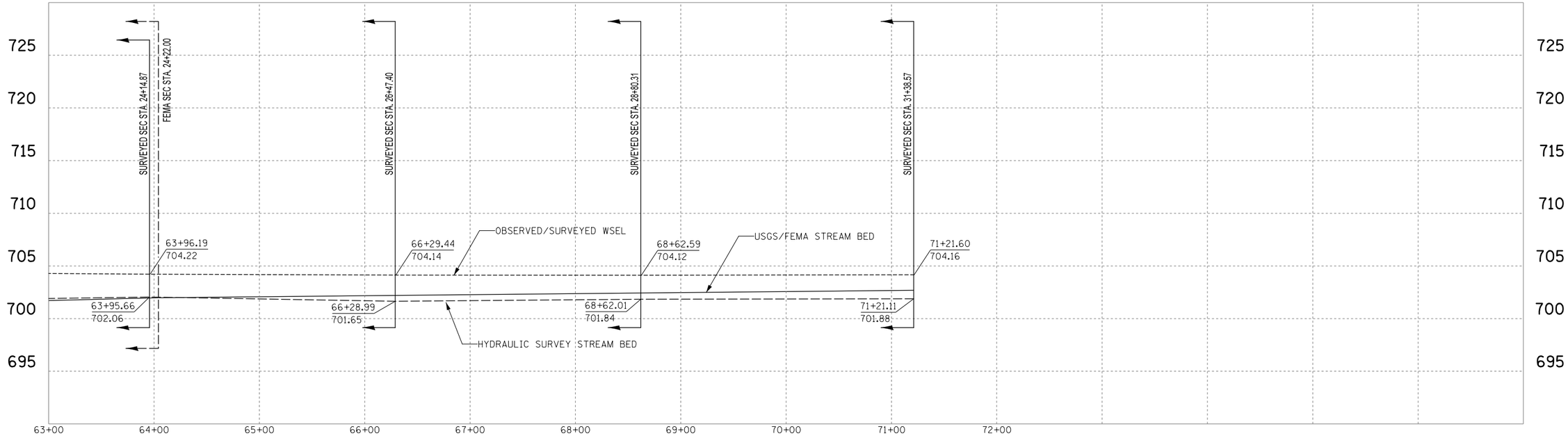
EXHIBIT E

PLAN VIEW
SURVEYED ALIGNMENT
IL. RTE. 47 OVER
SEAVEY ROAD RUN
S.N. 045–2001

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED - KU	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EXHIBIT – SURVEYED ALIGNMENT IL. RTE. 47 OVER SEAVEY ROAD RUN	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		DRAWN - KU	REVISED -			326		KANE		
	PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -					JOB NO. P-91-015-14		
	PLOT DATE = $DATE$	DATE - 11/2015	REVISED -		SCALE: 1"=100'	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		



RIVER STATION (SURVEY ALIGNMENT)



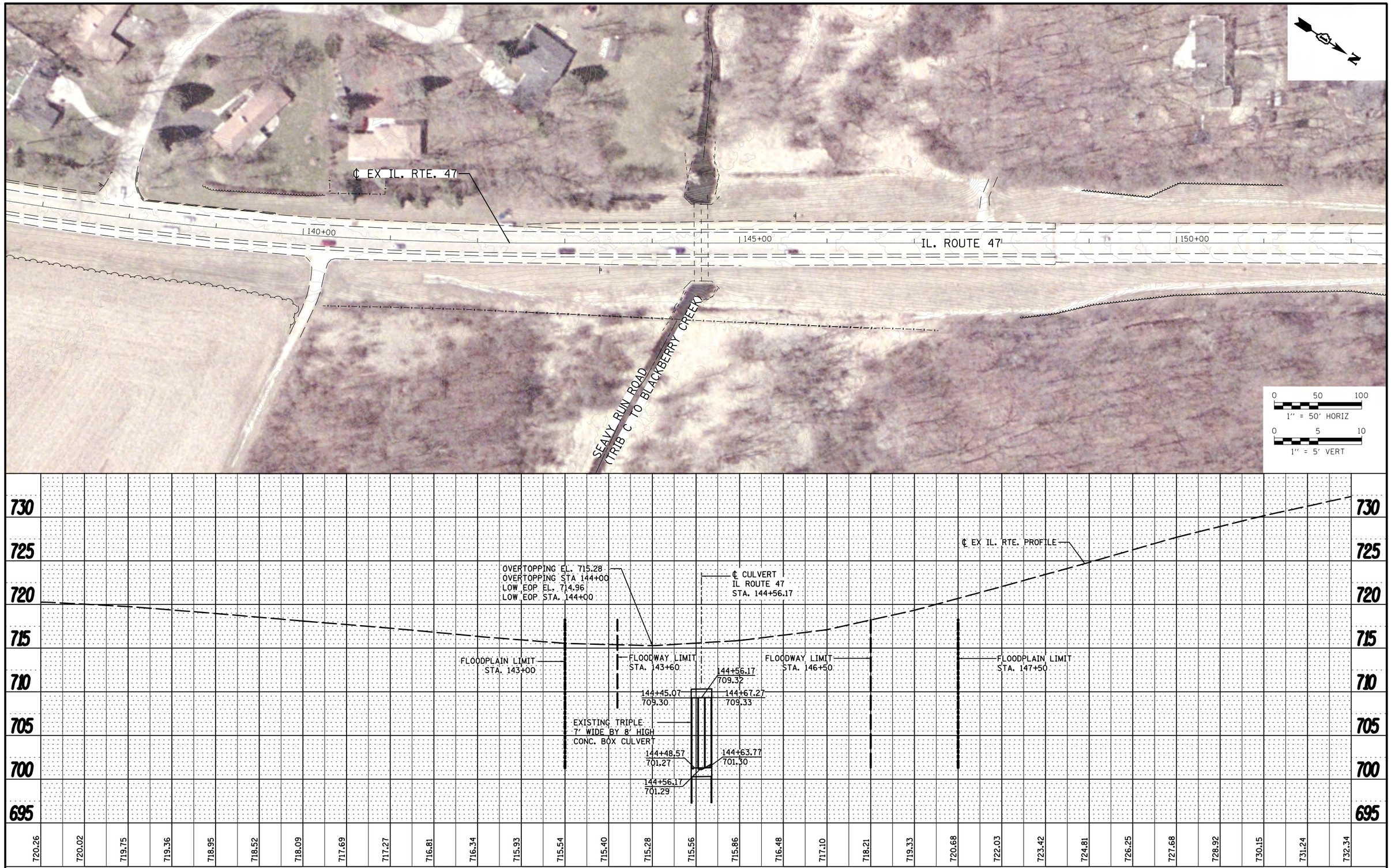
RIVER STATION (SURVEY ALIGNMENT)

STREAM PROFILE IL. RTE. 47 OVER SEAVEY ROAD RUN, S.N. 045-2001

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED - KU	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	EXHIBIT D – STREAM PROFILE IL. RTE. 47 OVER SEAVE ROAD RUN (TRIBUTARY C)	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS / SHEET NO.
		DRAWN - KU	REVISED -					KANE	
	PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -					JOB NO. P-91-015-14	
	PLOT DATE = $DATE$	DATE - 11/2015	REVISED -			FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT	

EXHIBIT F

ROADWAY PROFILE



PLAN		BY	DATE
	SURVEYED		
	PLOTTED		
	ALIGNMENT CHECKED		
NOTE BOOK	RT. OF WAY CHECKED		
NO.	CADD FILE NAME		

PROFILE		BY	DATE
	SURVEYED		
	PLOTTED		
	GRADES CHECKED		
NOTE BOOK	B.M. NOTED		
NO.	STRUCTURE NOTATNS CHKD		

FILE NAME = $FILE1$	USER NAME = $USER$	DESIGNED - KU	REVISED -
		DRAWN - KU	REVISED -
	PLOT SCALE = $SCALE$	CHECKED -	REVISED -
$MODELNAME$	PLOT DATE = $DATE$	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXHIBIT F
IL. RTE. 47 PLAN AND PROFILE

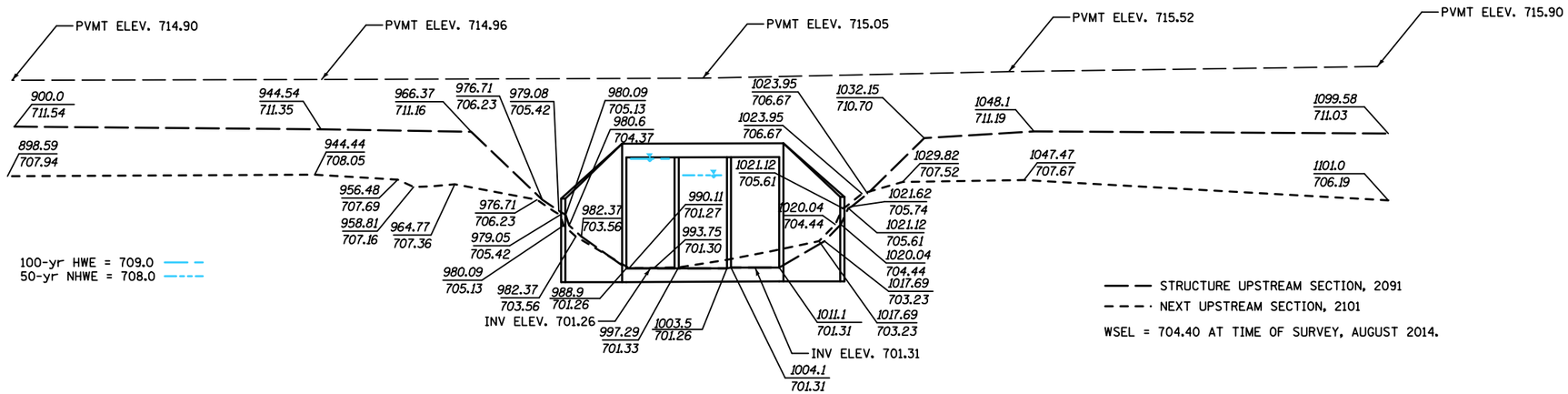
SCALE: 1"=50' | SHEET OF SHEETS | STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

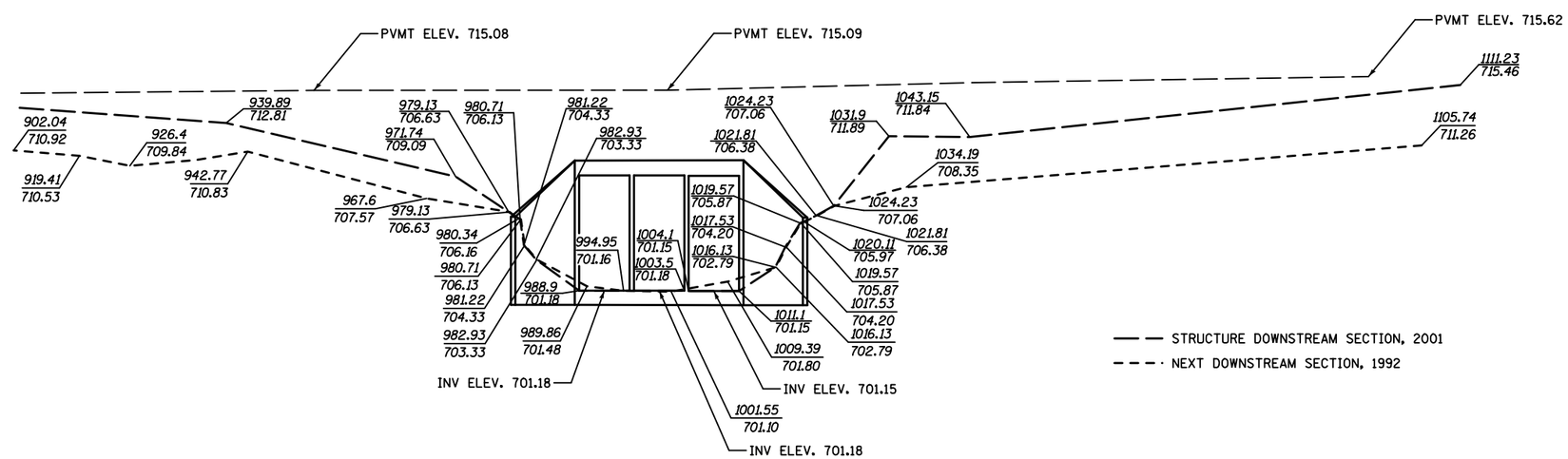
CONTRACT NO.

ILLINOIS FED. AID PROJECT

EXISTING CULVERT (SN 045-2001)



UPSTREAM FACE (LOOKING DOWNSTREAM)



NOTE:
CROSS SECTION STATIONS MATCH HEC-RAS MODEL AND HAVE BEEN SUPERIMPOSED ONTO THE STRUCTURE OPENING FOR THE PURPOSE OF THIS EXHIBIT.

DOWNSTREAM FACE (LOOKING DOWNSTREAM)

LIN ENGINEERING, LTD. Consulting Engineers Westmont, Illinois	USER NAME = $USER$	DESIGNED - KU	REVISED - SGL 05/2017	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	IL. RTE. 47 OVER SEAVEY ROAD RUN (TRIBUTARY C) EXHIBIT G – CULVERT OPENING PLOTS	F.A.P. RTE. 326	SECTION	COUNTY KANE	TOTAL SHEETS	SHEET NO.
		DRAWN - KU	REVISED -					JOB NO. P-91-015-14		
	PLOT SCALE = $SCALE$	CHECKED - FML	REVISED -							
	PLOT DATE = $DATE$	DATE - 11/2015	REVISED -		SCALE: N.T.S	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		

\192.168.24.4\linjobs\1407\Existing Data\As-Built Plans\0452001 1971 Plans SW.pdf

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS

PLANS FOR PROPOSED FEDERAL AID HIGHWAY

F.A. ROUTE NO.	SEC.	COUNTY	TOTAL SHEETS	SHEET NO.
64	107 (W&RS)	KANE	239	1

S.B.I.R. ROUTE NO. 4 ILLINOIS PROJECT F-158

IL 47 Kane Co

Sta 320+06 Triple 7'x8'
045-2001

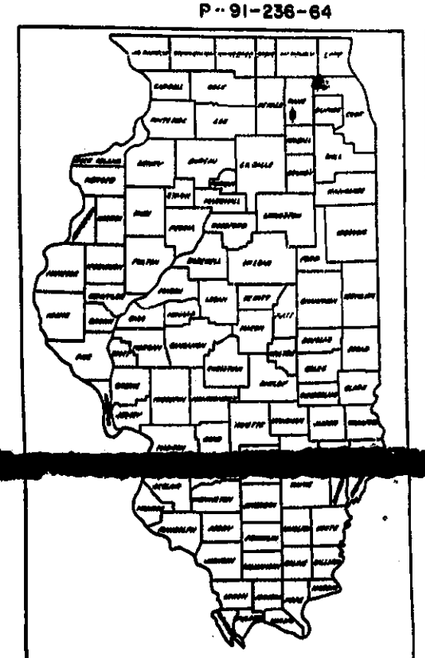
SCALES: 1" = 1 MILE; PROFILE HOR. 1 INCH = 50 FT.; PROFILE, VERT. 1 INCH = 5 FT.; CROSS-SECTIONS 1 INCH = 5 FT. VERT., 10 FT. HOR.

FOR INDEX OF SHEETS SEE SHEET NO. 9

F.A. ROUTE 64 (ILL. RTE. 47)
SECTION 107 (W&RS)
PROJECT RF-158(13)
KANE COUNTY

C-91-577-67

P-91-236-64



LOCATION OF SECTION INDICATED THUS:—

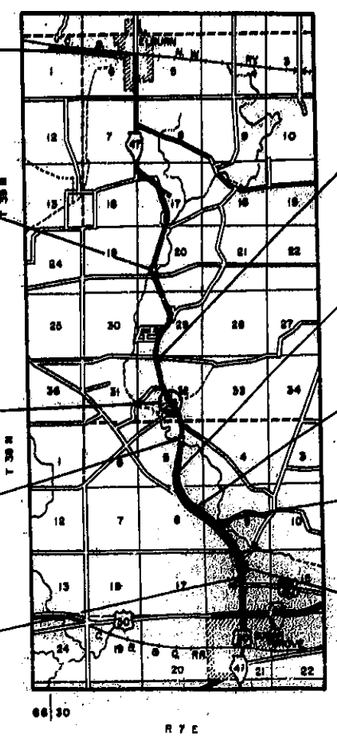
PROJECT RF-158(13)
BEGINS STA. 17+73.5

OMISSION
STA. 207+00 – STA. 208+00

SECTION 107(W&RS)
INCLUDES TRIPLE 7' x 8' BOX CULVERT AT STA. 320+06

OMISSION
STA. 351+75 – STA. 354+24.65

PROJECT RF-158(13)
ENDS STA. 469+50



STATION EQUATION
STA. 282+[illegible] BK. = STA. 282+09.10 AH.

STATION EQUATION
STA. 378+56.5 BK. = STA. 378+57.9 AH.

STATION EQUATION
STA. 410+04.05 BK. = STA. 410+40.15 AH.

STATION EQUATION
STA. 434+06.46 BK. = STA. 434+20.50 AH.

STATION EQUATION
STA. 478+02.36 BK. = STA. 478+34.68 AH.

NET LENGTH OF PROJECT = 46,[illegible] LIN. FT. = 8.834 MI.

LAYOUT SCALE: 1" = 1 MILE

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
SUBMITTED 6/27 1970
RECOMMENDED 6/28 1970
PASSED 6/29 1970
APPROVED 6/30 1970
APPROVED 6/30 1970

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED
DIVISION ENGINEER DATE

REVISED SET 6-15-71

JOB NUMBER CONTRACT NO. 28070

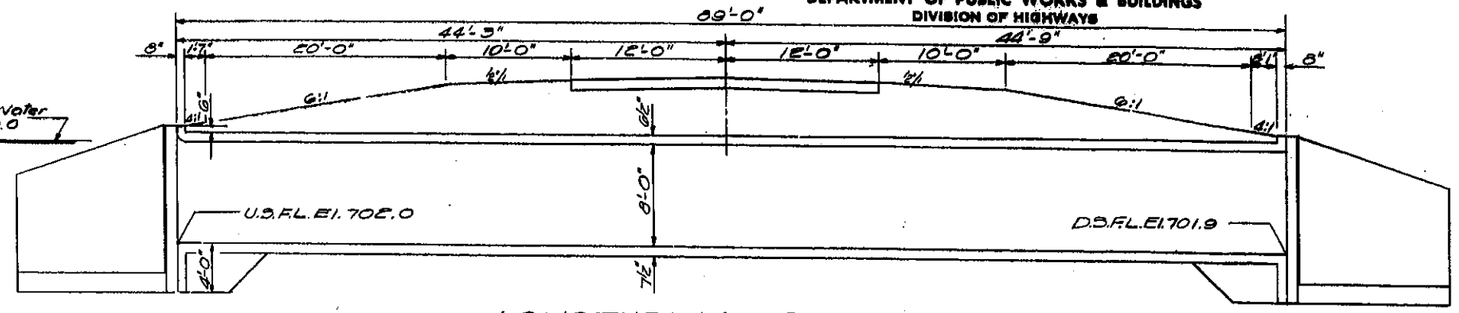
KANE COUNTY SECTION 107(W&RS) F.A. ROUTE 64

B.M.: #16 At West Edge of Box Culvert. El. 713.41
Existing Structure: 3'x8' Triple Box Culvert, 14' Rdwy. Width
To be removed by Contractor at Time of Construction.
No Salvage.
Temporary Bridge not required.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.R. 64	107 W&RS	Kane	239	101
FED. ROAD DIST. NO. 7	HIGHWAY	FED. AID PROJECT		

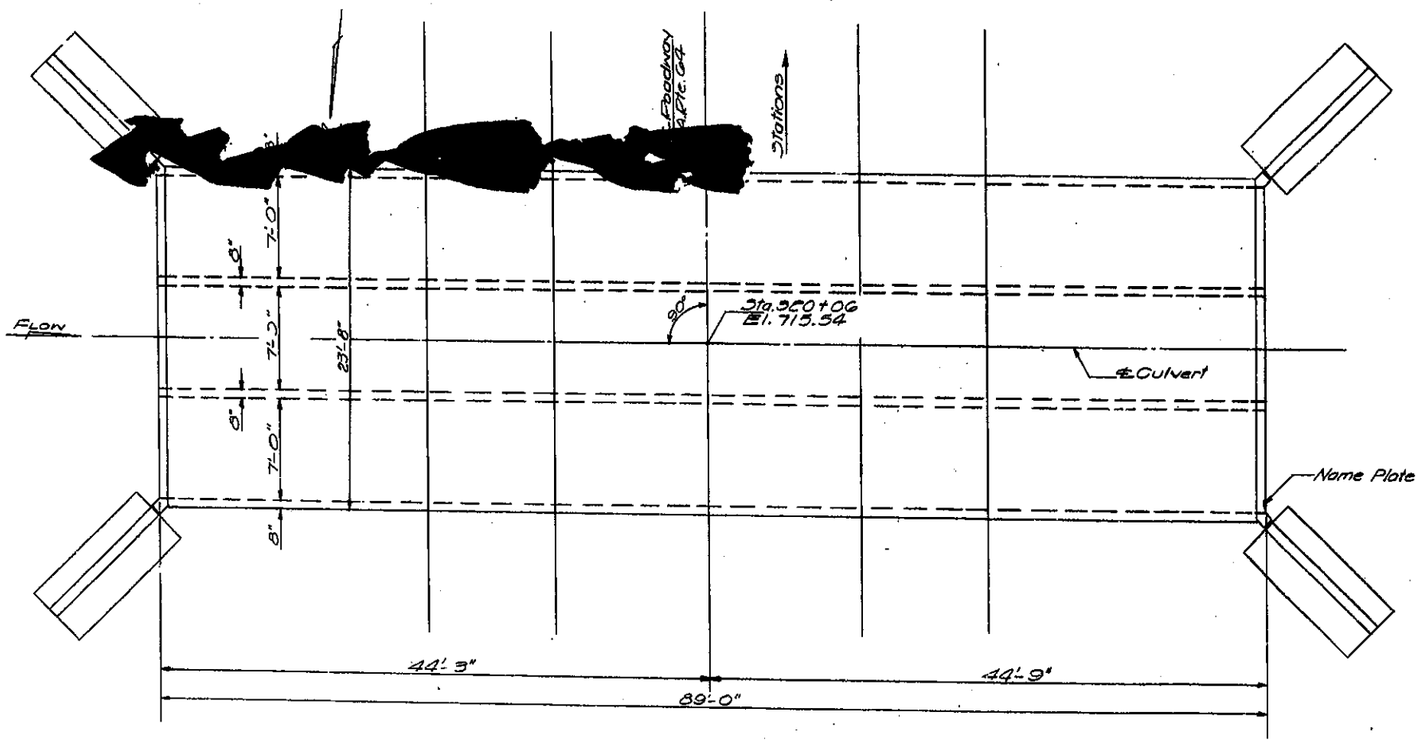
SHEET NO. 1
2 SHEETS



LONGITUDINAL SECTION

STATION 320+06
BUILT 197 BY
STATE OF ILLINOIS
F.A. RT. 64 SEC. 107(W&RS)
F.A. PROJ. F-158 (13)
LOADING HS20

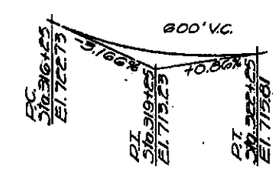
NAME PLATE
See Std. 2119-1



PLAN

TOTAL BILL OF MATERIAL

Item		Quantity
Class X Concrete	Cu. Yds.	200.8
Reinforcement Bars	Lbs.	40920
Name Plate	Ea.	1
Removal of Exist. Struct.	Ea.	1



PROFILE-F.A. RTE. 64

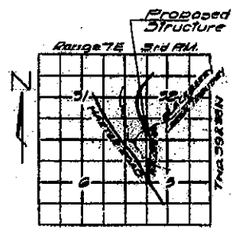
DESIGNED	J. M. Patel
CHECKED	A. R. Hakan
DRAWN	J.M.P. A. Barroza
CHECKED	

EXAMINED May 1 1970
PASSED
APPROVED
Chief Highway Engineer

WATERWAY INFORMATION
Drainage Area — 4.37 Sq. Miles
Character — Rolling
Required Opening — 30 Year Flood — 170 Sq. Ft.
Present Opening — 196 Sq. Ft.
Proposed Opening — 168 Sq. Ft.
Q (30) = 773 c.f.s.

DESIGN STRESSES
fc = 1400 psi. Barrel
fc = 1000 psi. Wings
fs = 20,000 psi. Reinf.
Vc = 75 psi Ftgs.
n = 10
Allowable Future [redacted] #/s'

LOADING HS20-44

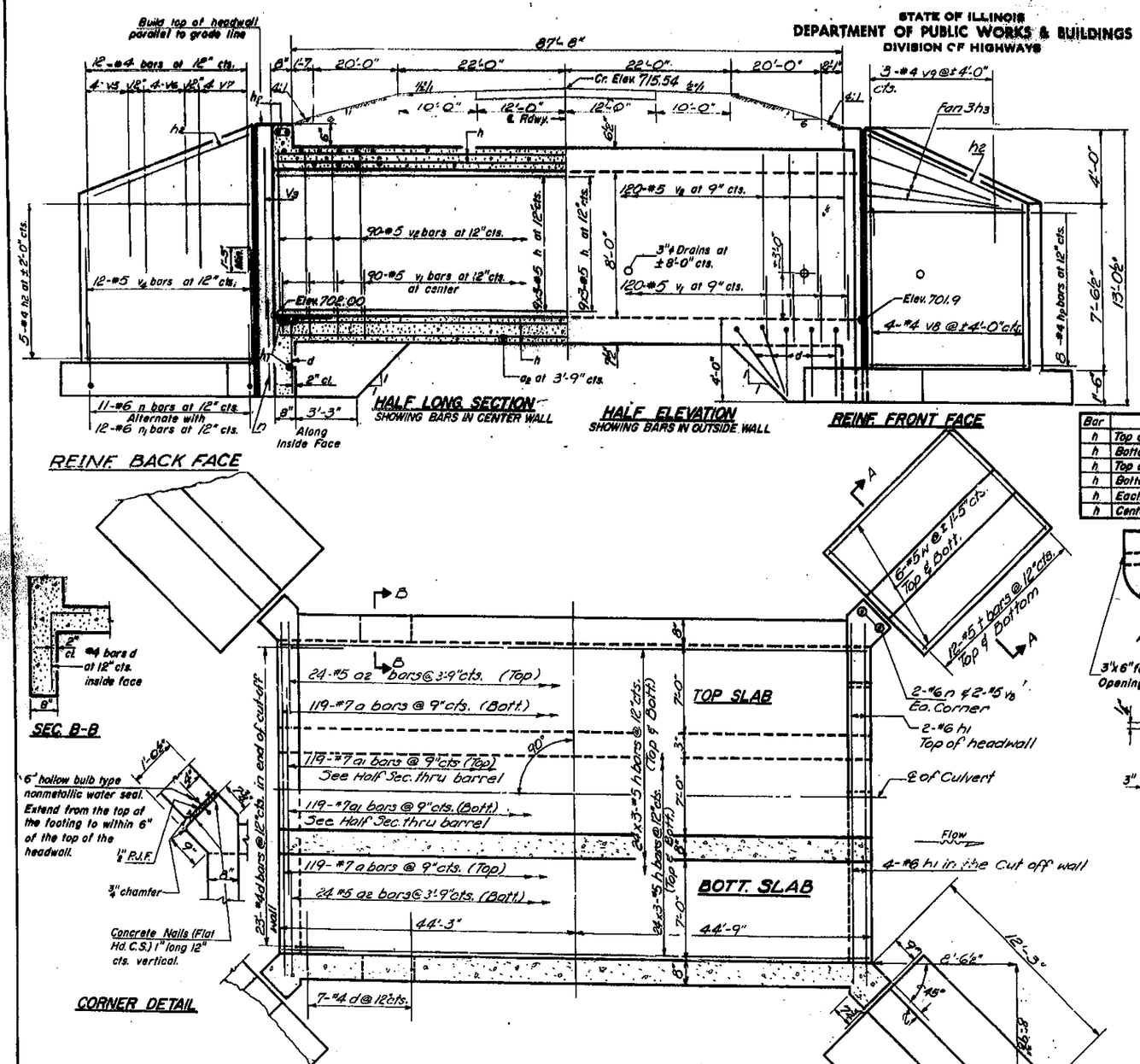


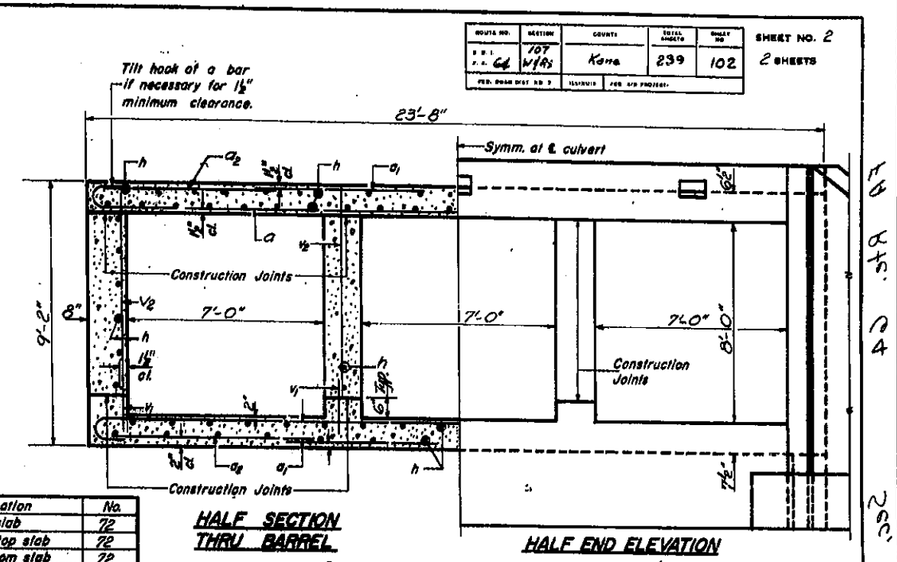
GENERAL PLAN & ELEVATION
PROJ. F-158 (13)
F.A. ROUTE 64
OVER TRIBUTARY OF
BLACKBERRY CREEK
F.A. RTE. 64 (ILL. RTE 47)
SECTION 107 (W&RS)
KANE COUNTY
STATION 320+06

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
F.A.P. 64	107 W&Rs	Kane	239	102
FED. ROAD DIST. NO. 3	ILLINOIS	FED. AID PROJECT-		

SHEET NO. 2
2 SHEETS

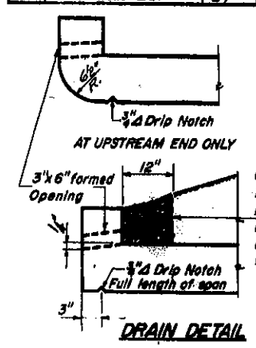




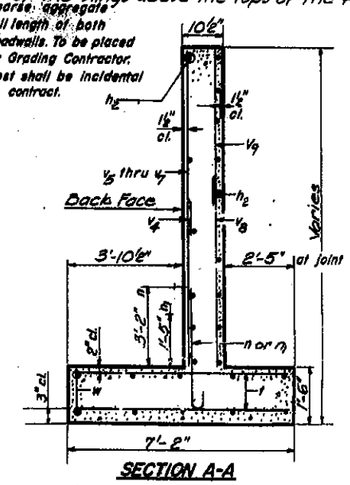
Bar	Location	No.
h	Top of top slab	72
h	Bottom of top slab	72
h	Top of bottom slab	72
h	Bottom of bottom slab	72
h	Each outside wall	27
h	Center walls Ea.	27

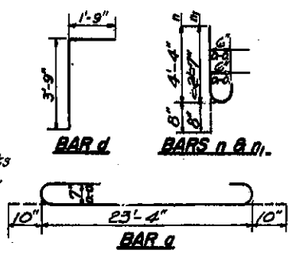
GENERAL NOTES

Exposed edges shall be beveled ¾" except as shown.
For backfilling and embankment see Standard Specifications.
All bars shall be lapped 24 diameters unless otherwise shown.
The following surfaces of the culvert shall be waterproofed; the top of the top slab, the backs of the exterior walls above the lower construction jt. & the backs of the wings above the tops of the footings.



Coarse aggregate full length of both headwalls. To be placed by Grading Contractor. Cost shall be incidental to contract.





BILL OF MATERIAL

Bar	No.	Size	Length	Bar	No.	Size	Length
a	238	#7	25'-0"	t	96	#5	6'-11"
a1	238	#7	15'-5"				
a2	96	#5	6'-0"				
				v1	420	#5	2'-3"
d	72	#4	5'-6"	v2	420	#5	7'-9"
h	996	#5	30'-6"	v3	8	#5	9'-0"
h1	12	#6	23'-3"	v4	48	#5	4'-6"
h2	60	#4	11'-3"	v5	16	#4	3'-9"
h3	12	#4	11'-6"	v6	16	#4	7'-6"
				v7	16	#4	8'-3"
				v8	16	#4	7'-3"
				v9	12	#4	5'-0"
n	52	#6	5'-0"	w	48	#5	11'-3"
n1	48	#6	3'-3"				
Class X Concrete					Cu. Yds.		200.8
Reinforcement Bars					Lbs.		40,920

Note: Bars indicated thus 20x3 #5 etc. [illegible]

DESIGN STRESSES

[illegible] 0 p.s.i.
[illegible] p.s.i. Barrel
[illegible] p.s.i. Wings
vc = 90 p.s.i. Barrel
vc = 75 p.s.i. Wings
n = 10
Comp. Max. Soil Pressure [illegible]-44

DESIGNED J. M. Patel
CHECKED B. P.
CHECKED
MAY 1 1970
APPROVED Richard H. Hollerman
ENGINEER OF DESIGN
CHIEF HIGHWAY ENGINEER

TB-T-L Drawn 1-11-68

FA. RTE. 64 SEC. 107 (W&R)
KANE COUNTY
STA. 320+06

F.A. RTE. 64 SEC. 107 (W&R) KANE CO. D.A.X. 1

EXHIBIT H

SURVEY NOTES

6151 IDOT / IL 47 @
BLACKBERRY CREEK

LEVEL RUN

BM 180 (I-88) - 736.567

+	HI	-	ELEV	T/P
			736.567	
0.352	736.919			
		3.578	733.341	1
11.424	744.765			
		1.292	743.473	2
7.653	751.127			
		7.003	744.124	3
0.369	744.494			
		9.071	735.422	4
1.253	736.676			
		7.780	728.895	5
0.820	729.715			
		10.449	719.265	6
1.238	720.504			
		6.106	714.397	7
5.532	719.930			
		9.607	710.322	8
9.396	719.718			

JH
MS

8/6/14
+/- 75°

516/1

DESC
BM 180 (I-88)

TOP SPIKE

TOP SPIKE

TURTLE

TURTLE

FOUND MAG NAIL IDOT CP # 60

TURTLE

FOUND REBAR W/ CAP IDOT CP # 59

BM: CUT "□" IN S.E. WINGWALL @ RT 47 AND CREEK SITE 1 +/- 700' NORTH OF THORNAPPLE TREE RD.

+	HI	-	ELEV	T/P
	719.718			
		9.494	710.224	9
10.222	720.446			
		2.839	717.607	10
7.017	724.625			
		4.657	719.967	11
4.457	724.425			
		6.480	717.944	12
1.755	719.700			
		8.443	711.256	13
2.150	713.406			
		6.640	706.766	14
4.816	711.583			
		6.178	705.405	15
6.679	712.084			
		4.529	707.555	16
4.504	712.059			
		4.736	707.323	17
4.469	711.793			
		3.774	708.018	18
4.911	712.930			
		4.879	708.050	19
4.817	712.868			

DESC

- BM: CUT □ IN SW WINGWALL @ CREEK + RT 47 SITE 1, +/- 700' NORTH OF THORNAPPLE TREE RD.
- FOUND REBAR W/CAP IDOT CP# 58

FOUND REBAR W/CAP IDOT CP# 57

FOUND MAG NAIL IDOT CP# 56

FOUND REBAR W/CAP IDOT CP# 55

TURTLE

FOUND REBAR W/CAP IDOT CP# 54

FOUND MAG NAIL IDOT CP# 53

- CUT □ IN NW WINGWALL @ CREEK + RT 47 1/4 MILE NORTH OF COLLEGE DR.
- FOUND CUT □ IN SE WINGWALL @ CREEK + RT 47 (SAME BRIDGE)
- FOUND MAG NAIL IDOT CP# 52

+	HI	-	ELEV	T/P	DESC
	712.868				
		6.584	706.284	20	TURTLE
5.193	711.477				
		4.723	706.754	21	TURTLE
9.573	716.327				
		2.422	713.904	22	TURTLE
8.602	722.506				
		2.476	720.030	23	TURTLE
4.522	724.552				
		6.466	718.086	24	TURTLE
3.038	721.124				
		6.304	714.820	25	TURTLE
6.310	721.131				
		0.751	720.379	26	TURTLE
11.448	731.827				
		2.042	729.785	27	TURTLE
11.242	741.027				
		1.178	739.848	28	TURTLE
9.176	749.025				
		1.146	747.878	29	BOLT ON LIGHT POLE FOUNDATION
3.035	750.913				
		10.721	740.192	30	TOP SPIKE
1.756	741.948				

+	HI	-	ELEV	T/P
	741.948			
		10.435	731.513	31
6.997	738.511			
		1.949	736.561	✓

DESC

TOP SPIKE

BM 180 (I.88) 736.567

6151 IDOT / RT 47 @ BLACKBERRY CREEK

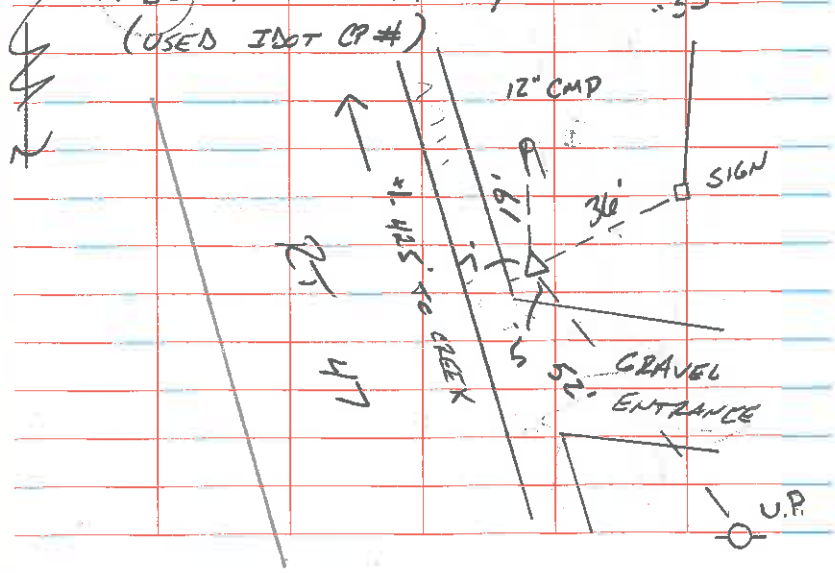
VRS CONTROL

*1 - KAN 47 2B (AJ2789)
HI: 5.46 5 MIN. OBS.

*2 - KAN 47 2A (AJ2787)
HI: 5.33 5 MIN. OBS.

*3 - IL KANE 20 39 7 (AJ3010)
HI: 4.94 5 MIN. OBS.

#58 FOUND REBAR W/CAP
(USED IDOT CP #)

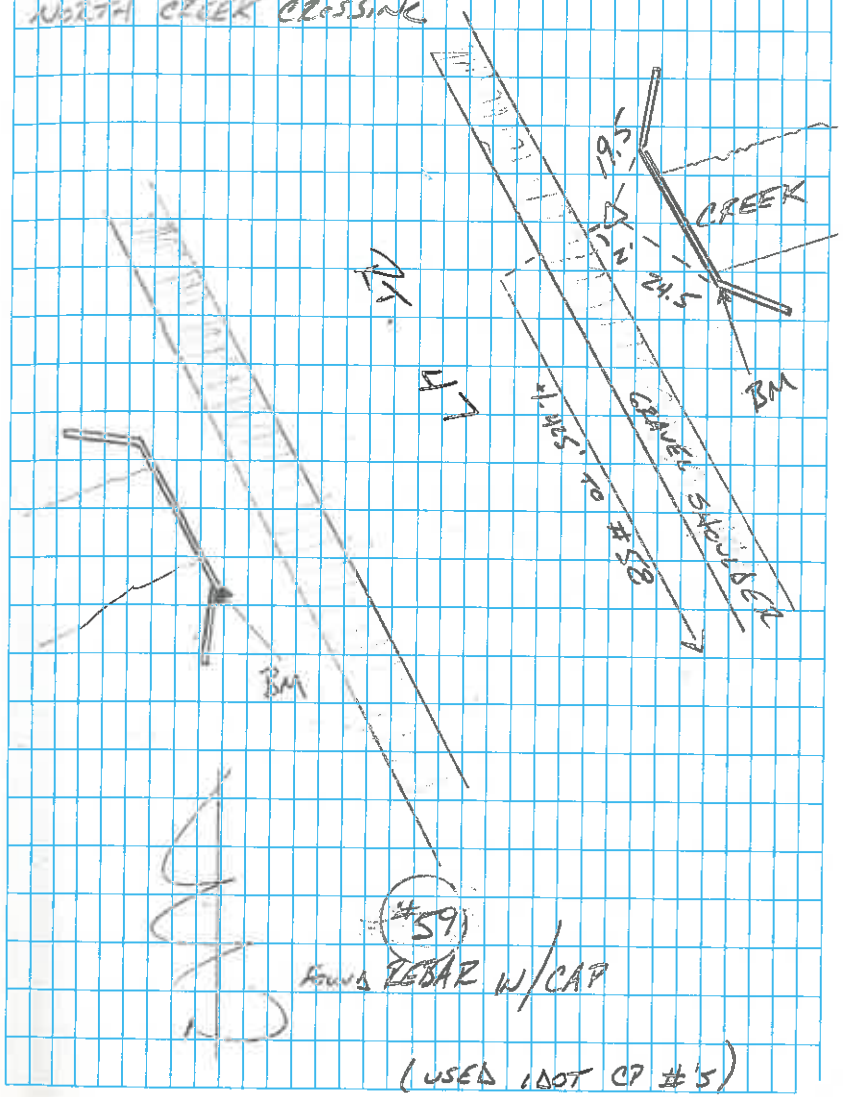


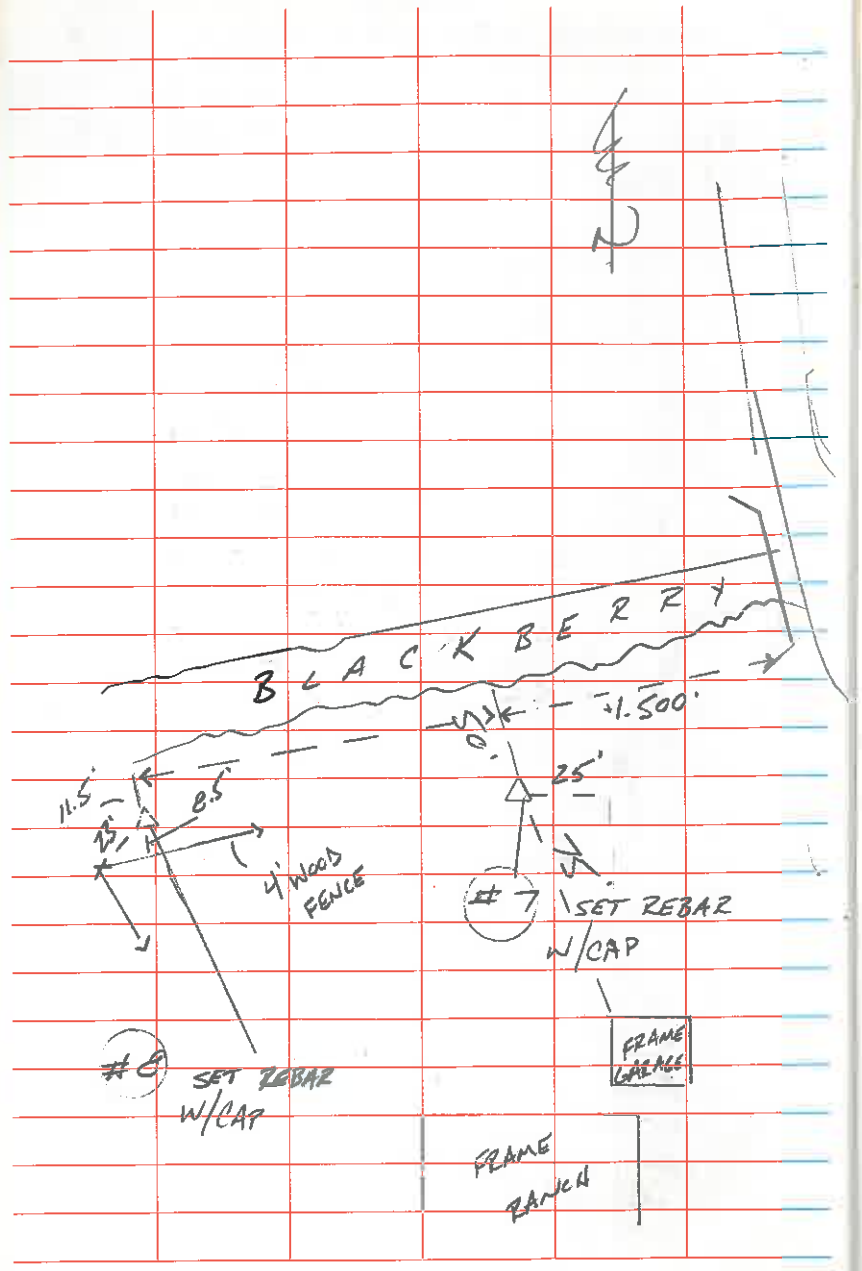
JH
MS

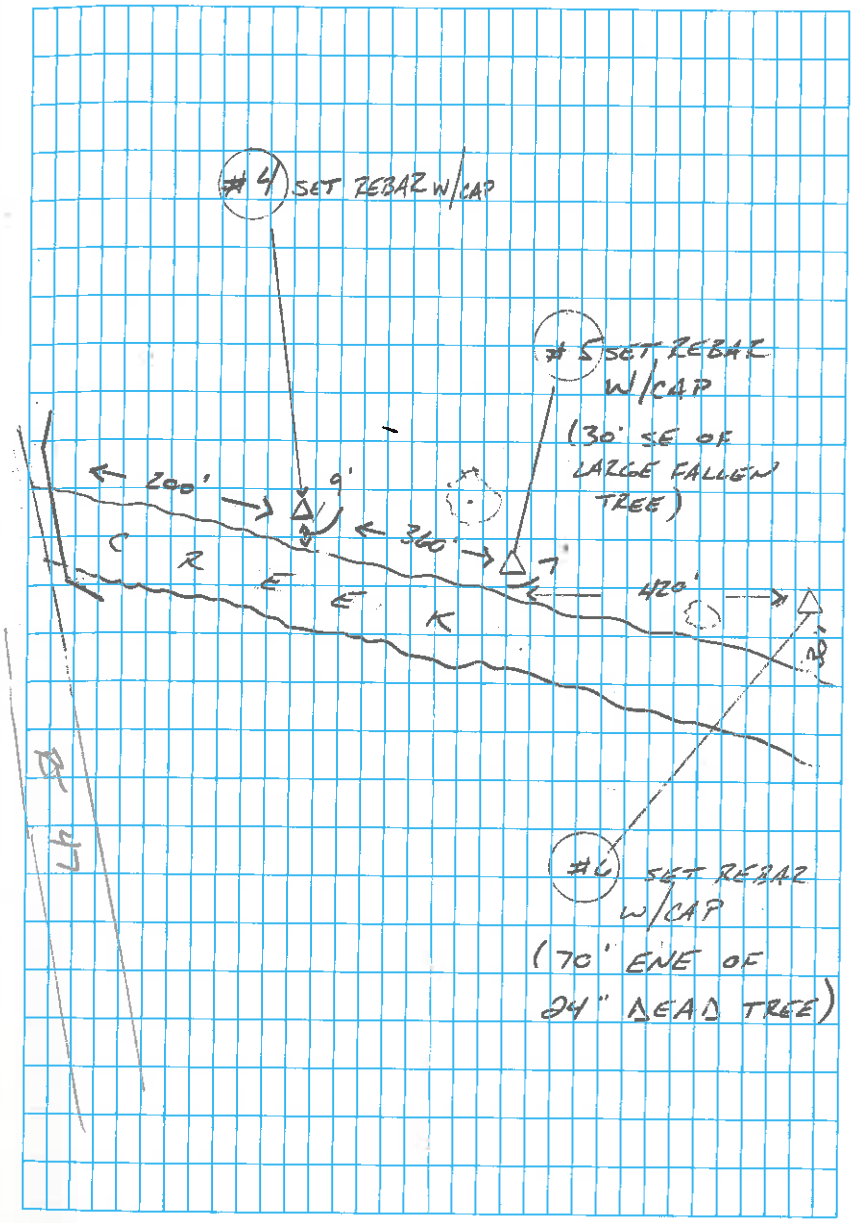
8/7/14
+/- 75°

516/5

SITE A
NORTH CREEK CROSSING



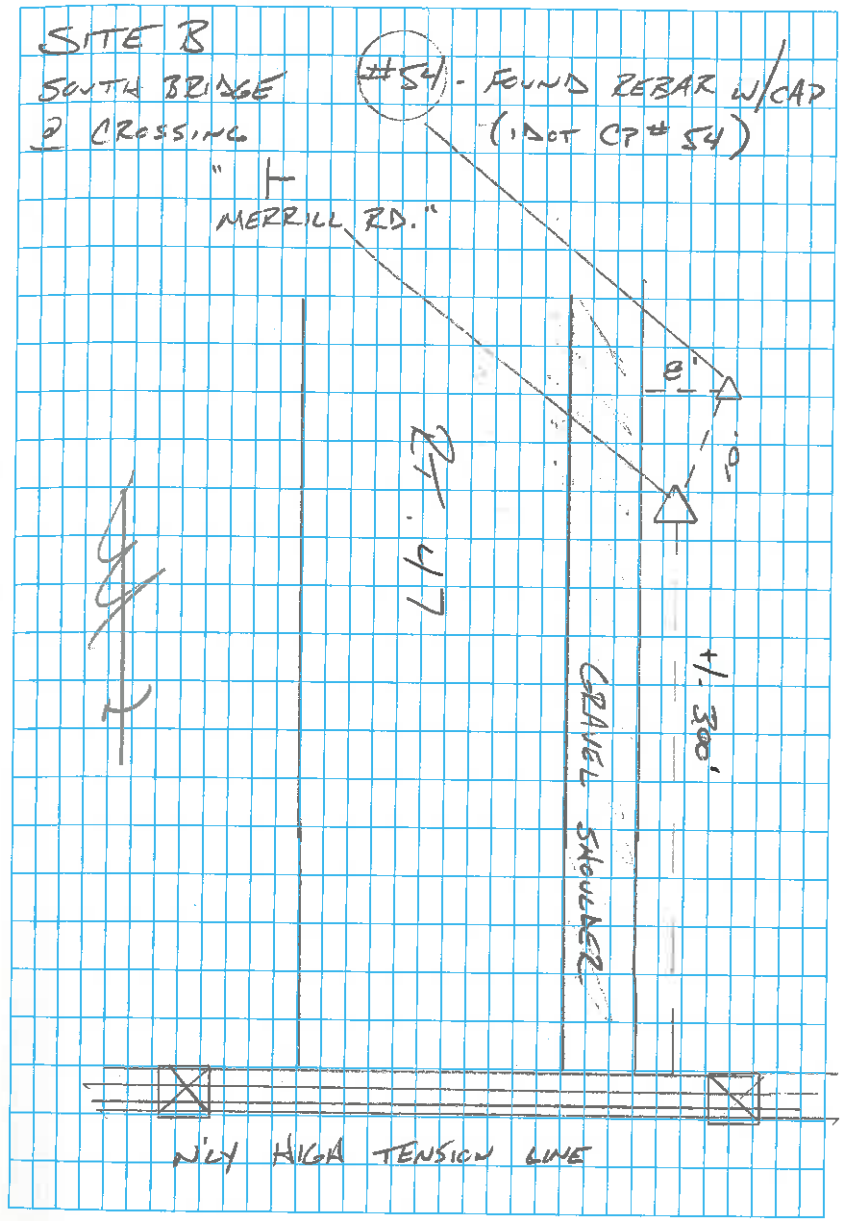

BLACKBERRY
1.500'
11.5'
8.5'
4' WOOD FENCE
25'
#7 SET REBAR W/CAP
#8 SET REBAR W/CAP
FRAME GARAGE
FRAME RANCH

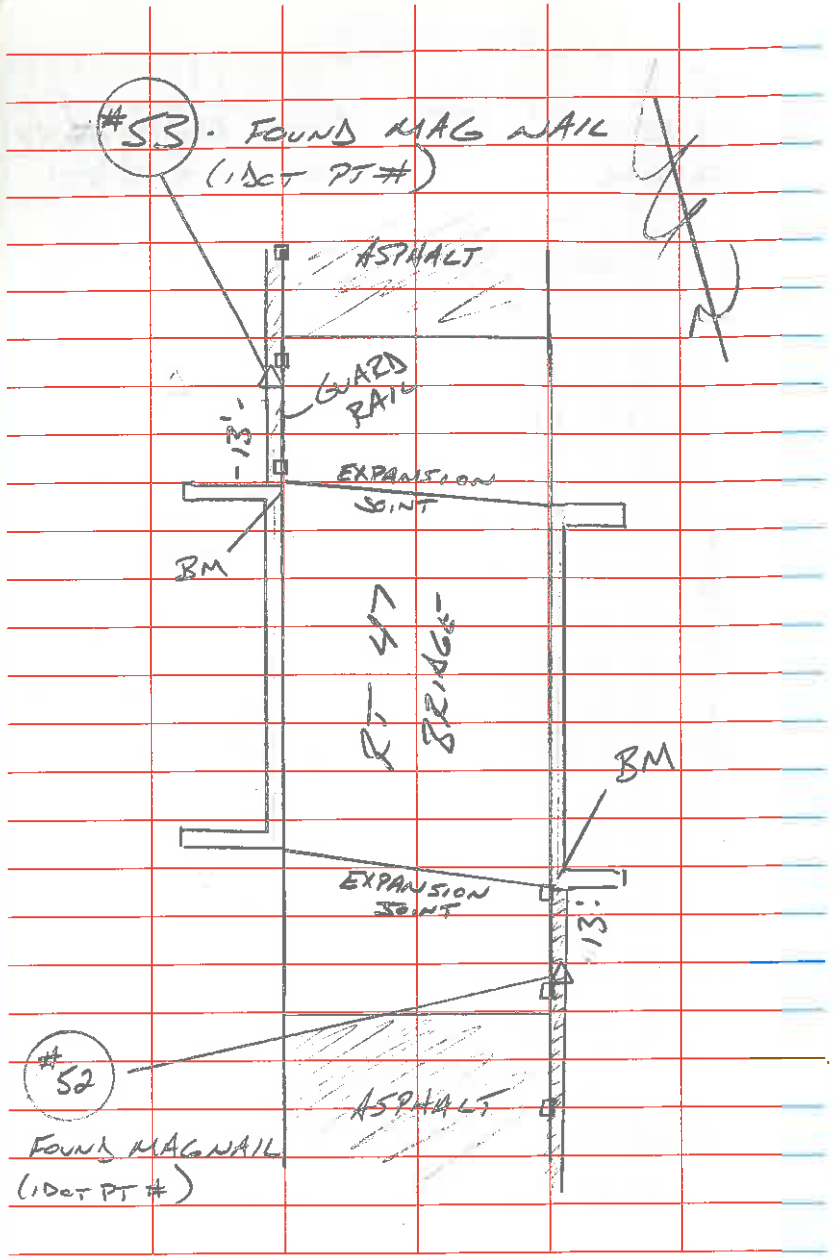

#4 SET REBAR W/CAP
#5 SET REBAR W/CAP
(30' SE OF LARGE FALLEN TREE)
200'
360'
420'
CREEK
#6 SET REBAR W/CAP
(70' ENE OF 24" DEAD TREE)

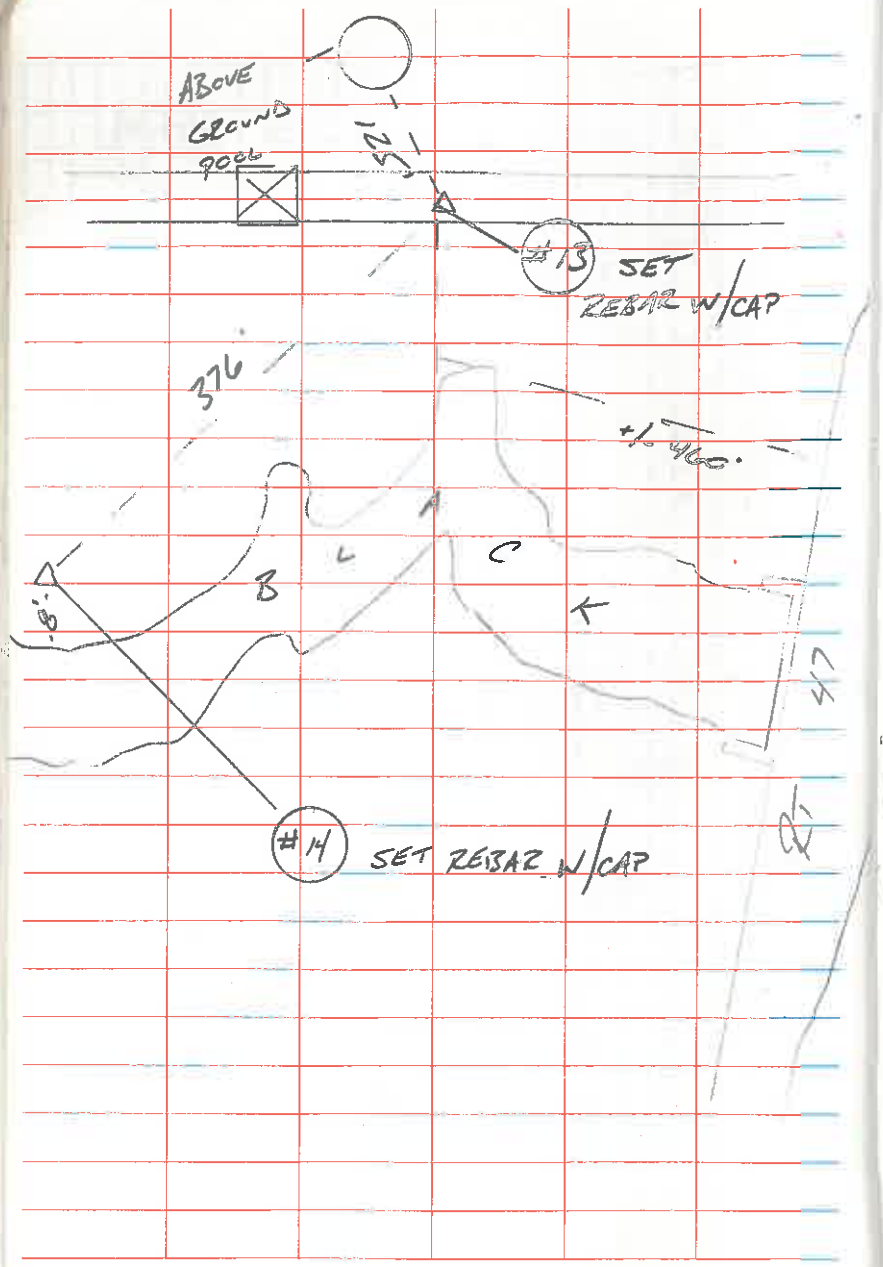
5 MIN OBS

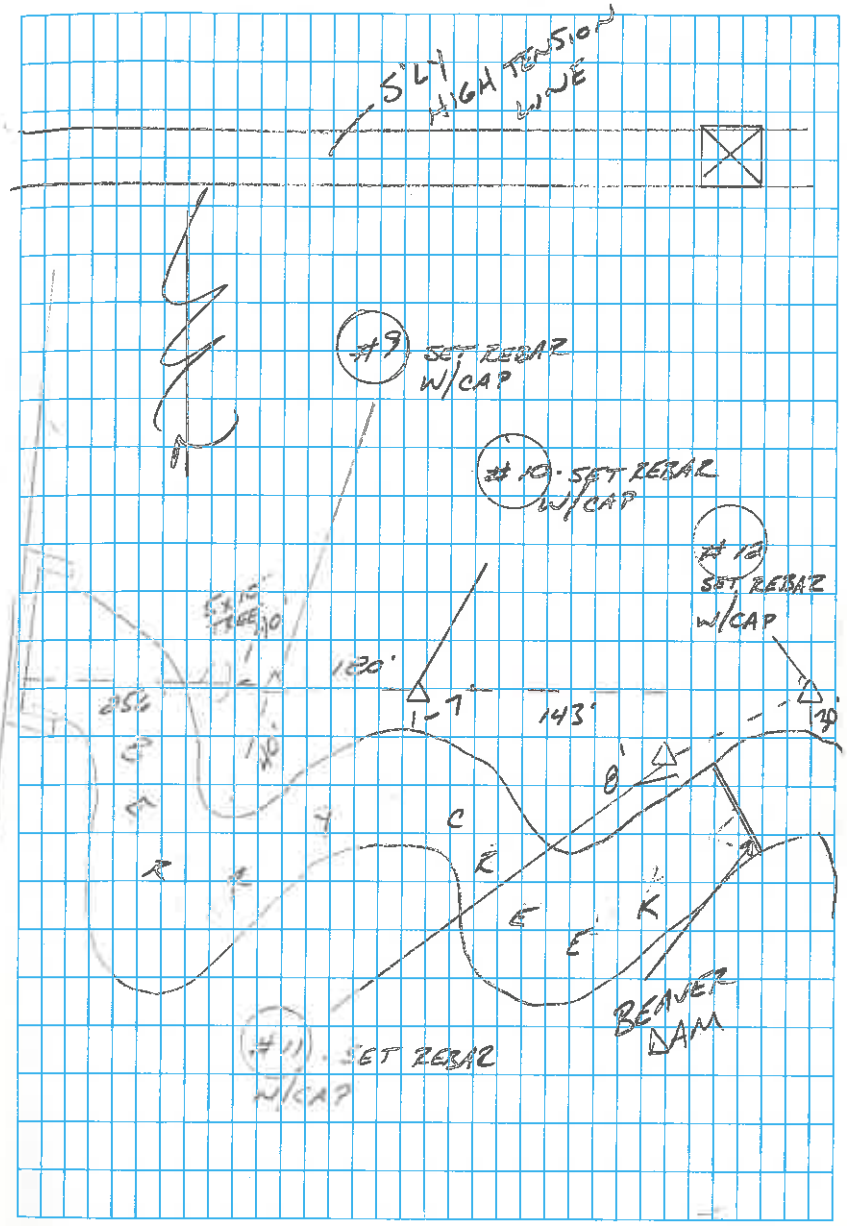
58 - HI : 5.18
59 - HI : 4.87
4 - HI : 4.365
5 - HI : 3.90
6 - HI : 4.59
7 - HI : 4.92
8 - HI : 4.99
54 - HI : 4.88
53 - HI : 5.18
52 - HI : 4.56
9 - HI : 4.03
10 - HI : 4.46
11 - HI : 4.55
12 - HI : 4.52
13 - HI : 4.55
14 - HI : 4.10

SITE B
SOUTH BRIDGE
@ CROSSING




#53 · FOUND MAG NAIL
(1DOT PT #)
ASPHALT
GUARD RAIL
13'
EXPANSION JOINT
BM
BRIDGE
BM
EXPANSION JOINT
13'
#52
ASPHALT
FOUND MAGNAIL
(1DOT PT #)


ABOVE GROUND POOL
#13 SET REBAR W/CAP
376
+/- 460'
#14 SET REBAR W/CAP


5'+/- HIGH TENSION WIRE
#9 SET REBAR W/CAP
#10 SET REBAR W/CAP
#12 SET REBAR W/CAP
120'
143'
BEAVER DAM
#11 SET REBAR W/CAP

JOB NO. 6151 I.D.O.T.
FINAL G.P.S. CONTROL

NAD83(2011) GPS Control Points

1	1866670.187	949543.821	(721.65)	118/NGS
2	1865215.307	951478.018	(694.82)	118/NGS
3	1884844.206	947360.660	(727.32)	118/NGS
4	1874625.138	949068.378	(706.56)	112/CWA REBAR
5	1874670.502	949425.083	(706.57)	112/CWA REBAR
6	1874754.672	949835.923	(706.43)	112/CWA REBAR
7	1874250.686	948427.530	(705.06)	112/CWA REBAR
8	1874115.391	948081.117	(703.32)	112/CWA REBAR
9	1871158.372	949787.601	(698.35)	112/CWA REBAR
10	1871058.327	949936.619	(698.83)	112/CWA REBAR
11	1870951.208	950032.256	(698.27)	112/CWA REBAR
12	1871035.367	950218.016	(696.82)	112/CWA REBAR
13	1871694.741	949139.978	(699.48)	112/CWA REBAR
14	1871406.155	948898.043	(699.91)	112/CWA REBAR
52	1871318.809	949587.449	**708.050**	112/IDOT MAG NL
53	1871494.445	949555.324	**707.555**	112/IDOT MAG NL
54	1872067.186	949644.328	**705.405**	112/IDOT REBAR
58	1874230.922	949097.261	**717.607**	112/IDOT REBAR
59	1874584.084	948852.534	**714.397**	112/IDOT REBAR

XXX.XX = LEVELED ELEVATION (HOLD)
(XXX.XX) = GPS DERIVED ELEVATION

NOTE: ALL ELEVATIONS IN BLUE NEED HARD LEVELED BEFORE USE IN SURVEY.

K. GREGORY 8-8-14 516/10

ALL HORIZONTAL COORDINATES ARE ILLINOIS STATE PLANE, EAST ZONE, NAD83(2011) GRID VALUES BASED ON RTK GPS OCCUPATIONS HOLDING NGS PUBLISHED VALUES ON AJ2789, AJ2737 & AJ3010.

ALL VERTICAL DATUM IS NAVD88 BASED ON DIFFERENTIAL LEVELING METHODS HOLDING NGS 2nd ORDER BENCHMARKS Q50 AND KAN 31 IB.

JOB # 6151 ODOT / BLACKBERRY CREEK

LEVEL CONTROL - SITE B EAST

+	HI	-	ELEV	T/P
			708.02	(708.018)
3.04	711.06			
		3.00	708.06 ⊙	(708.05)
3.17	711.23			
		7.97	703.26	2
1.12	704.38			
		5.09	699.29	3
4.365	703.655			
		3.67	699.985	4
5.00	704.985			
		7.00	697.985	5
4.635	702.62			
		4.215	698.405	6
5.86	704.265			
		5.205	699.06	7
4.265	703.325			
		5.025	698.3[illegible]	8
4.65	702.95			
		6.14	696.81	9
5.96	702.77			
		4.465	698.305	10

JH
SN
MS

8/11/14
+/- 70° WET

516/11

DESC

BM @ SE WINGWALL ZJ47 BRIDGE SITE B

CP# 52

T/PIN

T/PIN

T/PIN

T/PIN

CP# 9

CP# 10

CP# 11

CP# 12

T/REBAR #11

+	HI	-	ELEV	T/P
			698.305	
4.87	703.175			
		4.105	699.07	11
4.43	703.50			
		4.81	698.69	12
4.73	703.42			
		3.165	700.255	13
4.31	704.565			
		4.81	699.755	14
4.185	703.94			
		4.34	699.60	15
7.20	706.80			
		1.67	705.15	16
7.06	712.19			
		4.165	708.025	(708.02) ✓
SITE B WEST				
			707.325	(707.323)
4.16	711.485			
		3.92	707.565	@ (707.555)
3.61	711.175			
		8.025	703.15	2
1.79	704.94			
		5.24	699.70	3

DESC

T/REBAR #10

T/PIN

T/PIN

T/PIN

T/PIN

T/PIN

BM @ NW/X RT. 47 BRIDGE

CP 53

T/PIN

CT # 13

5/6/13

+	HI	-	ELEV		T/P	DESC
4.605	704.305					
		4.52	699.785		4	T/PIN
3.43	703.215					
		3.39	699.895		5	CP#14
3.305	703.13					
		3.345	699.785		6	T/PIN
4.705	704.49					
		4.79	699.70		7	T/REBAR #3
5.88	705.58					
		2.015	703.565		8	T/PIN
7.655	711.22					
		3.90	707.32	✓	(707.325)	BM
SITE A WEST						
			710.225		(710.224)	BM @ SW WINGWALL SITE A
7.445	717.67					
		7.345	710.325	✓	(710.322)	BM @ SE WINGWALL SITE A
6.68	717.005					
		8.31	708.695		2	T/PIN
2.315	711.01					
		6.01	[illegible]		3	CP#1
4.83	709.83					
		6.45	703.38		4	CP#2

+	HI	-	ELEV	T/P	DESC
			703.38		
6.325	709.705				
		4.705	705.00	5	REBAR #7
6.165	711.165				
		2.38	708.785	6	T/PIN
8.395	717.18				
		6.84	710.34	G. (710.322)	SE BM
8.55	718.89				
		8.645	710.245	(710.225)	SW BM
SITE	A	EAST			
			710.325 (710.322)		BM @ SE WINGWALL
6.47	716.795				
		2.395	714.400 (714.397) ✓		CP # 59
1.23	715.63				
		6.05	709.58	2	T/POST
1.035	710.615				
		4.13	706.485	3	CP # 4
4.795	711.28				
		4.63	706.65	4	T/PIN
4.675	711.325				
		4.76	706.565	5	CP # 5

+	HI	-	ELEV	T/P
			706.565	
5.075	711.64			
		5.00	706.64	6
5.195	711.835			
		5.275	706.56	7
5.125	711.685			
		5.055	706.63	8
4.80	711.43			
		5.30	706.13	9
4.005	710.135			
		0.72	709.415	10
7.325	716.74			
		6.43	710.31 ✓	(710.325)

5/16/15

DESC

CP #6

REBAR #5

T/PIN

T/PIN

T/POST

SE BM

JOB # 6151 IDOT
RT 47 @ BLACKBERRY CREEK

TOPO SITE A (NORTH CROSSING)
W/ TRIMBLE S-6

TO 59 HI = 5.26 BS @ 58 (4.98)
PT #'S 100-379

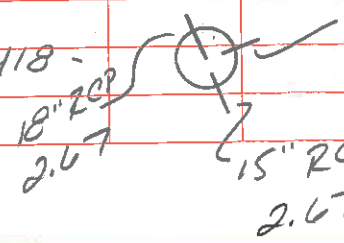
197 - 4' WIRE WOVEN FENCE
378 - SET NAIL

* ALL 359 SHOTS ARE SUSPECTED CONCRETE DITCH FLOWLINE ℄ +/-. CONCRETE DITCH IS PARTIALLY VISIBLE AT SOME SITE LOCATIONS BUT IS UNDERWATER AND BURIED IN MUD AT MOST.

TO 378 HI = 5.31 BS @ 59
PT #'S 380 - 423

403 - 18" RCP

418 -

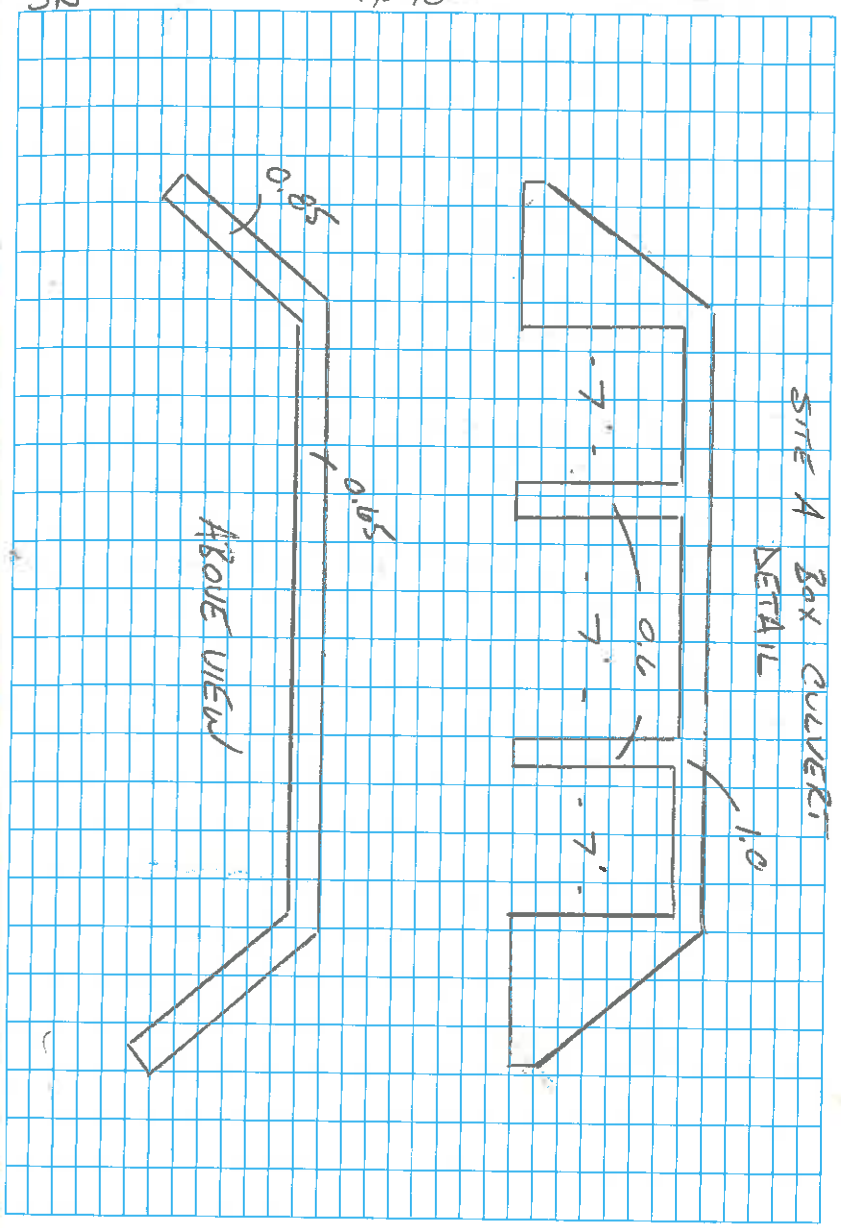


TOP DEBRIS -2.85
BEEHIVE

SA
SN

8/12/14
+/- 70°

516/16



JOB # 6151 IDOT / BLACKDOG CREEK

TOPO NORTH CROSSING (SITE A)

TP 59 HI = 5.375 BS @ SP = (5.13)
PT #'S 424 - 455

453 - SET NAIL

TP 453 HI = 5.05 BS @ 59 (5.00)
PT #'S 456 - 471

TP 7 HI = 5.34 BS @ 59 (5.10)
PT #'S 472 - 491

475 - SET NAIL
490 - SET NAIL

TP 475 HI = 5.07 BS @ 7 (5.00)
PT #'S 492 - 500

493 - WOOD FRAME AND METAL FOOTBRIDGE

JH
SN

8/13/14
+/- 75°

516/17

TP 490 HI = 5.12 BS @ 7 (6.00)
PT #'S 501 - 550

523 - WOODEN FRAME FOOTBRIDGE

TP 8 HI = 5.29 BS @ 7 (5.00)
PT #'S 551 - 560

557 - SET NAIL

TP 557 HI = 5.20 BS @ 8 (5.00)
PT #'S 561 - 594

581 - WOODEN FRAME FOOTBRIDGE
593 - TOP OF WATER @ POND
* TOPO'ING POND IS A DAY LONG PROJECT AT LEAST. CONSULT IDOT FOR INSTRUCTIONS.

TP 6 HI = 4.89 BS @ 5 (8.00)
PT #'S 595 - 612

TP 5 HI = 5.005 BS @ 6 (7.50)
PT # 613 - 642

JOB # 6151 IDOT
BLACKBERRY CREEK @ RT 47

TOPO SOUTH CROSSING (SITE B)

T@ 52 AI= 5.015 BS@ 54 (4.90)
PT #'S 643-831

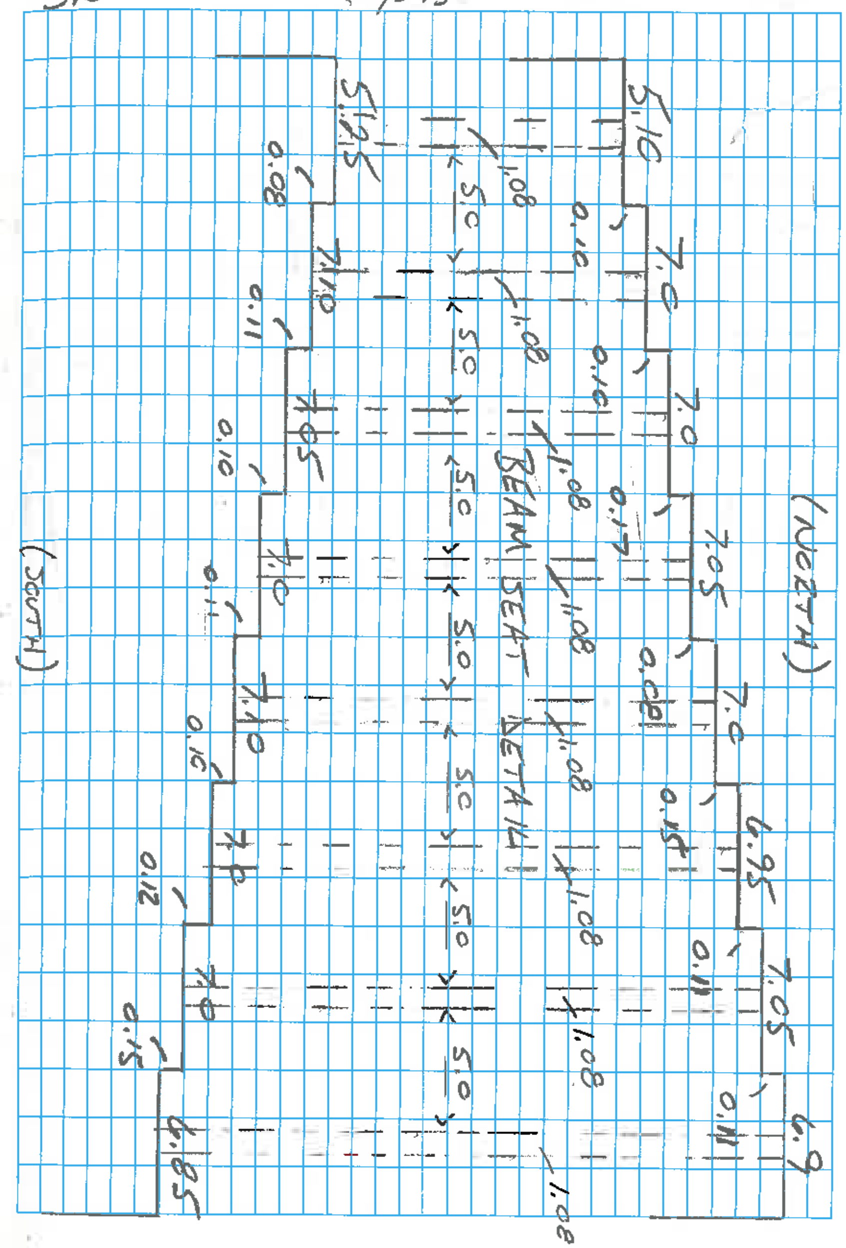
639-744 6' DIAMETER BRIDGE DRAIN

T@ 53 AI= 5.30 BS@ 54 (4.90)
PT #'S 832-870

SH
SN

8/14/14
+/- 75°

516/18



6151 IDOT / BLACKBERRY CREEK @ RT 47

TI @ 52 HI = 4.89 BS @ 54 = (5.12)
PT #'S 871 - 1033

875. SET NAIL
916. 30" RCP
937. SET NAIL

TI @ 937 HI = 5.07 BS @ 54 (5.12)
PT #'S 1034 - 1044

TI @ 875 HI = 5.35 BS @ 52 (5.00)
PT #'S 1045 - 1051

TI @ 53 HI = 5.115 BS @ 54 (5.12)
PT #'S 1052 - 1133

1056 - SET NAIL

SN

8/15/14
+/- 80°

516/19

6151 IDOT / BLACKBERRY CREEK @ RT 47

TA@ 53 HI= 5.215 BS@ 54 (4.72)
PT #'S 1134 - 1168

1135 - SET NAIL 100' NORTH OF 53
1136 - SET NAIL 200' SOUTH OF 53
1137 - SET NAIL 300' SOUTH OF 53
* NORTH END OF CONCRETE DITCH
B + C IS BURIED CREW LOCATED
TO BEST OF THEIR ABILITY
1166 - 4' WIRE WOVEN + BARBED WIRE
FENCE

TA@ 1136 HI= 5.065 BS@ 54 (4.72)
PT #'S 1169 - 1175

TA@ 1137 HI= 5.225 BS@ 54 (4.72)
PT #'S 1176 - 1183

TA@ 1135 HI= 5.11 BS@ 54 (4.72)
PT #'S 1184 - 1196

* NEED TO SHOOT CENTER OF WEST BEAM

JH
SN

8/18/14
+/- 80°

516/20

TA@ 9 HI= 4.81 BS@ 10 (6.00)
PT #'S 1197 - 1215

TA@ 10 HI= 4.92 BS@ 9 (6.00)
PT #'S 1216 - 1225

TA@ 11 HI= 4.62 BS@ 12 (6.00)
PT #'S 1226 - 1252

1254 - BEAVER DAM

TA@ 12 HI= 4.88 BS@ 11 (6.00)
PT #'S 1253 - 1275

6151 IDOT / BLACKBERRY CREEK
@ RT 47

TA @ 1135 HI = 5.03 BS @ 54 (6.00)
PT #'S 1276 - 1278

1277 - SET NAIL

TA @ 13 HI = 5.305 BS @ 1277 (4.83)
PT #'S 1279 - 1307

1280 - SET NAIL
1281 - SET NAIL

TA @ 1280 HI = 5.485 BS @ 13 (5.20)
PT #'S 1308 - 1353

TA @ 1281 HI = 4.99 BS @ 13 (5.00)
PT #'S 1354 - 1373

TA @ 14 HI = 4.89 BS @ 1281 (5.60)
PT # 1374 - 1405

SA
SN

8/19/14
+/- 80°

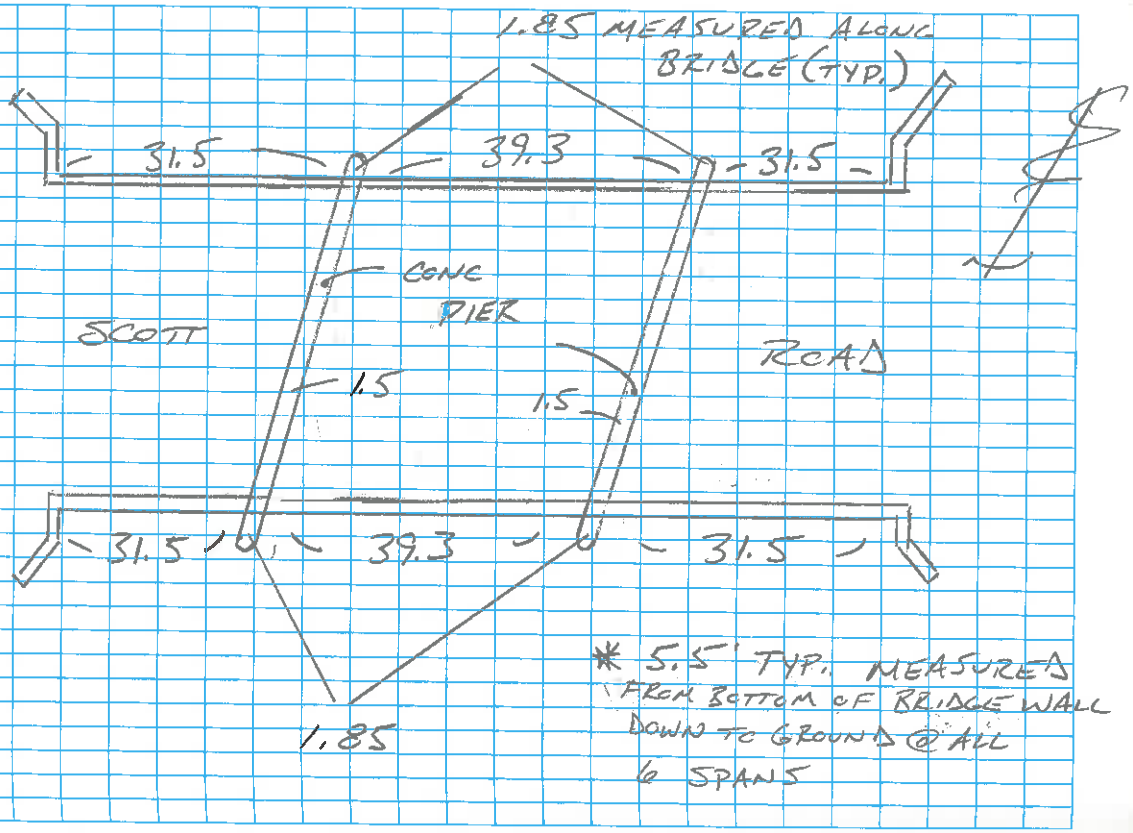
TA @ 1056 HI = 4.85 BS @ 53 (5.00)
PTS # 1405 - 1406

5/4/22

8/25/14 +/- 90'

5/4 MS

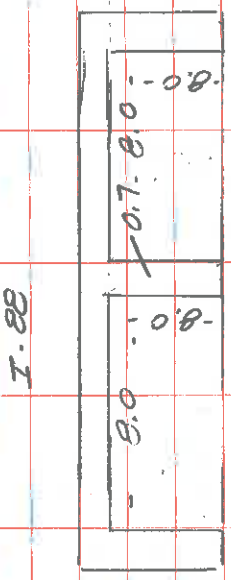
STRUCTURE "B" (PICS 3051-3054)



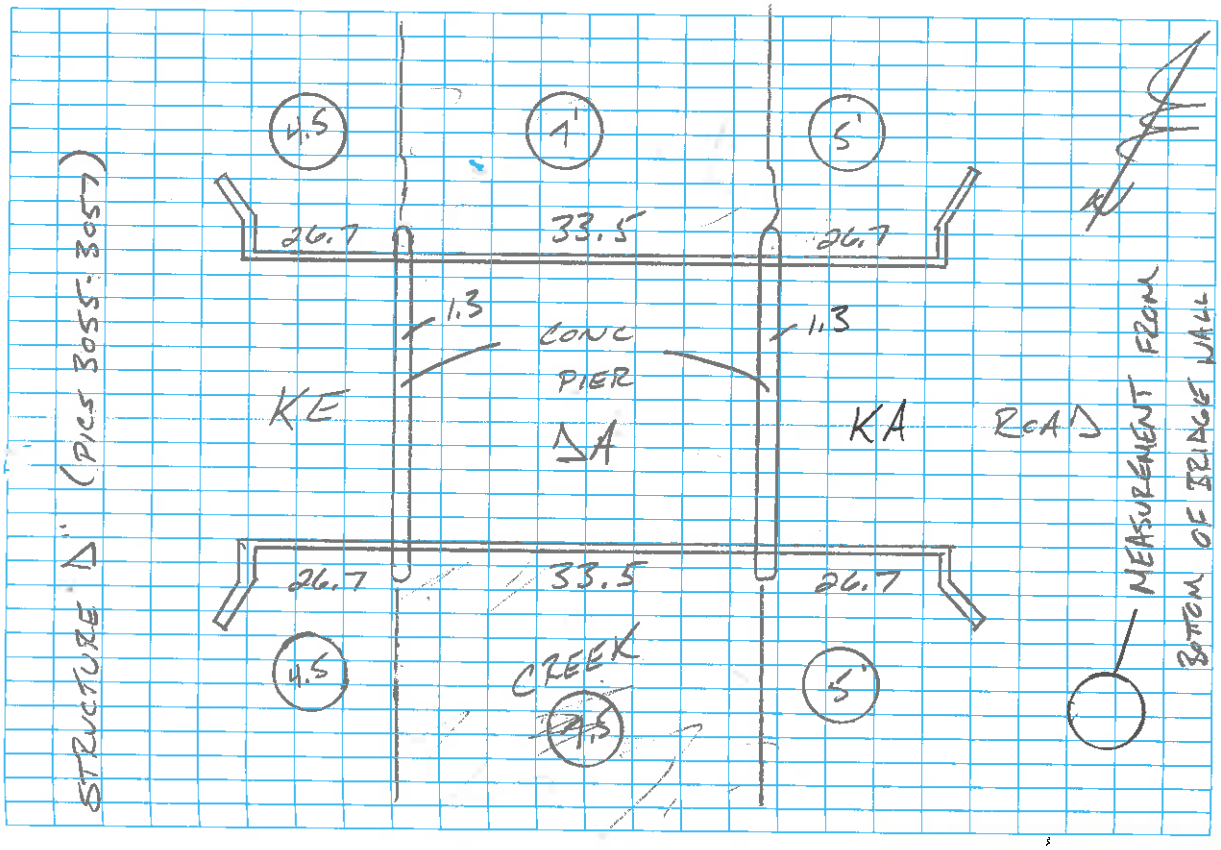
* 5.5' TYP. MEASURED FROM BOTTOM OF BRIDGE WALL DOWN TO GROUND @ ALL 6 SPANS

6/5/1 IDOT / BLACKBERRY CREEK

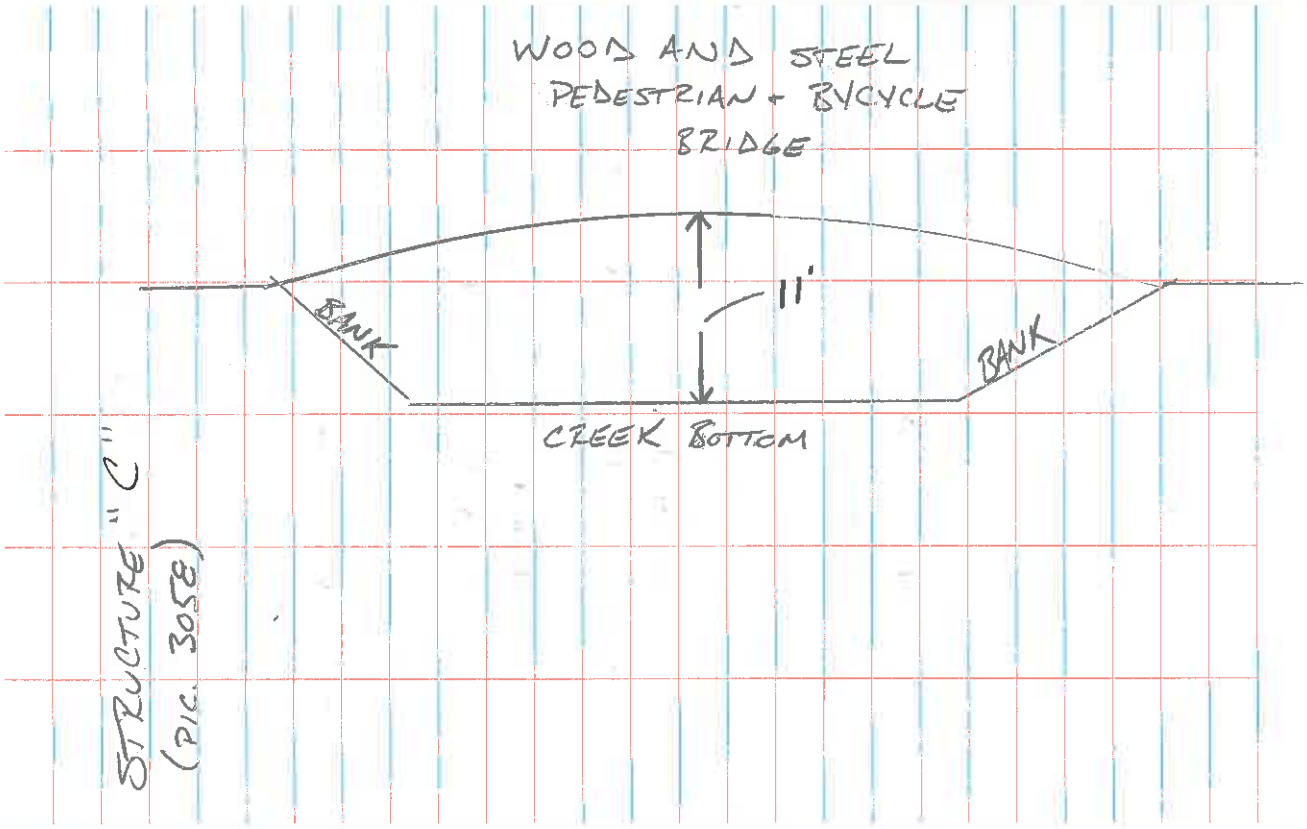
MEASURE UPSTREAM AND DOWNSTREAM STRUCTURES



STRUCTURE "A" (PIC 3059)



STRUCTURE "A" (PICS 3055-3057)



STRUCTURE "C" (PIC. 3058)

IDOT / BLACKBERRY CREEK

6151

F.S. C 52 (5.05) B.S. C 53 (5.20)

Pt # 1407 → 1420

" 1420 BM ✓

1421, 1422 calc'd Pt.

F.S. C 9 (4.80) B.S. C 10 (6.00) ~~(5.20)~~

Pt # " 1423 → 1436

F.S. C 13 (5.23) B.S. C 1280

Pt # " 1437 → 1440

1440 cp

F.S. C 1440 (5.06) B.S. C 13 (5.60)

Pt # 1441 → 1456

1456 ✓ cp 1277

J.H.
M.S.

8/26/14

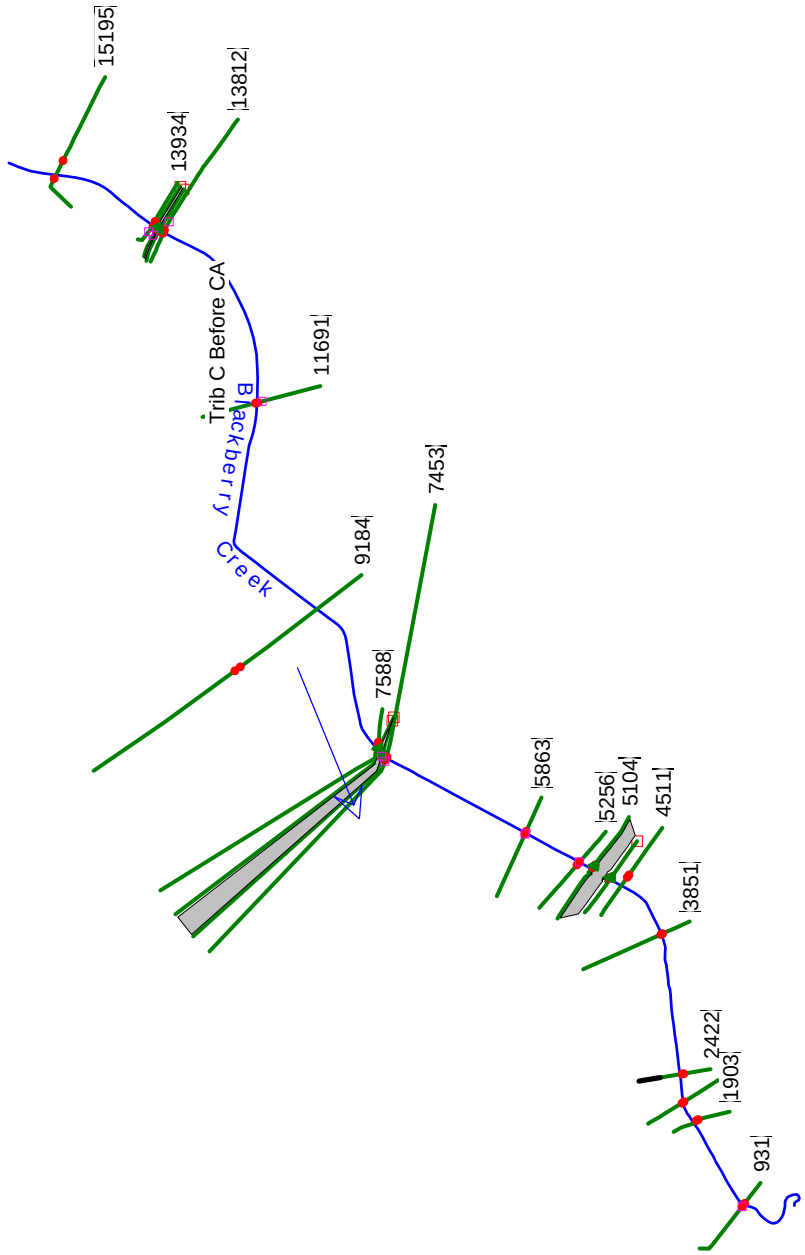
5/6/24

EXHIBIT I

HEC-RAS MODEL REPORT (PERMIT)

NATURAL CONDITIONS
(PERMIT MODEL)

Plan: TribC_0452001_Permit_Natural



```
HEC-RAS HEC-RAS 5.0.3 September 2016
  U.S. Army Corps of Engineers
 Hydrologic Engineering Center
       609 Second Street
       Davis, California


X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 3:20:24 PM

Project in English units

Project Description:
0.0 787.6
68.6 782.8
125.8 778.6
205.9 768.9
263.1 764.6
343.1 760.6
377.4
758.8
391.0 756.3
399.0 755.5
401.8 754.5
408.0 751.2
413.0 753.5
420.0 7
54.7
437.0 756.2
469.7 756.5
539.2 756.8
619.3 756.6
687.9 756.7
790.9 756
.8
905.2 760.1
0.00 712.00
114.68 710.00
369.07 708.00
375.00 707.99
381.8
3 707.95
385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

PLAN DATA

Plan Title: TribC_0452001_Permit_Natural
Plan File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.p05

Geometry Title: Natural_Permit
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.g04

Flow Title : 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Plan Summary Information:
Number of: Cross Sections = 21 Multiple Openings = 0
Culverts = 3 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 30
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Program Selects Appropriate method
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Flow Data (cfs)

River	Reach	RS	Q10	Q50	Q100	Q500
Blackberry Creek	Trib C Before	CA15195	378	706	879	1373
Blackberry Creek	Trib C Before	CA13934	369	670	828	1268
Blackberry Creek	Trib C Before	CA13812	369	670	828	1268
Blackberry Creek	Trib C Before	CA11691	364	652	800	1213
Blackberry Creek	Trib C Before	CA9184	349	592	713	1036
Blackberry Creek	Trib C Before	CA7453	347	587	705	1020
Blackberry Creek	Trib C Before	CA5863	347	587	705	1020
Blackberry Creek	Trib C Before	CA5256	361	619	749	1105
Blackberry Creek	Trib C Before	CA4511	362	621	752	1109
Blackberry Creek	Trib C Before	CA2422	363	623	755	1115
Blackberry Creek	Trib C Before	CA1903	363	624	756	1118
Blackberry Creek	Trib C Before	CA931	364	625	758	1122

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blackberry Creek	Trib C Before	CAQ10	Critical	Known WS = 706.25
Blackberry Creek	Trib C Before	CAQ50	Critical	Known WS = 707.21
Blackberry Creek	Trib C Before	CAQ100	Critical	Known WS = 707.54
Blackberry Creek	Trib C Before	CAQ500	Critical	Known WS = 708.26

Inline Structure Gate Openings
River = Blackberry Creek
Reach = Podolski RS = 9000
Gate = Gate #1
# Open Open Ht # Open Open Ht # Open Open Ht # Open Open Ht

```
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = Podolski          RS = 9000
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #3
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
      .5       3      .5       3      .5       3      .5       3
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
     2.2       1     2.2       1     2.2       1     2.2       1
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
    2.35       1    2.35       1    2.35       1    2.35       1



GEOMETRY DATA

Geometry Title: Natural_Permit
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C
Blackberry)\IL47.g04

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 15195

INPUT
Description: Interpolated cross section for river junction computation. Data
             are obtained from the DEM and 2 foot contour map Kane County 2001.
             The channel cross section are interpolated between 16644 and
             13934.

Revised using data from the 2004 TIN by Woodworth Jan
             2005
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  728.23   50.97  728.41  110.82  728.49  173.94  728.46  234.82  728.12
  282.62  728.01  361.79  726.09  412.61     724  452.97  722.08  517.54  720.85
  561.93  720.03  620.01  719.98  687.87  720.16  780.75  720.32     843     720
  890.61  719.06  939.83  718.05  993.16   717.4 1035.15  716.78 1066.14   716.3
 1090.29  716.02    1093     714    1097     713    1102   712.5    1105   712.5
    1108     714    1112     715 1114.22  716.17 1141.08  717.99  1181.5  717.86
 1233.51  717.75 1265.44  718.01 1323.04  718.75 1363.62  719.34 1386.91  719.99
 1414.95  720.96 1442.97  721.95 1479.79  724.05 1501.08  725.78 1523.32  726.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .105  939.83    .065 1141.08    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        939.83 1141.08             1162    1160    1140             .1       .3

CROSS SECTION
```

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 13934

INPUT
Description: USGS IL 2001. Approach to Farm Road (Seavey27)

outer 2pts on
LHS and outer 3 points on the RHS are interpolated from the 2004
TIN by BW Jan 2005
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	722.7	223.8	721.7	344.71	722.55	360.15	721.36	404.22	721.29
453.57	717.48	468.05	717.8	483.82	715.96	488.86	713.95	492.11	710.86
495.33	710.37	499.79	710.35	503.55	711.05	505.5	713.63	507.23	714.19
511.34	717.43	522.72	718.07	543.14	718.16	599.85	719.9	636.38	718.62
692.75	718.69	706.4	721.6	715.3	722.7	757.8	724		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.105	468.05	.065	522.72	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
468.05	522.72	110	100	110	.3	.5

Right Levee Station= 599.85 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 13896

INPUT
Description: USGS IL 2001. USF Farm Road (Seavey27). The use of n=100 is to
block of conveyance but retain storage computation. This is for
f-table computation only.
outer point on LHS and 2 outer points
on RHS are interpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-480.9	722.6	-145.9	722.65	-143.63	722.65	-114.09	720.57	-83.41	719.2
-52.65	718.68	-19.79	718.56	-14.91	717.64	-7.37	713.74	-4.35	714.08
-2.3	710.54	0	709.56	2.27	709.86	3.87	710.25	5.09	711.71
7.17	713.32	12.65	717.5	19.52	718.45	35.18	718.68	58.7	718.91
83.13	720.2	97.56	720.08	164.36	719.37	212.4	720.8	252.4	721.6
318.4	723.8								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-480.9	.105	-14.91	.065	12.65	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-14.91	12.65	60	46	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-480.9	-6	719.8	F
8	318.4	719.8	F

Right Levee Station= 83.13 Elevation=

CULVERT

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 13875

INPUT
Description: Farmers Road (Seavey27) IL USGS
Distance from Upstream XS = 11
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 13

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-140.71	722.75		-131.8	722.37		-118.51	721.22	
-47.85	720.1		-23.84	719.84		0	719.45	
44.34	720.25		114.12	720.67		114.13	720.66	

```
  181.97  721.31          182.08  721.32          206.78  721.58
  206.81  721.58

Upstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -145.9  722.65 -143.63  722.65 -114.09  720.57  -83.41   719.2  -52.65  718.68
  -19.79  718.56  -14.91  717.64   -7.37  713.74   -4.35  714.08    -2.3  710.54
       0  709.56    2.27  709.86    3.87  710.25    5.09  711.71    7.17  713.32
   12.65   717.5   19.52  718.45   35.18  718.68    58.7  718.91   83.13   720.2
   97.56  720.08  164.36  719.37     211     720     310     722     380     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -145.9      .1  -14.91    .014   12.65      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        -14.91   12.65             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -145.9      -6   719.8       F
       8     380   719.8       F
Right Levee     Station=   83.13      Elevation=

Downstream  Deck/Roadway Coordinates
    num=      13
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -140.71  722.75          -131.8  722.37         -118.51  721.22
  -47.85   720.1          -23.84  719.84               0  719.45
   44.34  720.25          114.12  720.67          114.13  720.66
  181.97  721.31          182.08  721.32          206.78  721.58
  206.81  721.58

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29   -17.7  718.68
   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32    6.67  715.22
   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19  201.99   720.4
     284     722     389     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -136.45      .1   -17.7    .014   14.82      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -17.7   14.82             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -136.45   -4.75  717.76       F
    4.78     389  717.76       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse    6.58    7.28
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  4      36     .014     .014        0                   .5                1
Upstream   Elevation =  711.17
           Centerline Station =  1
Downstream Elevation =  711.17
           Centerline Station =  0

CROSS SECTION
```

```
RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13859

INPUT
Description: USGS IL 2001.  DSF Farm Road (Seavey27)
1 pt on LHS and 2 on the
             RHS (outermost) are interpolated from the 2004 TIN
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -470.5   722.5 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29
   -17.7  718.68   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32
    6.67  715.22   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19
  201.99   720.4     256     722     342     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -470.5    .105   -17.7    .065   14.82    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -17.7   14.82              145     130     154             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -470.5   -4.75  717.76       F
    4.78     342  717.76       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13812

INPUT
Description: USGS IL 2001.  Departure to Farm Road (Seavey27)
Several points
             on the LHS and the 2 outer points on the RHS are interpolated from
             the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   727.1   42.16     727   96.54   726.6   158.3   726.2  221.22   725.9
  281.34   725.7  344.25   725.3  404.25   725.2  461.06   725.1  522.82   724.7
  558.61   724.4  587.97   724.2  627.78   723.9  662.55   723.6  702.92   723.3
  748.98     723  793.19   722.8  832.65   722.6  886.89   722.3   922.5   722.2
  968.59   721.9 1008.64   721.6 1071.67   721.5 1119.92   721.5 1163.63   721.8
 1191.96     722 1219.92 721.703    1242 723.407 1261.29 723.108 1322.51 717.477
 1337.65 717.289 1343.27 713.189 1345.73 711.588  1351.5 710.884 1358.27 710.875
 1362.02 711.468 1368.17 714.783 1374.67 717.301  1427.9 718.324 1478.97 720.331
 1514.71 720.634 1562.54 720.586 1607.43   721.9 1685.47     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .105 1337.65    .065 1374.67    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1337.65 1374.67             2162    2021    1923             .1       .3
Left Levee      Station=    1242      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 11691

INPUT
Description: IDNR 1985. C befoer CA 1093
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  718.68      42  719.18     114  719.98     163  719.58     215  719.88
     270  719.58     327  717.98     382  716.38     440  715.58     495  715.18
     541  715.48     605  716.18  647.01  714.78  655.01  711.78  658.01  711.18
  663.01  711.08  666.01  711.78  674.01  715.88  721.01  716.38  778.01  717.38
  834.01  717.98  892.01  719.18  946.01  722.18 1001.01  724.98 1058.01  728.18
 1114.01  730.48 1169.01  732.18 1227.01  733.68
```

```
Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     100     270    .105  647.01    .065  674.01    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        647.01  674.01             2140    2506    2590             .1       .3
Left Levee      Station=     605      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 9184

INPUT
Description: IDNR 1985. C before CA 846 (Verified) Distance Not Including Seavey
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  726.48      24  726.18      37  723.28      99  720.58     156  718.18
     214  717.08     270  716.08     326  715.68     385  714.18     442  713.08
  500.01  712.68  547.01  712.88  555.01  708.88  558.01  707.58  561.01  707.68
  563.01  708.88  571.01  712.88  626.01  712.88  683.01  713.78  739.01  714.08
  795.01  715.28  851.01  716.48  908.01  716.78  964.01  717.58 1022.01  717.88
 1079.01  718.18 1136.01  718.08 1194.01  718.38

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .105  547.01     .06  571.01    .105 1079.01     100

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        547.01  571.01             1440    1496    1560             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7588

INPUT
Description: USGS IL 2001.  Approach Seavey26; two RB extended pts and 4 LB
             extended pts, elevations from bb_tinascii
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -326     720    -296   717.9    -245     716    -150     714  -16.57  712.23
       0  711.15    3.12  708.72    5.24  707.06    9.21  705.97   12.14  705.78
   14.07  706.25    15.5  706.66   17.39  708.48   20.57  710.57   26.68  711.86
   42.34  711.47   54.49  712.31   87.28  713.03  106.96  713.73     319   721.4
    2614   723.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -326    .105       0     .06   20.57    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0   20.57              135     122     132             .3       .5

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7576

INPUT
Description: USGS IL 2001.  USF Seavey26 . The use of n=100 is to block of
             conveyance but retain storage computation. This is for f-table
             computation only.
Added extend pts-3 on LHS, 2 on RHS,
             elevations from bb_tinascii
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -340   719.8    -276     718    -192     716 -111.83  714.86  -75.45  714.69
   -44.6  713.53  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42
       0  705.39    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39
   53.77  712.49   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65
     297   720.5    2634     728
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -340    .105   -4.92     .06    11.8    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -4.92    11.8               48      46      48             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -340      -5     715       F
      12    2634     715       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7550

INPUT
Description: Seavey 26  IL USGS
Distance from Upstream XS =       6
Deck/Roadway Width        =      36
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -260  715.82         -104.91  715.44          -63.81   715.3
  -20.86   715.4          -10.42  715.43           50.12  715.48
   98.41  715.57          139.08  715.81             240   716.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -295     720    -161     716 -111.83  714.86  -75.45  714.69   -44.6  713.53
  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42       0  705.39
    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39   53.77  712.49
   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65     182     716
     274     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -295      .1   -4.92    .014    11.8      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -4.92    11.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -295      -5     715       F
      12     274     715       F

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -260  715.96         -136.45  715.47          -73.33   715.6
  -27.61  715.84           19.92  715.89           56.43  715.85
   97.33  715.83          126.43  716.03          161.88  716.34
     240   716.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -299     720    -270     716 -188.97  714.61 -153.89  713.64 -131.71  714.11
 -118.51   713.7  -92.92  713.04   -59.3  712.77     -25  712.87    -6.8  711.77
   -5.64   707.9   -2.28  706.86   -1.72  705.57       0  704.49    2.62   703.7
     6.7   703.6    8.63  703.85   10.06  704.22   12.18  704.14   13.64  703.87
    15.2  703.85   16.52  705.19   16.79  712.26   22.52  711.46   33.88  712.39
   63.18  713.39   83.33  714.16   98.36  714.21  110.58  713.23  143.91  713.47
  179.27  714.04     234     716     283     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -299      .1    -6.8    .014   16.79      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
          -6.8   16.79             .3       .5
```

```
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -299      -1   711.4       F
   16.17     283   711.4       F
Right Levee     Station=   16.79      Elevation=

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #2           Box       6     8.8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                  .4                1
Upstream   Elevation =  705.4
           Centerline Station = -0.15
Downstream Elevation =  705.3
           Centerline Station =  3.8

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6     7.5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                  .4                1
Upstream   Elevation =  705.45
           Centerline Station =  8.05
Downstream Elevation =  705.35
           Centerline Station =  12

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7499

INPUT
Description: USGS IL 2001.   DSF Seavey26. The use of n=100 is to block of
             conveyance but retain storage computation. This is for f-table
             computation only.Added extended pts-2 RHS and 3 LHS, elevations
             from bb_tinascii
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -358   722.2    -292   720.3    -245   718.2 -188.97  714.61 -153.89  713.64
 -131.71  714.11 -118.51   713.7  -92.92  713.04   -59.3  712.77     -25  712.87
    -6.8  711.77   -5.64   707.9   -2.28  706.86   -1.72  705.57       0  704.49
    2.62   703.7     6.7   703.6    8.63  703.85   10.06  704.22   12.18  704.14
   13.64  703.87    15.2  703.85   16.52  705.19   16.79  712.26   22.52  711.46
   33.88  712.39   63.18  713.39   83.33  714.16   98.36  714.21  110.58  713.23
  143.91  713.47  179.27  714.04     351   720.6    2679   724.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -358    .105    -6.8     .06   16.79    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -6.8   16.79              162     146     142             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -358      -1   711.4       F
   16.17    2679   711.4       F
Right Levee     Station=   16.79      Elevation=

CROSS SECTION
```

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7453

INPUT
Description: USGS IL 2001. Departure Seavey26; added 22 extend pts on LHS and
2 on RHS, elevations from bb_tinascii
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-2419	729.2	-2254	730.5	-2102	731.3	-1952	731.7	-1824	731.7
-1754	731.9	-1665	732.3	-1595	733	-1501	734.4	-1380	735.6
-1258	736.6	-1136	737.7	-1031	738.7	-906	739.9	-802	740.1
-702	738.8	-593	738.4	-487	734	-378	730.7	-292	729.3
-192	723.3	-107	719.8	0	713.98	37.16	713.08	80.37	712.06
116.16	711.3	143.93	710.58	160.37	710.92	171.65	709.95	174.29	708.99
175.95	706.88	180.25	705.73	186.19	705.42	191.48	705.75	194.47	705.81
195.89	706.81	196.8	707.82	198.83	708.89	204.64	713.8	211.67	713.72
218.75	713.97	223.37	713.73	229.89	711.49	255.23	711.08	334.18	712.42
512	718.4	2839	728.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-2419	.105	171.65	.06	204.64	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.65	204.64	1540	1490	1570	.1	.3

Right Levee Station= 218.75 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5863

INPUT
Description: IDNR, 1985. C before CA 513
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	720.08	55	719.38	112	717.48	170	714.68	228	711.98
286	710.18	373	709.38	379	707.38	380	705.28	382	704.98
386	704.68	389	704.98	391	705.28	403	709.98	411	709.38
468	709.28	522	709.28	580	709.28	640	710.58	695	711.38
752.01	712.88	808.01	713.98	864.01	715.38	922.01	716.88	979.01	717.98
1035.01	719.68	1091.01	721.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.105	373	.06	403	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
373	403	530	608	703	.1	.3

Right Levee Station= 403 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5256

INPUT
Description: IDNR 2001. TP#0 off kane 32 Approach to I-88
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-134	720	0	718.23	57.09	716.021	111.01	714.792	164.2	712.864
218.95	710.29	271.69	709.07	323.06	708.367	369.9	706.971	389.15	708.237
396.25	704.846	398.52	704.28	409.99	704.265	419.34	704.24	431.06	704.746
440.45	708.745	475.2	709.07	532.47	709.35	582.9	709.461	633.34	709.624
680.43	709.962	726.24	710.4	774.08	710.705	825.99	710.887	877.81	712.035
932.11	713.742	985.25	715	1037.43	715.542	1080	716	1114	718
1182	720								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-134	.075	389.15	.06	440.45	.075

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        389.15  440.45              175     152     108             .2       .3
Left Levee      Station=  389.15      Elevation= 708.237

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5104

INPUT
Description: IDNR 2001. Section A I88 USF.
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -686     720 -528.47  717.55 -374.86  714.61 -322.66  713.52 -268.02  711.62
 -211.93  709.89 -152.45  708.98  -95.32   708.7   -63.2  706.91   -58.1   704.7
  -48.87  704.54  -41.74  704.35  -38.64  706.33  -25.17  705.88       0  707.51
   56.49  708.23  114.04  708.73  171.49  708.99  225.74  709.39  283.09  709.98
  336.84  710.54  389.38  711.09  448.08  712.48  504.19  713.22   561.4  714.12
  620.15  714.45     674     716     744     718     787     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -686    .105   -63.2     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -63.2       0              250     230     240             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -686     -63     718       F
     -30     787     718       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5103

INPUT
Description: I-88 New IDNR
Distance from Upstream XS =      25
Deck/Roadway Width        =     150
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      11
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -590   721.9            -493   721.3            -396   720.8
    -200   719.8          -101.5   718.1             139     719
     236   719.1             341  719.36             438   720.2
     535   721.1             631   721.7

Upstream Bridge Cross Section Data
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -686     720 -528.47  717.55 -374.86  714.61 -322.66  713.52 -268.02  711.62
 -211.93  709.89 -152.45  708.98  -95.32   708.7   -63.2  706.91   -58.1   704.7
  -48.87  704.54  -41.74  704.35  -38.64  706.33  -25.17  705.88       0  707.51
   56.49  708.23  114.04  708.73  171.49  708.99  225.74  709.39  283.09  709.98
  336.84  710.54  389.38  711.09  448.08  712.48  504.19  713.22   561.4  714.12
  620.15  714.45     674     716     744     718     787     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -686      .1   -63.2    .014       0      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -63.2       0             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -686     -63     718       F
     -30     787     718       F

Downstream  Deck/Roadway Coordinates
    num=      11
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

```
    -590   721.9            -493   721.3            -396   720.8
    -200   719.8          -101.5   718.1             139     719
     236   719.1             341  719.36             438   720.2
     535   721.1             631   721.7

Downstream Bridge Cross Section Data
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -508.42  712.84 -451.43  712.89 -398.35  712.66 -342.27  712.31 -285.28   711.7
 -228.51  710.71 -172.24  710.18 -114.82  708.95  -65.67  705.15  -63.25  704.68
  -57.87  701.51  -27.28  702.49  -22.75  703.54  -14.84  704.46       0  705.75
   62.13  708.26  114.41  708.41  170.77  708.67   221.5  709.68  277.13  709.95
  329.33  710.29   381.2  710.91     421     712     459     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -508.42      .1  -63.25    .014       0      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        -63.25       0             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -508.42     -52   712.1       F
     -29     459   712.1       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       8       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Outlet control
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18     180     .014     .014        0                   .4                1
Number of Barrels =  2
Upstream   Elevation =  704.4
Centerline Stations
    Sta.    Sta.
     -52     -43
Downstream Elevation =  704.1
Centerline Stations
    Sta.    Sta.
     -45     -36

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4652

INPUT
Description: IDNR 2001. Section D DSF I-88.
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -508.42  712.84 -451.43  712.89 -398.35  712.66 -342.27  712.31 -285.28   711.7
 -228.51  710.71 -172.24  710.18 -114.82  708.95  -65.67  705.15  -63.25  704.68
  -57.87  701.51  -27.28  702.49  -22.75  703.54  -14.84  704.46       0  705.75
   62.13  708.26  114.41  708.41  170.77  708.67   221.5  709.68  277.13  709.95
  329.33  710.29   381.2  710.91     421     712     459     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -508.42    .105  -63.25     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -63.25       0              138     120     140             .3       .5
Ineffective Flow     num=       2
```

```
   Sta L   Sta R    Elev  Permanent
 -508.42     -52   712.1       F
     -29     459   712.1       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4511

INPUT
Description: IDNR 2001. 1TP #2 off KANE 32 Depart from I-88; extended 2 pts on
             each side, elevation from bb_tinascii
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -889   721.6    -582     715  -445.7  711.17 -392.55  711.04  -343.9  711.35
 -289.26  711.86 -237.33  711.75 -184.94  711.62 -136.77  711.84  -89.81  711.14
  -55.84  710.13  -43.48  707.49  -39.71   704.7  -36.71  704.12  -31.21  703.76
  -25.38  704.02  -22.76  704.72  -16.52  708.76       0  709.01   47.92  709.24
  100.01  709.62  154.14  709.92  207.49  710.96  268.79  711.45  324.93  711.63
     580   714.4     650   715.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -889    .105  -55.84     .06  -16.52    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -55.84  -16.52              485     660     768             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 3851

INPUT
Description: IDNR 1985. C before CA 340
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   692.5  722.58   739.5  721.88   819.5  716.28   867.5  713.98   881.5  712.68
   925.5  708.98   972.5  707.18   991.5  706.58   996.5  703.68   997.5  703.38
  1001.5  703.48  1003.5  703.78  1008.5  706.08  1055.5  707.08  1100.5  707.08
  1146.5  707.18  1193.5  707.08 1242.51  707.08 1288.51  708.48 1336.51  709.48
 1384.51  710.18 1434.51  710.68 1485.51  711.48 1535.51  711.28 1586.51  711.48
 1638.51  712.08 1689.51  712.88 1740.51  713.48 1793.51  714.28 1844.51  715.98
 1866.51  717.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   692.5    .105   991.5     .07  1008.5    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         991.5  1008.5             1366    1429    1455             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2422

INPUT
Description: IDNR 1985. C before CA 198
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   689.5  719.08   710.5  718.78   760.5  716.88   806.5  713.58   853.5  710.68
   900.5  708.38   943.5  706.48   990.5  705.28   993.5  702.88   996.5  702.08
  1001.5  701.98  1002.5  702.78  1009.5  705.38  1075.5  705.78  1123.5  705.28
  1168.5  705.48  1216.5  705.48  1259.5  705.18  1304.5  704.08  1344.5  708.68
  1385.5  709.48  1417.5  710.08  1475.5     712  1495.5     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   689.5     .12   990.5     .07  1009.5     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
         990.5  1009.5              328     183     140             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
  1259.5  1495.5  705.15

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2139

INPUT
Description: USGS IL 2001. . Approach CS to Rte 47-25

Outer 3 pts on RHS
             interpolated from the 2004 TIN, by BW 1-28-05
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  583.91  721.51     688  719.38  796.27  712.28  855.07  708.57  964.47  705.32
  988.03  704.68  989.87  702.77  991.88  701.58    1006  701.27 1008.95  703.57
 1011.97  705.27 1052.11  704.51 1228.51  704.74 1281.57  707.34 1307.81   710.2
 1368.01   714.2 1413.41   718.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  583.91     .12  988.03     .07 1011.97     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        988.03 1011.97              488     386     387             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1903

INPUT
Description: USGS IL 2001.  Depart Rte 47-25
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  616.77  718.43  794.52     714  813.52     712  869.52     708  929.52  705.52
  987.71  705.81  992.43  704.98  993.49  703.55  995.76  703.21  997.12   701.6
 1010.91  703.72 1012.29  705.52  1079.7  706.84 1128.79  707.19 1218.83  705.17
 1247.52     708 1277.52     710 1293.52     712 1320.52     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  616.77     .12  987.71     .07 1012.29     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        987.71 1012.29              887     872    1098             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 931

INPUT
Description: IDNR 1985. C before CA 051
extended points added on the
             floodplain which were interpolated formt he 2004 TIN
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  705.03  710.18  752.06  709.18  799.99  708.58  849.08  707.88  880.03  707.08
  919.01  704.78  966.04  703.98  981.99  703.68  990.02  701.88     993  701.38
    1000  701.08    1002  701.88 1006.05  704.28 1057.01  703.48 1101.01  703.68
 1150.02  704.18 1191.08  703.88 1235.01  705.28 1285.06  704.78 1339.05  704.68
    1388  704.28 1431.03  704.88 1493.73   705.7 1545.83     706 1594.83     708
 1615.83   709.7 1641.53   711.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  705.03     .12  966.04     .07 1006.05     .12
```

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
966.04	1006.05	0	0	0	.1	.3

Right Levee Station= 1006.03 Elevation=

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek

Reach	River Sta.	n1	n2	n3	n4
Trib C Before CA	15195	.105	.065	.105	
Trib C Before CA	13934	.105	.065	.105	
Trib C Before CA	13896	.105	.065	.105	
Trib C Before CA	13875	Culvert			
Trib C Before CA	13859	.105	.065	.105	
Trib C Before CA	13812	.105	.065	.105	
Trib C Before CA	11691	100	.105	.065	.105
Trib C Before CA	9184	.105	.06	.105	100
Trib C Before CA	7588	.105	.06	.105	
Trib C Before CA	7576	.105	.06	.105	
Trib C Before CA	7550	Culvert			
Trib C Before CA	7499	.105	.06	.105	
Trib C Before CA	7453	.105	.06	.105	
Trib C Before CA	5863	.105	.06	.105	
Trib C Before CA	5256	.075	.06	.075	
Trib C Before CA	5104	.105	.06	.105	
Trib C Before CA	5103	Culvert			
Trib C Before CA	4652	.105	.06	.105	
Trib C Before CA	4511	.105	.06	.105	
Trib C Before CA	3851	.105	.07	.105	
Trib C Before CA	2422	.12	.07	.12	
Trib C Before CA	2139	.12	.07	.12	
Trib C Before CA	1903	.12	.07	.12	
Trib C Before CA	931	.12	.07	.12	

SUMMARY OF REACH LENGTHS

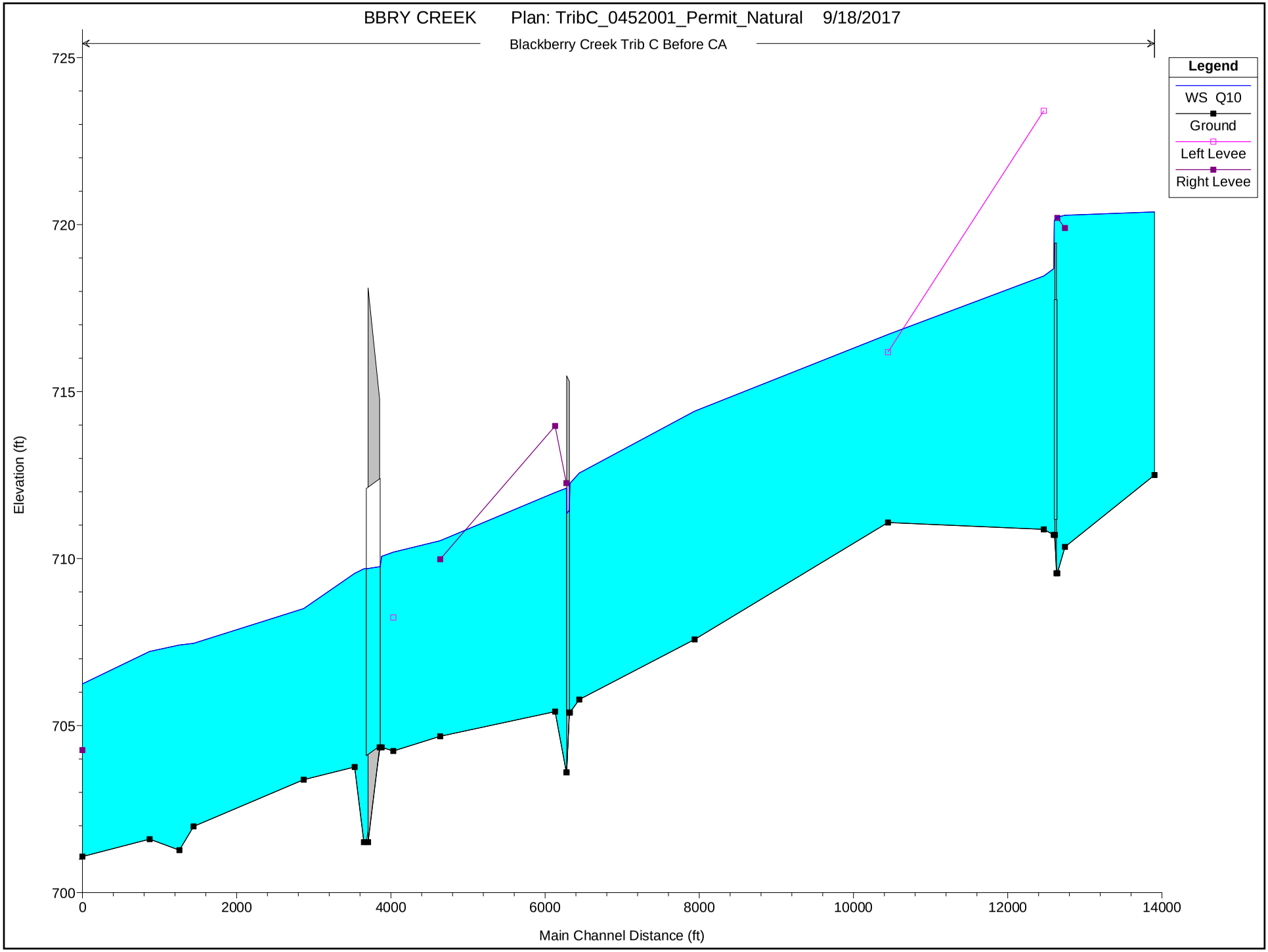
River: Blackberry Creek

Reach	River Sta.	Left	Channel	Right
Trib C Before CA	15195	1162	1160	1140
Trib C Before CA	13934	110	100	110
Trib C Before CA	13896	60	46	50
Trib C Before CA	13875	Culvert		
Trib C Before CA	13859	145	130	154
Trib C Before CA	13812	2162	2021	1923
Trib C Before CA	11691	2140	2506	2590
Trib C Before CA	9184	1440	1496	1560
Trib C Before CA	7588	135	122	132
Trib C Before CA	7576	48	46	48
Trib C Before CA	7550	Culvert		
Trib C Before CA	7499	162	146	142
Trib C Before CA	7453	1540	1490	1570
Trib C Before CA	5863	530	608	703
Trib C Before CA	5256	175	152	108
Trib C Before CA	5104	250	230	240
Trib C Before CA	5103	Culvert		
Trib C Before CA	4652	138	120	140
Trib C Before CA	4511	485	660	768
Trib C Before CA	3851	1366	1429	1455
Trib C Before CA	2422	328	183	140
Trib C Before CA	2139	488	386	387
Trib C Before CA	1903	887	872	1098
Trib C Before CA	931	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Blackberry Creek

Reach	River Sta.	Contr.	Expan.
Trib C Before CA	15195	.1	.3
Trib C Before CA	13934	.3	.5
Trib C Before CA	13896	.3	.5
Trib C Before CA	13875	Culvert	
Trib C Before CA	13859	.3	.5
Trib C Before CA	13812	.1	.3
Trib C Before CA	11691	.1	.3
Trib C Before CA	9184	.1	.3
Trib C Before CA	7588	.3	.5
Trib C Before CA	7576	.3	.5
Trib C Before CA	7550	Culvert	
Trib C Before CA	7499	.3	.5
Trib C Before CA	7453	.1	.3
Trib C Before CA	5863	.1	.3
Trib C Before CA	5256	.2	.3
Trib C Before CA	5104	.3	.5
Trib C Before CA	5103	Culvert	
Trib C Before CA	4652	.3	.5
Trib C Before CA	4511	.1	.3
Trib C Before CA	3851	.1	.3
Trib C Before CA	2422	.1	.3
Trib C Before CA	2139	.1	.3
Trib C Before CA	1903	.1	.3
Trib C Before CA	931	.1	.3


BBRY CREEK Plan: TribC_0452001_Permit_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q10
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 3:20:24 PM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q10	720.38	720.38	0.00	0.09	0.00	12.94	287.25	77.80	855.24
Trib C Before CA	13934	Q10	720.29	720.28	0.01	0.03	0.01	26.40	278.59	64.01	282.87
Trib C Before CA	13896	Q10	720.25	720.22	0.03			40.84	292.57	35.59	299.33
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q10	718.81	718.68	0.13	0.26	0.04	2.00	362.39	4.61	130.81
Trib C Before CA	13812	Q10	718.51	718.46	0.05	1.76	0.00	7.07	352.65	9.28	119.63
Trib C Before CA	11691	Q10	716.75	716.71	0.03	2.31	0.00	144.37	210.82	8.81	369.26
Trib C Before CA	9184	Q10	714.44	714.41	0.03	1.72	0.01	94.96	187.46	66.58	378.66
Trib C Before CA	7588	Q10	712.71	712.56	0.15	0.30	0.00	7.40	324.46	17.14	107.36
Trib C Before CA	7576	Q10	712.40	712.25	0.15				349.00		16.71
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q10	712.17	712.11	0.07	0.13	0.00	0.12	348.88		29.16
Trib C Before CA	7453	Q10	712.04	711.98	0.06	1.46	0.01	30.91	316.09		118.30
Trib C Before CA	5863	Q10	710.57	710.53	0.03	0.36	0.01	23.65	204.67	118.69	363.35
Trib C Before CA	5256	Q10	710.20	710.19	0.01	0.04	0.01	91.54	230.61	38.85	481.48
Trib C Before CA	5104	Q10	710.15	710.07	0.08				361.00		509.15
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q10	709.76	709.70	0.07	0.09	0.01		361.00		374.42
Trib C Before CA	4511	Q10	709.66	709.56	0.10	1.11	0.03		349.14	12.86	144.53
Trib C Before CA	3851	Q10	708.52	708.50	0.02	1.06	0.00	24.84	117.70	219.46	351.67
Trib C Before CA	2422	Q10	707.47	707.46	0.01	0.05	0.00	24.28	85.36	253.36	412.70
Trib C Before CA	2139	Q10	707.42	707.41	0.00	0.16	0.00	29.68	111.49	221.83	388.25
Trib C Before CA	1903	Q10	707.26	707.22	0.04	1.00	0.01	77.39	192.43	93.18	351.30
Trib C Before CA	931	Q10	706.25	706.25	0.00			26.08	100.18	237.74	657.86

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude

			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	# Chl
Trib C Before CA	15195	Q10	378.00	712.50	720.38	715.64	720.38	0.000049	0.38	1453.41	855.24	0.04
Trib C Before CA	13934	Q10	369.00	710.35	720.28	713.58	720.29	0.000209	0.96	629.41	282.87	0.07
Trib C Before CA	13896	Q10	369.00	709.56	720.22	714.24	720.25	0.000475	1.57	438.85	299.33	0.11
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q10	369.00	710.71	718.68	715.11	718.81	0.003348	2.95	144.56	130.81	0.27
Trib C Before CA	13812	Q10	369.00	710.88	718.46	713.48	718.51	0.000678	1.75	258.47	119.63	0.13
Trib C Before CA	11691	Q10	364.00	711.08	716.71	714.19	716.75	0.001173	1.92	429.50	369.26	0.17
Trib C Before CA	9184	Q10	349.00	707.58	714.41	711.48	714.44	0.000762	1.74	494.53	378.66	0.14
Trib C Before CA	7588	Q10	349.00	705.78	712.56	709.37	712.71	0.002334	3.18	152.47	107.36	0.25
Trib C Before CA	7576	Q10	349.00	705.39	712.25	707.83	712.40	0.002646	3.08	113.18	16.71	0.21
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q10	349.00	703.60	712.11	706.32	712.17	0.000847	2.06	170.57	29.16	0.14
Trib C Before CA	7453	Q10	347.00	705.42	711.98	707.95	712.04	0.000941	2.06	230.75	118.30	0.16
Trib C Before CA	5863	Q10	347.00	704.68	710.53	707.84	710.57	0.001004	1.80	433.62	363.35	0.16
Trib C Before CA	5256	Q10	361.00	704.24	710.19	705.85	710.20	0.000151	0.88	727.63	481.48	0.07
Trib C Before CA	5104	Q10	361.00	704.35	710.07	706.77	710.15	0.001061	2.26	159.66	509.15	0.18
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q10	361.00	701.51	709.70	704.03	709.76	0.000460	2.06	175.48	374.42	0.13
Trib C Before CA	4511	Q10	362.00	703.76	709.56	706.46	709.66	0.002166	2.61	172.29	144.53	0.24
Trib C Before CA	3851	Q10	362.00	703.38	708.50	707.08	708.52	0.001066	1.69	508.58	351.67	0.15
Trib C Before CA	2422	Q10	363.00	701.98	707.46	705.84	707.47	0.000399	1.05	813.39	412.70	0.09
Trib C Before CA	2139	Q10	363.00	701.27	707.41	703.92	707.42	0.000217	0.89	922.41	388.25	0.07
Trib C Before CA	1903	Q10	363.00	701.60	707.22	705.13	707.26	0.001809	2.06	414.86	351.30	0.19
Trib C Before CA	931	Q10	364.00	701.08	706.25	704.27	706.25	0.000234	0.73	1143.90	657.86	0.07

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Permit

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13875 Profile: Q10 Culv: Culvert #1
Warning:During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q10
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q10
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 9184 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7576 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7499 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7453 Profile: Q10
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5863 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5256 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5104 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

```
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
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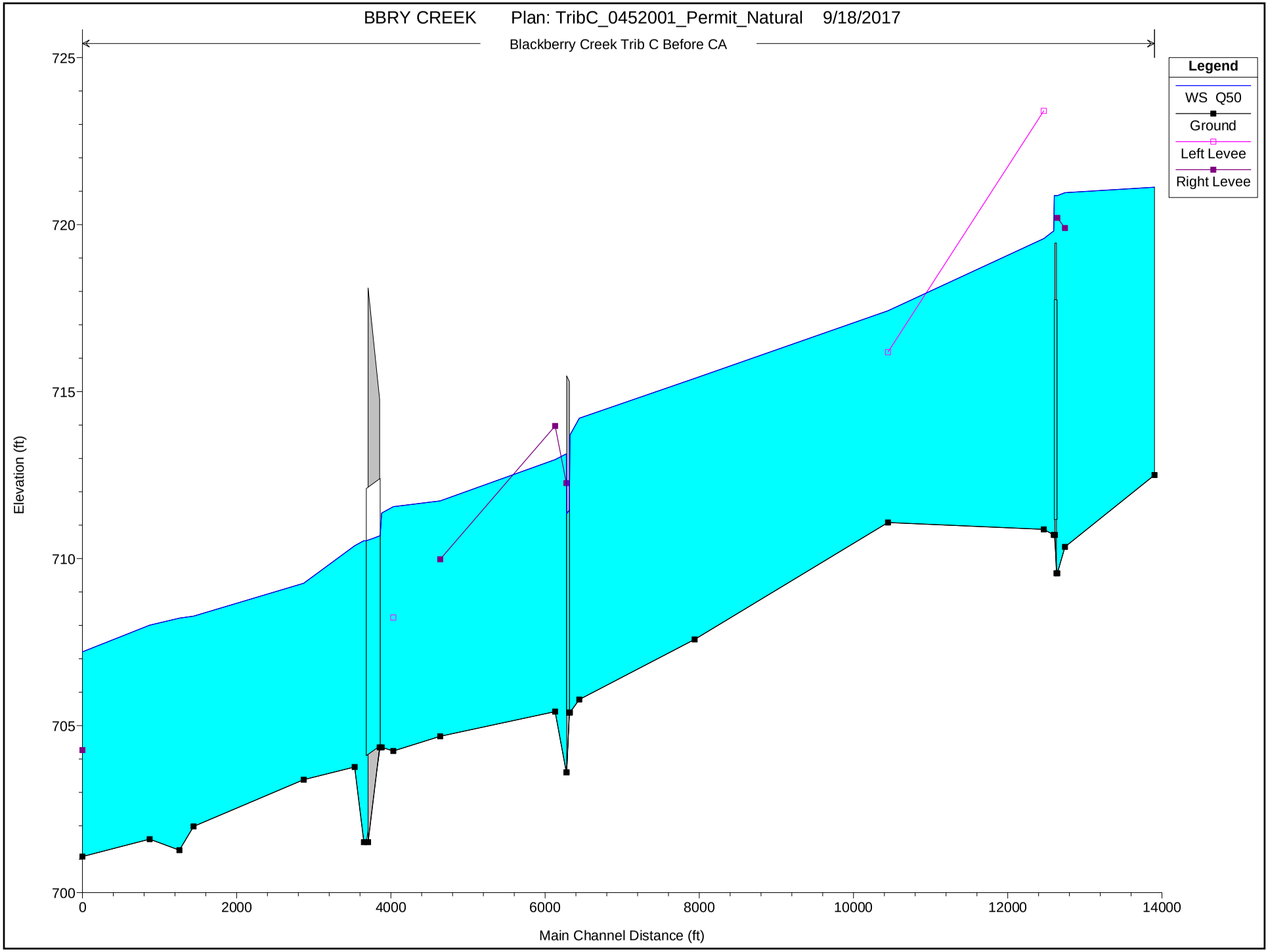
BBRY CREEK Plan: TribC_0452001_Permit_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q50
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
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            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 3:20:24 PM

Project in English units

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391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
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905.2   760.1
0.00    712.00
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369.07  708.00
375.00  707.99
381.8
3       707.95
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392.75 703.73
396.12 702.94
397.39 702.73
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400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q50	721.12	721.12	0.00	0.14	0.00	69.57	478.27	158.16	916.08
Trib C Before CA	13934	Q50	720.98	720.96	0.02	0.05	0.01	56.49	451.08	162.43	294.85
Trib C Before CA	13896	Q50	720.92	720.87	0.05			102.12	443.75	124.13	334.04
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q50	719.94	719.81	0.13	0.26	0.03	54.14	520.59	95.27	243.31
Trib C Before CA	13812	Q50	719.66	719.58	0.08	2.19	0.01	33.18	575.62	61.20	160.23
Trib C Before CA	11691	Q50	717.45	717.42	0.03	2.04	0.00	334.87	277.14	39.99	435.48
Trib C Before CA	9184	Q50	715.41	715.40	0.02	1.12	0.01	200.19	218.70	173.12	463.20
Trib C Before CA	7588	Q50	714.29	714.20	0.08	0.24	0.06	104.79	382.30	104.91	279.77
Trib C Before CA	7576	Q50	713.99	713.70	0.29			0.12	591.66	0.22	125.01
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q50	713.27	713.14	0.13	0.20	0.02	9.51	569.44	13.04	152.54
Trib C Before CA	7453	Q50	713.05	712.97	0.08	1.28	0.02	114.72	472.28		161.62
Trib C Before CA	5863	Q50	711.74	711.73	0.02	0.18	0.00	85.82	224.78	276.41	472.15
Trib C Before CA	5256	Q50	711.56	711.56	0.00	0.02	0.03	183.77	260.35	174.88	664.19
Trib C Before CA	5104	Q50	711.51	711.36	0.15				619.00		660.63
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q50	710.69	710.53	0.16	0.17	0.02		619.00		559.69
Trib C Before CA	4511	Q50	710.51	710.39	0.12	1.19	0.03	0.19	507.66	113.15	242.42
Trib C Before CA	3851	Q50	709.28	709.26	0.02	0.99	0.00	57.10	148.21	415.69	403.85
Trib C Before CA	2422	Q50	708.28	708.28	0.01	0.06	0.00	53.65	116.47	452.88	438.18
Trib C Before CA	2139	Q50	708.23	708.22	0.01	0.19	0.00	66.21	159.92	396.88	422.77
Trib C Before CA	1903	Q50	708.04	708.01	0.03	0.81	0.01	146.09	235.03	242.88	378.19
Trib C Before CA	931	Q50	707.21	707.21	0.00			48.73	132.96	443.32	700.48

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude

			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	# Chl
Trib C Before CA	15195	Q50	706.00	712.50	721.12	716.98	721.12	0.000075	0.53	2108.22	916.08	0.04
Trib C Before CA	13934	Q50	670.00	710.35	720.96	714.96	720.98	0.000367	1.37	825.48	294.85	0.10
Trib C Before CA	13896	Q50	670.00	709.56	720.87	715.60	720.92	0.000808	2.17	642.84	334.04	0.14
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q50	670.00	710.71	719.81	716.85	719.94	0.002887	3.27	361.19	243.31	0.26
Trib C Before CA	13812	Q50	670.00	710.88	719.58	714.53	719.66	0.000971	2.37	414.88	160.23	0.16
Trib C Before CA	11691	Q50	652.00	711.08	717.42	715.33	717.45	0.001187	2.15	714.21	435.48	0.17
Trib C Before CA	9184	Q50	592.00	707.58	715.40	712.53	715.41	0.000536	1.67	908.32	463.20	0.13
Trib C Before CA	7588	Q50	592.00	705.78	714.20	710.50	714.29	0.001249	2.81	479.70	279.77	0.19
Trib C Before CA	7576	Q50	592.00	705.39	713.70	708.85	713.99	0.004066	4.31	137.65	125.01	0.27
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q50	592.00	703.60	713.14	707.31	713.27	0.001453	2.94	257.12	152.54	0.18
Trib C Before CA	7453	Q50	587.00	705.42	712.97	708.83	713.05	0.001206	2.56	368.93	161.62	0.19
Trib C Before CA	5863	Q50	587.00	704.68	711.73	708.84	711.74	0.000485	1.50	936.26	472.15	0.12
Trib C Before CA	5256	Q50	619.00	704.24	711.56	706.46	711.56	0.000087	0.79	1531.38	664.19	0.05
Trib C Before CA	5104	Q50	619.00	704.35	711.36	707.45	711.51	0.001414	3.06	202.43	660.63	0.22
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q50	619.00	701.51	710.53	704.89	710.69	0.000955	3.18	194.77	559.69	0.19
Trib C Before CA	4511	Q50	621.00	703.76	710.39	707.39	710.51	0.002461	3.07	340.25	242.42	0.26
Trib C Before CA	3851	Q50	621.00	703.38	709.26	707.70	709.28	0.000960	1.79	795.90	403.85	0.14
Trib C Before CA	2422	Q50	623.00	701.98	708.28	706.09	708.28	0.000415	1.21	1159.43	438.18	0.09
Trib C Before CA	2139	Q50	623.00	701.27	708.22	705.28	708.23	0.000278	1.10	1249.22	422.77	0.08
Trib C Before CA	1903	Q50	624.00	701.60	708.01	706.38	708.04	0.001445	2.08	700.86	378.19	0.17
Trib C Before CA	931	Q50	625.00	701.08	707.21	704.52	707.21	0.000181	0.75	1794.74	700.48	0.06

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Permit

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q50
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q50
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q50
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 9184 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7588 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7576 Profile: Q50
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7499 Profile: Q50
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7453 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5863 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5256 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

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River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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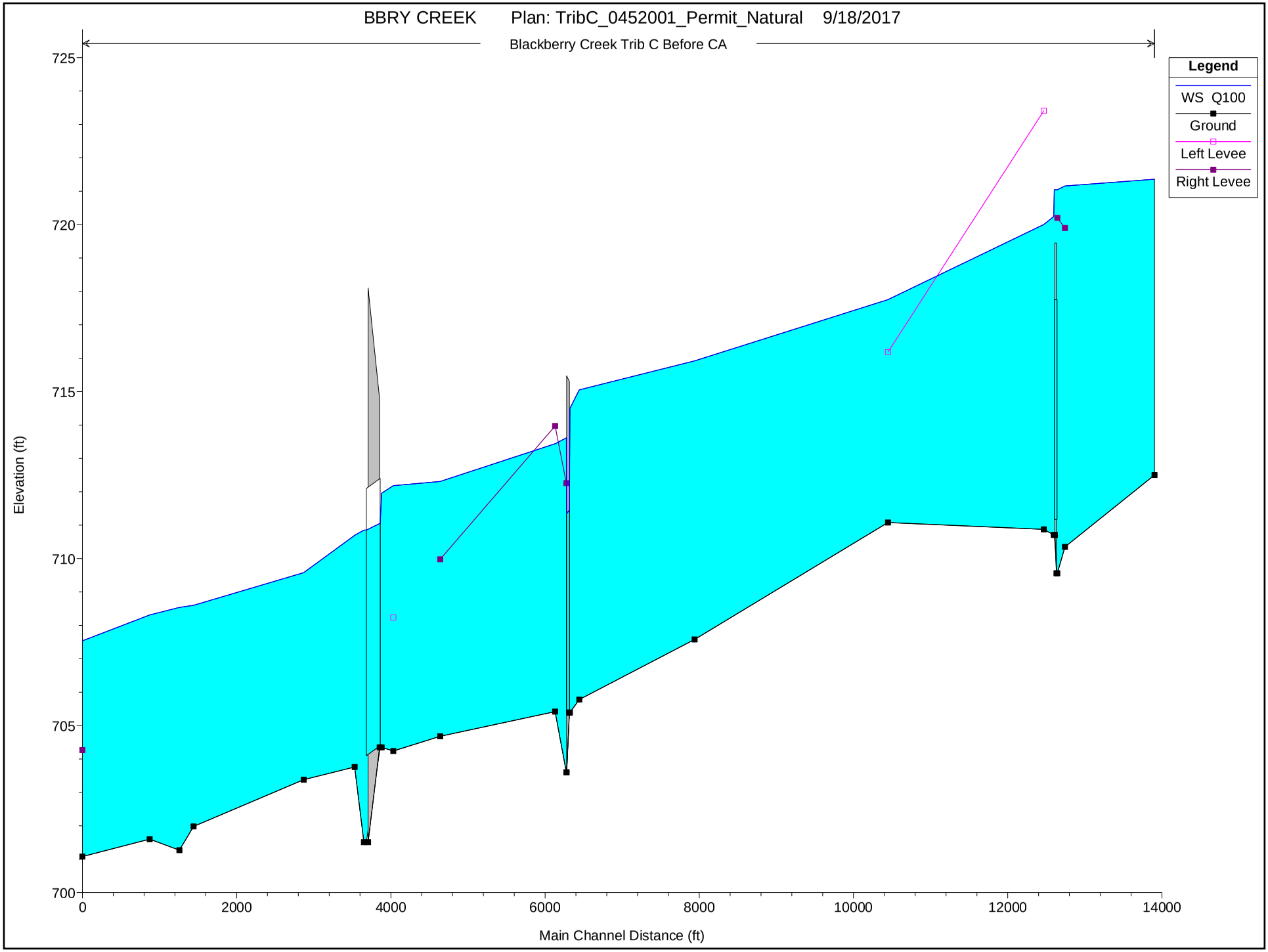
BBRY CREEK Plan: TribC_0452001_Permit_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q100
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

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                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
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PROJECT DATA
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Project File : IL47.prj
Run Date and Time: 9/18/2017 3:20:24 PM

Project in English units

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401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q100	879.00	712.50	721.36	717.20	721.36	0.000091	0.61	2329.77	935.42	0.05
Trib C Before CA	13934	Q100	828.00	710.35	721.16	715.50	721.18	0.000473	1.59	884.92	298.38	0.11
Trib C Before CA	13896	Q100	828.00	709.56	721.04	716.23	721.11	0.001040	2.50	702.57	345.32	0.16
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q100	828.00	710.71	720.24	717.77	720.36	0.002678	3.33	474.17	281.04	0.25
Trib C Before CA	13812	Q100	828.00	710.88	720.00	714.99	720.09	0.001101	2.62	485.95	175.60	0.17
Trib C Before CA	11691	Q100	800.00	711.08	717.76	715.84	717.79	0.001128	2.19	867.48	478.32	0.17
Trib C Before CA	9184	Q100	713.00	707.58	715.92	713.52	715.94	0.000438	1.60	1166.96	532.80	0.12
Trib C Before CA	7588	Q100	713.00	705.78	715.05	710.94	715.10	0.000766	2.39	743.46	343.38	0.15
Trib C Before CA	7576	Q100	713.00	705.39	714.50	709.30	714.85	0.004318	4.73	151.28	182.02	0.28
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q100	713.00	703.60	713.62	707.75	713.76	0.001547	3.15	348.09	231.53	0.19
Trib C Before CA	7453	Q100	705.00	705.42	713.44	709.21	713.52	0.001202	2.66	450.45	181.89	0.19
Trib C Before CA	5863	Q100	705.00	704.68	712.31	709.23	712.32	0.000351	1.38	1221.84	509.41	0.10

Trib C Before CA	5256	Q100	749.00	704.24	712.18	706.73	712.19	0.000068	0.74	1960.44	703.83	0.05
Trib C Before CA	5104	Q100	749.00	704.35	711.96	707.74	712.13	0.001523	3.37	221.99	703.66	0.23
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q100	749.00	701.51	710.85	705.27	711.07	0.001236	3.71	202.09	613.13	0.22
Trib C Before CA	4511	Q100	752.00	703.76	710.70	707.84	710.82	0.002452	3.21	419.84	268.86	0.27
Trib C Before CA	3851	Q100	752.00	703.38	709.58	707.81	709.60	0.000934	1.85	927.45	424.94	0.14
Trib C Before CA	2422	Q100	755.00	701.98	708.60	706.18	708.61	0.000431	1.28	1303.22	447.86	0.10
Trib C Before CA	2139	Q100	755.00	701.27	708.54	705.43	708.55	0.000305	1.20	1386.83	436.49	0.08
Trib C Before CA	1903	Q100	756.00	701.60	708.31	706.55	708.34	0.001391	2.13	818.45	387.10	0.17
Trib C Before CA	931	Q100	758.00	701.08	707.54	704.63	707.54	0.000186	0.80	2029.31	721.32	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q100	721.36	721.36	0.00	0.18	0.00	103.09	575.71	200.20	935.42
Trib C Before CA	13934	Q100	721.18	721.16	0.03	0.07	0.01	72.64	540.75	214.61	298.38
Trib C Before CA	13896	Q100	721.11	721.04	0.06			134.40	523.39	170.21	345.32
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q100	720.36	720.24	0.12	0.26	0.02	88.18	577.07	162.75	281.04
Trib C Before CA	13812	Q100	720.09	720.00	0.09	2.29	0.02	50.53	679.97	97.50	175.60
Trib C Before CA	11691	Q100	717.79	717.76	0.03	1.85	0.01	436.31	302.45	61.25	478.32
Trib C Before CA	9184	Q100	715.94	715.92	0.02	0.83	0.00	245.58	230.42	237.00	532.80
Trib C Before CA	7588	Q100	715.10	715.05	0.05	0.16	0.09	189.94	366.09	156.97	343.38
Trib C Before CA	7576	Q100	714.85	714.50	0.35			0.27	712.18	0.55	182.02
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q100	713.76	713.62	0.14	0.20	0.03	37.26	645.56	30.18	231.53
Trib C Before CA	7453	Q100	713.52	713.44	0.08	1.18	0.02	173.70	531.30		181.89
Trib C Before CA	5863	Q100	712.32	712.31	0.01	0.13	0.00	119.97	229.76	355.27	509.41
Trib C Before CA	5256	Q100	712.19	712.18	0.00	0.02	0.03	223.50	267.66	257.84	703.83
Trib C Before CA	5104	Q100	712.13	711.96	0.18				749.00		703.66
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q100	711.07	710.85	0.21	0.20	0.04		749.00		613.13
Trib C Before CA	4511	Q100	710.82	710.70	0.12	1.19	0.03	1.63	570.85	179.52	268.86
Trib C Before CA	3851	Q100	709.60	709.58	0.02	0.98	0.00	76.10	162.46	513.44	424.94
Trib C Before CA	2422	Q100	708.61	708.60	0.01	0.06	0.00	70.31	131.64	553.05	447.86
Trib C Before CA	2139	Q100	708.55	708.54	0.01	0.20	0.00	87.23	182.75	485.02	436.49
Trib C Before CA	1903	Q100	708.34	708.31	0.03	0.79	0.01	183.19	256.88	315.94	387.10
Trib C Before CA	931	Q100	707.54	707.54	0.00			59.20	151.93	546.87	721.32

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Permit

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q100
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q100
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7588 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7576 Profile: Q100
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7499 Profile: Q100
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7453 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5863 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5256 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5104 Profile: Q100
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 4652 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

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            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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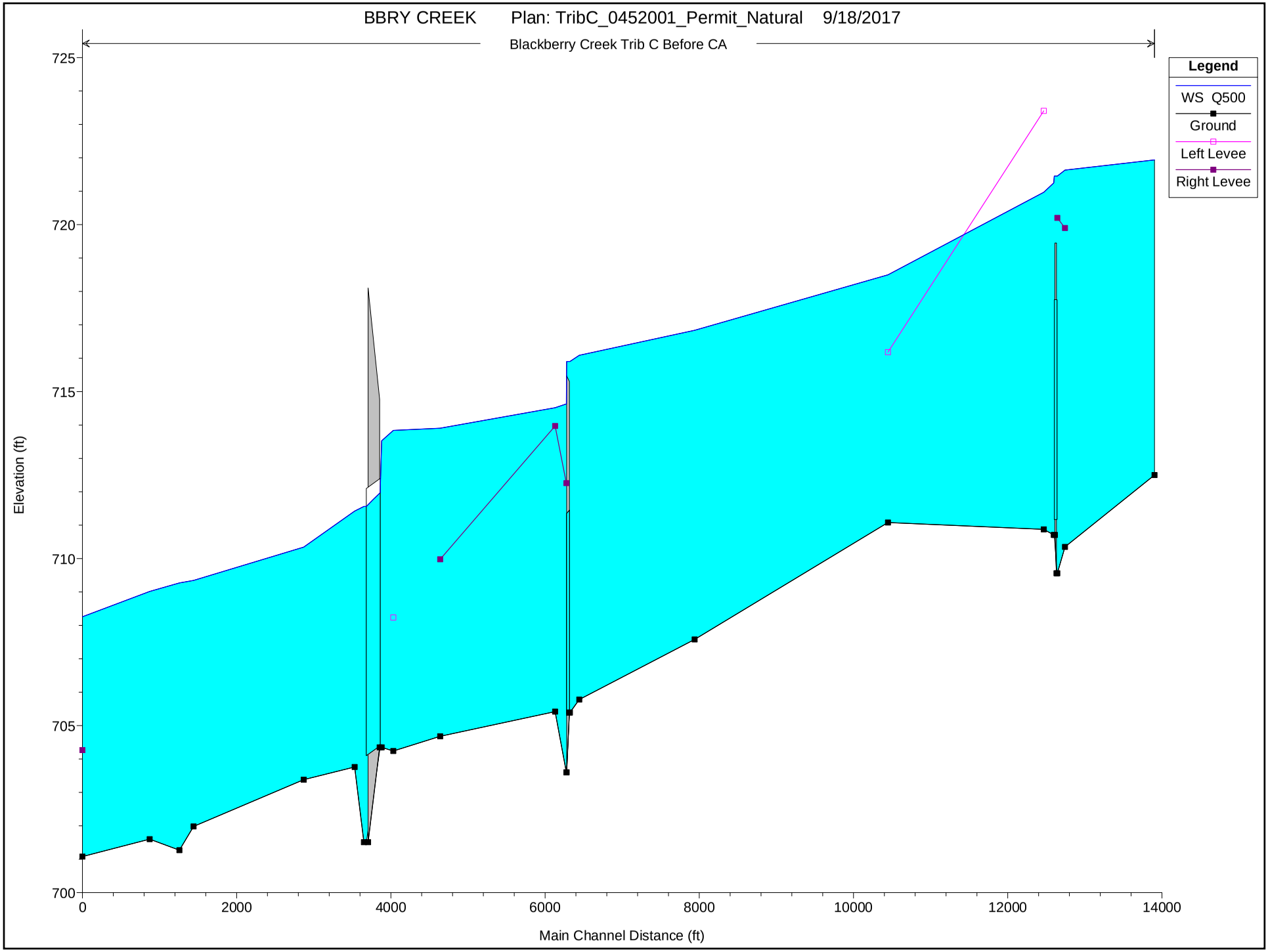
BBRY CREEK Plan: TribC_0452001_Permit_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q500
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
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Project File : IL47.prj
Run Date and Time: 9/18/2017 3:20:24 PM

Project in English units

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343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
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385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q500	1373.00	712.50	721.94	717.69	721.94	0.000130	0.79	2883.10	982.05	0.06
Trib C Before CA	13934	Q500	1268.00	710.35	721.63	716.94	721.68	0.000787	2.16	1041.78	350.03	0.15
Trib C Before CA	13896	Q500	1268.00	709.56	721.45	717.79	721.55	0.001657	3.27	850.03	371.73	0.20
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q500	1268.00	710.71	721.25	719.24	721.35	0.002122	3.32	788.37	338.58	0.23
Trib C Before CA	13812	Q500	1268.00	710.88	720.97	716.10	721.10	0.001426	3.26	704.33	291.09	0.20
Trib C Before CA	11691	Q500	1213.00	711.08	718.50	716.58	718.53	0.001048	2.31	1251.43	550.40	0.17
Trib C Before CA	9184	Q500	1036.00	707.58	716.84	713.87	716.85	0.000385	1.65	1717.18	684.30	0.11
Trib C Before CA	7588	Q500	1036.00	705.78	716.09	712.31	716.13	0.000636	2.37	1139.79	419.48	0.14
Trib C Before CA	7576	Q500	1036.00	705.39	715.90	710.40	715.99	0.001636	3.20	751.07	356.71	0.17
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q500	1036.00	703.60	714.63	708.83	714.76	0.001459	3.29	679.13	384.09	0.19
Trib C Before CA	7453	Q500	1020.00	705.42	714.52	710.11	714.56	0.000660	2.18	1058.67	406.39	0.14
Trib C Before CA	5863	Q500	1020.00	704.68	713.90	710.22	713.91	0.000173	1.14	2115.87	617.41	0.08

Trib C Before CA	5256	Q500	1105.00	704.24	713.84	707.40	713.84	0.000039	0.64	3201.59	798.88	0.04
Trib C Before CA	5104	Q500	1105.00	704.35	713.53	708.49	713.78	0.001646	4.04	273.83	846.72	0.25
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q500	1105.00	701.51	711.56	706.22	711.96	0.002077	5.06	218.39	682.36	0.29
Trib C Before CA	4511	Q500	1109.00	703.76	711.42	708.86	711.55	0.002386	3.50	676.04	492.68	0.27
Trib C Before CA	3851	Q500	1109.00	703.38	710.34	708.05	710.36	0.000891	1.98	1275.90	491.51	0.14
Trib C Before CA	2422	Q500	1115.00	701.98	709.35	706.38	709.36	0.000501	1.51	1654.34	497.94	0.11
Trib C Before CA	2139	Q500	1115.00	701.27	709.27	705.72	709.28	0.000365	1.41	1713.65	455.36	0.09
Trib C Before CA	1903	Q500	1118.00	701.60	709.02	706.92	709.05	0.001339	2.29	1097.94	407.50	0.17
Trib C Before CA	931	Q500	1122.00	701.08	708.26	704.89	708.26	0.000206	0.93	2566.92	775.61	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q500	721.94	721.94	0.01	0.26	0.00	215.37	835.71	321.92	982.05
Trib C Before CA	13934	Q500	721.68	721.63	0.05	0.11	0.02	100.74	788.71	378.55	350.03
Trib C Before CA	13896	Q500	721.55	721.45	0.10			230.75	721.55	315.70	371.73
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q500	721.35	721.25	0.10	0.24	0.01	185.96	685.16	396.88	338.58
Trib C Before CA	13812	Q500	721.10	720.97	0.13	2.54	0.03	111.12	960.18	196.70	291.09
Trib C Before CA	11691	Q500	718.53	718.50	0.03	1.68	0.01	702.27	365.44	145.29	550.40
Trib C Before CA	9184	Q500	716.85	716.84	0.01	0.72	0.00	397.00	273.80	365.20	684.30
Trib C Before CA	7588	Q500	716.13	716.09	0.04	0.12	0.02	357.96	414.42	263.62	419.48
Trib C Before CA	7576	Q500	715.99	715.90	0.09			182.14	557.83	296.03	356.71
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q500	714.76	714.63	0.12	0.16	0.04	154.36	753.81	127.83	384.09
Trib C Before CA	7453	Q500	714.56	714.52	0.04	0.64	0.01	280.04	511.64	228.32	406.39
Trib C Before CA	5863	Q500	713.91	713.90	0.01	0.07	0.00	218.30	245.32	556.38	617.41
Trib C Before CA	5256	Q500	713.84	713.84	0.00	0.01	0.05	325.49	288.56	490.95	798.88
Trib C Before CA	5104	Q500	713.78	713.53	0.25				1105.00		846.72
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q500	711.96	711.56	0.40	0.27	0.13		1105.00		682.36
Trib C Before CA	4511	Q500	711.55	711.42	0.13	1.15	0.03	21.76	721.83	365.41	492.68
Trib C Before CA	3851	Q500	710.36	710.34	0.02	1.00	0.00	131.95	199.60	777.45	491.51
Trib C Before CA	2422	Q500	709.36	709.35	0.01	0.07	0.00	123.86	175.97	815.17	497.94
Trib C Before CA	2139	Q500	709.28	709.27	0.01	0.23	0.00	156.07	239.34	719.59	455.36
Trib C Before CA	1903	Q500	709.05	709.02	0.03	0.78	0.01	285.52	315.22	517.26	407.50
Trib C Before CA	931	Q500	708.26	708.26	0.00			88.31	202.37	831.32	775.61

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Permit

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q500
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q500
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7588 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7576 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7499 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 7453 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5863 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 5256 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5104 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 5103 Profile: Q500 Culv: Culvert #1
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height of the culvert.
River: Blackberry Creek Reach: Trib C Before CA RS: 4652 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 4511 Profile: Q500
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q500
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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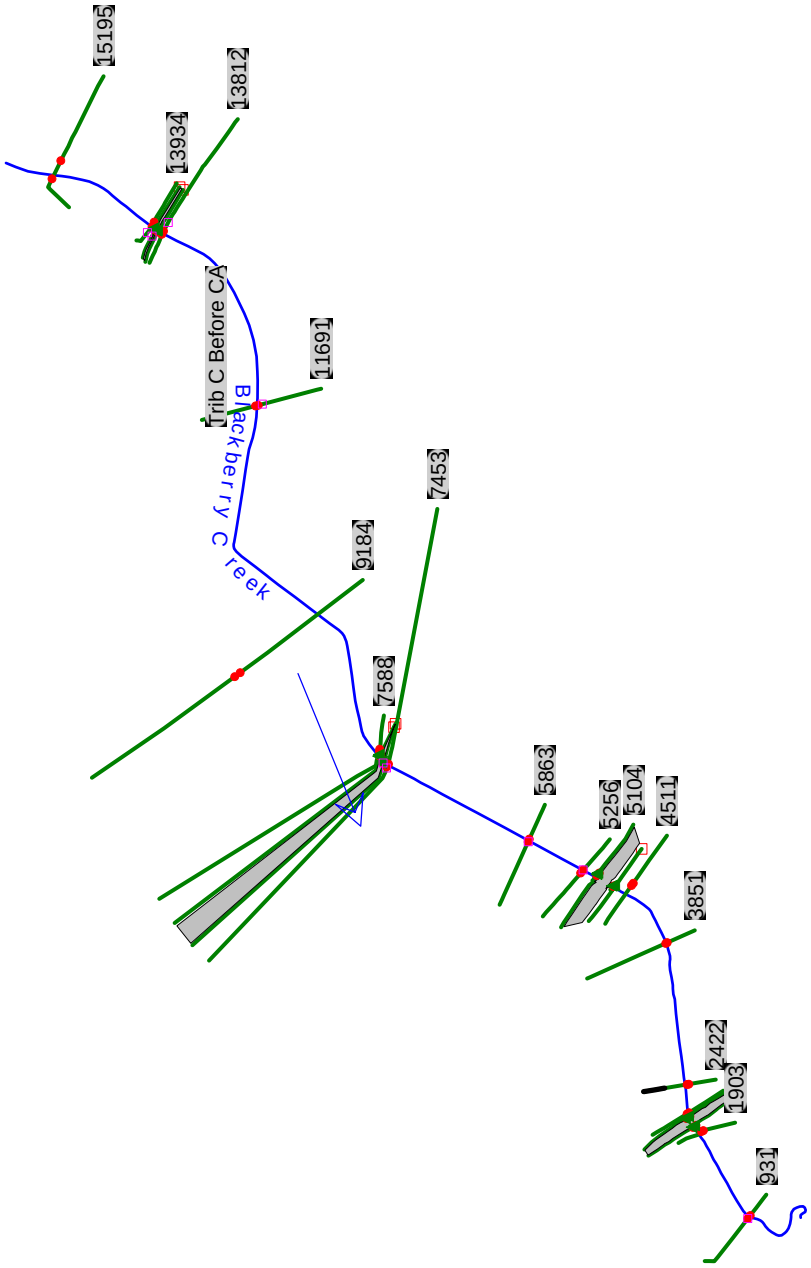
EXISTING CONDITIONS
(PERMIT MODEL)

Plan: TribC_0452001_Permit_Exist



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                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


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PROJECT DATA
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Project File : IL47.prj
Run Date and Time: 9/19/2017 9:11:39 AM

Project in English units

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343.1   760.6
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399.0   755.5
401.8   754.5
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413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
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905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.
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PLAN DATA

Plan Title: TribC_0452001_Permit_Exist
Plan File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.p04

Geometry Title: Exist_Permit
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.g03

Flow Title : 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Plan Summary Information:
Number of: Cross Sections = 23 Multiple Openings = 0
Culverts = 4 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 30
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Program Selects Appropriate method
Computational Flow Regime: Mixed Flow

****

FLOW DATA

Flow Title: 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Flow Data (cfs)

River	Reach	RS	Q10	Q50	Q100	Q500
Blackberry Creek	Trib C Before	CA15195	378	706	879	1373
Blackberry Creek	Trib C Before	CA13934	369	670	828	1268
Blackberry Creek	Trib C Before	CA13812	369	670	828	1268
Blackberry Creek	Trib C Before	CA11691	364	652	800	1213
Blackberry Creek	Trib C Before	CA9184	349	592	713	1036
Blackberry Creek	Trib C Before	CA7453	347	587	705	1020
Blackberry Creek	Trib C Before	CA5863	347	587	705	1020
Blackberry Creek	Trib C Before	CA5256	361	619	749	1105
Blackberry Creek	Trib C Before	CA4511	362	621	752	1109
Blackberry Creek	Trib C Before	CA2422	363	623	755	1115
Blackberry Creek	Trib C Before	CA1903	363	624	756	1118
Blackberry Creek	Trib C Before	CA931	364	625	758	1122

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blackberry Creek	Trib C Before	CAQ10	Critical	Known WS = 706.25
Blackberry Creek	Trib C Before	CAQ50	Critical	Known WS = 707.21
Blackberry Creek	Trib C Before	CAQ100	Critical	Known WS = 707.54
Blackberry Creek	Trib C Before	CAQ500	Critical	Known WS = 708.26

Inline Structure Gate Openings
River = Blackberry Creek
Reach = Podolski RS = 9000
Gate = Gate #1
# Open Open Ht # Open Open Ht # Open Open Ht # Open Open Ht

```
*****************************************************************
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = Podolski          RS = 9000
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #3
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
     2.2       1     2.2       1     2.2       1     2.2       1
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
    2.35       1    2.35       1    2.35       1    2.35       1

*******************************************************************************

GEOMETRY DATA

Geometry Title: Exist_Permit
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C
Blackberry)\IL47.g03

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 15195

INPUT
Description: Interpolated cross section for river junction computation. Data
             are obtained from the DEM and 2 foot contour map Kane County 2001.
             The channel cross section are interpolated between 16644 and
             13934.

Revised using data from the 2004 TIN by Woodworth Jan
             2005
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  728.23   50.97  728.41  110.82  728.49  173.94  728.46  234.82  728.12
  282.62  728.01  361.79  726.09  412.61     724  452.97  722.08  517.54  720.85
  561.93  720.03  620.01  719.98  687.87  720.16  780.75  720.32     843     720
  890.61  719.06  939.83  718.05  993.16   717.4 1035.15  716.78 1066.14   716.3
 1090.29  716.02    1093     714    1097     713    1102   712.5    1105   712.5
    1108     714    1112     715 1114.22  716.17 1141.08  717.99  1181.5  717.86
 1233.51  717.75 1265.44  718.01 1323.04  718.75 1363.62  719.34 1386.91  719.99
 1414.95  720.96 1442.97  721.95 1479.79  724.05 1501.08  725.78 1523.32  726.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
**************************************************
       0    .105  939.83    .065 1141.08    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        939.83 1141.08             1162    1160    1140             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13934

INPUT
Description: USGS IL 2001.  Approach to Farm Road (Seavey27)

outer 2pts on
             LHS and outer 3 points on the RHS are interpolated from the 2004
             TIN by BW Jan 2005
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0   722.7   223.8   721.7  344.71  722.55  360.15  721.36  404.22  721.29
  453.57  717.48  468.05   717.8  483.82  715.96  488.86  713.95  492.11  710.86
  495.33  710.37  499.79  710.35  503.55  711.05   505.5  713.63  507.23  714.19
  511.34  717.43  522.72  718.07  543.14  718.16  599.85   719.9  636.38  718.62
  692.75  718.69   706.4   721.6   715.3   722.7   757.8     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .105  468.05    .065  522.72    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        468.05  522.72              110     100     110             .3       .5
Right Levee     Station=  599.85      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13896

INPUT
Description: USGS IL 2001.  USF Farm Road (Seavey27). The use of n=100 is to
             block of conveyance but retain storage computation. This is for
             f-table computation only.
outer point on LHS and 2 outer points
             on RHS are interpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  -480.9   722.6  -145.9  722.65 -143.63  722.65 -114.09  720.57  -83.41   719.2
  -52.65  718.68  -19.79  718.56  -14.91  717.64   -7.37  713.74   -4.35  714.08
    -2.3  710.54       0  709.56    2.27  709.86    3.87  710.25    5.09  711.71
    7.17  713.32   12.65   717.5   19.52  718.45   35.18  718.68    58.7  718.91
   83.13   720.2   97.56  720.08  164.36  719.37   212.4   720.8   252.4   721.6
   318.4   723.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  -480.9    .105  -14.91    .065   12.65    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -14.91   12.65               60      46      50             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -480.9      -6   719.8       F
       8   318.4   719.8       F
Right Levee     Station=   83.13      Elevation=

CULVERT


RIVER: Blackberry Creek
```

```
REACH: Trib C Before CA   RS: 13875

INPUT
Description: Farmers Road (Seavey27) IL USGS
Distance from Upstream XS =      11
Deck/Roadway Width        =      20
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      13
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
 -140.71  722.75          -131.8  722.37         -118.51  721.22
  -47.85   720.1          -23.84  719.84               0  719.45
   44.34  720.25          114.12  720.67          114.13  720.66
  181.97  721.31          182.08  721.32          206.78  721.58
  206.81  721.58

Upstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  -145.9  722.65 -143.63  722.65 -114.09  720.57  -83.41   719.2  -52.65  718.68
  -19.79  718.56  -14.91  717.64   -7.37  713.74   -4.35  714.08    -2.3  710.54
       0  709.56    2.27  709.86    3.87  710.25    5.09  711.71    7.17  713.32
   12.65   717.5   19.52  718.45   35.18  718.68    58.7  718.91   83.13   720.2
   97.56  720.08  164.36  719.37     211     720     310     722     380     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  -145.9      .1  -14.91    .014   12.65      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        -14.91   12.65             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -145.9      -6   719.8       F
       8     380   719.8       F
Right Levee     Station=   83.13      Elevation=

Downstream  Deck/Roadway Coordinates
    num=      13
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
 -140.71  722.75          -131.8  722.37         -118.51  721.22
  -47.85   720.1          -23.84  719.84               0  719.45
   44.34  720.25          114.12  720.67          114.13  720.66
  181.97  721.31          182.08  721.32          206.78  721.58
  206.81  721.58

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29   -17.7  718.68
   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32    6.67  715.22
   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19  201.99   720.4
     284     722     389     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 -136.45      .1   -17.7    .014   14.82      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -17.7   14.82             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -136.45   -4.75  717.76       F
    4.78     389  717.76       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
```

```
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse    6.58    7.28
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  4      36     .014     .014        0                  .5                1
Upstream   Elevation =  711.17
           Centerline Station =  1
Downstream Elevation =  711.17
           Centerline Station =  0

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13859

INPUT
Description: USGS IL 2001.  DSF Farm Road (Seavey27)
1 pt on LHS and 2 on the
             RHS (outermost) are interpolated from the 2004 TIN
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  -470.5   722.5 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29
   -17.7  718.68   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32
    6.67  715.22   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19
  201.99   720.4     256     722     342     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  -470.5    .105   -17.7    .065   14.82    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -17.7   14.82              145     130     154             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -470.5   -4.75  717.76       F
    4.78     342  717.76       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13812

INPUT
Description: USGS IL 2001.  Departure to Farm Road (Seavey27)
Several points
             on the LHS and the 2 outer points on the RHS are interpolated from
             the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0   727.1   42.16     727   96.54   726.6   158.3   726.2  221.22   725.9
  281.34   725.7  344.25   725.3  404.25   725.2  461.06   725.1  522.82   724.7
  558.61   724.4  587.97   724.2  627.78   723.9  662.55   723.6  702.92   723.3
  748.98     723  793.19   722.8  832.65   722.6  886.89   722.3   922.5   722.2
  968.59   721.9 1008.64   721.6 1071.67   721.5 1119.92   721.5 1163.63   721.8
 1191.96     722 1219.92 721.703    1242 723.407 1261.29 723.108 1322.51 717.477
 1337.65 717.289 1343.27 713.189 1345.73 711.588  1351.5 710.884 1358.27 710.875
 1362.02 711.468 1368.17 714.783 1374.67 717.301  1427.9 718.324 1478.97 720.331
 1514.71 720.634 1562.54 720.586 1607.43   721.9 1685.47     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
```

```
       0    .105 1337.65    .065 1374.67    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1337.65 1374.67             2162    2021    1923             .1       .3
Left Levee      Station=    1242      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 11691

INPUT
Description: IDNR 1985. C befoer CA 1093
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  718.68      42  719.18     114  719.98     163  719.58     215  719.88
     270  719.58     327  717.98     382  716.38     440  715.58     495  715.18
     541  715.48     605  716.18  647.01  714.78  655.01  711.78  658.01  711.18
  663.01  711.08  666.01  711.78  674.01  715.88  721.01  716.38  778.01  717.38
  834.01  717.98  892.01  719.18  946.01  722.18 1001.01  724.98 1058.01  728.18
 1114.01  730.48 1169.01  732.18 1227.01  733.68

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
       0     100     270    .105  647.01    .065  674.01    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        647.01  674.01             2140    2506    2590             .1       .3
Left Levee      Station=     605      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 9184

INPUT
Description: IDNR 1985. C before CA 846 (Verified) Distance Not Including Seavey
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  726.48      24  726.18      37  723.28      99  720.58     156  718.18
     214  717.08     270  716.08     326  715.68     385  714.18     442  713.08
  500.01  712.68  547.01  712.88  555.01  708.88  558.01  707.58  561.01  707.68
  563.01  708.88  571.01  712.88  626.01  712.88  683.01  713.78  739.01  714.08
  795.01  715.28  851.01  716.48  908.01  716.78  964.01  717.58 1022.01  717.88
 1079.01  718.18 1136.01  718.08 1194.01  718.38

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
       0    .105  547.01     .06  571.01    .105 1079.01     100

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        547.01  571.01             1440    1496    1560             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7588

INPUT
Description: USGS IL 2001.  Approach Seavey26; two RB extended pts and 4 LB
             extended pts, elevations from bb_tinascii
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -326     720    -296   717.9    -245     716    -150     714  -16.57  712.23
       0  711.15    3.12  708.72    5.24  707.06    9.21  705.97   12.14  705.78
   14.07  706.25    15.5  706.66   17.39  708.48   20.57  710.57   26.68  711.86
   42.34  711.47   54.49  712.31   87.28  713.03  106.96  713.73     319   721.4
```

```
    2614   723.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -326    .105       0     .06   20.57    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0   20.57              135     122     132             .3       .5

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7576

INPUT
Description: USGS IL 2001.  USF Seavey26 . The use of n=100 is to block of
             conveyance but retain storage computation. This is for f-table
             computation only.
Added extend pts-3 on LHS, 2 on RHS,
             elevations from bb_tinascii
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -340   719.8    -276     718    -192     716 -111.83  714.86  -75.45  714.69
   -44.6  713.53  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42
       0  705.39    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39
   53.77  712.49   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65
     297   720.5    2634     728

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -340    .105   -4.92     .06    11.8    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -4.92    11.8               48      46      48             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -340      -5     715       F
      12    2634     715       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7550

INPUT
Description: Seavey 26  IL USGS
Distance from Upstream XS =       6
Deck/Roadway Width        =      36
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
    -260  715.82         -104.91  715.44          -63.81   715.3
  -20.86   715.4          -10.42  715.43           50.12  715.48
   98.41  715.57          139.08  715.81             240   716.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -295     720    -161     716 -111.83  714.86  -75.45  714.69   -44.6  713.53
  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42       0  705.39
    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39   53.77  712.49
   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65     182     716
     274     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
```

```
    -295      .1   -4.92    .014    11.8      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -4.92    11.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -295      -5     715       F
      12     274     715       F

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************************************
    -260  715.96         -136.45  715.47          -73.33   715.6
  -27.61  715.84           19.92  715.89           56.43  715.85
   97.33  715.83          126.43  716.03          161.88  716.34
     240   716.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    -299     720    -270     716 -188.97  714.61 -153.89  713.64 -131.71  714.11
 -118.51   713.7  -92.92  713.04   -59.3  712.77     -25  712.87    -6.8  711.77
   -5.64   707.9   -2.28  706.86   -1.72  705.57       0  704.49    2.62   703.7
     6.7   703.6    8.63  703.85   10.06  704.22   12.18  704.14   13.64  703.87
    15.2  703.85   16.52  705.19   16.79  712.26   22.52  711.46   33.88  712.39
   63.18  713.39   83.33  714.16   98.36  714.21  110.58  713.23  143.91  713.47
  179.27  714.04     234     716     283     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
    -299      .1    -6.8    .014   16.79      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
          -6.8   16.79             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -299      -1   711.4       F
   16.17     283   711.4       F
Right Levee     Station=   16.79      Elevation=

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #2           Box       6     8.8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                   .4                1
Upstream   Elevation =  705.4
           Centerline Station = -0.15
Downstream Elevation =  705.3
           Centerline Station =  3.8

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6     7.5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                   .4                1
Upstream   Elevation =  705.45
           Centerline Station =  8.05
Downstream Elevation =  705.35
```

Centerline Station = 12

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7499

INPUT
Description: USGS IL 2001. DSF Seavey26. The use of n=100 is to block of conveyance but retain storage computation. This is for f-table computation only.Added extended pts-2 RHS and 3 LHS, elevations from bb_tinascii

Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-358	722.2	-292	720.3	-245	718.2	-188.97	714.61	-153.89	713.64
-131.71	714.11	-118.51	713.7	-92.92	713.04	-59.3	712.77	-25	712.87
-6.8	711.77	-5.64	707.9	-2.28	706.86	-1.72	705.57	0	704.49
2.62	703.7	6.7	703.6	8.63	703.85	10.06	704.22	12.18	704.14
13.64	703.87	15.2	703.85	16.52	705.19	16.79	712.26	22.52	711.46
33.88	712.39	63.18	713.39	83.33	714.16	98.36	714.21	110.58	713.23
143.91	713.47	179.27	714.04	351	720.6	2679	724.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-358	.105	-6.8	.06	16.79	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-6.8	16.79	162	146	142	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-358	-1	711.4	F
16.17	2679	711.4	F

Right Levee Station= 16.79 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7453

INPUT
Description: USGS IL 2001. Departure Seavey26; added 22 extend pts on LHS and 2 on RHS, elevations from bb_tinascii

Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-2419	729.2	-2254	730.5	-2102	731.3	-1952	731.7	-1824	731.7
-1754	731.9	-1665	732.3	-1595	733	-1501	734.4	-1380	735.6
-1258	736.6	-1136	737.7	-1031	738.7	-906	739.9	-802	740.1
-702	738.8	-593	738.4	-487	734	-378	730.7	-292	729.3
-192	723.3	-107	719.8	0	713.98	37.16	713.08	80.37	712.06
116.16	711.3	143.93	710.58	160.37	710.92	171.65	709.95	174.29	708.99
175.95	706.88	180.25	705.73	186.19	705.42	191.48	705.75	194.47	705.81
195.89	706.81	196.8	707.82	198.83	708.89	204.64	713.8	211.67	713.72
218.75	713.97	223.37	713.73	229.89	711.49	255.23	711.08	334.18	712.42
512	718.4	2839	728.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-2419	.105	171.65	.06	204.64	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.65	204.64	1540	1490	1570	.1	.3

Right Levee Station= 218.75 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5863

```
INPUT
Description: IDNR, 1985.  C before CA 513
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  720.08      55  719.38     112  717.48     170  714.68     228  711.98
     286  710.18     373  709.38     379  707.38     380  705.28     382  704.98
     386  704.68     389  704.98     391  705.28     403  709.98     411  709.38
     468  709.28     522  709.28     580  709.28     640  710.58     695  711.38
  752.01  712.88  808.01  713.98  864.01  715.38  922.01  716.88  979.01  717.98
 1035.01  719.68 1091.01  721.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .105     373     .06     403    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           373     403              530     608     703             .1       .3
Right Levee     Station=     403      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5256

INPUT
Description: IDNR 2001.  TP#0 off kane 32 Approach to I-88
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -134     720       0  718.23   57.09 716.021  111.01 714.792   164.2 712.864
  218.95  710.29  271.69  709.07  323.06 708.367   369.9 706.971  389.15 708.237
  396.25 704.846  398.52  704.28  409.99 704.265  419.34  704.24  431.06 704.746
  440.45 708.745   475.2  709.07  532.47  709.35   582.9 709.461  633.34 709.624
  680.43 709.962  726.24   710.4  774.08 710.705  825.99 710.887  877.81 712.035
  932.11 713.742  985.25     715 1037.43 715.542    1080     716    1114     718
    1182     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -134    .075  389.15     .06  440.45    .075

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        389.15  440.45              175     152     108             .2       .3
Left Levee      Station=  389.15      Elevation= 708.237

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5104

INPUT
Description: IDNR 2001. Section A I88 USF.
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -686     720 -528.47  717.55 -374.86  714.61 -322.66  713.52 -268.02  711.62
 -211.93  709.89 -152.45  708.98  -95.32   708.7   -63.2  706.91   -58.1   704.7
  -48.87  704.54  -41.74  704.35  -38.64  706.33  -25.17  705.88       0  707.51
   56.49  708.23  114.04  708.73  171.49  708.99  225.74  709.39  283.09  709.98
  336.84  710.54  389.38  711.09  448.08  712.48  504.19  713.22   561.4  714.12
  620.15  714.45     674     716     744     718     787     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -686    .105   -63.2     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -63.2       0              250     230     240             .3       .5
Ineffective Flow     num=       2
```

Sta L	Sta R	Elev	Permanent
-686	-63	718	F
-30	787	718	F

CULVERT

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5103

INPUT
Description: I-88 New IDNR
Distance from Upstream XS = 25
Deck/Roadway Width = 150
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 11

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-590	721.9	-493	721.3	-396	720.8
-200	719.8	-101.5	718.1	139	719
236	719.1	341	719.36	438	720.2
535	721.1	631	721.7		

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-686	720	-528.47	717.55	-374.86	714.61	-322.66	713.52	-268.02	711.62
-211.93	709.89	-152.45	708.98	-95.32	708.7	-63.2	706.91	-58.1	704.7
-48.87	704.54	-41.74	704.35	-38.64	706.33	-25.17	705.88	0	707.51
56.49	708.23	114.04	708.73	171.49	708.99	225.74	709.39	283.09	709.98
336.84	710.54	389.38	711.09	448.08	712.48	504.19	713.22	561.4	714.12
620.15	714.45	674	716	744	718	787	720		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-686	.1	-63.2	.014	0	.1

Bank Sta: Left Right Coeff Contr. Expan.
-63.2 0 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-686	-63	718	F
-30	787	718	F

Downstream Deck/Roadway Coordinates
num= 11

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-590	721.9	-493	721.3	-396	720.8
-200	719.8	-101.5	718.1	139	719
236	719.1	341	719.36	438	720.2
535	721.1	631	721.7		

Downstream Bridge Cross Section Data
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-508.42	712.84	-451.43	712.89	-398.35	712.66	-342.27	712.31	-285.28	711.7
-228.51	710.71	-172.24	710.18	-114.82	708.95	-65.67	705.15	-63.25	704.68
-57.87	701.51	-27.28	702.49	-22.75	703.54	-14.84	704.46	0	705.75
62.13	708.26	114.41	708.41	170.77	708.67	221.5	709.68	277.13	709.95
329.33	710.29	381.2	710.91	421	712	459	714		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-508.42	.1	-63.25	.014	0	.1

Bank Sta: Left Right Coeff Contr. Expan.
-63.25 0 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
 -508.42     -52   712.1       F
     -29     459   712.1       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       8       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Outlet control
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18     180     .014     .014        0                   .4                1
Number of Barrels =  2
Upstream   Elevation =  704.4
Centerline Stations
    Sta.    Sta.
     -52     -43
Downstream Elevation =  704.1
Centerline Stations
    Sta.    Sta.
     -45     -36

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4652

INPUT
Description: IDNR 2001. Section D DSF I-88.
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -508.42  712.84 -451.43  712.89 -398.35  712.66 -342.27  712.31 -285.28   711.7
 -228.51  710.71 -172.24  710.18 -114.82  708.95  -65.67  705.15  -63.25  704.68
  -57.87  701.51  -27.28  702.49  -22.75  703.54  -14.84  704.46       0  705.75
   62.13  708.26  114.41  708.41  170.77  708.67   221.5  709.68  277.13  709.95
  329.33  710.29   381.2  710.91     421     712     459     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
 -508.42    .105  -63.25     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -63.25       0              138     120     140              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -508.42     -52   712.1       F
     -29     459   712.1       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4511

INPUT
Description: IDNR 2001. 1TP #2 off KANE 32 Depart from I-88; extended 2 pts on
             each side, elevation from bb_tinascii
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -889   721.6    -582     715  -445.7  711.17 -392.55  711.04  -343.9  711.35
 -289.26  711.86 -237.33  711.75 -184.94  711.62 -136.77  711.84  -89.81  711.14
  -55.84  710.13  -43.48  707.49  -39.71   704.7  -36.71  704.12  -31.21  703.76
  -25.38  704.02  -22.76  704.72  -16.52  708.76       0  709.01   47.92  709.24
```

```
  100.01  709.62  154.14  709.92  207.49  710.96  268.79  711.45  324.93  711.63
     580   714.4     650   715.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -889    .105  -55.84     .06  -16.52    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -55.84  -16.52              485     660     768             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 3851

INPUT
Description: IDNR 1985. C before CA 340
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   692.5  722.58   739.5  721.88   819.5  716.28   867.5  713.98   881.5  712.68
   925.5  708.98   972.5  707.18   991.5  706.58   996.5  703.68   997.5  703.38
  1001.5  703.48  1003.5  703.78  1008.5  706.08  1055.5  707.08  1100.5  707.08
  1146.5  707.18  1193.5  707.08 1242.51  707.08 1288.51  708.48 1336.51  709.48
 1384.51  710.18 1434.51  710.68 1485.51  711.48 1535.51  711.28 1586.51  711.48
 1638.51  712.08 1689.51  712.88 1740.51  713.48 1793.51  714.28 1844.51  715.98
 1866.51  717.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   692.5    .105   991.5     .07  1008.5    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         991.5  1008.5             1366    1429    1455             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2422

INPUT
Description: IDNR 1985. C before CA 198
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   689.5  719.08   710.5  718.78   760.5  716.88   806.5  713.58   853.5  710.68
   900.5  708.38   943.5  706.48   990.5  705.28   993.5  702.88   996.5  702.08
  1001.5  701.98  1002.5  702.78  1009.5  705.38  1075.5  705.78  1123.5  705.28
  1168.5  705.48  1216.5  705.48  1259.5  705.18  1304.5  704.08  1344.5  708.68
  1385.5  709.48  1417.5  710.08  1475.5     712  1495.5     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   689.5     .12   990.5     .07  1009.5     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         990.5  1009.5              328     183     140             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
  1259.5  1495.5  705.15

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2139

INPUT
Description: USGS IL 2001. . Approach CS to Rte 47-25
```

```
Outer 3 pts on RHS
             interpolated from the 2004 TIN, by BW 1-28-05
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  583.91  721.51     688  719.38  796.27  712.28  855.07  708.57  964.47  705.32
  988.03  704.68  989.87  702.77  991.88  701.58    1006  701.27 1008.95  703.57
 1011.97  705.27 1052.11  704.51 1228.51  704.74 1281.57  707.34 1307.81   710.2
 1368.01   714.2 1413.41   718.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  583.91     .12  988.03     .07 1011.97     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        988.03 1011.97              136     138     135             .3       .5

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2101

INPUT
Description: Lin Eng - 2015 (Exist U/S XS)
Station Elevation Data    num=      67
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  524.05  718.55  534.31  717.76  548.83  718.97  562.77  719.13  579.25  718.02
   584.7  717.22  605.54  716.59  640.12  715.33  667.28  715.58  694.26  714.77
  706.95  714.72  728.94  713.87   736.7  713.62  751.33  712.34  758.63   711.4
  761.74  710.97  767.83  710.66   773.2  710.86  777.64  711.03  797.54  711.32
  827.23   709.3  834.41  709.06  898.59  707.94  944.44  708.05  956.48  707.69
  958.81  707.16  961.33  707.21  964.77  707.36  976.71  706.23  979.08  705.42
  980.09  705.13   980.6  704.37  982.37  703.56  990.11  701.27  993.75   701.3
  997.29  701.33 1004.19  701.87 1010.82  702.51 1017.69  703.23 1020.04  704.44
 1021.12  705.61 1021.62  705.74 1023.95  706.67 1029.82  707.52 1047.47  707.67
    1101  706.19  1145.2  706.62 1192.88  708.35 1203.22  708.97 1221.63  708.89
  1231.4  709.37 1239.77  709.51 1254.83  710.15 1272.02  710.42 1275.55  710.38
 1286.48  710.64 1340.74  712.69 1349.67  713.39  1379.5  715.29 1401.86   716.3
  1446.8  718.88    1448  718.58 1501.61  721.65 1506.57  721.91 1512.51  722.27
 1539.59  724.15 1547.67  724.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  524.05     .12  979.08     .04 1021.12     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        979.08 1021.12              182     109     129             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  524.05   978.9  715.28       F
  1021.1 1547.67  715.28       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2046

INPUT
Description: IL-47 over Trib C to Blackberry Creek - surveyed crossing
Distance from Upstream XS =      10
Deck/Roadway Width        =      90
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      15
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*******************************************************************************
  524.05 718.329          640.12 717.499           736.7 716.577
  797.59 715.865          834.53 715.552          898.72 714.904
  943.69  714.96         1001.19 715.046         1047.47 715.524
```

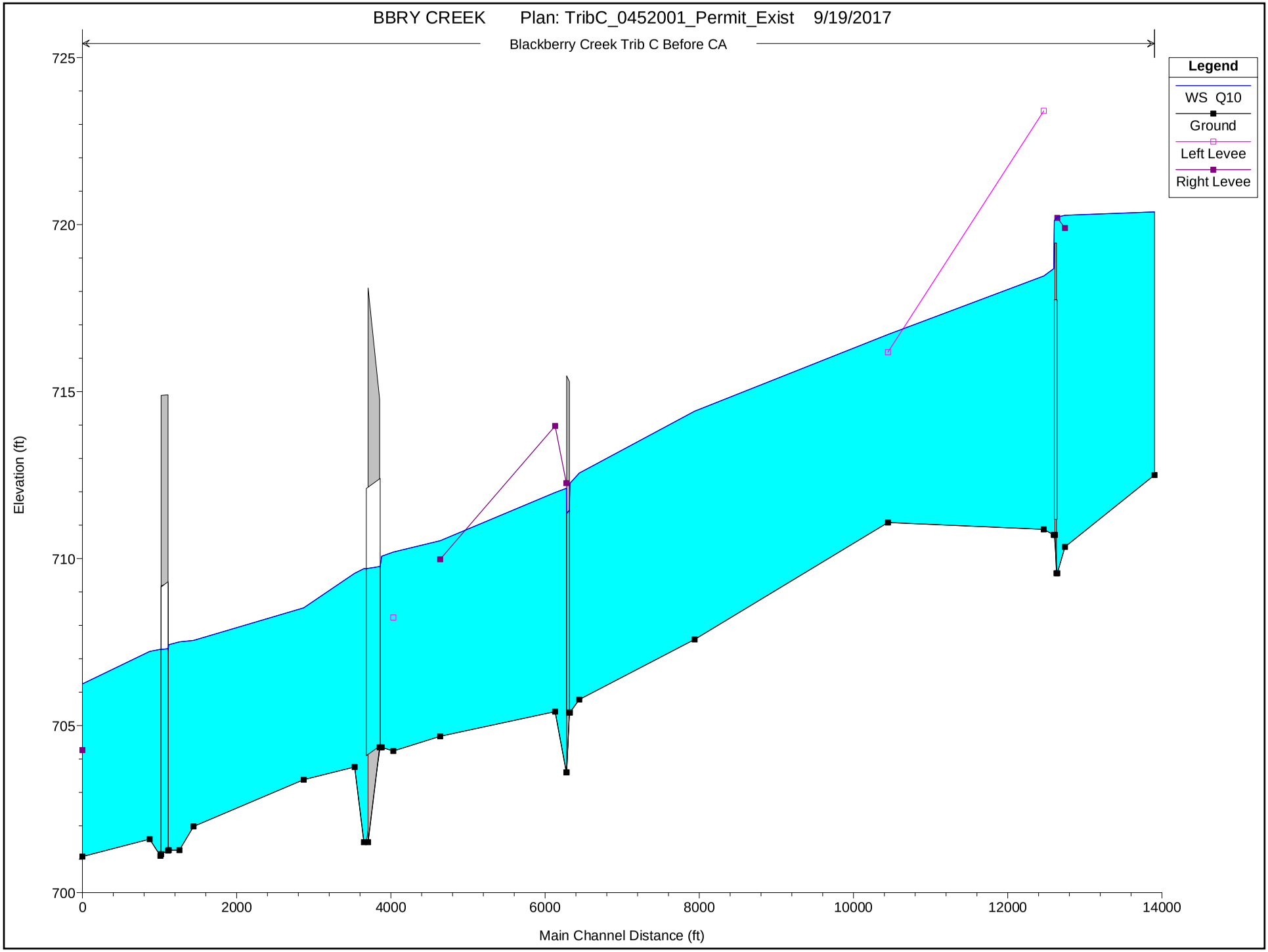
```
 1101.01 715.901         1145.23 716.822         1244.59 719.017
 1349.67 721.699         1446.96  724.61         1543.82 727.529

Upstream Bridge Cross Section Data
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  524.05 717.415  574.24 717.601  592.67 716.474  624.34 715.177  741.96 714.523
  800.78 713.266  842.04 712.761     900 711.544  944.54 711.352  966.37 711.155
  976.71  706.23  979.08  705.42  980.09  705.13   980.6  704.37  982.37  703.56
   988.9  701.26  1003.5  701.26  1004.1  701.31  1011.1  701.31 1017.69  703.23
 1020.04  704.44 1021.12  705.61 1021.62  705.74 1023.95  706.67 1032.15 710.704
  1048.1 711.192 1099.58 711.029 1144.62 712.966 1201.17 713.735 1244.16 714.778
 1349.08 717.449  1445.2 721.004 1543.82 724.961

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
  524.05      .1  979.08     .04   988.9    .014  1011.1     .04 1021.12      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        979.08 1021.12             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  524.05   978.9  715.28       F
  1021.1 1543.82  715.28       F

Downstream  Deck/Roadway Coordinates
    num=      15
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
  543.01 717.578          641.73 716.761          745.66 715.861
  845.66 715.192          902.04 714.885          942.77 715.082
 1001.55 715.095         1050.94 715.619         1105.74 716.044
 1148.48 716.827         1204.01 717.753         1245.42 719.025
 1349.42 721.792         1447.42 724.723         1553.53 727.545

Downstream Bridge Cross Section Data
Station Elevation Data    num=      35
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  543.01  718.72  641.71 716.353  745.35 715.948  785.27 715.474  797.58 715.227
  842.01 714.684  897.33  714.38  939.89 712.806  971.74 709.092  979.13  706.63
  980.34  706.16  980.71  706.13  981.22  704.33  982.93  703.33   988.9  701.18
  1003.5  701.18  1004.1  701.15  1011.1  701.15 1016.13  702.79 1017.53   704.2
 1019.57  705.87 1020.11  705.97 1021.81  706.38 1024.23  707.06  1031.9 711.885
 1043.15 711.837 1111.23 715.462 1152.25 714.114 1211.62  717.13 1253.25 718.192
 1317.43 719.747 1354.85 721.113 1408.08 722.675 1453.69  724.28 1553.53 726.737

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
  543.01      .1  980.71     .04   988.9    .014  1011.1     .04 1019.57      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        980.71 1019.57             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  543.01   984.4   714.9       F
  1015.6 1553.53   714.9       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  3

Culvert Name     Shape      Rise    Span
Culvert #1           Box       8       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
```

```
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 10      90     .014     .014        0                  .3                1
Upstream   Elevation =  701.26
           Centerline Station =  992.4
Downstream Elevation =  701.18
           Centerline Station =  992.4

Culvert Name     Shape      Rise    Span
Culvert #2           Box       8       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 10      90     .014     .014        0                  .3                1
Upstream   Elevation =  701.26
           Centerline Station =  1000
Downstream Elevation =  701.18
           Centerline Station =  1000

Culvert Name     Shape      Rise    Span
Culvert #3           Box       8       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 10      90     .014     .014        0                  .3                1
Upstream   Elevation =  701.31
           Centerline Station =  1007.6
Downstream Elevation =  701.15
           Centerline Station =  1007.6

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1992

INPUT
Description: Lin Eng - 2015 (D/S XS)
Station Elevation Data    num=      70
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  543.01  718.72   565.3  718.48  611.22  718.19  626.82  717.74  641.71  717.33
  663.65  716.65   695.1  716.56  700.41   716.2  724.54  715.34  743.46  714.54
  747.88  714.42  752.51  714.13  758.16   713.8  762.04  713.53  763.45  713.53
  787.79  712.49  801.02  711.61  817.89  711.18  827.27  710.98  838.93  710.73
  858.49  710.52  861.75   710.8  863.58  710.81  869.21  710.72   872.8   710.7
  900.48  710.85  902.04   710.9  910.27  710.92  919.41  710.53   926.4  709.84
  935.59  710.24  942.77  710.83   967.6  707.57  979.13  706.63  980.34  706.16
  980.71  706.13  981.22  704.33  982.93  703.33  989.86  701.48  994.95  701.16
 1001.55   701.1 1007.77  701.66 1009.39   701.8 1016.13  702.79 1017.53   704.2
 1019.57  705.87 1020.11  705.97 1021.81  706.38 1024.23  707.06 1034.19  708.35
 1105.74  711.26 1144.34  712.05 1158.81  712.27 1203.99  713.29 1218.88  713.63
 1233.69  714.16 1245.42  714.94 1265.81  714.69 1298.99  716.31 1321.45  718.58
 1323.19  718.66 1335.96  719.16 1349.14  719.17 1388.95  719.76 1406.19  720.06
 1411.21  719.68 1447.42  721.37 1491.15   723.2 1517.34  723.85 1546.68  725.23

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  543.01     .12  980.71     .04 1019.57     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        980.71 1019.57              170     139     123             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  543.01   984.4   714.9       F
  1015.6 1546.68   714.9       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1903
```

```
INPUT
Description: USGS IL 2001.  Depart Rte 47-25
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  616.77  718.43  794.52     714  813.52     712  869.52     708  929.52  705.52
  987.71  705.81  992.43  704.98  993.49  703.55  995.76  703.21  997.12   701.6
 1010.91  703.72 1012.29  705.52  1079.7  706.84 1128.79  707.19 1218.83  705.17
 1247.52     708 1277.52     710 1293.52     712 1320.52     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  616.77     .12  987.71     .07 1012.29     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        987.71 1012.29              887     872    1098             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 931

INPUT
Description: IDNR 1985. C before CA 051
extended points added on the
             floodplain which were interpolated formt he 2004 TIN
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  705.03  710.18  752.06  709.18  799.99  708.58  849.08  707.88  880.03  707.08
  919.01  704.78  966.04  703.98  981.99  703.68  990.02  701.88     993  701.38
    1000  701.08    1002  701.88 1006.05  704.28 1057.01  703.48 1101.01  703.68
 1150.02  704.18 1191.08  703.88 1235.01  705.28 1285.06  704.78 1339.05  704.68
    1388  704.28 1431.03  704.88 1493.73   705.7 1545.83     706 1594.83     708
 1615.83   709.7 1641.53   711.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  705.03     .12  966.04     .07 1006.05     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        966.04 1006.05                0       0       0             .1       .3
Right Levee     Station= 1006.03      Elevation=

*******************************************************************************

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek
*************************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *   n4    *
*************************************************************************
*Trib C Before CA*    15195       *     .105*     .065*     .105*         *
*Trib C Before CA*    13934       *     .105*     .065*     .105*         *
*Trib C Before CA*    13896       *     .105*     .065*     .105*         *
*Trib C Before CA*    13875       *Culvert  *        *        *        *
*Trib C Before CA*    13859       *     .105*     .065*     .105*         *
*Trib C Before CA*    13812       *     .105*     .065*     .105*         *
*Trib C Before CA*    11691       *      100*     .105*     .065*     .105*
*Trib C Before CA*    9184        *     .105*      .06*     .105*      100*
*Trib C Before CA*    7588        *     .105*      .06*     .105*         *
*Trib C Before CA*    7576        *     .105*      .06*     .105*         *
*Trib C Before CA*    7550        *Culvert  *        *        *        *
*Trib C Before CA*    7499        *     .105*      .06*     .105*         *
*Trib C Before CA*    7453        *     .105*      .06*     .105*         *
*Trib C Before CA*    5863        *     .105*      .06*     .105*         *
*Trib C Before CA*    5256        *     .075*      .06*     .075*         *
*Trib C Before CA*    5104        *     .105*      .06*     .105*         *
*Trib C Before CA*    5103        *Culvert  *        *        *        *
*Trib C Before CA*    4652        *     .105*      .06*     .105*         *
*Trib C Before CA*    4511        *     .105*      .06*     .105*         *
```

```
*Trib C Before CA*    3851        *     .105*      .07*     .105*         *
*Trib C Before CA*    2422        *      .12*      .07*      .12*         *
*Trib C Before CA*    2139        *      .12*      .07*      .12*         *
*Trib C Before CA*    2101        *      .12*      .04*      .12*         *
*Trib C Before CA*    2046        *Culvert  *        *        *        *
*Trib C Before CA*    1992        *      .12*      .04*      .12*         *
*Trib C Before CA*    1903        *      .12*      .07*      .12*         *
*Trib C Before CA*    931         *      .12*      .07*      .12*         *
*************************************************************************

*****************************************************************************

SUMMARY OF REACH LENGTHS

River: Blackberry Creek
****************************************************************
*     Reach      *   River Sta.   *  Left   * Channel *  Right  *
****************************************************************
*Trib C Before CA*    15195       *     1162*     1160*     1140*
*Trib C Before CA*    13934       *      110*      100*      110*
*Trib C Before CA*    13896       *       60*       46*       50*
*Trib C Before CA*    13875       *Culvert  *         *         *
*Trib C Before CA*    13859       *      145*      130*      154*
*Trib C Before CA*    13812       *     2162*     2021*     1923*
*Trib C Before CA*    11691       *     2140*     2506*     2590*
*Trib C Before CA*    9184        *     1440*     1496*     1560*
*Trib C Before CA*    7588        *      135*      122*      132*
*Trib C Before CA*    7576        *       48*       46*       48*
*Trib C Before CA*    7550        *Culvert  *         *         *
*Trib C Before CA*    7499        *      162*      146*      142*
*Trib C Before CA*    7453        *     1540*     1490*     1570*
*Trib C Before CA*    5863        *      530*      608*      703*
*Trib C Before CA*    5256        *      175*      152*      108*
*Trib C Before CA*    5104        *      250*      230*      240*
*Trib C Before CA*    5103        *Culvert  *         *         *
*Trib C Before CA*    4652        *      138*      120*      140*
*Trib C Before CA*    4511        *      485*      660*      768*
*Trib C Before CA*    3851        *     1366*     1429*     1455*
*Trib C Before CA*    2422        *      328*      183*      140*
*Trib C Before CA*    2139        *      136*      138*      135*
*Trib C Before CA*    2101        *      182*      109*      129*
*Trib C Before CA*    2046        *Culvert  *         *         *
*Trib C Before CA*    1992        *      170*      139*      123*
*Trib C Before CA*    1903        *      887*      872*     1098*
*Trib C Before CA*    931         *        0*        0*        0*
****************************************************************

*****************************************************************************

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

*******************************************************
*     Reach      *   River Sta.   * Contr.  * Expan.  *
*******************************************************
*Trib C Before CA*    15195   *       .1*       .3*
*Trib C Before CA*    13934   *       .3*       .5*
*Trib C Before CA*    13896   *       .3*       .5*
*Trib C Before CA*    13875   *Culvert  *         *
*Trib C Before CA*    13859   *       .3*       .5*
*Trib C Before CA*    13812   *       .1*       .3*
*Trib C Before CA*    11691   *       .1*       .3*
*Trib C Before CA*    9184    *       .1*       .3*
*Trib C Before CA*    7588    *       .3*       .5*
*Trib C Before CA*    7576    *       .3*       .5*
*Trib C Before CA*    7550    *Culvert  *         *
*Trib C Before CA*    7499    *       .3*       .5*
*Trib C Before CA*    7453    *       .1*       .3*
*Trib C Before CA*    5863    *       .1*       .3*
*Trib C Before CA*    5256    *       .2*       .3*
*Trib C Before CA*    5104    *       .3*       .5*
*Trib C Before CA*    5103    *Culvert  *         *
*Trib C Before CA*    4652    *       .3*       .5*
*Trib C Before CA*    4511    *       .1*       .3*
*Trib C Before CA*    3851    *       .1*       .3*
```

```
*Trib C Before CA*    2422    *       .1*       .3*
*Trib C Before CA*    2139    *       .3*       .5*
*Trib C Before CA*    2101    *       .3*       .5*
*Trib C Before CA*    2046    *Culvert  *         *
*Trib C Before CA*    1992    *       .3*       .5*
*Trib C Before CA*    1903    *       .1*       .3*
*Trib C Before CA*    931     *       .1*       .3*
*****************************************************
```


BBRY CREEK Plan: TribC_0452001_Permit_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q10
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 9:11:39 AM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q10	378.00	712.50	720.38	715.64	720.38	0.000049	0.38	1453.41	855.24	0.04
Trib C Before CA	13934	Q10	369.00	710.35	720.28	713.58	720.29	0.000209	0.96	629.41	282.87	0.07
Trib C Before CA	13896	Q10	369.00	709.56	720.22	714.24	720.25	0.000475	1.57	438.85	299.33	0.11
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q10	369.00	710.71	718.68	715.11	718.81	0.003348	2.95	144.56	130.81	0.27
Trib C Before CA	13812	Q10	369.00	710.88	718.46	713.48	718.51	0.000678	1.75	258.47	119.63	0.13
Trib C Before CA	11691	Q10	364.00	711.08	716.71	714.19	716.75	0.001173	1.92	429.50	369.26	0.17
Trib C Before CA	9184	Q10	349.00	707.58	714.41	711.48	714.44	0.000762	1.74	494.50	378.66	0.14
Trib C Before CA	7588	Q10	349.00	705.78	712.56	709.37	712.71	0.002335	3.18	152.42	107.30	0.25
Trib C Before CA	7576	Q10	349.00	705.39	712.25	707.83	712.40	0.002647	3.08	113.17	16.71	0.21
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q10	349.00	703.60	712.11	706.32	712.17	0.000848	2.06	170.56	29.15	0.14
Trib C Before CA	7453	Q10	347.00	705.42	711.98	707.95	712.04	0.000941	2.06	230.70	118.28	0.16
Trib C Before CA	5863	Q10	347.00	704.68	710.54	707.84	710.57	0.001000	1.80	434.35	363.50	0.16

Trib C Before CA	5256	Q10	361.00	704.24	710.20	705.85	710.20	0.000150	0.88	729.25	481.98	0.07
Trib C Before CA	5104	Q10	361.00	704.35	710.07	706.77	710.15	0.001059	2.26	159.77	509.61	0.18
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q10	361.00	701.51	709.70	704.03	709.77	0.000459	2.06	175.57	375.49	0.13
Trib C Before CA	4511	Q10	362.00	703.76	709.56	706.46	709.66	0.002156	2.61	172.98	145.22	0.24
Trib C Before CA	3851	Q10	362.00	703.38	708.53	707.08	708.54	0.001023	1.66	516.76	353.39	0.14
Trib C Before CA	2422	Q10	363.00	701.98	707.55	705.84	707.56	0.000351	1.00	849.66	415.44	0.08
Trib C Before CA	2139	Q10	363.00	701.27	707.51	703.92	707.51	0.000196	0.85	958.78	392.24	0.06
Trib C Before CA	2101	Q10	363.00	701.27	707.42	703.57	707.47	0.000271	1.73	209.78	182.26	0.14
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q10	363.00	701.10	707.28	703.27	707.35	0.000313	2.07	175.58	54.82	0.15
Trib C Before CA	1903	Q10	363.00	701.60	707.22	705.13	707.26	0.001809	2.06	414.86	351.30	0.19
Trib C Before CA	931	Q10	364.00	701.08	706.25	704.27	706.25	0.000234	0.73	1143.90	657.86	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q10	720.38	720.38	0.00	0.09	0.00	12.94	287.25	77.80	855.24
Trib C Before CA	13934	Q10	720.29	720.28	0.01	0.03	0.01	26.40	278.59	64.01	282.87
Trib C Before CA	13896	Q10	720.25	720.22	0.03			40.84	292.57	35.59	299.33
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q10	718.81	718.68	0.13	0.26	0.04	2.00	362.39	4.61	130.81
Trib C Before CA	13812	Q10	718.51	718.46	0.05	1.76	0.00	7.07	352.65	9.28	119.63
Trib C Before CA	11691	Q10	716.75	716.71	0.03	2.31	0.00	144.37	210.82	8.81	369.26
Trib C Before CA	9184	Q10	714.44	714.41	0.03	1.72	0.01	94.96	187.46	66.58	378.66
Trib C Before CA	7588	Q10	712.71	712.56	0.15	0.30	0.00	7.40	324.48	17.13	107.30
Trib C Before CA	7576	Q10	712.40	712.25	0.15				349.00		16.71
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q10	712.17	712.11	0.07	0.13	0.00	0.12	348.88		29.15
Trib C Before CA	7453	Q10	712.04	711.98	0.06	1.46	0.01	30.89	316.11		118.28
Trib C Before CA	5863	Q10	710.57	710.54	0.03	0.35	0.01	23.71	204.48	118.81	363.50
Trib C Before CA	5256	Q10	710.20	710.20	0.01	0.04	0.01	91.60	230.37	39.03	481.98
Trib C Before CA	5104	Q10	710.15	710.07	0.08				361.00		509.61
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q10	709.77	709.70	0.07	0.09	0.01		361.00		375.49
Trib C Before CA	4511	Q10	709.66	709.56	0.10	1.09	0.03		348.93	13.07	145.22
Trib C Before CA	3851	Q10	708.54	708.53	0.02	0.99	0.00	25.10	116.38	220.52	353.39
Trib C Before CA	2422	Q10	707.56	707.55	0.01	0.05	0.00	25.11	82.86	255.03	415.44

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* Trib C Before CA * 2139        * Q10     *    707.51 *    707.51 *     0.00 *       0.03 *       0.01 *  30.75 *    108.89 *  223.37 *    392.24 *
* Trib C Before CA * 2101        * Q10     *    707.47 *    707.42 *     0.05 *            *            *   0.11 *    362.89 *         *    182.26 *
* Trib C Before CA * 2046        *         *   Culvert *           *          *            *            *        *           *         *           *
* Trib C Before CA * 1992        * Q10     *    707.35 *    707.28 *     0.07 *       0.07 *       0.01 *        *    363.00 *         *     54.82 *
* Trib C Before CA * 1903        * Q10     *    707.26 *    707.22 *     0.04 *       1.00 *       0.01 *  77.39 *    192.43 *   93.18 *    351.30 *
* Trib C Before CA * 931         * Q10     *    706.25 *    706.25 *     0.00 *            *            *  26.08 *    100.18 *  237.74 *    657.86 *
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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Permit

River: Blackberry Creek  Reach: Trib C Before CA     RS: 15195     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13934     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13896     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13875     Profile: Q10     Culv: Culvert #1
     Warning:During the culvert inlet control computations, the program could not balance the culvert/weir flow.  The reported
             inlet energy grade answer may not be valid.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13859     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 9184     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
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            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
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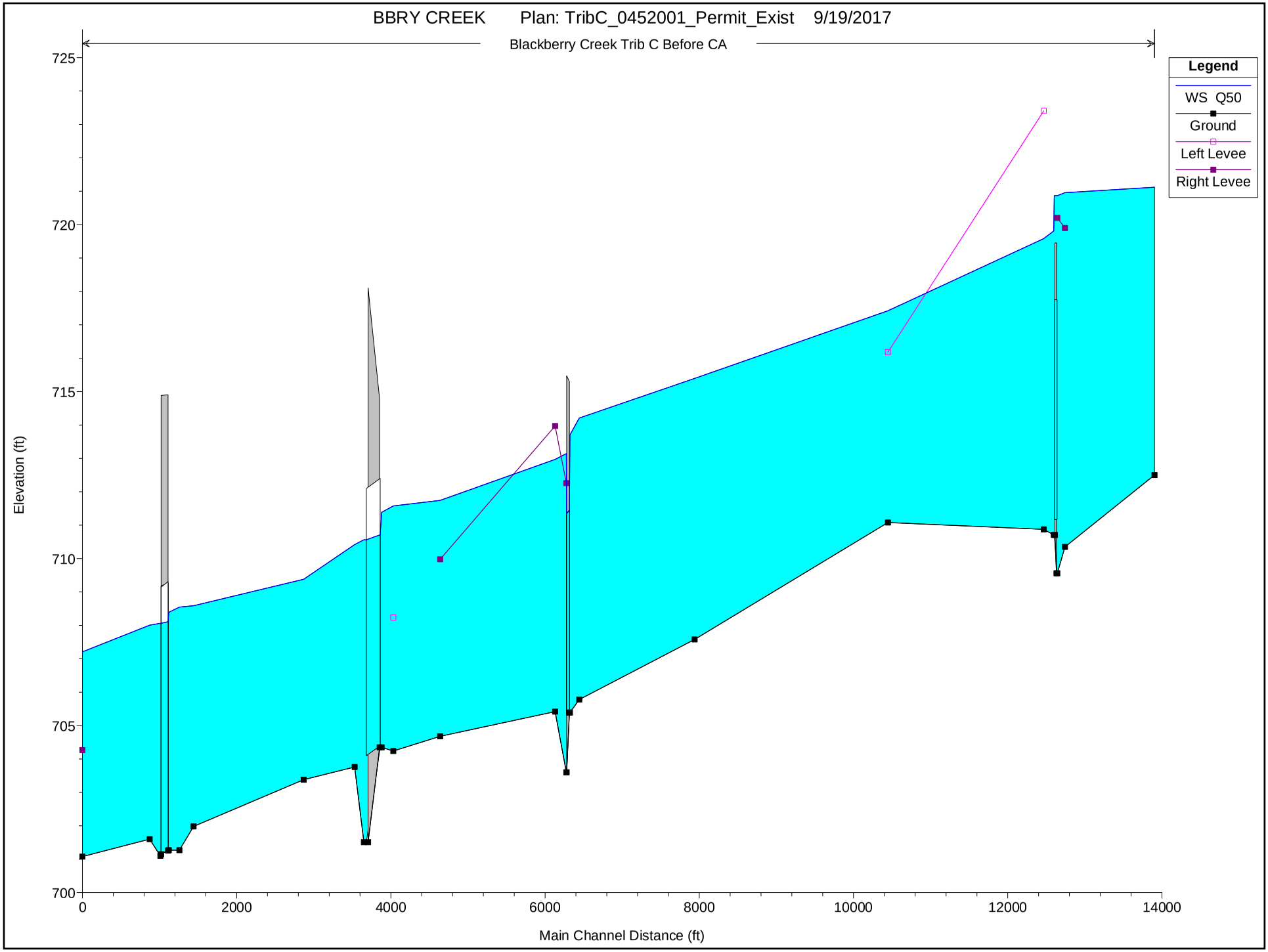
BBRY CREEK Plan: TribC_0452001_Permit_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q50
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

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                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 9:11:39 AM

Project in English units

Project Description:
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125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q50	706.00	712.50	721.12	716.98	721.12	0.000075	0.53	2108.22	916.08	0.04
Trib C Before CA	13934	Q50	670.00	710.35	720.96	714.96	720.98	0.000367	1.37	825.48	294.85	0.10
Trib C Before CA	13896	Q50	670.00	709.56	720.87	715.60	720.92	0.000808	2.17	642.84	334.04	0.14
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q50	670.00	710.71	719.81	716.85	719.94	0.002887	3.27	361.19	243.31	0.26
Trib C Before CA	13812	Q50	670.00	710.88	719.58	714.53	719.66	0.000971	2.37	414.88	160.23	0.16
Trib C Before CA	11691	Q50	652.00	711.08	717.42	715.33	717.45	0.001187	2.15	714.27	435.49	0.17
Trib C Before CA	9184	Q50	592.00	707.58	715.40	712.53	715.41	0.000535	1.67	908.80	463.29	0.13
Trib C Before CA	7588	Q50	592.00	705.78	714.21	710.50	714.29	0.001244	2.81	480.84	280.07	0.19
Trib C Before CA	7576	Q50	592.00	705.39	713.70	708.85	713.99	0.004058	4.31	137.73	125.17	0.26
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q50	592.00	703.60	713.14	707.31	713.27	0.001449	2.93	257.82	152.85	0.18
Trib C Before CA	7453	Q50	587.00	705.42	712.97	708.83	713.05	0.001201	2.56	369.77	161.84	0.19
Trib C Before CA	5863	Q50	587.00	704.68	711.75	708.84	711.76	0.000475	1.49	944.11	473.31	0.12

Trib C Before CA	5256	Q50	619.00	704.24	711.58	706.46	711.58	0.000086	0.78	1544.77	665.53	0.05
Trib C Before CA	5104	Q50	619.00	704.35	711.39	707.45	711.53	0.001398	3.05	203.15	662.25	0.22
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q50	619.00	701.51	710.56	704.89	710.72	0.000944	3.17	195.46	565.41	0.19
Trib C Before CA	4511	Q50	621.00	703.76	710.42	707.39	710.54	0.002353	3.02	348.87	245.42	0.26
Trib C Before CA	3851	Q50	621.00	703.38	709.38	707.70	709.40	0.000817	1.68	844.69	411.02	0.13
Trib C Before CA	2422	Q50	623.00	701.98	708.59	706.09	708.60	0.000297	1.06	1298.00	447.52	0.08
Trib C Before CA	2139	Q50	623.00	701.27	708.55	705.28	708.55	0.000207	0.99	1390.38	436.84	0.07
Trib C Before CA	2101	Q50	623.00	701.27	708.39	704.23	708.49	0.000440	2.49	250.74	320.85	0.18
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q50	623.00	701.10	708.06	703.96	708.21	0.000598	3.12	199.96	68.14	0.22
Trib C Before CA	1903	Q50	624.00	701.60	708.01	706.38	708.04	0.001445	2.08	700.86	378.19	0.17
Trib C Before CA	931	Q50	625.00	701.08	707.21	704.52	707.21	0.000181	0.75	1794.74	700.48	0.06

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q50	721.12	721.12	0.00	0.14	0.00	69.57	478.27	158.16	916.08
Trib C Before CA	13934	Q50	720.98	720.96	0.02	0.05	0.01	56.49	451.08	162.43	294.85
Trib C Before CA	13896	Q50	720.92	720.87	0.05			102.12	443.75	124.13	334.04
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q50	719.94	719.81	0.13	0.26	0.03	54.14	520.59	95.27	243.31
Trib C Before CA	13812	Q50	719.66	719.58	0.08	2.19	0.01	33.18	575.62	61.20	160.23
Trib C Before CA	11691	Q50	717.45	717.42	0.03	2.03	0.00	334.88	277.13	39.99	435.49
Trib C Before CA	9184	Q50	715.41	715.40	0.02	1.12	0.01	200.22	218.62	173.16	463.29
Trib C Before CA	7588	Q50	714.29	714.21	0.08	0.24	0.06	105.08	381.86	105.06	280.07
Trib C Before CA	7576	Q50	713.99	713.70	0.29			0.12	591.66	0.22	125.17
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q50	713.27	713.14	0.13	0.20	0.02	9.68	569.19	13.13	152.85
Trib C Before CA	7453	Q50	713.05	712.97	0.08	1.27	0.02	115.05	471.95		161.84
Trib C Before CA	5863	Q50	711.76	711.75	0.02	0.18	0.00	86.24	223.64	277.12	473.31
Trib C Before CA	5256	Q50	711.58	711.58	0.00	0.02	0.03	183.83	258.87	176.30	665.53
Trib C Before CA	5104	Q50	711.53	711.39	0.14				619.00		662.25
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q50	710.72	710.56	0.16	0.16	0.02		619.00		565.41
Trib C Before CA	4511	Q50	710.54	710.42	0.12	1.11	0.03	0.27	503.39	117.34	245.42
Trib C Before CA	3851	Q50	709.40	709.38	0.01	0.80	0.00	59.33	142.37	419.30	411.02
Trib C Before CA	2422	Q50	708.60	708.59	0.01	0.04	0.00	57.86	108.88	456.26	447.52

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* Trib C Before CA * 2139        * Q50     *    708.55 *    708.55 *     0.01 *       0.04 *       0.03 *  72.12 *    150.59 *  400.29 *    436.84 *
* Trib C Before CA * 2101        * Q50     *    708.49 *    708.39 *     0.10 *            *            *   0.27 *    622.73 *         *    320.85 *
* Trib C Before CA * 2046        *         *   Culvert *           *          *            *            *        *           *         *           *
* Trib C Before CA * 1992        * Q50     *    708.21 *    708.06 *     0.15 *       0.12 *       0.06 *        *    623.00 *         *     68.14 *
* Trib C Before CA * 1903        * Q50     *    708.04 *    708.01 *     0.03 *       0.81 *       0.01 * 146.09 *    235.03 *  242.88 *    378.19 *
* Trib C Before CA * 931         * Q50     *    707.21 *    707.21 *     0.00 *            *            *  48.73 *    132.96 *  443.32 *    700.48 *
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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Permit

River: Blackberry Creek  Reach: Trib C Before CA     RS: 15195     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13934     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13896     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13859     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q50
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q50
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 9184     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
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     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```

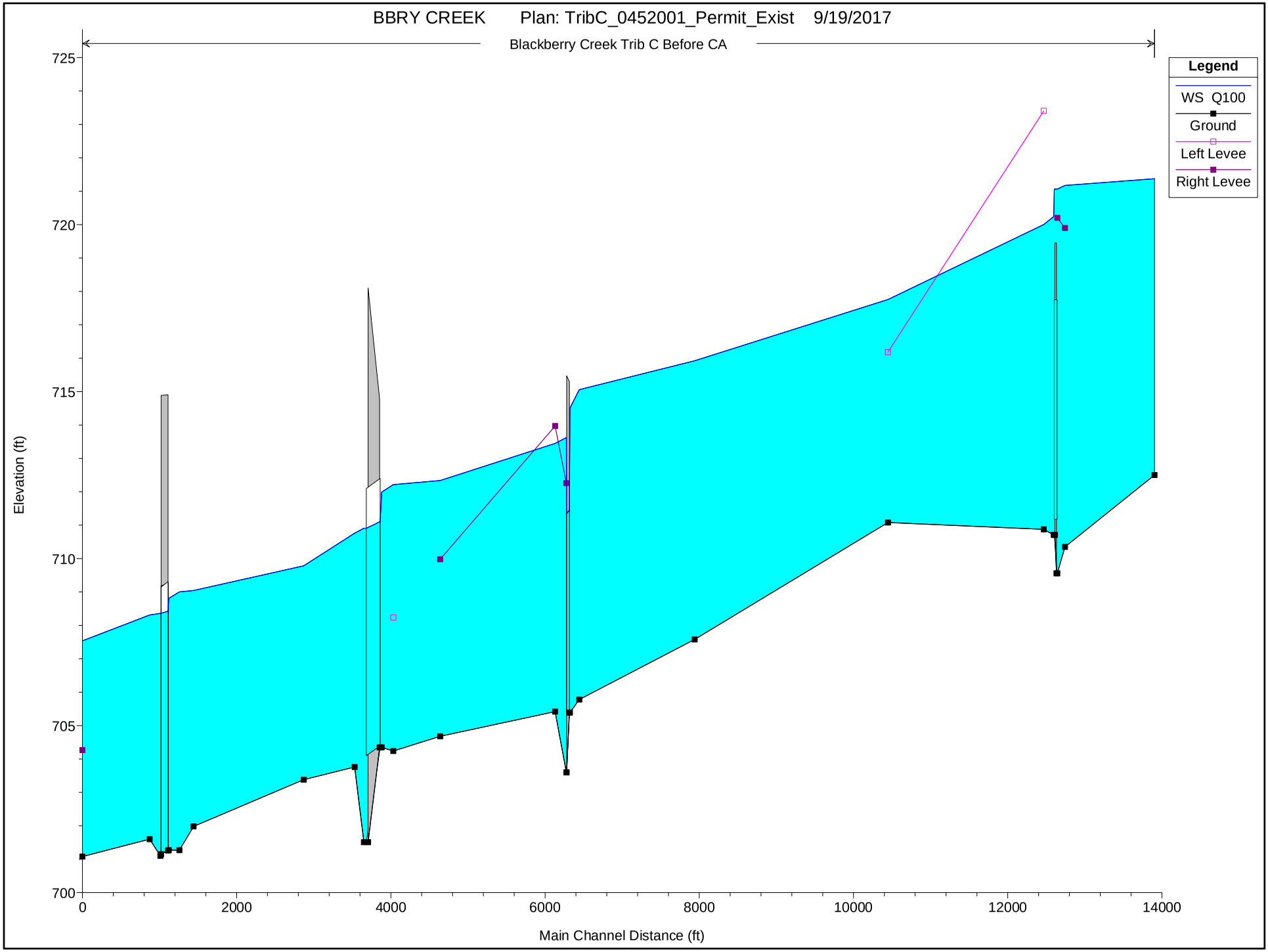
BBRY CREEK Plan: TribC_0452001_Permit_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q100
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 9:11:39 AM

Project in English units

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343.1   760.6
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391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
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385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
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400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q100	879.00	712.50	721.37	717.20	721.38	0.000090	0.61	2342.91	936.55	0.05
Trib C Before CA	13934	Q100	828.00	710.35	721.17	715.50	721.20	0.000466	1.59	889.89	298.68	0.11
Trib C Before CA	13896	Q100	828.00	709.56	721.06	716.23	721.12	0.001021	2.48	709.05	346.53	0.16
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q100	828.00	710.71	720.24	717.77	720.36	0.002679	3.33	474.13	281.03	0.25
Trib C Before CA	13812	Q100	828.00	710.88	720.00	714.99	720.09	0.001101	2.63	485.92	175.59	0.17
Trib C Before CA	11691	Q100	800.00	711.08	717.76	715.84	717.79	0.001127	2.19	867.77	478.39	0.17
Trib C Before CA	9184	Q100	713.00	707.58	715.92	713.52	715.94	0.000436	1.60	1168.62	533.38	0.12
Trib C Before CA	7588	Q100	713.00	705.78	715.06	710.94	715.11	0.000761	2.38	745.85	343.90	0.15
Trib C Before CA	7576	Q100	713.00	705.39	714.51	709.30	714.85	0.004305	4.72	151.43	183.69	0.28
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q100	713.00	703.60	713.62	707.75	713.76	0.001538	3.14	349.90	232.62	0.19
Trib C Before CA	7453	Q100	705.00	705.42	713.45	709.21	713.53	0.001194	2.65	452.08	182.28	0.19
Trib C Before CA	5863	Q100	705.00	704.68	712.34	709.23	712.35	0.000340	1.36	1237.07	511.19	0.10

Trib C Before CA	5256	Q100	749.00	704.24	712.22	706.73	712.22	0.000066	0.73	1984.32	705.63	0.05
Trib C Before CA	5104	Q100	749.00	704.35	711.99	707.74	712.17	0.001495	3.36	223.20	706.26	0.23
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q100	749.00	701.51	710.91	705.27	711.12	0.001210	3.68	203.38	621.04	0.22
Trib C Before CA	4511	Q100	752.00	703.76	710.76	707.84	710.88	0.002262	3.12	438.10	274.57	0.26
Trib C Before CA	3851	Q100	752.00	703.38	709.78	707.81	709.80	0.000736	1.68	1015.86	441.36	0.13
Trib C Before CA	2422	Q100	755.00	701.98	709.05	706.18	709.05	0.000293	1.11	1507.43	476.32	0.08
Trib C Before CA	2139	Q100	755.00	701.27	709.00	705.43	709.01	0.000206	1.03	1591.80	448.61	0.07
Trib C Before CA	2101	Q100	755.00	701.27	708.81	704.52	708.93	0.000516	2.82	268.39	351.79	0.20
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q100	755.00	701.10	708.36	704.29	708.57	0.000755	3.61	209.31	72.97	0.25
Trib C Before CA	1903	Q100	756.00	701.60	708.31	706.55	708.34	0.001391	2.13	818.45	387.10	0.17
Trib C Before CA	931	Q100	758.00	701.08	707.54	704.63	707.54	0.000186	0.80	2029.31	721.32	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q100	721.38	721.37	0.00	0.17	0.00	104.02	574.61	200.37	936.55
Trib C Before CA	13934	Q100	721.20	721.17	0.03	0.07	0.01	72.87	539.42	215.71	298.68
Trib C Before CA	13896	Q100	721.12	721.06	0.06			135.23	520.82	171.95	346.53
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q100	720.36	720.24	0.12	0.26	0.02	88.18	577.09	162.74	281.03
Trib C Before CA	13812	Q100	720.09	720.00	0.09	2.29	0.02	50.53	679.98	97.49	175.59
Trib C Before CA	11691	Q100	717.79	717.76	0.03	1.84	0.01	436.35	302.39	61.27	478.39
Trib C Before CA	9184	Q100	715.94	715.92	0.02	0.83	0.00	245.56	230.27	237.17	533.38
Trib C Before CA	7588	Q100	715.11	715.06	0.05	0.16	0.09	190.39	365.44	157.18	343.90
Trib C Before CA	7576	Q100	714.85	714.51	0.35			0.27	712.17	0.56	183.69
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q100	713.76	713.62	0.14	0.20	0.03	37.74	644.75	30.51	232.62
Trib C Before CA	7453	Q100	713.53	713.45	0.08	1.17	0.02	174.37	530.63		182.28
Trib C Before CA	5863	Q100	712.35	712.34	0.01	0.13	0.00	120.76	228.06	356.18	511.19
Trib C Before CA	5256	Q100	712.22	712.22	0.00	0.02	0.03	223.48	265.49	260.02	705.63
Trib C Before CA	5104	Q100	712.17	711.99	0.17				749.00		706.26
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q100	711.12	710.91	0.21	0.19	0.05		749.00		621.04
Trib C Before CA	4511	Q100	710.88	710.76	0.11	1.05	0.03	2.11	561.88	188.01	274.57
Trib C Before CA	3851	Q100	709.80	709.78	0.01	0.74	0.00	80.14	153.85	518.01	441.36
Trib C Before CA	2422	Q100	709.05	709.05	0.01	0.04	0.00	78.56	123.67	552.77	476.32

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* Trib C Before CA * 2139        * Q100    *    709.01 *    709.00 *     0.01 *       0.04 *       0.04 *  99.31 *    168.86 *  486.82 *    448.61 *
* Trib C Before CA * 2101        * Q100    *    708.93 *    708.81 *     0.12 *            *            *   0.37 *    754.63 *         *    351.79 *
* Trib C Before CA * 2046        *         *   Culvert *           *          *            *            *        *           *         *           *
* Trib C Before CA * 1992        * Q100    *    708.57 *    708.36 *     0.20 *       0.14 *       0.09 *        *    755.00 *         *     72.97 *
* Trib C Before CA * 1903        * Q100    *    708.34 *    708.31 *     0.03 *       0.79 *       0.01 * 183.19 *    256.88 *  315.94 *    387.10 *
* Trib C Before CA * 931         * Q100    *    707.54 *    707.54 *     0.00 *            *            *  59.20 *    151.93 *  546.87 *    721.32 *
*****************************************************************************************************************************************************

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Permit

River: Blackberry Creek  Reach: Trib C Before CA     RS: 15195     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13934     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13896     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13859     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q100
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
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River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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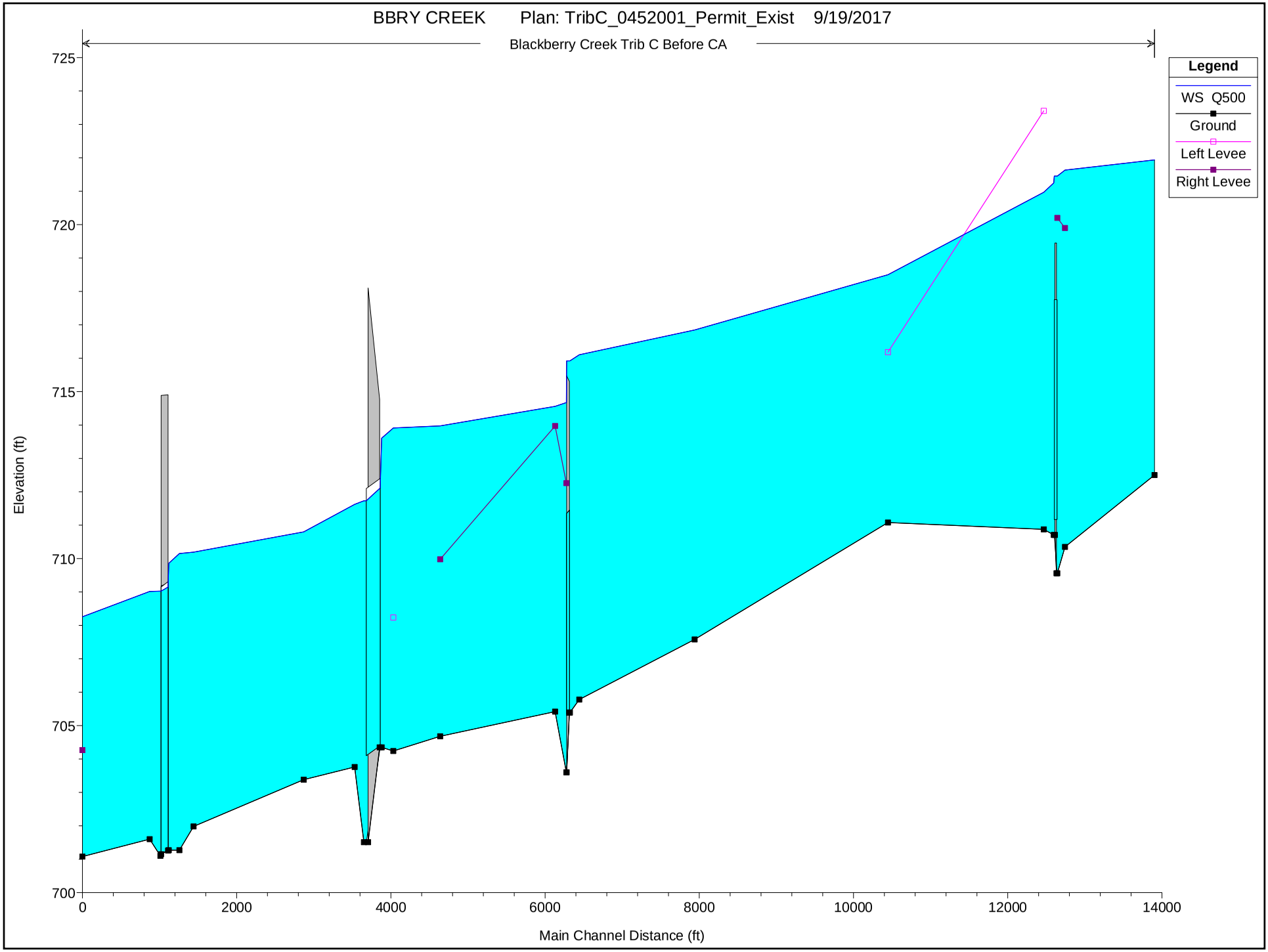
BBRY CREEK Plan: TribC_0452001_Permit_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q500
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 9:11:39 AM

Project in English units

Project Description:
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406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q500	1373.00	712.50	721.94	717.69	721.94	0.000130	0.79	2883.10	982.05	0.06
Trib C Before CA	13934	Q500	1268.00	710.35	721.63	716.94	721.68	0.000787	2.16	1041.78	350.03	0.15
Trib C Before CA	13896	Q500	1268.00	709.56	721.45	717.79	721.55	0.001657	3.27	850.03	371.73	0.20
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q500	1268.00	710.71	721.25	719.24	721.35	0.002122	3.32	788.37	338.58	0.23
Trib C Before CA	13812	Q500	1268.00	710.88	720.97	716.10	721.10	0.001426	3.26	704.35	291.09	0.20
Trib C Before CA	11691	Q500	1213.00	711.08	718.50	716.58	718.53	0.001046	2.31	1252.40	550.55	0.17
Trib C Before CA	9184	Q500	1036.00	707.58	716.84	713.87	716.86	0.000382	1.65	1722.53	685.29	0.11
Trib C Before CA	7588	Q500	1036.00	705.78	716.10	712.31	716.14	0.000628	2.36	1146.17	420.31	0.14
Trib C Before CA	7576	Q500	1036.00	705.39	715.92	710.40	716.01	0.001609	3.18	757.60	358.49	0.17
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q500	1036.00	703.60	714.67	708.83	714.79	0.001407	3.24	694.14	385.71	0.18
Trib C Before CA	7453	Q500	1020.00	705.42	714.56	710.11	714.60	0.000635	2.14	1076.15	408.45	0.14
Trib C Before CA	5863	Q500	1020.00	704.68	713.97	710.22	713.98	0.000164	1.12	2159.04	622.45	0.07

Trib C Before CA	5256	Q500	1105.00	704.24	713.91	707.40	713.91	0.000037	0.63	3260.04	803.98	0.04
Trib C Before CA	5104	Q500	1105.00	704.35	713.61	708.49	713.85	0.001595	4.00	276.44	855.52	0.24
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q500	1105.00	701.51	711.73	706.22	712.11	0.001959	4.97	222.27	699.29	0.28
Trib C Before CA	4511	Q500	1109.00	703.76	711.63	708.86	711.73	0.001975	3.27	785.73	596.70	0.25
Trib C Before CA	3851	Q500	1109.00	703.38	710.80	708.05	710.81	0.000582	1.68	1511.34	538.22	0.12
Trib C Before CA	2422	Q500	1115.00	701.98	710.19	706.38	710.20	0.000268	1.20	2100.98	557.40	0.08
Trib C Before CA	2139	Q500	1115.00	701.27	710.15	705.72	710.16	0.000197	1.12	2123.39	477.35	0.07
Trib C Before CA	2101	Q500	1115.00	701.27	709.86	705.21	710.06	0.000676	3.57	312.72	429.01	0.23
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q500	1115.00	701.10	709.03	705.07	709.39	0.001202	4.85	229.99	94.32	0.31
Trib C Before CA	1903	Q500	1118.00	701.60	709.02	706.92	709.05	0.001339	2.29	1097.94	407.50	0.17
Trib C Before CA	931	Q500	1122.00	701.08	708.26	704.89	708.26	0.000206	0.93	2566.92	775.61	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q500	721.94	721.94	0.01	0.26	0.00	215.37	835.71	321.92	982.05
Trib C Before CA	13934	Q500	721.68	721.63	0.05	0.11	0.02	100.74	788.71	378.55	350.03
Trib C Before CA	13896	Q500	721.55	721.45	0.10			230.75	721.55	315.70	371.73
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q500	721.35	721.25	0.10	0.24	0.01	185.96	685.16	396.88	338.58
Trib C Before CA	13812	Q500	721.10	720.97	0.13	2.54	0.03	111.12	960.17	196.71	291.09
Trib C Before CA	11691	Q500	718.53	718.50	0.03	1.68	0.01	702.33	365.27	145.41	550.55
Trib C Before CA	9184	Q500	716.86	716.84	0.01	0.71	0.00	397.21	273.26	365.52	685.29
Trib C Before CA	7588	Q500	716.14	716.10	0.04	0.12	0.02	359.11	412.92	263.97	420.31
Trib C Before CA	7576	Q500	716.01	715.92	0.09			183.72	554.87	297.41	358.49
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q500	714.79	714.67	0.12	0.15	0.04	158.84	745.17	131.99	385.71
Trib C Before CA	7453	Q500	714.60	714.56	0.04	0.61	0.01	282.20	506.92	230.88	408.45
Trib C Before CA	5863	Q500	713.98	713.97	0.01	0.06	0.00	219.68	242.77	557.55	622.45
Trib C Before CA	5256	Q500	713.91	713.91	0.00	0.01	0.05	325.47	285.54	493.99	803.98
Trib C Before CA	5104	Q500	713.85	713.61	0.25				1105.00		855.52
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q500	712.11	711.73	0.38	0.24	0.14		1105.00		699.29
Trib C Before CA	4511	Q500	711.73	711.63	0.11	0.90	0.03	37.74	699.65	371.61	596.70
Trib C Before CA	3851	Q500	710.81	710.80	0.01	0.61	0.00	140.63	182.43	785.94	538.22
Trib C Before CA	2422	Q500	710.20	710.19	0.01	0.04	0.00	142.66	159.49	812.85	557.40

```
* Trib C Before CA * 2139        * Q500    *    710.16 *    710.15 *     0.01 *       0.04 *       0.06 * 182.14 *    213.60 *  719.27 *    477.35 *
* Trib C Before CA * 2101        * Q500    *    710.06 *    709.86 *     0.20 *            *            *   0.66 *   1114.34 *         *    429.01 *
* Trib C Before CA * 2046        *         *   Culvert *          *          *            *            *        *          *         *           *
* Trib C Before CA * 1992        * Q500    *    709.39 *    709.03 *     0.37 *       0.18 *       0.17 *        *   1115.00 *         *     94.32 *
* Trib C Before CA * 1903        * Q500    *    709.05 *    709.02 *     0.03 *       0.78 *       0.01 * 285.52 *    315.22 *  517.26 *    407.50 *
* Trib C Before CA * 931         * Q500    *    708.26 *    708.26 *     0.00 *            *            *  88.31 *    202.37 *  831.32 *    775.61 *
*****************************************************************************************************************************************************

*****************************************************************************

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Permit

River: Blackberry Creek  Reach: Trib C Before CA     RS: 15195     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13934     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13896     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q500
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q500
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5103     Profile: Q500     Culv: Culvert #1
```

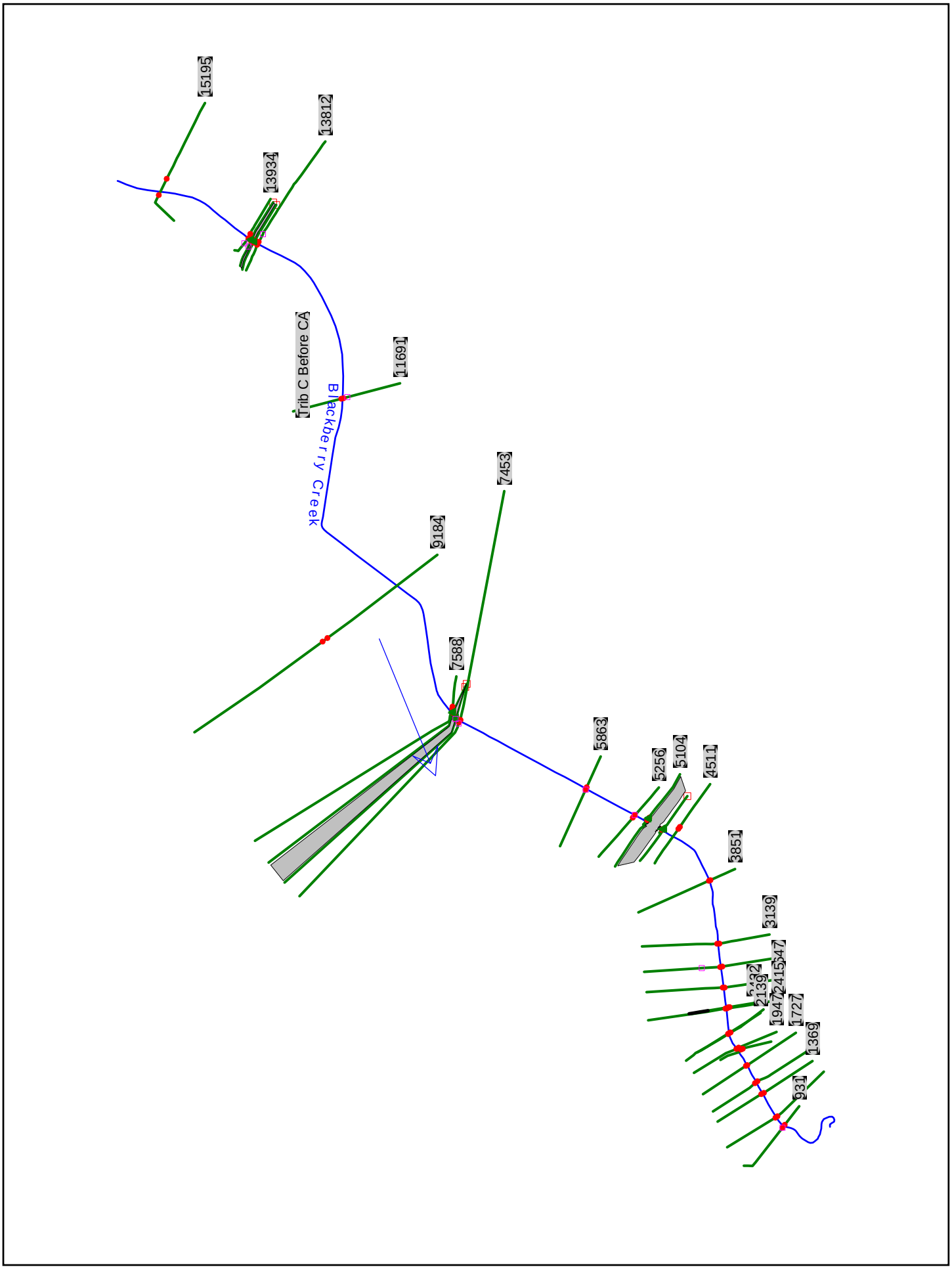
```
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the height
             of the culvert.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2046     Profile: Q500     Culv: Culvert #1
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the height
             of the culvert.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2046     Profile: Q500     Culv: Culvert #2
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the height
             of the culvert.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```

EXHIBIT J

HEC-RAS MODEL REPORT (DESIGN)

NATURAL CONDITIONS
(DESIGN MODEL)

Plan: TribC_0452001_Design_Natural



```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 11:50:25 AM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
385.96  703.87
392.75  703.73
396.12  702.94
397.39  702.73
399.73  702
.59
400.06  702.76
400.35  703.82
400.86  703.81
401.21  707.84
406.47  707.80

412.35  707.76
676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.
```

****

PLAN DATA

Plan Title: TribC_0452001_Design_Natural
Plan File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.p03

Geometry Title: Natural_Design
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.g02

Flow Title : 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Plan Summary Information:
Number of: Cross Sections = 31 Multiple Openings = 0
Culverts = 3 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 30
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Program Selects Appropriate method
Computational Flow Regime: Mixed Flow

****

FLOW DATA

Flow Title: 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Flow Data (cfs)

River	Reach	RS	Q10	Q50	Q100	Q500
Blackberry Creek	Trib C Before	CA15195	378	706	879	1373
Blackberry Creek	Trib C Before	CA13934	369	670	828	1268
Blackberry Creek	Trib C Before	CA13812	369	670	828	1268
Blackberry Creek	Trib C Before	CA11691	364	652	800	1213
Blackberry Creek	Trib C Before	CA9184	349	592	713	1036
Blackberry Creek	Trib C Before	CA7453	347	587	705	1020
Blackberry Creek	Trib C Before	CA5863	347	587	705	1020
Blackberry Creek	Trib C Before	CA5256	361	619	749	1105
Blackberry Creek	Trib C Before	CA4511	362	621	752	1109
Blackberry Creek	Trib C Before	CA2422	363	623	755	1115
Blackberry Creek	Trib C Before	CA1903	363	624	756	1118
Blackberry Creek	Trib C Before	CA931	364	625	758	1122

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blackberry Creek	Trib C Before	CAQ10	Critical	Known WS = 706.25
Blackberry Creek	Trib C Before	CAQ50	Critical	Known WS = 707.21
Blackberry Creek	Trib C Before	CAQ100	Critical	Known WS = 707.54
Blackberry Creek	Trib C Before	CAQ500	Critical	Known WS = 708.26

Inline Structure Gate Openings
River = Blackberry Creek
Reach = Podolski RS = 9000
Gate = Gate #1
# Open Open Ht # Open Open Ht # Open Open Ht # Open Open Ht

```
*****************************************************************
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = Podolski          RS = 9000
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #3
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
     2.2       1     2.2       1     2.2       1     2.2       1
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
    2.35       1    2.35       1    2.35       1    2.35       1

*******************************************************************************

GEOMETRY DATA

Geometry Title: Natural_Design
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C
Blackberry)\IL47.g02

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 15195

INPUT
Description: Interpolated cross section for river junction computation. Data
             are obtained from the DEM and 2 foot contour map Kane County 2001.
             The channel cross section are interpolated between 16644 and
             13934.

Revised using data from the 2004 TIN by Woodworth Jan
             2005
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  728.23   50.97  728.41  110.82  728.49  173.94  728.46  234.82  728.12
  282.62  728.01  361.79  726.09  412.61     724  452.97  722.08  517.54  720.85
  561.93  720.03  620.01  719.98  687.87  720.16  780.75  720.32     843     720
  890.61  719.06  939.83  718.05  993.16   717.4 1035.15  716.78 1066.14   716.3
 1090.29  716.02    1093     714    1097     713    1102   712.5    1105   712.5
    1108     714    1112     715 1114.22  716.17 1141.08  717.99  1181.5  717.86
 1233.51  717.75 1265.44  718.01 1323.04  718.75 1363.62  719.34 1386.91  719.99
 1414.95  720.96 1442.97  721.95 1479.79  724.05 1501.08  725.78 1523.32  726.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
**************************************************
       0    .105  939.83    .065 1141.08    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        939.83 1141.08             1162    1160    1140             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13934

INPUT
Description: USGS IL 2001.  Approach to Farm Road (Seavey27)

outer 2pts on
             LHS and outer 3 points on the RHS are interpolated from the 2004
             TIN by BW Jan 2005
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0   722.7   223.8   721.7  344.71  722.55  360.15  721.36  404.22  721.29
  453.57  717.48  468.05   717.8  483.82  715.96  488.86  713.95  492.11  710.86
  495.33  710.37  499.79  710.35  503.55  711.05   505.5  713.63  507.23  714.19
  511.34  717.43  522.72  718.07  543.14  718.16  599.85   719.9  636.38  718.62
  692.75  718.69   706.4   721.6   715.3   722.7   757.8     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .105  468.05    .065  522.72    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        468.05  522.72              110     100     110             .3       .5
Right Levee     Station=  599.85      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13896

INPUT
Description: USGS IL 2001.  USF Farm Road (Seavey27). The use of n=100 is to
             block of conveyance but retain storage computation. This is for
             f-table computation only.
outer point on LHS and 2 outer points
             on RHS are interpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  -480.9   722.6  -145.9  722.65 -143.63  722.65 -114.09  720.57  -83.41   719.2
  -52.65  718.68  -19.79  718.56  -14.91  717.64   -7.37  713.74   -4.35  714.08
    -2.3  710.54       0  709.56    2.27  709.86    3.87  710.25    5.09  711.71
    7.17  713.32   12.65   717.5   19.52  718.45   35.18  718.68    58.7  718.91
   83.13   720.2   97.56  720.08  164.36  719.37   212.4   720.8   252.4   721.6
   318.4   723.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  -480.9    .105  -14.91    .065   12.65    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -14.91   12.65               60      46      50             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -480.9      -6   719.8       F
       8   318.4   719.8       F
Right Levee     Station=   83.13      Elevation=

CULVERT


RIVER: Blackberry Creek
```

```
REACH: Trib C Before CA   RS: 13875

INPUT
Description: Farmers Road (Seavey27) IL USGS
Distance from Upstream XS =      11
Deck/Roadway Width        =      20
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      13
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
 -140.71  722.75          -131.8  722.37         -118.51  721.22
  -47.85   720.1          -23.84  719.84               0  719.45
   44.34  720.25          114.12  720.67          114.13  720.66
  181.97  721.31          182.08  721.32          206.78  721.58
  206.81  721.58

Upstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  -145.9  722.65 -143.63  722.65 -114.09  720.57  -83.41   719.2  -52.65  718.68
  -19.79  718.56  -14.91  717.64   -7.37  713.74   -4.35  714.08    -2.3  710.54
       0  709.56    2.27  709.86    3.87  710.25    5.09  711.71    7.17  713.32
   12.65   717.5   19.52  718.45   35.18  718.68    58.7  718.91   83.13   720.2
   97.56  720.08  164.36  719.37     211     720     310     722     380     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  -145.9      .1  -14.91    .014   12.65      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        -14.91   12.65             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -145.9      -6   719.8       F
       8     380   719.8       F
Right Levee     Station=   83.13      Elevation=

Downstream  Deck/Roadway Coordinates
    num=      13
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
 -140.71  722.75          -131.8  722.37         -118.51  721.22
  -47.85   720.1          -23.84  719.84               0  719.45
   44.34  720.25          114.12  720.67          114.13  720.66
  181.97  721.31          182.08  721.32          206.78  721.58
  206.81  721.58

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29   -17.7  718.68
   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32    6.67  715.22
   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19  201.99   720.4
     284     722     389     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 -136.45      .1   -17.7    .014   14.82      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -17.7   14.82             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -136.45   -4.75  717.76       F
    4.78     389  717.76       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
```

```
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse    6.58    7.28
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  4      36     .014     .014        0                  .5                1
Upstream   Elevation =  711.17
           Centerline Station =  1
Downstream Elevation =  711.17
           Centerline Station =  0

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13859

INPUT
Description: USGS IL 2001.  DSF Farm Road (Seavey27)
1 pt on LHS and 2 on the
             RHS (outermost) are interpolated from the 2004 TIN
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  -470.5   722.5 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29
   -17.7  718.68   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32
    6.67  715.22   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19
  201.99   720.4     256     722     342     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  -470.5    .105   -17.7    .065   14.82    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -17.7   14.82              145     130     154             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -470.5   -4.75  717.76       F
    4.78     342  717.76       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13812

INPUT
Description: USGS IL 2001.  Departure to Farm Road (Seavey27)
Several points
             on the LHS and the 2 outer points on the RHS are interpolated from
             the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0   727.1   42.16     727   96.54   726.6   158.3   726.2  221.22   725.9
  281.34   725.7  344.25   725.3  404.25   725.2  461.06   725.1  522.82   724.7
  558.61   724.4  587.97   724.2  627.78   723.9  662.55   723.6  702.92   723.3
  748.98     723  793.19   722.8  832.65   722.6  886.89   722.3   922.5   722.2
  968.59   721.9 1008.64   721.6 1071.67   721.5 1119.92   721.5 1163.63   721.8
 1191.96     722 1219.92 721.703    1242 723.407 1261.29 723.108 1322.51 717.477
 1337.65 717.289 1343.27 713.189 1345.73 711.588  1351.5 710.884 1358.27 710.875
 1362.02 711.468 1368.17 714.783 1374.67 717.301  1427.9 718.324 1478.97 720.331
 1514.71 720.634 1562.54 720.586 1607.43   721.9 1685.47     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
```

```
       0    .105 1337.65    .065 1374.67    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1337.65 1374.67             2162    2021    1923             .1       .3
Left Levee      Station=    1242      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 11691

INPUT
Description: IDNR 1985. C befoer CA 1093
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  718.68      42  719.18     114  719.98     163  719.58     215  719.88
     270  719.58     327  717.98     382  716.38     440  715.58     495  715.18
     541  715.48     605  716.18  647.01  714.78  655.01  711.78  658.01  711.18
  663.01  711.08  666.01  711.78  674.01  715.88  721.01  716.38  778.01  717.38
  834.01  717.98  892.01  719.18  946.01  722.18 1001.01  724.98 1058.01  728.18
 1114.01  730.48 1169.01  732.18 1227.01  733.68

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
       0     100     270    .105  647.01    .065  674.01    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        647.01  674.01             2140    2506    2590             .1       .3
Left Levee      Station=     605      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 9184

INPUT
Description: IDNR 1985. C before CA 846 (Verified) Distance Not Including Seavey
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  726.48      24  726.18      37  723.28      99  720.58     156  718.18
     214  717.08     270  716.08     326  715.68     385  714.18     442  713.08
  500.01  712.68  547.01  712.88  555.01  708.88  558.01  707.58  561.01  707.68
  563.01  708.88  571.01  712.88  626.01  712.88  683.01  713.78  739.01  714.08
  795.01  715.28  851.01  716.48  908.01  716.78  964.01  717.58 1022.01  717.88
 1079.01  718.18 1136.01  718.08 1194.01  718.38

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
       0    .105  547.01     .06  571.01    .105 1079.01     100

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        547.01  571.01             1440    1496    1560             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7588

INPUT
Description: USGS IL 2001.  Approach Seavey26; two RB extended pts and 4 LB
             extended pts, elevations from bb_tinascii
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -326     720    -296   717.9    -245     716    -150     714  -16.57  712.23
       0  711.15    3.12  708.72    5.24  707.06    9.21  705.97   12.14  705.78
   14.07  706.25    15.5  706.66   17.39  708.48   20.57  710.57   26.68  711.86
   42.34  711.47   54.49  712.31   87.28  713.03  106.96  713.73     319   721.4
```

```
    2614   723.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -326    .105       0     .06   20.57    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0   20.57              135     122     132             .3       .5

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7576

INPUT
Description: USGS IL 2001.  USF Seavey26 . The use of n=100 is to block of
             conveyance but retain storage computation. This is for f-table
             computation only.
Added extend pts-3 on LHS, 2 on RHS,
             elevations from bb_tinascii
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -340   719.8    -276     718    -192     716 -111.83  714.86  -75.45  714.69
   -44.6  713.53  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42
       0  705.39    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39
   53.77  712.49   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65
     297   720.5    2634     728

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -340    .105   -4.92     .06    11.8    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -4.92    11.8               48      46      48             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -340      -5     715       F
      12    2634     715       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7550

INPUT
Description: Seavey 26  IL USGS
Distance from Upstream XS =       6
Deck/Roadway Width        =      36
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
    -260  715.82         -104.91  715.44          -63.81   715.3
  -20.86   715.4          -10.42  715.43           50.12  715.48
   98.41  715.57          139.08  715.81             240   716.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -295     720    -161     716 -111.83  714.86  -75.45  714.69   -44.6  713.53
  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42       0  705.39
    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39   53.77  712.49
   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65     182     716
     274     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
```

```
    -295      .1   -4.92    .014    11.8      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -4.92    11.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -295      -5     715       F
      12     274     715       F

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************************************
    -260  715.96         -136.45  715.47          -73.33   715.6
  -27.61  715.84           19.92  715.89           56.43  715.85
   97.33  715.83          126.43  716.03          161.88  716.34
     240   716.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    -299     720    -270     716 -188.97  714.61 -153.89  713.64 -131.71  714.11
 -118.51   713.7  -92.92  713.04   -59.3  712.77     -25  712.87    -6.8  711.77
   -5.64   707.9   -2.28  706.86   -1.72  705.57       0  704.49    2.62   703.7
     6.7   703.6    8.63  703.85   10.06  704.22   12.18  704.14   13.64  703.87
    15.2  703.85   16.52  705.19   16.79  712.26   22.52  711.46   33.88  712.39
   63.18  713.39   83.33  714.16   98.36  714.21  110.58  713.23  143.91  713.47
  179.27  714.04     234     716     283     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
    -299      .1    -6.8    .014   16.79      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
          -6.8   16.79             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -299      -1   711.4       F
   16.17     283   711.4       F
Right Levee     Station=   16.79      Elevation=

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #2           Box       6     8.8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                   .4                1
Upstream   Elevation =  705.4
           Centerline Station = -0.15
Downstream Elevation =  705.3
           Centerline Station =  3.8

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6     7.5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                   .4                1
Upstream   Elevation =  705.45
           Centerline Station =  8.05
Downstream Elevation =  705.35
```

Centerline Station = 12

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7499

INPUT
Description: USGS IL 2001. DSF Seavey26. The use of n=100 is to block of conveyance but retain storage computation. This is for f-table computation only.Added extended pts-2 RHS and 3 LHS, elevations from bb_tinascii

Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-358	722.2	-292	720.3	-245	718.2	-188.97	714.61	-153.89	713.64
-131.71	714.11	-118.51	713.7	-92.92	713.04	-59.3	712.77	-25	712.87
-6.8	711.77	-5.64	707.9	-2.28	706.86	-1.72	705.57	0	704.49
2.62	703.7	6.7	703.6	8.63	703.85	10.06	704.22	12.18	704.14
13.64	703.87	15.2	703.85	16.52	705.19	16.79	712.26	22.52	711.46
33.88	712.39	63.18	713.39	83.33	714.16	98.36	714.21	110.58	713.23
143.91	713.47	179.27	714.04	351	720.6	2679	724.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-358	.105	-6.8	.06	16.79	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-6.8	16.79	162	146	142	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-358	-1	711.4	F
16.17	2679	711.4	F

Right Levee Station= 16.79 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7453

INPUT
Description: USGS IL 2001. Departure Seavey26; added 22 extend pts on LHS and 2 on RHS, elevations from bb_tinascii

Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-2419	729.2	-2254	730.5	-2102	731.3	-1952	731.7	-1824	731.7
-1754	731.9	-1665	732.3	-1595	733	-1501	734.4	-1380	735.6
-1258	736.6	-1136	737.7	-1031	738.7	-906	739.9	-802	740.1
-702	738.8	-593	738.4	-487	734	-378	730.7	-292	729.3
-192	723.3	-107	719.8	0	713.98	37.16	713.08	80.37	712.06
116.16	711.3	143.93	710.58	160.37	710.92	171.65	709.95	174.29	708.99
175.95	706.88	180.25	705.73	186.19	705.42	191.48	705.75	194.47	705.81
195.89	706.81	196.8	707.82	198.83	708.89	204.64	713.8	211.67	713.72
218.75	713.97	223.37	713.73	229.89	711.49	255.23	711.08	334.18	712.42
512	718.4	2839	728.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-2419	.105	171.65	.06	204.64	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.65	204.64	1540	1490	1570	.1	.3

Right Levee Station= 218.75 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5863

```
INPUT
Description: IDNR, 1985.  C before CA 513
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  720.08      55  719.38     112  717.48     170  714.68     228  711.98
     286  710.18     373  709.38     379  707.38     380  705.28     382  704.98
     386  704.68     389  704.98     391  705.28     403  709.98     411  709.38
     468  709.28     522  709.28     580  709.28     640  710.58     695  711.38
  752.01  712.88  808.01  713.98  864.01  715.38  922.01  716.88  979.01  717.98
 1035.01  719.68 1091.01  721.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .105     373     .06     403    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           373     403              530     608     703             .1       .3
Right Levee     Station=     403      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5256

INPUT
Description: IDNR 2001.  TP#0 off kane 32 Approach to I-88
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -134     720       0  718.23   57.09 716.021  111.01 714.792   164.2 712.864
  218.95  710.29  271.69  709.07  323.06 708.367   369.9 706.971  389.15 708.237
  396.25 704.846  398.52  704.28  409.99 704.265  419.34  704.24  431.06 704.746
  440.45 708.745   475.2  709.07  532.47  709.35   582.9 709.461  633.34 709.624
  680.43 709.962  726.24   710.4  774.08 710.705  825.99 710.887  877.81 712.035
  932.11 713.742  985.25     715 1037.43 715.542    1080     716    1114     718
    1182     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -134    .075  389.15     .06  440.45    .075

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        389.15  440.45              175     152     108             .2       .3
Left Levee      Station=  389.15      Elevation= 708.237

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5104

INPUT
Description: IDNR 2001. Section A I88 USF.
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -686     720 -528.47  717.55 -374.86  714.61 -322.66  713.52 -268.02  711.62
 -211.93  709.89 -152.45  708.98  -95.32   708.7   -63.2  706.91   -58.1   704.7
  -48.87  704.54  -41.74  704.35  -38.64  706.33  -25.17  705.88       0  707.51
   56.49  708.23  114.04  708.73  171.49  708.99  225.74  709.39  283.09  709.98
  336.84  710.54  389.38  711.09  448.08  712.48  504.19  713.22   561.4  714.12
  620.15  714.45     674     716     744     718     787     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -686    .105   -63.2     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -63.2       0              250     230     240             .3       .5
Ineffective Flow     num=       2
```

Sta L	Sta R	Elev	Permanent
-686	-63	718	F
-30	787	718	F

CULVERT

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5103

INPUT
Description: I-88 New IDNR
Distance from Upstream XS = 25
Deck/Roadway Width = 150
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-590	721.9		-493	721.3		-396	720.8	
-200	719.8		-101.5	718.1		139	719	
236	719.1		341	719.36		438	720.2	
535	721.1		631	721.7				

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-686	720	-528.47	717.55	-374.86	714.61	-322.66	713.52	-268.02	711.62
-211.93	709.89	-152.45	708.98	-95.32	708.7	-63.2	706.91	-58.1	704.7
-48.87	704.54	-41.74	704.35	-38.64	706.33	-25.17	705.88	0	707.51
56.49	708.23	114.04	708.73	171.49	708.99	225.74	709.39	283.09	709.98
336.84	710.54	389.38	711.09	448.08	712.48	504.19	713.22	561.4	714.12
620.15	714.45	674	716	744	718	787	720		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-686	.1	-63.2	.014	0	.1

Bank Sta: Left Right Coeff Contr. Expan.
-63.2 0 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-686	-63	718	F
-30	787	718	F

Downstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-590	721.9		-493	721.3		-396	720.8	
-200	719.8		-101.5	718.1		139	719	
236	719.1		341	719.36		438	720.2	
535	721.1		631	721.7				

Downstream Bridge Cross Section Data
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-508.42	712.84	-451.43	712.89	-398.35	712.66	-342.27	712.31	-285.28	711.7
-228.51	710.71	-172.24	710.18	-114.82	708.95	-65.67	705.15	-63.25	704.68
-57.87	701.51	-27.28	702.49	-22.75	703.54	-14.84	704.46	0	705.75
62.13	708.26	114.41	708.41	170.77	708.67	221.5	709.68	277.13	709.95
329.33	710.29	381.2	710.91	421	712	459	714		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-508.42	.1	-63.25	.014	0	.1

Bank Sta: Left Right Coeff Contr. Expan.
-63.25 0 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
 -508.42     -52   712.1       F
     -29     459   712.1       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       8       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Outlet control
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18     180     .014     .014        0                   .4                1
Number of Barrels =  2
Upstream   Elevation =  704.4
Centerline Stations
    Sta.    Sta.
     -52     -43
Downstream Elevation =  704.1
Centerline Stations
    Sta.    Sta.
     -45     -36

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4652

INPUT
Description: IDNR 2001. Section D DSF I-88.
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -508.42  712.84 -451.43  712.89 -398.35  712.66 -342.27  712.31 -285.28   711.7
 -228.51  710.71 -172.24  710.18 -114.82  708.95  -65.67  705.15  -63.25  704.68
  -57.87  701.51  -27.28  702.49  -22.75  703.54  -14.84  704.46       0  705.75
   62.13  708.26  114.41  708.41  170.77  708.67   221.5  709.68  277.13  709.95
  329.33  710.29   381.2  710.91     421     712     459     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
 -508.42    .105  -63.25     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -63.25       0              138     120     140              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -508.42     -52   712.1       F
     -29     459   712.1       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4511

INPUT
Description: IDNR 2001. 1TP #2 off KANE 32 Depart from I-88; extended 2 pts on
             each side, elevation from bb_tinascii
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -889   721.6    -582     715  -445.7  711.17 -392.55  711.04  -343.9  711.35
 -289.26  711.86 -237.33  711.75 -184.94  711.62 -136.77  711.84  -89.81  711.14
  -55.84  710.13  -43.48  707.49  -39.71   704.7  -36.71  704.12  -31.21  703.76
  -25.38  704.02  -22.76  704.72  -16.52  708.76       0  709.01   47.92  709.24
```

```
  100.01  709.62  154.14  709.92  207.49  710.96  268.79  711.45  324.93  711.63
     580   714.4     650   715.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -889    .105  -55.84     .06  -16.52    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -55.84  -16.52              485     660     768             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 3851

INPUT
Description: IDNR 1985. C before CA 340
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   692.5  722.58   739.5  721.88   819.5  716.28   867.5  713.98   881.5  712.68
   925.5  708.98   972.5  707.18   991.5  706.58   996.5  703.68   997.5  703.38
  1001.5  703.48  1003.5  703.78  1008.5  706.08  1055.5  707.08  1100.5  707.08
  1146.5  707.18  1193.5  707.08 1242.51  707.08 1288.51  708.48 1336.51  709.48
 1384.51  710.18 1434.51  710.68 1485.51  711.48 1535.51  711.28 1586.51  711.48
 1638.51  712.08 1689.51  712.88 1740.51  713.48 1793.51  714.28 1844.51  715.98
 1866.51  717.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   692.5    .105   991.5     .07  1008.5    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         991.5  1008.5              649     712     738             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 3139

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  423.36   726.5  472.16  727.24  549.39  727.27  673.17  726.79  696.14  724.06
  705.73  724.23  726.16   721.9  796.85  710.63  900.88  708.11  926.31  707.08
  939.84  706.59  959.01  706.78  970.74  706.45  975.99   706.4  976.44  706.49
  978.09  706.67  983.77  706.34     987  706.11  991.82   704.1  993.16   702.8
   994.9  702.32   999.1  701.88 1001.03  702.07 1005.41  702.52 1006.76  703.15
 1008.38  704.16    1013  706.31 1014.95  706.53 1016.26  706.63 1017.95  706.72
 1023.44   706.8 1031.39  706.29 1036.47  706.38  1038.5  706.18 1045.04  706.63
  1053.6  706.47 1059.95   706.2 1074.93  706.24 1139.28   706.6 1197.27  709.47
 1242.33  709.35 1287.17  709.13 1316.01  709.16 1431.04  709.67 1515.42  710.48
 1575.64  712.16 1646.39  714.43 1704.68  716.04 1745.66  717.46 1814.17  717.79
 1828.03  717.55 1847.39     718

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  423.36     .12     987     .07    1013     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           987    1013              259     259     259             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2880
```

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
404.3	723.22	415.19	723.48	431.78	723.68	439.79	723.96	470.21	723.9
476.16	724.09	487.36	724.03	493.3	724.16	502.99	724.3	531.86	723.7
545.63	723.62	618.74	723.43	639.01	723.99	656.15	723.89	689.98	721.08
715.9	720.98	803.78	714.97	832.83	712.35	853.83	711.76	869.74	710.45
887.78	709.75	900.58	709.31	906.7	708.45	944.3	706.28	953.52	705.97
962.4	705.82	967.24	706.08	969.62	705.88	977.59	706.41	985.26	706.12
986.24	705.89	989.6	704.12	991.26	703.05	993.39	702.23	998.07	701.72
1002.86	701.7	1003.71	702	1007.05	703.18	1008	704.08	1013.75	706.91
1028.46	706.59	1031.16	705.96	1039.89	706.25	1044	706.18	1044.6	706.12
1046.3	706.17	1048.28	706.16	1053.96	705.91	1059.04	706.01	1066.52	705.91
1068.1	705.69	1073.64	705.63	1085.04	706.1	1088.48	705.85	1096.48	705.89
1103.57	705.72	1111.22	706.08	1118.94	705.93	1136.82	706.09	1156.58	706.45
1188.26	708.45	1194.88	708.87	1204.52	709.25	1208.36	709.27	1212.04	709.46
1217.15	709.52	1225.12	709.34	1232.17	709.66	1235.09	709.43	1239.75	709.33
1242.45	709.46	1249.68	709.09	1257.78	709.13	1269.76	708.42	1308.47	707.78
1348.98	708.09	1390.81	707.76	1414.66	708.41	1429.61	709.62	1461.31	711.59
1527.54	715.21	1538.02	716.04	1553.28	716.11	1583.62	718.35	1620.71	720.15
1657.36	722.88	1697.38	724.78	1706.99	725.81	1717.53	726.15	1722.78	725.84
1733.32	727.38	1741.44	727.73	1765.47	728.33	1781.06	729.62	1857.1	731

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
404.3	.12	986.24	.07	1013.75	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
986.24	1013.75	233	233	233	.1	.3

Right Levee Station= 1217.15 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2647

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
388.38	720.6	499.07	721.76	612.18	721.6	622.04	722.32	632.68	722.17
645.15	723.94	658.77	723.22	670.68	723.7	680.57	722.41	701.2	722.11
711.07	721.91	725.47	722.3	733.79	721.32	742.08	721.59	747.98	721.43
798.18	717.22	843.82	713.82	853.43	712.28	860.33	711.61	877.53	710.47
886.21	710.42	910.76	708.76	989.04	705.68	992.48	703.16	994.77	702
1000	701.49	1001.26	701.59	1004.3	701.82	1006.57	702.9	1007.24	704.07
1011.35	705.96	1104.05	705.99	1208.19	706.16	1274.15	706.93	1300.39	707.79
1359	708.06	1390.36	709	1435.3	709.07	1491.56	712.48	1650.3	725.95
1741.73	731.94	1748.54	731.81	1806.73	734.14	1843.36	734.37	1858.06	734

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
388.38	.12	989.04	.07	1011.35	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
989.04	1011.35	225	225	225	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2422

INPUT
Description: IDNR 1985. C before CA 198
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
689.5	719.08	710.5	718.78	760.5	716.88	806.5	713.58	853.5	710.68

```
   900.5  708.38   943.5  706.48   990.5  705.28   993.5  702.88   996.5  702.08
  1001.5  701.98  1002.5  702.78  1009.5  705.38  1075.5  705.78  1123.5  705.28
  1168.5  705.48  1216.5  705.48  1259.5  705.18  1304.5  704.08  1344.5  708.68
  1385.5  709.48  1417.5  710.08  1475.5     712  1495.5     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   689.5     .12   990.5     .07  1009.5     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         990.5  1009.5                 7       7       7             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
  1259.5  1495.5  705.15

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2415

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      57
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  421.44  720.13   605.3  720.22   614.3  720.97  651.97  720.09  687.23  719.95
  695.02  718.83   727.3  718.58  743.24  718.24  767.76  717.29  772.52  717.49
  786.82  716.59   799.1  714.82  867.45  709.55  878.72  709.45  932.76  706.68
  936.71  706.82  963.66  705.73  968.17  706.12  982.77  706.27   988.1  705.75
  990.76   705.3  992.07  704.21  992.97  703.25  995.67  702.17    1000  702.06
 1003.54  702.11 1005.09  702.13 1006.76  702.94 1007.57  704.22 1010.73  705.52
 1013.72  705.55 1015.82  705.78 1017.78     706 1025.46  706.06 1028.89  706.38
 1047.29  705.89  1066.3  705.96 1115.66  705.19 1146.12  705.28 1172.55  705.35
 1176.61  705.56 1180.25  705.26 1202.95  705.16 1255.52  706.25 1297.46  707.96
 1329.69   708.1 1335.29   708.9 1346.82  708.42 1353.72  709.44 1370.12  708.66
 1392.36   708.7 1485.77  711.39 1545.39  717.61 1606.04   721.5 1727.56  729.84
 1790.33  731.52    1872  732.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  421.44     .12  990.76     .07 1010.73     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        990.76 1010.73               321     176     133             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2139

INPUT
Description: USGS IL 2001. . Approach CS to Rte 47-25

Outer 3 pts on RHS
             interpolated from the 2004 TIN, by BW 1-28-05
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  583.91  721.51     688  719.38  796.27  712.28  855.07  708.57  964.47  705.32
  988.03  704.68  989.87  702.77  991.88  701.58    1006  701.27 1008.95  703.57
 1011.97  705.27 1052.11  704.51 1228.51  704.74 1281.57  707.34 1307.81   710.2
 1368.01   714.2 1413.41   718.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  583.91     .12  988.03     .07 1011.97     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        988.03 1011.97                 3       3       3             .1       .3
```

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2136

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
537.66	721.44	553.41	721.55	555.96	721.46	558.52	721.41	564.32	721.53
568.67	721.45	571.27	721.73	572.59	721.61	577.1	721.78	584.95	721.49
586.27	721.47	643.09	720.87	668.39	721.02	669.93	721	729.27	716.64
742.83	715.46	758.09	714.4	762.04	714.24	765	714.05	767.53	713.89
778.02	713.23	781.16	713.04	782.18	712.92	816.49	710.8	822.16	710.46
834.01	709.59	841.76	709.52	856.21	708.56	893.4	707.36	894.56	707.31
926.32	706.45	958.61	705.56	978.67	705.48	984.26	705.49	987.42	704.35
989.3	703.3	993.7	701.82	997.41	701.47	998.16	701.41	1003.92	701.33
1004.73	701.62	1008.97	703.11	1010.11	704.48	1015.74	705.56	1024.82	705.31
1042.11	705.05	1046.21	704.06	1052.01	704.84	1056.45	704.96	1064.24	704.71
1069.85	704.77	1082.31	705.14	1085.15	705.18	1112.77	705.08	1120.67	705.19
1163.82	704.98	1164.24	704.96	1225.93	705.16	1276.85	706.68	1297.44	707.5
1367.87	713.48	1436.23	718.99	1470.38	722.75	1572.18	731.45		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
537.66	.12	984.26	.07	1015.74	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
984.26	1015.74	400	314	323	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 1947

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
534.6	721.84	643.49	719.59	690.18	718.15	720.97	714.95	754.68	713.42
800.06	710.97	829.72	708.73	847.33	708.43	853.77	707.99	897.93	707.01
932.52	706.17	951.75	705.98	962.96	706.11	985.79	705.48	987.57	703.88
989.34	702.74	993	701.76	999.48	701.47	1004.28	701.84	1005.44	702.11
1009.54	703.03	1011.45	704.45	1014.22	704.93	1034.98	705.86	1105.57	705.6
1138.5	706.84	1207.72	705.12	1252.59	706.58	1355.54	714.57	1434.09	719.83
1450.28	722.33	1555.35	735.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
534.6	.12	985.79	.07	1014.22	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
985.79	1014.22	85	69	61	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 1903

INPUT
Description: USGS IL 2001. Depart Rte 47-25
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
616.77	718.43	794.52	714	813.52	712	869.52	708	929.52	705.52
987.71	705.81	992.43	704.98	993.49	703.55	995.76	703.21	997.12	701.6
1010.91	703.72	1012.29	705.52	1079.7	706.84	1128.79	707.19	1218.83	705.17

```
 1247.52     708 1277.52     710 1293.52     712 1320.52     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  616.77     .12  987.71     .07 1012.29     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        987.71 1012.29              161     158     199             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1727

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      75
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  343.07  719.59  390.44   719.5  429.05  719.78  513.42  719.12  596.46  717.77
  647.71  714.57  690.31  712.98  724.07  710.86  781.74  709.17  811.91  707.61
  857.78  706.52  895.61  706.25  899.24  705.74  918.02  705.27  937.57  705.57
  943.69  705.39  949.46  705.57  957.32  705.57  960.34  705.64  963.51  705.53
  968.18  705.49  973.73  705.58  989.86  705.67  993.23  704.16   994.5  703.59
  996.04  702.93    1000  702.56 1004.63  702.86 1006.48  703.29 1008.86  704.94
 1023.73  705.51 1026.25  705.61 1042.76  705.65  1051.6  705.19 1062.84  705.31
 1071.73  705.04 1082.43  705.36 1097.64  705.09 1112.98   705.2 1120.82   704.4
 1131.16  705.51 1141.08  704.88 1158.24  704.76 1172.62  704.32 1184.35  704.77
 1208.37  704.78 1220.68  705.93 1235.89  705.68 1255.79  706.57 1269.02  706.34
 1276.48  707.68 1291.34  707.97 1304.02  708.76 1311.71  708.31 1315.79  708.34
 1328.45  709.68 1347.73  710.72 1354.59  711.84 1368.38  713.24 1376.48  713.67
 1385.26  714.77 1397.53  715.67 1403.24   715.7 1422.52  717.31 1428.11  718.79
  1437.4  718.89 1449.27  719.69 1453.37  719.63 1484.56   723.9 1509.67  726.49
  1532.3  727.11 1541.87  728.32 1555.94     729 1573.38  730.65 1579.78  730.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  343.07     .12  989.86     .07 1008.86     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        989.86 1008.86              192     188     237             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1517

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  350.28   717.6  390.66  718.09  403.66  716.71  437.67  715.58  443.45  715.86
  459.85  714.38  475.41  714.88  494.72  714.23  545.37  710.31  663.96  709.19
  717.56  709.43  765.49   709.1  819.77  709.52   851.7  708.27  889.94  706.43
  913.37  705.32  961.91   705.1  981.66  705.52  994.86  702.51   996.5  701.86
 1003.57  702.19 1011.89  702.13 1013.28   702.5 1018.33  705.04 1096.97  704.22
 1149.99  704.75 1183.41  704.81 1185.69  705.19  1216.4   704.7 1236.15  705.16
 1249.98  704.64 1292.26  705.23 1316.31  707.72 1337.57  708.69 1341.95  709.86
 1348.72  709.16 1374.19  710.03 1382.28  711.26 1409.03  712.18 1562.14  723.08
 1566.73  722.88  1579.9     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  350.28     .12  981.66     .07 1018.33     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        981.66 1018.33              135     133     167             .1       .3

CROSS SECTION
```

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 1369

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
342.91	717.74	423.21	715.01	442.21	713.84	460.34	713.17	508.13	713.88
546.64	711.72	556.49	712.37	614.14	711.31	663.73	710.82	700.95	710.01
744.85	709.89	760.77	709.16	806.57	709.1	818.92	708.68	838.83	709.13
870.4	709.18	899.41	708.23	907.7	707.49	914.25	705.89	917.14	705.63
922.45	705.37	925.4	705.42	933.85	705.14	943.35	705.02	958.26	704.68
966.02	704.64	974.95	704.22	976.59	704.31	985.46	704.55	990.86	704.59
995.75	702.4	997.55	701.83	1000	701.33	1001.96	701.54	1002.94	701.64
1006.67	702.31	1011.02	704.44	1017.96	704.64	1022.14	704.64	1027.02	704.85
1031.61	704.32	1035.57	704.67	1041.72	705.65	1044.64	705.85	1047.75	705.91
1058.17	705.63	1064.28	704.82	1065.69	704.5	1106.99	704.18	1110.83	704.79
1119.25	704.41	1123.54	704.77	1130.54	704.3	1139.05	704.52	1143.04	704.09
1169.88	704.43	1179.35	705.54	1186.27	705.87	1188.9	706.24	1197.06	705.82
1205.74	704.72	1220.33	704.54	1222.13	704.78	1236.95	705.3	1245.89	705.44
1255.3	706.29	1257.51	706.38	1264.98	706.41	1276.63	706.78	1288.86	706.8
1290.73	706.62	1296.65	707.8	1306.09	707.24	1317.24	706.76	1325.62	707.29
1331.32	708.51	1342.76	707.95	1349.83	708.51	1353.97	708.1	1378.33	708.91
1393.68	709.84	1400.42	709.56	1412.19	710.39	1419.16	710.47	1431.33	711.81
1459.9	712.68	1486.22	714.75	1521.62	719.25	1567.85	721.34	1590.73	721.59

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
342.91	.12	985.46	.07	1017.96	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
985.46	1017.96	275	271	341	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 1067

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
273.6	714	342.55	714.18	380.96	713.37	397.8	712.77	413.66	711.83
420.44	712.38	456.7	710.86	473.9	711.11	489.37	710.87	496.04	710.16
525.14	710.39	566.05	709.75	587.65	711.19	617.78	710.9	647.22	709.61
664.59	710.06	717.88	709.06	730.65	709.31	741.18	710.17	777.87	709.3
823.05	708.83	845.98	709.08	846.44	709.06	846.97	709.03	874.94	709.66
918.33	708.35	919.73	708.24	947.26	705.81	947.88	705.81	948.37	705.8
971.83	704.62	986.98	704.2	991.57	703.97	995.9	701.83	997.36	700.99
1000	700.14	1002.43	700.32	1005	701.02	1010.98	703.69	1013.94	704.35
1028.79	704.54	1063.57	704.05	1104.41	704.04	1112.5	704.49	1122.99	703.78
1129.11	702.1	1198.08	703	1248.62	702.48	1270.56	704.07	1304.18	704.28
1312.9	706.36	1317.79	706.41	1329.3	704.87	1361.45	707.9	1391.61	708.23
1419.58	709.93	1495.22	710.75	1582.46	718.68	1609.03	724.19	1642.39	724.41

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
273.6	.12	986.98	.07	1013.94	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
986.98	1013.94	124	122	154	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 931

```
INPUT
Description: IDNR 1985. C before CA 051
extended points added on the
             floodplain which were interpolated formt he 2004 TIN
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  705.03  710.18  752.06  709.18  799.99  708.58  849.08  707.88  880.03  707.08
  919.01  704.78  966.04  703.98  981.99  703.68  990.02  701.88     993  701.38
    1000  701.08    1002  701.88 1006.05  704.28 1057.01  703.48 1101.01  703.68
 1150.02  704.18 1191.08  703.88 1235.01  705.28 1285.06  704.78 1339.05  704.68
    1388  704.28 1431.03  704.88 1493.73   705.7 1545.83     706 1594.83     708
 1615.83   709.7 1641.53   711.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  705.03     .12  966.04     .07 1006.05     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        966.04 1006.05                0       0       0             .1       .3
Right Levee     Station= 1006.03      Elevation=

*******************************************************************************

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek
*************************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *   n4    *
*************************************************************************
*Trib C Before CA*    15195       *     .105*     .065*     .105*         *
*Trib C Before CA*    13934       *     .105*     .065*     .105*         *
*Trib C Before CA*    13896       *     .105*     .065*     .105*         *
*Trib C Before CA*    13875       *Culvert  *        *        *        *
*Trib C Before CA*    13859       *     .105*     .065*     .105*         *
*Trib C Before CA*    13812       *     .105*     .065*     .105*         *
*Trib C Before CA*    11691       *      100*     .105*     .065*     .105*
*Trib C Before CA*    9184        *     .105*      .06*     .105*      100*
*Trib C Before CA*    7588        *     .105*      .06*     .105*         *
*Trib C Before CA*    7576        *     .105*      .06*     .105*         *
*Trib C Before CA*    7550        *Culvert  *        *        *        *
*Trib C Before CA*    7499        *     .105*      .06*     .105*         *
*Trib C Before CA*    7453        *     .105*      .06*     .105*         *
*Trib C Before CA*    5863        *     .105*      .06*     .105*         *
*Trib C Before CA*    5256        *     .075*      .06*     .075*         *
*Trib C Before CA*    5104        *     .105*      .06*     .105*         *
*Trib C Before CA*    5103        *Culvert  *        *        *        *
*Trib C Before CA*    4652        *     .105*      .06*     .105*         *
*Trib C Before CA*    4511        *     .105*      .06*     .105*         *
*Trib C Before CA*    3851        *     .105*      .07*     .105*         *
*Trib C Before CA*    3139        *      .12*      .07*      .12*         *
*Trib C Before CA*    2880        *      .12*      .07*      .12*         *
*Trib C Before CA*    2647        *      .12*      .07*      .12*         *
*Trib C Before CA*    2422        *      .12*      .07*      .12*         *
*Trib C Before CA*    2415        *      .12*      .07*      .12*         *
*Trib C Before CA*    2139        *      .12*      .07*      .12*         *
*Trib C Before CA*    2136        *      .12*      .07*      .12*         *
*Trib C Before CA*    1947        *      .12*      .07*      .12*         *
*Trib C Before CA*    1903        *      .12*      .07*      .12*         *
*Trib C Before CA*    1727        *      .12*      .07*      .12*         *
*Trib C Before CA*    1517        *      .12*      .07*      .12*         *
*Trib C Before CA*    1369        *      .12*      .07*      .12*         *
*Trib C Before CA*    1067        *      .12*      .07*      .12*         *
*Trib C Before CA*    931         *      .12*      .07*      .12*         *
*************************************************************************

*******************************************************************************

SUMMARY OF REACH LENGTHS

River: Blackberry Creek
*****************************************************************
*     Reach      *   River Sta.   *  Left   * Channel *  Right  *
*****************************************************************
```

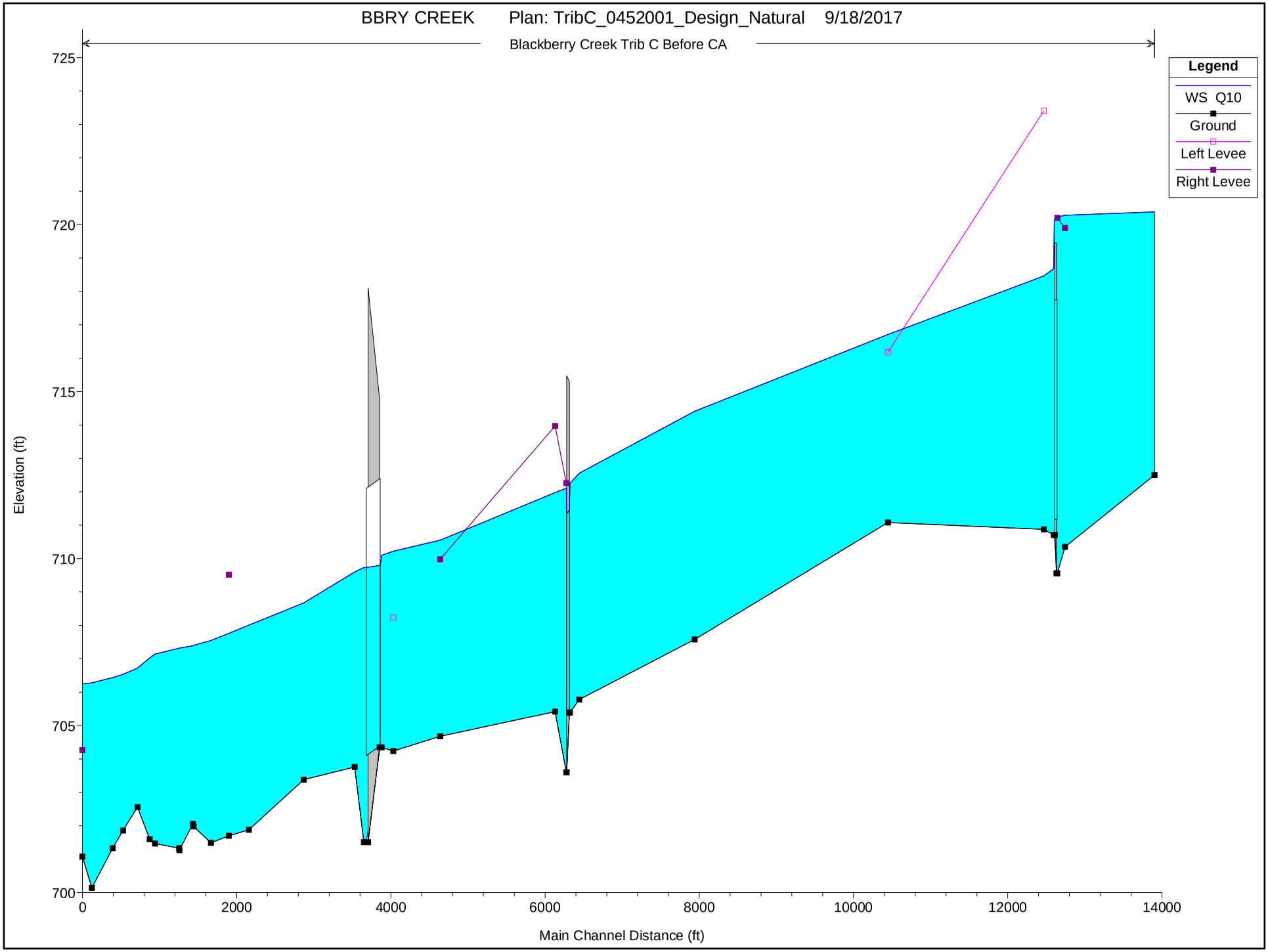
```
*Trib C Before CA*    15195       *     1162*     1160*     1140*
*Trib C Before CA*    13934       *      110*      100*      110*
*Trib C Before CA*    13896       *       60*       46*       50*
*Trib C Before CA*    13875       *Culvert  *         *         *
*Trib C Before CA*    13859       *      145*      130*      154*
*Trib C Before CA*    13812       *     2162*     2021*     1923*
*Trib C Before CA*    11691       *     2140*     2506*     2590*
*Trib C Before CA*    9184        *     1440*     1496*     1560*
*Trib C Before CA*    7588        *      135*      122*      132*
*Trib C Before CA*    7576        *       48*       46*       48*
*Trib C Before CA*    7550        *Culvert  *         *         *
*Trib C Before CA*    7499        *      162*      146*      142*
*Trib C Before CA*    7453        *     1540*     1490*     1570*
*Trib C Before CA*    5863        *      530*      608*      703*
*Trib C Before CA*    5256        *      175*      152*      108*
*Trib C Before CA*    5104        *      250*      230*      240*
*Trib C Before CA*    5103        *Culvert  *         *         *
*Trib C Before CA*    4652        *      138*      120*      140*
*Trib C Before CA*    4511        *      485*      660*      768*
*Trib C Before CA*    3851        *      649*      712*      738*
*Trib C Before CA*    3139        *      259*      259*      259*
*Trib C Before CA*    2880        *      233*      233*      233*
*Trib C Before CA*    2647        *      225*      225*      225*
*Trib C Before CA*    2422        *        7*        7*        7*
*Trib C Before CA*    2415        *      321*      176*      133*
*Trib C Before CA*    2139        *        3*        3*        3*
*Trib C Before CA*    2136        *      400*      314*      323*
*Trib C Before CA*    1947        *       85*       69*       61*
*Trib C Before CA*    1903        *      161*      158*      199*
*Trib C Before CA*    1727        *      192*      188*      237*
*Trib C Before CA*    1517        *      135*      133*      167*
*Trib C Before CA*    1369        *      275*      271*      341*
*Trib C Before CA*    1067        *      124*      122*      154*
*Trib C Before CA*    931         *        0*        0*        0*
*******************************************************************

*******************************************************************************

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

*****************************************************
*     Reach      *   River Sta.   * Contr.  * Expan.  *
*****************************************************
*Trib C Before CA*    15195   *       .1*       .3*
*Trib C Before CA*    13934   *       .3*       .5*
*Trib C Before CA*    13896   *       .3*       .5*
*Trib C Before CA*    13875   *Culvert  *         *
*Trib C Before CA*    13859   *       .3*       .5*
*Trib C Before CA*    13812   *       .1*       .3*
*Trib C Before CA*    11691   *       .1*       .3*
*Trib C Before CA*    9184    *       .1*       .3*
*Trib C Before CA*    7588    *       .3*       .5*
*Trib C Before CA*    7576    *       .3*       .5*
*Trib C Before CA*    7550    *Culvert  *         *
*Trib C Before CA*    7499    *       .3*       .5*
*Trib C Before CA*    7453    *       .1*       .3*
*Trib C Before CA*    5863    *       .1*       .3*
*Trib C Before CA*    5256    *       .2*       .3*
*Trib C Before CA*    5104    *       .3*       .5*
*Trib C Before CA*    5103    *Culvert  *         *
*Trib C Before CA*    4652    *       .3*       .5*
*Trib C Before CA*    4511    *       .1*       .3*
*Trib C Before CA*    3851    *       .1*       .3*
*Trib C Before CA*    3139    *       .1*       .3*
*Trib C Before CA*    2880    *       .1*       .3*
*Trib C Before CA*    2647    *       .1*       .3*
*Trib C Before CA*    2422    *       .1*       .3*
*Trib C Before CA*    2415    *       .1*       .3*
*Trib C Before CA*    2139    *       .1*       .3*
*Trib C Before CA*    2136    *       .1*       .3*
*Trib C Before CA*    1947    *       .1*       .3*
*Trib C Before CA*    1903    *       .1*       .3*
*Trib C Before CA*    1727    *       .1*       .3*
*Trib C Before CA*    1517    *       .1*       .3*
```

```
*Trib C Before CA*    1369    *       .1*       .3*
*Trib C Before CA*    1067    *       .1*       .3*
*Trib C Before CA*    931     *       .1*       .3*
*****************************************************
```


BBRY CREEK Plan: TribC_0452001_Design_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q10
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 11:50:25 AM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q10	378.00	712.50	720.38	715.64	720.38	0.000049	0.38	1453.46	855.24	0.04
Trib C Before CA	13934	Q10	369.00	710.35	720.28	713.58	720.29	0.000209	0.96	629.45	282.87	0.07
Trib C Before CA	13896	Q10	369.00	709.56	720.22	714.24	720.25	0.000475	1.57	438.91	299.34	0.11
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q10	369.00	710.71	718.68	715.11	718.81	0.003348	2.95	144.55	130.80	0.27
Trib C Before CA	13812	Q10	369.00	710.88	718.46	713.48	718.51	0.000678	1.75	258.47	119.63	0.13
Trib C Before CA	11691	Q10	364.00	711.08	716.71	714.19	716.75	0.001172	1.92	429.52	369.27	0.17
Trib C Before CA	9184	Q10	349.00	707.58	714.41	711.48	714.44	0.000762	1.74	494.37	378.63	0.14
Trib C Before CA	7588	Q10	349.00	705.78	712.56	709.37	712.70	0.002340	3.18	152.16	107.01	0.25
Trib C Before CA	7576	Q10	349.00	705.39	712.25	707.83	712.40	0.002650	3.09	113.13	16.71	0.21
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q10	349.00	703.60	712.10	706.32	712.17	0.000849	2.06	170.48	29.11	0.14
Trib C Before CA	7453	Q10	347.00	705.42	711.98	707.95	712.04	0.000944	2.06	230.36	118.14	0.16
Trib C Before CA	5863	Q10	347.00	704.68	710.55	707.84	710.58	0.000973	1.78	439.95	364.71	0.16

Trib C Before CA	5256	Q10	361.00	704.24	710.22	705.85	710.23	0.000146	0.87	741.77	485.80	0.07
Trib C Before CA	5104	Q10	361.00	704.35	710.10	706.77	710.18	0.001038	2.25	160.70	513.20	0.18
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q10	361.00	701.51	709.73	704.03	709.80	0.000452	2.05	176.32	383.68	0.13
Trib C Before CA	4511	Q10	362.00	703.76	709.60	706.46	709.70	0.002076	2.57	178.59	150.59	0.24
Trib C Before CA	3851	Q10	362.00	703.38	708.67	707.08	708.69	0.000793	1.50	569.85	364.35	0.13
Trib C Before CA	3139	Q10	362.00	701.88	708.01	705.04	708.04	0.001038	1.79	432.01	264.32	0.15
Trib C Before CA	2880	Q10	362.00	701.70	707.76	704.67	707.79	0.000879	1.62	465.31	258.77	0.14
Trib C Before CA	2647	Q10	362.00	701.49	707.55	704.72	707.57	0.000959	1.70	518.72	351.51	0.14
Trib C Before CA	2422	Q10	363.00	701.98	707.40	705.84	707.41	0.000437	1.09	788.34	410.79	0.09
Trib C Before CA	2415	Q10	363.00	702.06	707.39	705.08	707.41	0.000708	1.42	619.65	364.67	0.12
Trib C Before CA	2139	Q10	363.00	701.27	707.32	703.92	707.33	0.000242	0.93	886.44	384.04	0.07
Trib C Before CA	2136	Q10	363.00	701.33	707.32	704.14	707.32	0.000338	1.01	792.73	398.48	0.08
Trib C Before CA	1947	Q10	363.00	701.47	707.14	704.12	707.17	0.000830	1.61	519.37	367.90	0.13
Trib C Before CA	1903	Q10	363.00	701.60	707.03	705.13	707.08	0.002518	2.34	349.48	314.55	0.22
Trib C Before CA	1727	Q10	363.00	702.56	706.72	705.48	706.73	0.001260	1.60	566.27	421.75	0.16
Trib C Before CA	1517	Q10	363.00	701.86	706.54	704.30	706.54	0.000483	1.05	732.59	417.13	0.10
Trib C Before CA	1369	Q10	363.00	701.33	706.44	704.89	706.45	0.000856	1.30	586.71	353.86	0.13
Trib C Before CA	1067	Q10	363.00	700.14	706.28	703.33	706.28	0.000186	0.70	1007.60	396.14	0.06
Trib C Before CA	931	Q10	364.00	701.08	706.25	704.27	706.25	0.000234	0.73	1143.90	657.86	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q10	720.38	720.38	0.00	0.09	0.00	12.94	287.25	77.80	855.24
Trib C Before CA	13934	Q10	720.29	720.28	0.01	0.03	0.01	26.40	278.58	64.02	282.87
Trib C Before CA	13896	Q10	720.25	720.22	0.03			40.85	292.55	35.60	299.34
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q10	718.81	718.68	0.13	0.26	0.04	2.00	362.39	4.61	130.80
Trib C Before CA	13812	Q10	718.51	718.46	0.05	1.76	0.00	7.07	352.66	9.28	119.63
Trib C Before CA	11691	Q10	716.75	716.71	0.03	2.31	0.00	144.37	210.81	8.81	369.27

* Trib C Before CA * 9184	* Q10	*	714.44 *	714.41 *	0.03 *	1.72 *	0.01 *	94.95 *	187.49 *	66.56 *	378.63 *
* Trib C Before CA * 7588	* Q10	*	712.70 *	712.56 *	0.15 *	0.30 *	0.00 *	7.36 *	324.57 *	17.07 *	107.01 *
* Trib C Before CA * 7576	* Q10	*	712.40 *	712.25 *	0.15 *	*	*	*	349.00 *	*	16.71 *
* Trib C Before CA * 7550	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 7499	* Q10	*	712.17 *	712.10 *	0.07 *	0.13 *	0.00 *	0.12 *	348.88 *	*	29.11 *
* Trib C Before CA * 7453	* Q10	*	712.04 *	711.98 *	0.06 *	1.44 *	0.01 *	30.80 *	316.20 *	*	118.14 *
* Trib C Before CA * 5863	* Q10	*	710.58 *	710.55 *	0.03 *	0.34 *	0.01 *	24.18 *	203.06 *	119.76 *	364.71 *
* Trib C Before CA * 5256	* Q10	*	710.23 *	710.22 *	0.01 *	0.04 *	0.01 *	92.09 *	228.53 *	40.39 *	485.80 *
* Trib C Before CA * 5104	* Q10	*	710.18 *	710.10 *	0.08 *	*	*	*	361.00 *	*	513.20 *
* Trib C Before CA * 5103	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 4652	* Q10	*	709.80 *	709.73 *	0.07 *	0.09 *	0.01 *	*	361.00 *	*	383.68 *
* Trib C Before CA * 4511	* Q10	*	709.70 *	709.60 *	0.10 *	0.99 *	0.03 *	*	347.27 *	14.73 *	150.59 *
* Trib C Before CA * 3851	* Q10	*	708.69 *	708.67 *	0.01 *	0.65 *	0.00 *	26.69 *	108.70 *	226.61 *	364.35 *
* Trib C Before CA * 3139	* Q10	*	708.04 *	708.01 *	0.03 *	0.25 *	0.00 *	40.41 *	210.45 *	111.13 *	264.32 *
* Trib C Before CA * 2880	* Q10	*	707.79 *	707.76 *	0.02 *	0.21 *	0.00 *	39.82 *	198.11 *	124.07 *	258.77 *
* Trib C Before CA * 2647	* Q10	*	707.57 *	707.55 *	0.02 *	0.16 *	0.01 *	16.27 *	174.35 *	171.38 *	351.51 *
* Trib C Before CA * 2422	* Q10	*	707.41 *	707.40 *	0.01 *	0.00 *	0.00 *	23.69 *	87.22 *	252.09 *	410.79 *
* Trib C Before CA * 2415	* Q10	*	707.41 *	707.39 *	0.01 *	0.08 *	0.00 *	24.84 *	125.62 *	212.54 *	364.67 *
* Trib C Before CA * 2139	* Q10	*	707.33 *	707.32 *	0.01 *	0.00 *	0.00 *	28.60 *	114.21 *	220.18 *	384.04 *
* Trib C Before CA * 2136	* Q10	*	707.32 *	707.32 *	0.01 *	0.16 *	0.00 *	25.51 *	138.20 *	199.28 *	398.48 *
* Trib C Before CA * 1947	* Q10	*	707.17 *	707.14 *	0.02 *	0.09 *	0.00 *	27.36 *	208.60 *	127.04 *	367.90 *
* Trib C Before CA * 1903	* Q10	*	707.08 *	707.03 *	0.05 *	0.33 *	0.01 *	71.86 *	207.98 *	83.16 *	314.55 *
* Trib C Before CA * 1727	* Q10	*	706.73 *	706.72 *	0.01 *	0.19 *	0.00 *	50.78 *	99.45 *	212.77 *	421.75 *
* Trib C Before CA * 1517	* Q10	*	706.54 *	706.54 *	0.01 *	0.09 *	0.00 *	30.36 *	135.60 *	197.04 *	417.13 *
* Trib C Before CA * 1369	* Q10	*	706.45 *	706.44 *	0.01 *	0.16 *	0.00 *	52.20 *	132.31 *	178.50 *	353.86 *
* Trib C Before CA * 1067	* Q10	*	706.28 *	706.28 *	0.00 *	0.03 *	0.00 *	10.69 *	73.87 *	278.44 *	396.14 *
* Trib C Before CA * 931	* Q10	*	706.25 *	706.25 *	0.00 *	*	*	26.08 *	100.18 *	237.74 *	657.86 *

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13875 Profile: Q10 Culv: Culvert #1
Warning:During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q10
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

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River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 9184     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2647     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
```

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            This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q10
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1727     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1067     Profile: Q10
     Warning:Divided flow computed for this cross-section.
```

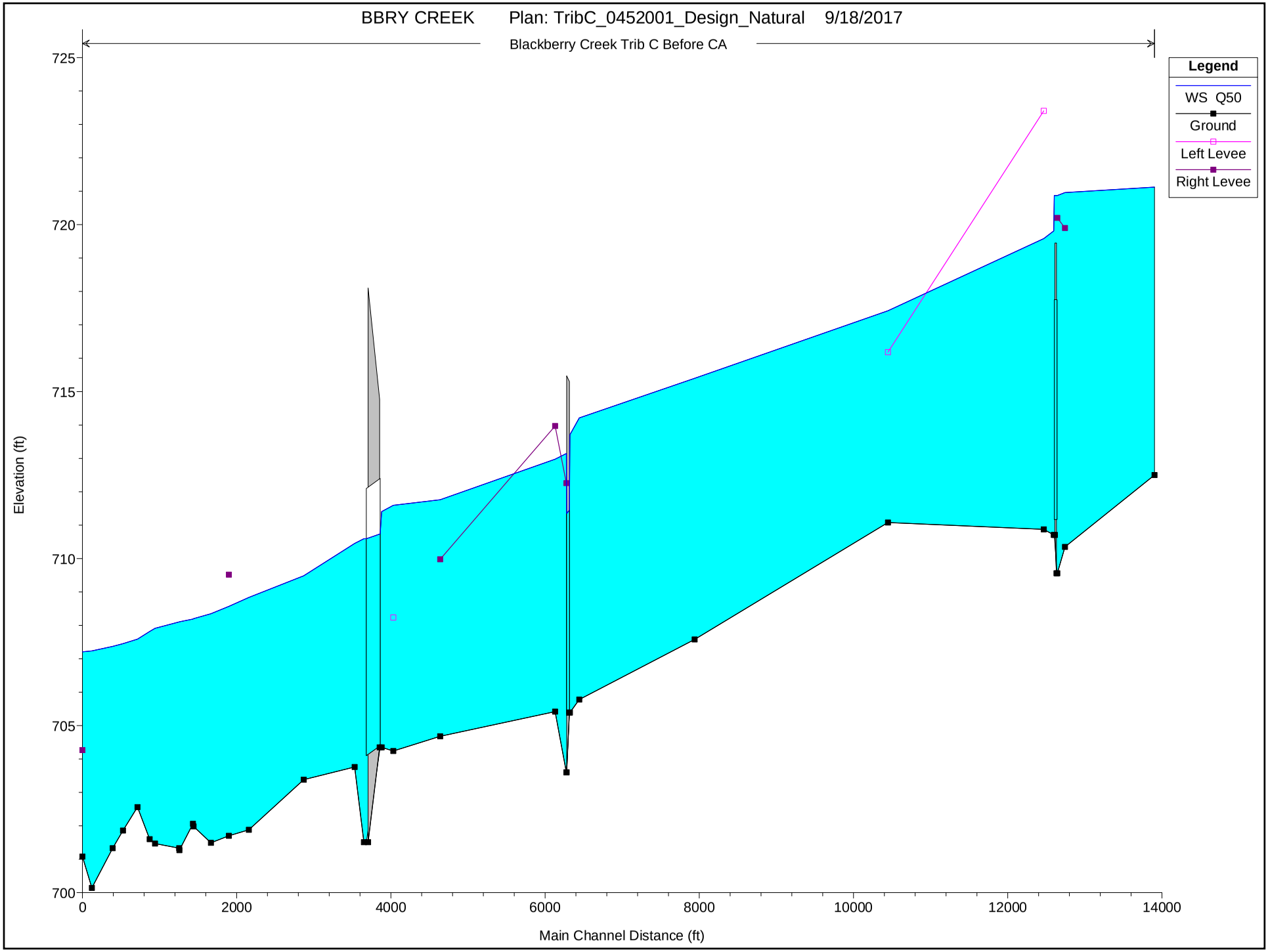
BBRY CREEK Plan: TribC_0452001_Design_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q50
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 11:50:25 AM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q50	706.00	712.50	721.12	716.98	721.13	0.000075	0.53	2110.85	916.31	0.04
Trib C Before CA	13934	Q50	670.00	710.35	720.96	714.96	720.98	0.000366	1.37	826.47	294.91	0.10
Trib C Before CA	13896	Q50	670.00	709.56	720.87	715.60	720.92	0.000805	2.17	644.06	334.27	0.14
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q50	670.00	710.71	719.81	716.85	719.94	0.002887	3.27	361.18	243.30	0.26
Trib C Before CA	13812	Q50	670.00	710.88	719.58	714.53	719.66	0.000971	2.37	414.87	160.23	0.16
Trib C Before CA	11691	Q50	652.00	711.08	717.42	715.33	717.45	0.001186	2.15	714.35	435.51	0.17
Trib C Before CA	9184	Q50	592.00	707.58	715.40	712.53	715.42	0.000534	1.66	909.39	463.40	0.13
Trib C Before CA	7588	Q50	592.00	705.78	714.21	710.50	714.29	0.001238	2.80	481.97	280.38	0.19
Trib C Before CA	7576	Q50	592.00	705.39	713.71	708.85	714.00	0.004050	4.30	137.82	125.32	0.26
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q50	592.00	703.60	713.15	707.31	713.28	0.001445	2.93	258.51	153.16	0.18
Trib C Before CA	7453	Q50	587.00	705.42	712.98	708.83	713.06	0.001196	2.55	370.62	162.07	0.19
Trib C Before CA	5863	Q50	587.00	704.68	711.76	708.84	711.78	0.000465	1.48	951.97	474.48	0.12

Trib C Before CA	5256	Q50	619.00	704.24	711.60	706.46	711.60	0.000084	0.77	1558.19	666.87	0.05
Trib C Before CA	5104	Q50	619.00	704.35	711.41	707.45	711.55	0.001381	3.04	203.86	663.88	0.22
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q50	619.00	701.51	710.59	704.89	710.75	0.000933	3.16	196.15	571.06	0.19
Trib C Before CA	4511	Q50	621.00	703.76	710.46	707.39	710.57	0.002252	2.97	357.49	248.39	0.25
Trib C Before CA	3851	Q50	621.00	703.38	709.49	707.70	709.50	0.000713	1.59	888.15	417.43	0.12
Trib C Before CA	3139	Q50	621.00	701.88	708.84	706.05	708.87	0.001104	2.06	671.43	313.69	0.16
Trib C Before CA	2880	Q50	621.00	701.70	708.57	705.70	708.60	0.000979	1.91	685.37	284.34	0.15
Trib C Before CA	2647	Q50	621.00	701.49	708.35	705.83	708.37	0.000960	1.89	839.34	447.45	0.14
Trib C Before CA	2422	Q50	623.00	701.98	708.20	706.09	708.21	0.000453	1.25	1125.87	435.78	0.10
Trib C Before CA	2415	Q50	623.00	702.06	708.19	706.21	708.20	0.000754	1.64	928.63	426.99	0.13
Trib C Before CA	2139	Q50	623.00	701.27	708.11	705.28	708.11	0.000309	1.15	1201.70	417.93	0.08
Trib C Before CA	2136	Q50	623.00	701.33	708.10	705.60	708.11	0.000390	1.21	1120.57	434.20	0.09
Trib C Before CA	1947	Q50	623.00	701.47	707.91	705.05	707.94	0.000833	1.79	819.84	412.52	0.14
Trib C Before CA	1903	Q50	624.00	701.60	707.82	706.38	707.86	0.001914	2.33	629.93	371.73	0.20
Trib C Before CA	1727	Q50	624.00	702.56	707.59	705.87	707.60	0.000846	1.53	951.37	463.22	0.13
Trib C Before CA	1517	Q50	624.00	701.86	707.45	705.19	707.46	0.000415	1.14	1128.41	445.08	0.10
Trib C Before CA	1369	Q50	624.00	701.33	707.37	705.19	707.38	0.000663	1.36	944.30	408.47	0.12
Trib C Before CA	1067	Q50	624.00	700.14	707.24	703.63	707.24	0.000216	0.86	1402.41	423.35	0.07
Trib C Before CA	931	Q50	625.00	701.08	707.21	704.52	707.21	0.000181	0.75	1794.74	700.48	0.06

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q50	721.13	721.12	0.00	0.14	0.00	69.74	478.07	158.19	916.31
Trib C Before CA	13934	Q50	720.98	720.96	0.02	0.05	0.01	56.52	450.85	162.63	294.91
Trib C Before CA	13896	Q50	720.92	720.87	0.05			102.27	443.32	124.42	334.27
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q50	719.94	719.81	0.13	0.26	0.03	54.13	520.60	95.27	243.30
Trib C Before CA	13812	Q50	719.66	719.58	0.08	2.19	0.01	33.18	575.62	61.19	160.23
Trib C Before CA	11691	Q50	717.45	717.42	0.03	2.03	0.00	334.90	277.11	39.99	435.51

* Trib C Before CA * 9184	* Q50	*	715.42 *	715.40 *	0.02 *	1.12 *	0.01 *	200.25 *	218.53 *	173.22 *	463.40 *
* Trib C Before CA * 7588	* Q50	*	714.29 *	714.21 *	0.08 *	0.24 *	0.06 *	105.37 *	381.43 *	105.20 *	280.38 *
* Trib C Before CA * 7576	* Q50	*	714.00 *	713.71 *	0.29 *	*	*	0.12 *	591.66 *	0.22 *	125.32 *
* Trib C Before CA * 7550	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 7499	* Q50	*	713.28 *	713.15 *	0.13 *	0.19 *	0.02 *	9.85 *	568.94 *	13.21 *	153.16 *
* Trib C Before CA * 7453	* Q50	*	713.06 *	712.98 *	0.08 *	1.26 *	0.02 *	115.39 *	471.61 *	*	162.07 *
* Trib C Before CA * 5863	* Q50	*	711.78 *	711.76 *	0.01 *	0.17 *	0.00 *	86.66 *	222.52 *	277.82 *	474.48 *
* Trib C Before CA * 5256	* Q50	*	711.60 *	711.60 *	0.00 *	0.02 *	0.03 *	183.90 *	257.41 *	177.70 *	666.87 *
* Trib C Before CA * 5104	* Q50	*	711.55 *	711.41 *	0.14 *	*	*	*	619.00 *	*	663.88 *
* Trib C Before CA * 5103	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 4652	* Q50	*	710.75 *	710.59 *	0.15 *	0.16 *	0.02 *	*	619.00 *	*	571.06 *
* Trib C Before CA * 4511	* Q50	*	710.57 *	710.46 *	0.11 *	1.04 *	0.03 *	0.36 *	499.21 *	121.43 *	248.39 *
* Trib C Before CA * 3851	* Q50	*	709.50 *	709.49 *	0.01 *	0.62 *	0.00 *	61.16 *	137.71 *	422.13 *	417.43 *
* Trib C Before CA * 3139	* Q50	*	708.87 *	708.84 *	0.03 *	0.27 *	0.00 *	95.66 *	287.36 *	237.98 *	313.69 *
* Trib C Before CA * 2880	* Q50	*	708.60 *	708.57 *	0.03 *	0.23 *	0.00 *	88.12 *	276.15 *	256.73 *	284.34 *
* Trib C Before CA * 2647	* Q50	*	708.37 *	708.35 *	0.02 *	0.16 *	0.00 *	42.09 *	227.81 *	351.10 *	447.45 *
* Trib C Before CA * 2422	* Q50	*	708.21 *	708.20 *	0.01 *	0.00 *	0.00 *	52.61 *	118.58 *	451.81 *	435.78 *
* Trib C Before CA * 2415	* Q50	*	708.20 *	708.19 *	0.01 *	0.09 *	0.00 *	63.17 *	170.86 *	388.97 *	426.99 *
* Trib C Before CA * 2139	* Q50	*	708.11 *	708.11 *	0.01 *	0.00 *	0.00 *	64.13 *	163.51 *	395.36 *	417.93 *
* Trib C Before CA * 2136	* Q50	*	708.11 *	708.10 *	0.01 *	0.17 *	0.00 *	61.12 *	195.54 *	366.35 *	434.20 *
* Trib C Before CA * 1947	* Q50	*	707.94 *	707.91 *	0.02 *	0.08 *	0.00 *	72.32 *	271.25 *	279.43 *	412.52 *
* Trib C Before CA * 1903	* Q50	*	707.86 *	707.82 *	0.04 *	0.25 *	0.01 *	143.67 *	252.15 *	228.17 *	371.73 *
* Trib C Before CA * 1727	* Q50	*	707.60 *	707.59 *	0.01 *	0.14 *	0.00 *	123.37 *	120.66 *	379.97 *	463.22 *
* Trib C Before CA * 1517	* Q50	*	707.46 *	707.45 *	0.01 *	0.08 *	0.00 *	73.28 *	185.28 *	365.43 *	445.08 *
* Trib C Before CA * 1369	* Q50	*	707.38 *	707.37 *	0.01 *	0.14 *	0.00 *	101.12 *	179.84 *	343.03 *	408.47 *
* Trib C Before CA * 1067	* Q50	*	707.24 *	707.24 *	0.00 *	0.03 *	0.00 *	28.37 *	114.17 *	481.46 *	423.35 *
* Trib C Before CA * 931	* Q50	*	707.21 *	707.21 *	0.00 *	*	*	48.73 *	132.96 *	443.32 *	700.48 *

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q50
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q50
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q50
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

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     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 9184     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3139     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2647     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
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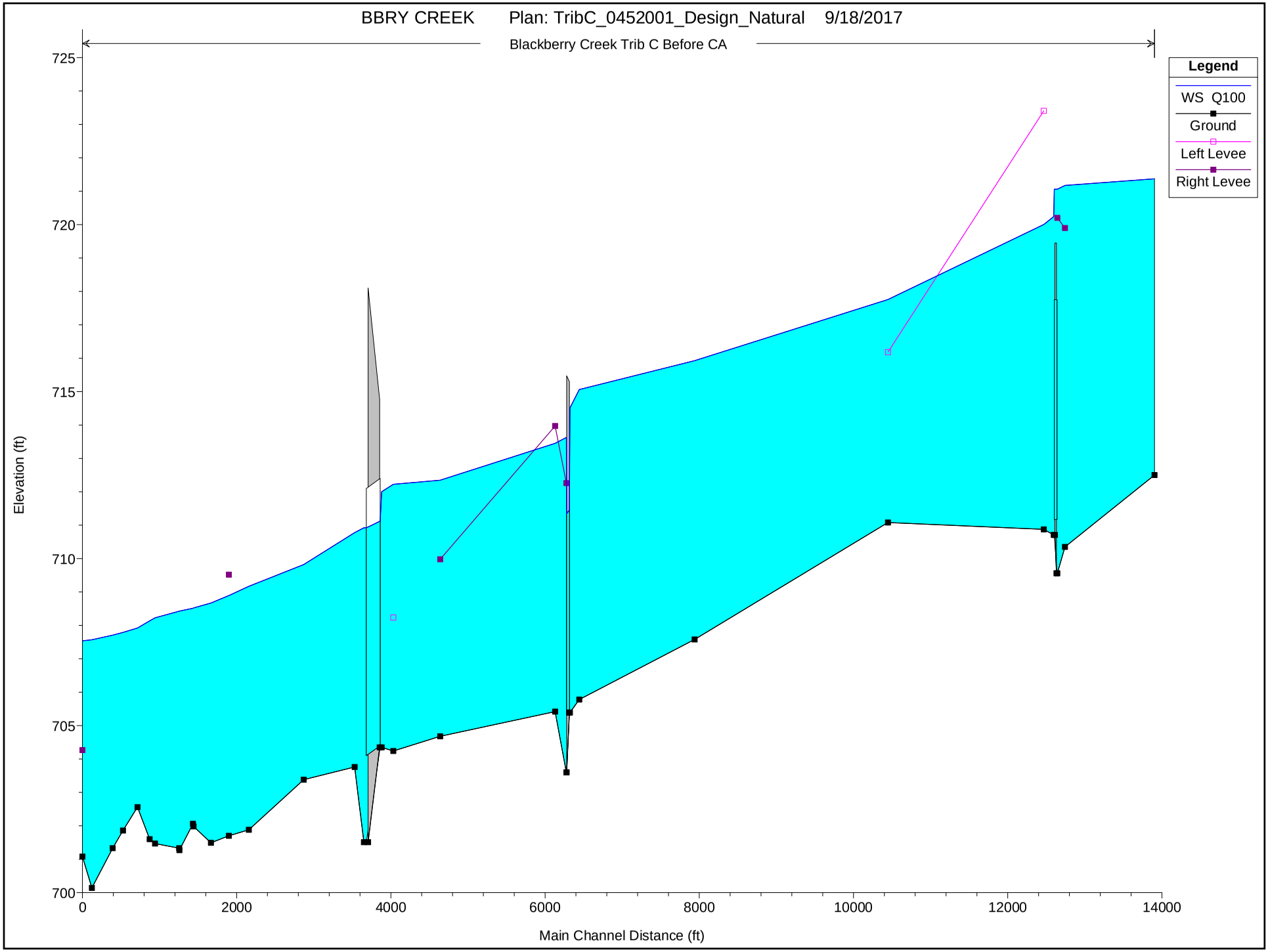
            This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q50
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
```


BBRY CREEK Plan: TribC_0452001_Design_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q100
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 11:50:25 AM

Project in English units

Project Description:
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125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
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385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q100	879.00	712.50	721.37	717.20	721.38	0.000090	0.61	2341.31	936.42	0.05
Trib C Before CA	13934	Q100	828.00	710.35	721.17	715.50	721.20	0.000467	1.59	889.29	298.64	0.11
Trib C Before CA	13896	Q100	828.00	709.56	721.06	716.23	721.12	0.001023	2.48	708.29	346.39	0.16
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q100	828.00	710.71	720.24	717.77	720.36	0.002679	3.33	474.12	281.02	0.25
Trib C Before CA	13812	Q100	828.00	710.88	720.00	714.99	720.09	0.001101	2.63	485.91	175.59	0.17
Trib C Before CA	11691	Q100	800.00	711.08	717.76	715.84	717.79	0.001127	2.19	867.80	478.40	0.17
Trib C Before CA	9184	Q100	713.00	707.58	715.93	713.52	715.94	0.000436	1.60	1169.20	533.59	0.12
Trib C Before CA	7588	Q100	713.00	705.78	715.06	710.94	715.11	0.000759	2.38	746.73	344.10	0.15
Trib C Before CA	7576	Q100	713.00	705.39	714.51	709.30	714.86	0.004300	4.72	151.48	184.30	0.28
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q100	713.00	703.60	713.63	707.75	713.77	0.001535	3.14	350.57	233.02	0.19
Trib C Before CA	7453	Q100	705.00	705.42	713.45	709.21	713.54	0.001191	2.65	452.67	182.41	0.19
Trib C Before CA	5863	Q100	705.00	704.68	712.35	709.23	712.36	0.000337	1.36	1240.69	511.61	0.10

Trib C Before CA	5256	Q100	749.00	704.24	712.22	706.73	712.23	0.000065	0.72	1989.96	706.06	0.05
Trib C Before CA	5104	Q100	749.00	704.35	712.00	707.74	712.18	0.001489	3.35	223.48	706.87	0.23
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q100	749.00	701.51	710.92	705.27	711.13	0.001204	3.68	203.68	622.30	0.22
Trib C Before CA	4511	Q100	752.00	703.76	710.78	707.84	710.89	0.002220	3.09	442.42	275.90	0.25
Trib C Before CA	3851	Q100	752.00	703.38	709.82	707.81	709.84	0.000705	1.65	1032.83	444.44	0.13
Trib C Before CA	3139	Q100	752.00	701.88	709.17	707.06	709.21	0.001135	2.17	779.93	373.57	0.16
Trib C Before CA	2880	Q100	752.00	701.70	708.89	706.64	708.92	0.001026	2.03	777.93	291.92	0.15
Trib C Before CA	2647	Q100	752.00	701.49	708.67	706.75	708.69	0.000927	1.93	986.36	466.37	0.14
Trib C Before CA	2422	Q100	755.00	701.98	708.52	706.18	708.53	0.000468	1.32	1268.16	445.57	0.10
Trib C Before CA	2415	Q100	755.00	702.06	708.51	706.34	708.53	0.000742	1.69	1068.22	438.40	0.13
Trib C Before CA	2139	Q100	755.00	701.27	708.43	705.43	708.44	0.000337	1.24	1338.16	431.69	0.09
Trib C Before CA	2136	Q100	755.00	701.33	708.42	705.74	708.44	0.000412	1.29	1262.25	447.93	0.10
Trib C Before CA	1947	Q100	755.00	701.47	708.23	706.09	708.25	0.000834	1.87	951.67	423.53	0.14
Trib C Before CA	1903	Q100	756.00	701.60	708.14	706.55	708.17	0.001763	2.34	750.43	381.97	0.19
Trib C Before CA	1727	Q100	756.00	702.56	707.92	705.98	707.93	0.000814	1.58	1108.59	483.08	0.13
Trib C Before CA	1517	Q100	756.00	701.86	707.79	705.39	707.80	0.000424	1.21	1279.56	456.15	0.10
Trib C Before CA	1369	Q100	756.00	701.33	707.71	705.30	707.72	0.000653	1.42	1082.98	420.28	0.12
Trib C Before CA	1067	Q100	756.00	700.14	707.57	703.76	707.57	0.000237	0.95	1543.98	430.62	0.07
Trib C Before CA	931	Q100	758.00	701.08	707.54	704.63	707.54	0.000186	0.80	2029.31	721.32	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q100	721.38	721.37	0.00	0.17	0.00	103.91	574.74	200.35	936.42
Trib C Before CA	13934	Q100	721.20	721.17	0.03	0.07	0.01	72.85	539.58	215.57	298.64
Trib C Before CA	13896	Q100	721.12	721.06	0.06			135.13	521.12	171.75	346.39
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q100	720.36	720.24	0.12	0.26	0.02	88.17	577.10	162.73	281.02
Trib C Before CA	13812	Q100	720.09	720.00	0.09	2.29	0.02	50.53	679.99	97.48	175.59
Trib C Before CA	11691	Q100	717.79	717.76	0.03	1.84	0.01	436.35	302.38	61.27	478.40

* Trib C Before CA * 9184	* Q100	*	715.94 *	715.93 *	0.02 *	0.83 *	0.00 *	245.55 *	230.22 *	237.23 *	533.59 *
* Trib C Before CA * 7588	* Q100	*	715.11 *	715.06 *	0.05 *	0.16 *	0.09 *	190.55 *	365.20 *	157.25 *	344.10 *
* Trib C Before CA * 7576	* Q100	*	714.86 *	714.51 *	0.35 *	*	*	0.27 *	712.17 *	0.56 *	184.30 *
* Trib C Before CA * 7550	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 7499	* Q100	*	713.77 *	713.63 *	0.14 *	0.20 *	0.03 *	37.91 *	644.46 *	30.63 *	233.02 *
* Trib C Before CA * 7453	* Q100	*	713.54 *	713.45 *	0.08 *	1.16 *	0.02 *	174.61 *	530.39 *	*	182.41 *
* Trib C Before CA * 5863	* Q100	*	712.36 *	712.35 *	0.01 *	0.13 *	0.00 *	120.94 *	227.66 *	356.40 *	511.61 *
* Trib C Before CA * 5256	* Q100	*	712.23 *	712.22 *	0.00 *	0.02 *	0.03 *	223.48 *	264.99 *	260.53 *	706.06 *
* Trib C Before CA * 5104	* Q100	*	712.18 *	712.00 *	0.17 *	*	*	*	749.00 *	*	706.87 *
* Trib C Before CA * 5103	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 4652	* Q100	*	711.13 *	710.92 *	0.21 *	0.19 *	0.05 *	*	749.00 *	*	622.30 *
* Trib C Before CA * 4511	* Q100	*	710.89 *	710.78 *	0.11 *	1.03 *	0.03 *	2.23 *	559.81 *	189.95 *	275.90 *
* Trib C Before CA * 3851	* Q100	*	709.84 *	709.82 *	0.01 *	0.62 *	0.00 *	80.85 *	152.34 *	518.81 *	444.44 *
* Trib C Before CA * 3139	* Q100	*	709.21 *	709.17 *	0.04 *	0.28 *	0.00 *	127.45 *	321.97 *	302.58 *	373.57 *
* Trib C Before CA * 2880	* Q100	*	708.92 *	708.89 *	0.03 *	0.23 *	0.00 *	115.77 *	312.14 *	324.09 *	291.92 *
* Trib C Before CA * 2647	* Q100	*	708.69 *	708.67 *	0.02 *	0.16 *	0.00 *	56.04 *	246.54 *	449.42 *	466.37 *
* Trib C Before CA * 2422	* Q100	*	708.53 *	708.52 *	0.01 *	0.00 *	0.00 *	69.04 *	133.77 *	552.19 *	445.57 *
* Trib C Before CA * 2415	* Q100	*	708.53 *	708.51 *	0.02 *	0.09 *	0.00 *	82.50 *	187.26 *	485.24 *	438.40 *
* Trib C Before CA * 2139	* Q100	*	708.44 *	708.43 *	0.01 *	0.00 *	0.00 *	84.80 *	186.42 *	483.78 *	431.69 *
* Trib C Before CA * 2136	* Q100	*	708.44 *	708.42 *	0.01 *	0.18 *	0.00 *	81.54 *	222.31 *	451.16 *	447.93 *
* Trib C Before CA * 1947	* Q100	*	708.25 *	708.23 *	0.02 *	0.08 *	0.00 *	101.03 *	298.64 *	355.34 *	423.53 *
* Trib C Before CA * 1903	* Q100	*	708.17 *	708.14 *	0.04 *	0.23 *	0.01 *	179.82 *	272.04 *	304.14 *	381.97 *
* Trib C Before CA * 1727	* Q100	*	707.93 *	707.92 *	0.01 *	0.13 *	0.00 *	166.32 *	134.63 *	455.05 *	483.08 *
* Trib C Before CA * 1517	* Q100	*	707.80 *	707.79 *	0.01 *	0.08 *	0.00 *	95.93 *	211.50 *	448.57 *	456.15 *
* Trib C Before CA * 1369	* Q100	*	707.72 *	707.71 *	0.01 *	0.14 *	0.00 *	122.85 *	203.74 *	429.41 *	420.28 *
* Trib C Before CA * 1067	* Q100	*	707.57 *	707.57 *	0.01 *	0.03 *	0.00 *	37.77 *	133.42 *	584.81 *	430.62 *
* Trib C Before CA * 931	* Q100	*	707.54 *	707.54 *	0.00 *	*	*	59.20 *	151.93 *	546.87 *	721.32 *

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q100
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q100
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

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     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3139     Profile: Q100
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
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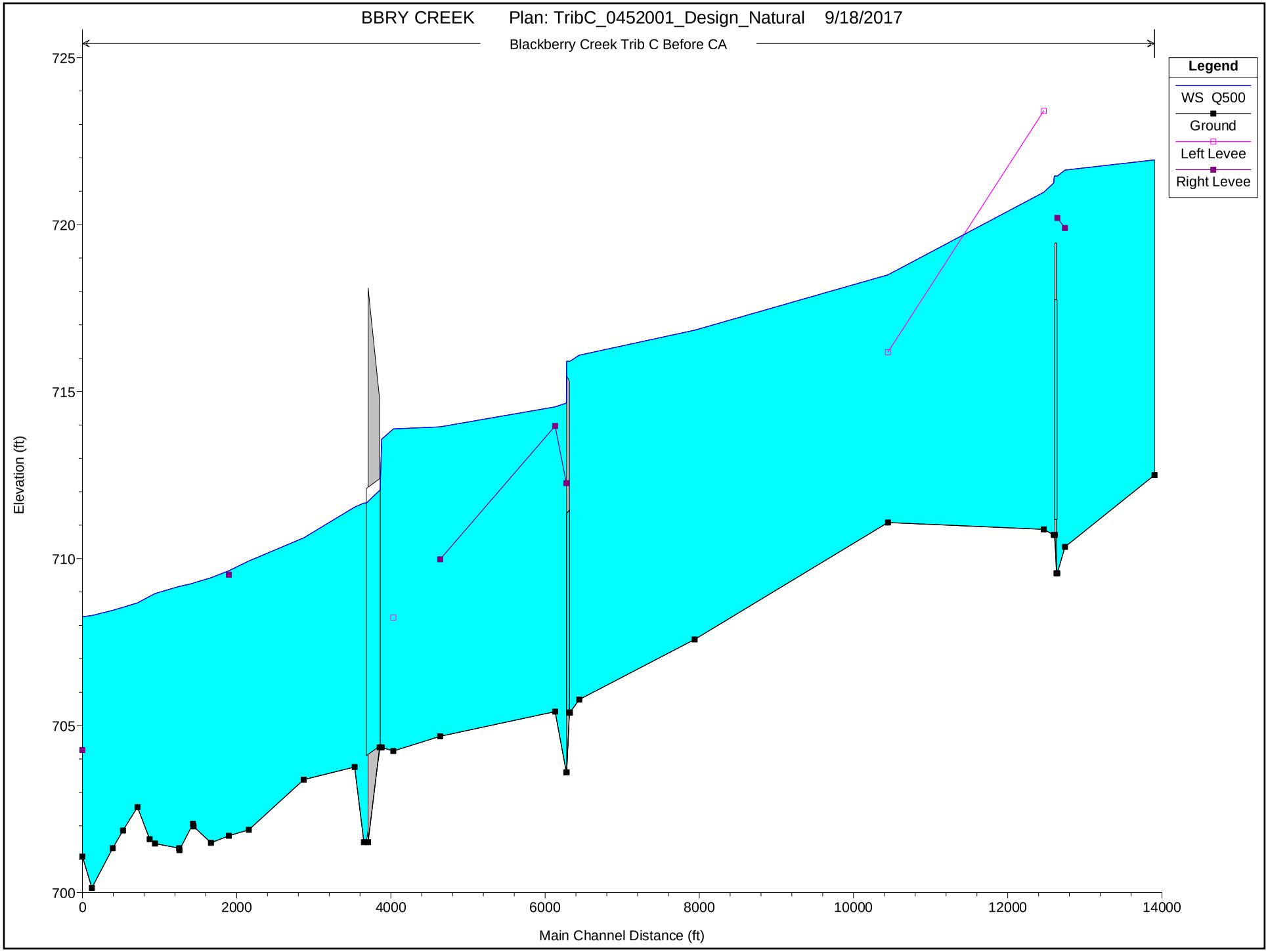
This may indicate the need for additional cross sections.


BBRY CREEK Plan: TribC_0452001_Design_Natural 9/18/2017
Blackberry Creek Trib C Before CA
Legend
WS Q500
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
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            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/18/2017 11:50:25 AM

Project in English units

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343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
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437.0   756.2
469.7   756.5
539.2   756.8
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375.00  707.99
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3       707.95
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400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q500	1373.00	712.50	721.94	717.69	721.94	0.000130	0.79	2883.10	982.05	0.06
Trib C Before CA	13934	Q500	1268.00	710.35	721.63	716.94	721.68	0.000787	2.16	1041.78	350.03	0.15
Trib C Before CA	13896	Q500	1268.00	709.56	721.45	717.79	721.55	0.001657	3.27	850.03	371.73	0.20
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q500	1268.00	710.71	721.25	719.24	721.35	0.002122	3.32	788.37	338.58	0.23
Trib C Before CA	13812	Q500	1268.00	710.88	720.97	716.10	721.10	0.001426	3.26	704.33	291.09	0.20
Trib C Before CA	11691	Q500	1213.00	711.08	718.50	716.58	718.53	0.001048	2.31	1251.69	550.44	0.17
Trib C Before CA	9184	Q500	1036.00	707.58	716.84	713.87	716.85	0.000384	1.65	1718.65	684.57	0.11
Trib C Before CA	7588	Q500	1036.00	705.78	716.09	712.31	716.13	0.000634	2.37	1141.51	419.71	0.14
Trib C Before CA	7576	Q500	1036.00	705.39	715.91	710.40	716.00	0.001629	3.20	752.84	357.19	0.17
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q500	1036.00	703.60	714.65	708.83	714.78	0.001429	3.26	687.81	385.03	0.18
Trib C Before CA	7453	Q500	1020.00	705.42	714.54	710.11	714.58	0.000645	2.16	1068.80	407.59	0.14
Trib C Before CA	5863	Q500	1020.00	704.68	713.94	710.22	713.95	0.000168	1.13	2140.99	620.34	0.07

Trib C Before CA	5256	Q500	1105.00	704.24	713.88	707.40	713.88	0.000038	0.64	3235.64	801.85	0.04
Trib C Before CA	5104	Q500	1105.00	704.35	713.57	708.49	713.82	0.001616	4.01	275.35	851.86	0.24
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q500	1105.00	701.51	711.66	706.22	712.05	0.002006	5.01	220.70	691.75	0.28
Trib C Before CA	4511	Q500	1109.00	703.76	711.54	708.86	711.66	0.002134	3.36	738.71	550.47	0.26
Trib C Before CA	3851	Q500	1109.00	703.38	710.62	708.05	710.64	0.000688	1.79	1417.55	522.77	0.13
Trib C Before CA	3139	Q500	1109.00	701.88	709.93	707.48	709.97	0.001388	2.61	1187.16	632.15	0.18
Trib C Before CA	2880	Q500	1109.00	701.70	709.64	707.08	709.67	0.000954	2.13	1275.20	538.06	0.15
Trib C Before CA	2647	Q500	1109.00	701.49	709.42	707.10	709.45	0.000905	2.07	1367.57	540.21	0.14
Trib C Before CA	2422	Q500	1115.00	701.98	709.27	706.38	709.28	0.000532	1.54	1616.65	492.48	0.11
Trib C Before CA	2415	Q500	1115.00	702.06	709.26	706.66	709.28	0.000743	1.84	1432.35	524.40	0.13
Trib C Before CA	2139	Q500	1115.00	701.27	709.17	705.72	709.18	0.000395	1.45	1666.82	452.78	0.10
Trib C Before CA	2136	Q500	1115.00	701.33	709.17	706.03	709.18	0.000456	1.48	1603.17	469.98	0.10
Trib C Before CA	1947	Q500	1115.00	701.47	708.95	706.61	708.98	0.000850	2.04	1271.65	456.43	0.14
Trib C Before CA	1903	Q500	1118.00	701.60	708.87	706.92	708.90	0.001569	2.44	1037.83	403.20	0.18
Trib C Before CA	1727	Q500	1118.00	702.56	708.67	706.20	708.69	0.000760	1.69	1485.80	524.79	0.13
Trib C Before CA	1517	Q500	1118.00	701.86	708.54	705.63	708.55	0.000466	1.40	1634.76	489.55	0.11
Trib C Before CA	1369	Q500	1118.00	701.33	708.45	705.58	708.47	0.000695	1.63	1408.74	469.12	0.13
Trib C Before CA	1067	Q500	1118.00	700.14	708.30	704.07	708.30	0.000314	1.19	1868.65	473.68	0.09
Trib C Before CA	931	Q500	1122.00	701.08	708.26	704.89	708.26	0.000206	0.93	2566.92	775.61	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q500	721.94	721.94	0.01	0.26	0.00	215.37	835.71	321.92	982.05
Trib C Before CA	13934	Q500	721.68	721.63	0.05	0.11	0.02	100.74	788.71	378.55	350.03
Trib C Before CA	13896	Q500	721.55	721.45	0.10			230.75	721.55	315.70	371.73
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q500	721.35	721.25	0.10	0.24	0.01	185.96	685.16	396.88	338.58
Trib C Before CA	13812	Q500	721.10	720.97	0.13	2.54	0.03	111.12	960.18	196.70	291.09
Trib C Before CA	11691	Q500	718.53	718.50	0.03	1.68	0.01	702.29	365.40	145.32	550.44

* Trib C Before CA * 9184	* Q500	*	716.85 *	716.84 *	0.01 *	0.72 *	0.00 *	397.06 *	273.65 *	365.29 *	684.57 *
* Trib C Before CA * 7588	* Q500	*	716.13 *	716.09 *	0.04 *	0.12 *	0.02 *	358.27 *	414.02 *	263.71 *	419.71 *
* Trib C Before CA * 7576	* Q500	*	716.00 *	715.91 *	0.09 *	*	*	182.57 *	557.02 *	296.40 *	357.19 *
* Trib C Before CA * 7550	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 7499	* Q500	*	714.78 *	714.65 *	0.12 *	0.15 *	0.04 *	156.96 *	748.79 *	130.25 *	385.03 *
* Trib C Before CA * 7453	* Q500	*	714.58 *	714.54 *	0.04 *	0.62 *	0.01 *	281.30 *	508.89 *	229.81 *	407.59 *
* Trib C Before CA * 5863	* Q500	*	713.95 *	713.94 *	0.01 *	0.07 *	0.00 *	219.11 *	243.83 *	557.07 *	620.34 *
* Trib C Before CA * 5256	* Q500	*	713.88 *	713.88 *	0.00 *	0.01 *	0.05 *	325.48 *	286.79 *	492.73 *	801.85 *
* Trib C Before CA * 5104	* Q500	*	713.82 *	713.57 *	0.25 *	*	*	*	1105.00 *	*	851.86 *
* Trib C Before CA * 5103	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA * 4652	* Q500	*	712.05 *	711.66 *	0.39 *	0.26 *	0.14 *	*	1105.00 *	*	691.75 *
* Trib C Before CA * 4511	* Q500	*	711.66 *	711.54 *	0.12 *	0.99 *	0.03 *	30.72 *	709.06 *	369.22 *	550.47 *
* Trib C Before CA * 3851	* Q500	*	710.64 *	710.62 *	0.01 *	0.66 *	0.00 *	137.99 *	189.34 *	781.66 *	522.77 *
* Trib C Before CA * 3139	* Q500	*	709.97 *	709.93 *	0.05 *	0.30 *	0.01 *	242.13 *	438.49 *	428.38 *	632.15 *
* Trib C Before CA * 2880	* Q500	*	709.67 *	709.64 *	0.03 *	0.22 *	0.00 *	171.07 *	370.75 *	567.18 *	538.06 *
* Trib C Before CA * 2647	* Q500	*	709.45 *	709.42 *	0.02 *	0.16 *	0.00 *	103.73 *	299.18 *	706.09 *	540.21 *
* Trib C Before CA * 2422	* Q500	*	709.28 *	709.27 *	0.01 *	0.00 *	0.00 *	121.94 *	177.61 *	815.45 *	492.48 *
* Trib C Before CA * 2415	* Q500	*	709.28 *	709.26 *	0.02 *	0.09 *	0.00 *	139.83 *	231.50 *	743.67 *	524.40 *
* Trib C Before CA * 2139	* Q500	*	709.18 *	709.17 *	0.01 *	0.00 *	0.00 *	152.56 *	243.03 *	719.40 *	452.78 *
* Trib C Before CA * 2136	* Q500	*	709.18 *	709.17 *	0.01 *	0.20 *	0.00 *	147.44 *	289.17 *	678.39 *	469.98 *
* Trib C Before CA * 1947	* Q500	*	708.98 *	708.95 *	0.03 *	0.08 *	0.00 *	182.01 *	369.07 *	563.91 *	456.43 *
* Trib C Before CA * 1903	* Q500	*	708.90 *	708.87 *	0.04 *	0.21 *	0.01 *	282.95 *	326.35 *	508.70 *	403.20 *
* Trib C Before CA * 1727	* Q500	*	708.69 *	708.67 *	0.01 *	0.13 *	0.00 *	282.00 *	168.49 *	667.51 *	524.79 *
* Trib C Before CA * 1517	* Q500	*	708.55 *	708.54 *	0.01 *	0.09 *	0.00 *	162.07 *	283.04 *	672.88 *	489.55 *
* Trib C Before CA * 1369	* Q500	*	708.47 *	708.45 *	0.02 *	0.16 *	0.00 *	179.28 *	272.51 *	666.20 *	469.12 *
* Trib C Before CA * 1067	* Q500	*	708.30 *	708.30 *	0.01 *	0.04 *	0.00 *	68.02 *	190.95 *	859.03 *	473.68 *
* Trib C Before CA * 931	* Q500	*	708.26 *	708.26 *	0.00 *	*	*	88.31 *	202.37 *	831.32 *	775.61 *

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Nat_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q500
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 11691 Profile: Q500
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7588 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 7576 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was

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            used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5103     Profile: Q500     Culv: Culvert #1
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the height
             of the culvert.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q500
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1727     Profile: Q500
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
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EXISTING CONDITIONS
(DESIGN MODEL)

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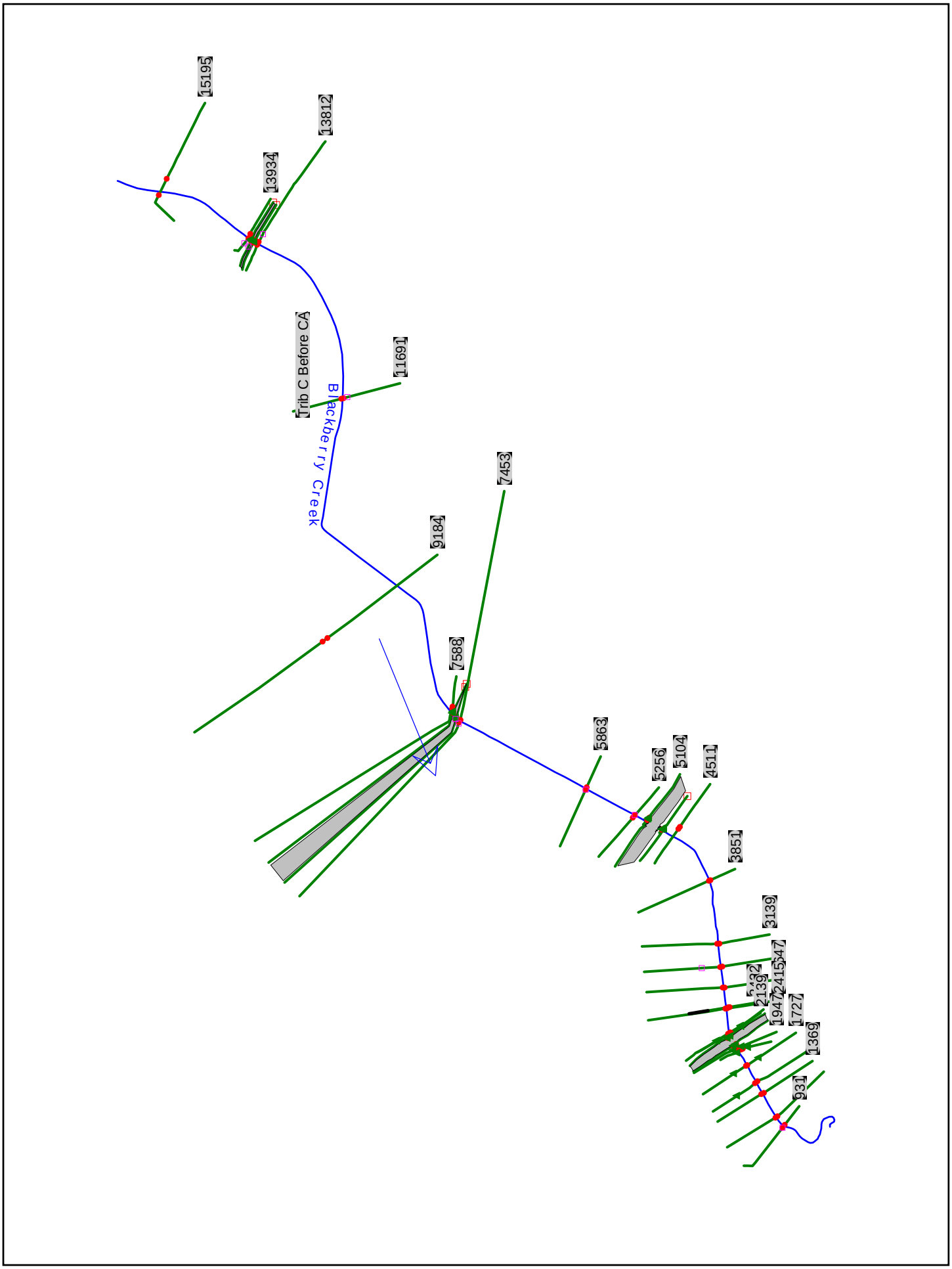

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                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


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            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


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PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 10:39:35 AM

Project in English units

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343.1   760.6
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469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
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375.00  707.99
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676.65  708.00
798.43  709.94
887.26  712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.
```

****

PLAN DATA

Plan Title: TribC_0452001_Design_Exist
Plan File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.p09

Geometry Title: Exist_Design
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.g07

Flow Title : 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Plan Summary Information:
Number of: Cross Sections = 33 Multiple Openings = 0
Culverts = 4 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 30
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Program Selects Appropriate method
Computational Flow Regime: Mixed Flow

****

FLOW DATA

Flow Title: 2005Flows-TribC_Before_CA
Flow File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C Blackberry)\IL47.f02

Flow Data (cfs)

River	Reach	RS	Q10	Q50	Q100	Q500
Blackberry Creek	Trib C Before	CA15195	378	706	879	1373
Blackberry Creek	Trib C Before	CA13934	369	670	828	1268
Blackberry Creek	Trib C Before	CA13812	369	670	828	1268
Blackberry Creek	Trib C Before	CA11691	364	652	800	1213
Blackberry Creek	Trib C Before	CA9184	349	592	713	1036
Blackberry Creek	Trib C Before	CA7453	347	587	705	1020
Blackberry Creek	Trib C Before	CA5863	347	587	705	1020
Blackberry Creek	Trib C Before	CA5256	361	619	749	1105
Blackberry Creek	Trib C Before	CA4511	362	621	752	1109
Blackberry Creek	Trib C Before	CA2422	363	623	755	1115
Blackberry Creek	Trib C Before	CA1903	363	624	756	1118
Blackberry Creek	Trib C Before	CA931	364	625	758	1122

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Blackberry Creek	Trib C Before	CAQ10	Critical	Known WS = 706.25
Blackberry Creek	Trib C Before	CAQ50	Critical	Known WS = 707.21
Blackberry Creek	Trib C Before	CAQ100	Critical	Known WS = 707.54
Blackberry Creek	Trib C Before	CAQ500	Critical	Known WS = 708.26

Inline Structure Gate Openings
River = Blackberry Creek
Reach = Podolski RS = 9000
Gate = Gate #1
# Open Open Ht # Open Open Ht # Open Open Ht # Open Open Ht

```
*****************************************************************
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = Podolski          RS = 9000
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
       1       1       1       1       1       1       1       1
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Blackberry Creek
Reach = ER_North          RS = 63593
Gate  = Gate #3
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
      .5       3      .5       3      .5       3      .5       3
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #2
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
     2.2       1     2.2       1     2.2       1     2.2       1
River = Chain_of_Lakes
Reach = 1                 RS = 11108.
Gate  = Gate #1
  # Open Open Ht  # Open Open Ht  # Open Open Ht  # Open Open Ht
*****************************************************************
    2.35       1    2.35       1    2.35       1    2.35       1

*******************************************************************************

GEOMETRY DATA

Geometry Title: Exist_Design
Geometry File : e:\1407\Drainage\HEC-RAS Model\IL 47 Seavy Rd Run (Trib C Blackberry)\IL 47 Seavy Rd Run (Trib C
Blackberry)\IL47.g07

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 15195

INPUT
Description: Interpolated cross section for river junction computation. Data
             are obtained from the DEM and 2 foot contour map Kane County 2001.
             The channel cross section are interpolated between 16644 and
             13934.

Revised using data from the 2004 TIN by Woodworth Jan
             2005
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  728.23   50.97  728.41  110.82  728.49  173.94  728.46  234.82  728.12
  282.62  728.01  361.79  726.09  412.61     724  452.97  722.08  517.54  720.85
  561.93  720.03  620.01  719.98  687.87  720.16  780.75  720.32     843     720
  890.61  719.06  939.83  718.05  993.16   717.4 1035.15  716.78 1066.14   716.3
 1090.29  716.02    1093     714    1097     713    1102   712.5    1105   712.5
    1108     714    1112     715 1114.22  716.17 1141.08  717.99  1181.5  717.86
 1233.51  717.75 1265.44  718.01 1323.04  718.75 1363.62  719.34 1386.91  719.99
 1414.95  720.96 1442.97  721.95 1479.79  724.05 1501.08  725.78 1523.32  726.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
**************************************************
       0    .105  939.83    .065 1141.08    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        939.83 1141.08             1162    1160    1140             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13934

INPUT
Description: USGS IL 2001.  Approach to Farm Road (Seavey27)

outer 2pts on
             LHS and outer 3 points on the RHS are interpolated from the 2004
             TIN by BW Jan 2005
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0   722.7   223.8   721.7  344.71  722.55  360.15  721.36  404.22  721.29
  453.57  717.48  468.05   717.8  483.82  715.96  488.86  713.95  492.11  710.86
  495.33  710.37  499.79  710.35  503.55  711.05   505.5  713.63  507.23  714.19
  511.34  717.43  522.72  718.07  543.14  718.16  599.85   719.9  636.38  718.62
  692.75  718.69   706.4   721.6   715.3   722.7   757.8     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .105  468.05    .065  522.72    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        468.05  522.72              110     100     110             .3       .5
Right Levee     Station=  599.85      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13896

INPUT
Description: USGS IL 2001.  USF Farm Road (Seavey27). The use of n=100 is to
             block of conveyance but retain storage computation. This is for
             f-table computation only.
outer point on LHS and 2 outer points
             on RHS are interpolated from the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  -480.9   722.6  -145.9  722.65 -143.63  722.65 -114.09  720.57  -83.41   719.2
  -52.65  718.68  -19.79  718.56  -14.91  717.64   -7.37  713.74   -4.35  714.08
    -2.3  710.54       0  709.56    2.27  709.86    3.87  710.25    5.09  711.71
    7.17  713.32   12.65   717.5   19.52  718.45   35.18  718.68    58.7  718.91
   83.13   720.2   97.56  720.08  164.36  719.37   212.4   720.8   252.4   721.6
   318.4   723.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
  -480.9    .105  -14.91    .065   12.65    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -14.91   12.65               60      46      50             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -480.9      -6   719.8       F
       8   318.4   719.8       F
Right Levee     Station=   83.13      Elevation=

CULVERT


RIVER: Blackberry Creek
```

REACH: Trib C Before CA RS: 13875

INPUT
Description: Farmers Road (Seavey27) IL USGS
Distance from Upstream XS = 11
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 13

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-140.71	722.75	-131.8	722.37	-118.51	721.22
-47.85	720.1	-23.84	719.84	0	719.45
44.34	720.25	114.12	720.67	114.13	720.66
181.97	721.31	182.08	721.32	206.78	721.58
206.81	721.58				

Upstream Bridge Cross Section Data
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-145.9	722.65	-143.63	722.65	-114.09	720.57	-83.41	719.2	-52.65	718.68
-19.79	718.56	-14.91	717.64	-7.37	713.74	-4.35	714.08	-2.3	710.54
0	709.56	2.27	709.86	3.87	710.25	5.09	711.71	7.17	713.32
12.65	717.5	19.52	718.45	35.18	718.68	58.7	718.91	83.13	720.2
97.56	720.08	164.36	719.37	211	720	310	722	380	724

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-145.9	.1	-14.91	.014	12.65	.1

Bank Sta: Left Right Coeff Contr. Expan.
-14.91 12.65 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-145.9	-6	719.8	F
8	380	719.8	F

Right Levee Station= 83.13 Elevation=

Downstream Deck/Roadway Coordinates
num= 13

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-140.71	722.75	-131.8	722.37	-118.51	721.22
-47.85	720.1	-23.84	719.84	0	719.45
44.34	720.25	114.12	720.67	114.13	720.66
181.97	721.31	182.08	721.32	206.78	721.58
206.81	721.58				

Downstream Bridge Cross Section Data
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-136.45	722.82	-99.65	720.79	-67.16	718.91	-33.18	718.29	-17.7	718.68
-10.5	716.67	-2.67	711.29	0	710.71	2.76	711.32	6.67	715.22
14.82	718.27	21.37	718.44	49.54	718.35	116.95	719.19	201.99	720.4
284	722	389	724						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-136.45	.1	-17.7	.014	14.82	.1

Bank Sta: Left Right Coeff Contr. Expan.
-17.7 14.82 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-136.45	-4.75	717.76	F
4.78	389	717.76	F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =

```
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse    6.58    7.28
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  4      36     .014     .014        0                  .5                1
Upstream   Elevation =  711.17
           Centerline Station =  1
Downstream Elevation =  711.17
           Centerline Station =  0

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13859

INPUT
Description: USGS IL 2001.  DSF Farm Road (Seavey27)
1 pt on LHS and 2 on the
             RHS (outermost) are interpolated from the 2004 TIN
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  -470.5   722.5 -136.45  722.82  -99.65  720.79  -67.16  718.91  -33.18  718.29
   -17.7  718.68   -10.5  716.67   -2.67  711.29       0  710.71    2.76  711.32
    6.67  715.22   14.82  718.27   21.37  718.44   49.54  718.35  116.95  719.19
  201.99   720.4     256     722     342     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  -470.5    .105   -17.7    .065   14.82    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -17.7   14.82              145     130     154             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -470.5   -4.75  717.76       F
    4.78     342  717.76       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 13812

INPUT
Description: USGS IL 2001.  Departure to Farm Road (Seavey27)
Several points
             on the LHS and the 2 outer points on the RHS are interpolated from
             the 2004 TIN by BW Jan 2005
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0   727.1   42.16     727   96.54   726.6   158.3   726.2  221.22   725.9
  281.34   725.7  344.25   725.3  404.25   725.2  461.06   725.1  522.82   724.7
  558.61   724.4  587.97   724.2  627.78   723.9  662.55   723.6  702.92   723.3
  748.98     723  793.19   722.8  832.65   722.6  886.89   722.3   922.5   722.2
  968.59   721.9 1008.64   721.6 1071.67   721.5 1119.92   721.5 1163.63   721.8
 1191.96     722 1219.92 721.703    1242 723.407 1261.29 723.108 1322.51 717.477
 1337.65 717.289 1343.27 713.189 1345.73 711.588  1351.5 710.884 1358.27 710.875
 1362.02 711.468 1368.17 714.783 1374.67 717.301  1427.9 718.324 1478.97 720.331
 1514.71 720.634 1562.54 720.586 1607.43   721.9 1685.47     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
```

```
       0    .105 1337.65    .065 1374.67    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1337.65 1374.67             2162    2021    1923             .1       .3
Left Levee      Station=    1242      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 11691

INPUT
Description: IDNR 1985. C befoer CA 1093
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  718.68      42  719.18     114  719.98     163  719.58     215  719.88
     270  719.58     327  717.98     382  716.38     440  715.58     495  715.18
     541  715.48     605  716.18  647.01  714.78  655.01  711.78  658.01  711.18
  663.01  711.08  666.01  711.78  674.01  715.88  721.01  716.38  778.01  717.38
  834.01  717.98  892.01  719.18  946.01  722.18 1001.01  724.98 1058.01  728.18
 1114.01  730.48 1169.01  732.18 1227.01  733.68

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
       0     100     270    .105  647.01    .065  674.01    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        647.01  674.01             2140    2506    2590             .1       .3
Left Levee      Station=     605      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 9184

INPUT
Description: IDNR 1985. C before CA 846 (Verified) Distance Not Including Seavey
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  726.48      24  726.18      37  723.28      99  720.58     156  718.18
     214  717.08     270  716.08     326  715.68     385  714.18     442  713.08
  500.01  712.68  547.01  712.88  555.01  708.88  558.01  707.58  561.01  707.68
  563.01  708.88  571.01  712.88  626.01  712.88  683.01  713.78  739.01  714.08
  795.01  715.28  851.01  716.48  908.01  716.78  964.01  717.58 1022.01  717.88
 1079.01  718.18 1136.01  718.08 1194.01  718.38

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************
       0    .105  547.01     .06  571.01    .105 1079.01     100

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        547.01  571.01             1440    1496    1560             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7588

INPUT
Description: USGS IL 2001.  Approach Seavey26; two RB extended pts and 4 LB
             extended pts, elevations from bb_tinascii
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -326     720    -296   717.9    -245     716    -150     714  -16.57  712.23
       0  711.15    3.12  708.72    5.24  707.06    9.21  705.97   12.14  705.78
   14.07  706.25    15.5  706.66   17.39  708.48   20.57  710.57   26.68  711.86
   42.34  711.47   54.49  712.31   87.28  713.03  106.96  713.73     319   721.4
```

```
    2614   723.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -326    .105       0     .06   20.57    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0   20.57              135     122     132             .3       .5

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7576

INPUT
Description: USGS IL 2001.  USF Seavey26 . The use of n=100 is to block of
             conveyance but retain storage computation. This is for f-table
             computation only.
Added extend pts-3 on LHS, 2 on RHS,
             elevations from bb_tinascii
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -340   719.8    -276     718    -192     716 -111.83  714.86  -75.45  714.69
   -44.6  713.53  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42
       0  705.39    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39
   53.77  712.49   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65
     297   720.5    2634     728

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -340    .105   -4.92     .06    11.8    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -4.92    11.8               48      46      48             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -340      -5     715       F
      12    2634     715       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 7550

INPUT
Description: Seavey 26  IL USGS
Distance from Upstream XS =       6
Deck/Roadway Width        =      36
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
    -260  715.82         -104.91  715.44          -63.81   715.3
  -20.86   715.4          -10.42  715.43           50.12  715.48
   98.41  715.57          139.08  715.81             240   716.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -295     720    -161     716 -111.83  714.86  -75.45  714.69   -44.6  713.53
  -27.94  712.98  -10.32  712.47   -4.92  712.34   -4.63  705.42       0  705.39
    5.16  705.43   11.75  705.42    11.8  712.58   25.13  712.39   53.77  712.49
   72.28  713.02   78.86  714.24  101.28  714.44   137.4  714.65     182     716
     274     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
```

```
    -295      .1   -4.92    .014    11.8      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -4.92    11.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -295      -5     715       F
      12     274     715       F

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************************************
    -260  715.96         -136.45  715.47          -73.33   715.6
  -27.61  715.84           19.92  715.89           56.43  715.85
   97.33  715.83          126.43  716.03          161.88  716.34
     240   716.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    -299     720    -270     716 -188.97  714.61 -153.89  713.64 -131.71  714.11
 -118.51   713.7  -92.92  713.04   -59.3  712.77     -25  712.87    -6.8  711.77
   -5.64   707.9   -2.28  706.86   -1.72  705.57       0  704.49    2.62   703.7
     6.7   703.6    8.63  703.85   10.06  704.22   12.18  704.14   13.64  703.87
    15.2  703.85   16.52  705.19   16.79  712.26   22.52  711.46   33.88  712.39
   63.18  713.39   83.33  714.16   98.36  714.21  110.58  713.23  143.91  713.47
  179.27  714.04     234     716     283     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -299      .1    -6.8    .014   16.79      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
          -6.8   16.79             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -299      -1   711.4       F
   16.17     283   711.4       F
Right Levee     Station=   16.79      Elevation=

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #2           Box       6     8.8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                   .4                1
Upstream   Elevation =  705.4
           Centerline Station = -0.15
Downstream Elevation =  705.3
           Centerline Station =  3.8

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6     7.5
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  6      36     .014     .014        0                   .4                1
Upstream   Elevation =  705.45
           Centerline Station =  8.05
Downstream Elevation =  705.35
```

Centerline Station = 12

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7499

INPUT
Description: USGS IL 2001. DSF Seavey26. The use of n=100 is to block of conveyance but retain storage computation. This is for f-table computation only.Added extended pts-2 RHS and 3 LHS, elevations from bb_tinascii

Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-358	722.2	-292	720.3	-245	718.2	-188.97	714.61	-153.89	713.64
-131.71	714.11	-118.51	713.7	-92.92	713.04	-59.3	712.77	-25	712.87
-6.8	711.77	-5.64	707.9	-2.28	706.86	-1.72	705.57	0	704.49
2.62	703.7	6.7	703.6	8.63	703.85	10.06	704.22	12.18	704.14
13.64	703.87	15.2	703.85	16.52	705.19	16.79	712.26	22.52	711.46
33.88	712.39	63.18	713.39	83.33	714.16	98.36	714.21	110.58	713.23
143.91	713.47	179.27	714.04	351	720.6	2679	724.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-358	.105	-6.8	.06	16.79	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-6.8	16.79	162	146	142	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-358	-1	711.4	F
16.17	2679	711.4	F

Right Levee Station= 16.79 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 7453

INPUT
Description: USGS IL 2001. Departure Seavey26; added 22 extend pts on LHS and 2 on RHS, elevations from bb_tinascii

Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-2419	729.2	-2254	730.5	-2102	731.3	-1952	731.7	-1824	731.7
-1754	731.9	-1665	732.3	-1595	733	-1501	734.4	-1380	735.6
-1258	736.6	-1136	737.7	-1031	738.7	-906	739.9	-802	740.1
-702	738.8	-593	738.4	-487	734	-378	730.7	-292	729.3
-192	723.3	-107	719.8	0	713.98	37.16	713.08	80.37	712.06
116.16	711.3	143.93	710.58	160.37	710.92	171.65	709.95	174.29	708.99
175.95	706.88	180.25	705.73	186.19	705.42	191.48	705.75	194.47	705.81
195.89	706.81	196.8	707.82	198.83	708.89	204.64	713.8	211.67	713.72
218.75	713.97	223.37	713.73	229.89	711.49	255.23	711.08	334.18	712.42
512	718.4	2839	728.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-2419	.105	171.65	.06	204.64	.105

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
171.65	204.64	1540	1490	1570	.1	.3

Right Levee Station= 218.75 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5863

```
INPUT
Description: IDNR, 1985.  C before CA 513
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  720.08      55  719.38     112  717.48     170  714.68     228  711.98
     286  710.18     373  709.38     379  707.38     380  705.28     382  704.98
     386  704.68     389  704.98     391  705.28     403  709.98     411  709.38
     468  709.28     522  709.28     580  709.28     640  710.58     695  711.38
  752.01  712.88  808.01  713.98  864.01  715.38  922.01  716.88  979.01  717.98
 1035.01  719.68 1091.01  721.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .105     373     .06     403    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           373     403              530     608     703             .1       .3
Right Levee     Station=     403      Elevation=

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5256

INPUT
Description: IDNR 2001.  TP#0 off kane 32 Approach to I-88
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -134     720       0  718.23   57.09 716.021  111.01 714.792   164.2 712.864
  218.95  710.29  271.69  709.07  323.06 708.367   369.9 706.971  389.15 708.237
  396.25 704.846  398.52  704.28  409.99 704.265  419.34  704.24  431.06 704.746
  440.45 708.745   475.2  709.07  532.47  709.35   582.9 709.461  633.34 709.624
  680.43 709.962  726.24   710.4  774.08 710.705  825.99 710.887  877.81 712.035
  932.11 713.742  985.25     715 1037.43 715.542    1080     716    1114     718
    1182     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -134    .075  389.15     .06  440.45    .075

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        389.15  440.45              175     152     108             .2       .3
Left Levee      Station=  389.15      Elevation= 708.237

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 5104

INPUT
Description: IDNR 2001. Section A I88 USF.
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -686     720 -528.47  717.55 -374.86  714.61 -322.66  713.52 -268.02  711.62
 -211.93  709.89 -152.45  708.98  -95.32   708.7   -63.2  706.91   -58.1   704.7
  -48.87  704.54  -41.74  704.35  -38.64  706.33  -25.17  705.88       0  707.51
   56.49  708.23  114.04  708.73  171.49  708.99  225.74  709.39  283.09  709.98
  336.84  710.54  389.38  711.09  448.08  712.48  504.19  713.22   561.4  714.12
  620.15  714.45     674     716     744     718     787     720

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    -686    .105   -63.2     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -63.2       0              250     230     240             .3       .5
Ineffective Flow     num=       2
```

Sta L	Sta R	Elev	Permanent
-686	-63	718	F
-30	787	718	F

CULVERT

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 5103

INPUT
Description: I-88 New IDNR
Distance from Upstream XS = 25
Deck/Roadway Width = 150
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-590	721.9		-493	721.3		-396	720.8	
-200	719.8		-101.5	718.1		139	719	
236	719.1		341	719.36		438	720.2	
535	721.1		631	721.7				

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-686	720	-528.47	717.55	-374.86	714.61	-322.66	713.52	-268.02	711.62
-211.93	709.89	-152.45	708.98	-95.32	708.7	-63.2	706.91	-58.1	704.7
-48.87	704.54	-41.74	704.35	-38.64	706.33	-25.17	705.88	0	707.51
56.49	708.23	114.04	708.73	171.49	708.99	225.74	709.39	283.09	709.98
336.84	710.54	389.38	711.09	448.08	712.48	504.19	713.22	561.4	714.12
620.15	714.45	674	716	744	718	787	720		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-686	.1	-63.2	.014	0	.1

Bank Sta: Left Right Coeff Contr. Expan.
-63.2 0 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-686	-63	718	F
-30	787	718	F

Downstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-590	721.9		-493	721.3		-396	720.8	
-200	719.8		-101.5	718.1		139	719	
236	719.1		341	719.36		438	720.2	
535	721.1		631	721.7				

Downstream Bridge Cross Section Data
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-508.42	712.84	-451.43	712.89	-398.35	712.66	-342.27	712.31	-285.28	711.7
-228.51	710.71	-172.24	710.18	-114.82	708.95	-65.67	705.15	-63.25	704.68
-57.87	701.51	-27.28	702.49	-22.75	703.54	-14.84	704.46	0	705.75
62.13	708.26	114.41	708.41	170.77	708.67	221.5	709.68	277.13	709.95
329.33	710.29	381.2	710.91	421	712	459	714		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-508.42	.1	-63.25	.014	0	.1

Bank Sta: Left Right Coeff Contr. Expan.
-63.25 0 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
 -508.42     -52   712.1       F
     -29     459   712.1       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       8       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Outlet control
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18     180     .014     .014        0                   .4                1
Number of Barrels =  2
Upstream   Elevation =  704.4
Centerline Stations
    Sta.    Sta.
     -52     -43
Downstream Elevation =  704.1
Centerline Stations
    Sta.    Sta.
     -45     -36

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4652

INPUT
Description: IDNR 2001. Section D DSF I-88.
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 -508.42  712.84 -451.43  712.89 -398.35  712.66 -342.27  712.31 -285.28   711.7
 -228.51  710.71 -172.24  710.18 -114.82  708.95  -65.67  705.15  -63.25  704.68
  -57.87  701.51  -27.28  702.49  -22.75  703.54  -14.84  704.46       0  705.75
   62.13  708.26  114.41  708.41  170.77  708.67   221.5  709.68  277.13  709.95
  329.33  710.29   381.2  710.91     421     712     459     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
 -508.42    .105  -63.25     .06       0    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -63.25       0              138     120     140              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -508.42     -52   712.1       F
     -29     459   712.1       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 4511

INPUT
Description: IDNR 2001. 1TP #2 off KANE 32 Depart from I-88; extended 2 pts on
             each side, elevation from bb_tinascii
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    -889   721.6    -582     715  -445.7  711.17 -392.55  711.04  -343.9  711.35
 -289.26  711.86 -237.33  711.75 -184.94  711.62 -136.77  711.84  -89.81  711.14
  -55.84  710.13  -43.48  707.49  -39.71   704.7  -36.71  704.12  -31.21  703.76
  -25.38  704.02  -22.76  704.72  -16.52  708.76       0  709.01   47.92  709.24
```

```
  100.01  709.62  154.14  709.92  207.49  710.96  268.79  711.45  324.93  711.63
     580   714.4     650   715.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    -889    .105  -55.84     .06  -16.52    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        -55.84  -16.52              485     660     768             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 3851

INPUT
Description: IDNR 1985. C before CA 340
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   692.5  722.58   739.5  721.88   819.5  716.28   867.5  713.98   881.5  712.68
   925.5  708.98   972.5  707.18   991.5  706.58   996.5  703.68   997.5  703.38
  1001.5  703.48  1003.5  703.78  1008.5  706.08  1055.5  707.08  1100.5  707.08
  1146.5  707.18  1193.5  707.08 1242.51  707.08 1288.51  708.48 1336.51  709.48
 1384.51  710.18 1434.51  710.68 1485.51  711.48 1535.51  711.28 1586.51  711.48
 1638.51  712.08 1689.51  712.88 1740.51  713.48 1793.51  714.28 1844.51  715.98
 1866.51  717.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   692.5    .105   991.5     .07  1008.5    .105

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         991.5  1008.5              649     712     738             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 3139

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  423.36   726.5  472.16  727.24  549.39  727.27  673.17  726.79  696.14  724.06
  705.73  724.23  726.16   721.9  796.85  710.63  900.88  708.11  926.31  707.08
  939.84  706.59  959.01  706.78  970.74  706.45  975.99   706.4  976.44  706.49
  978.09  706.67  983.77  706.34     987  706.11  991.82   704.1  993.16   702.8
   994.9  702.32   999.1  701.88 1001.03  702.07 1005.41  702.52 1006.76  703.15
 1008.38  704.16    1013  706.31 1014.95  706.53 1016.26  706.63 1017.95  706.72
 1023.44   706.8 1031.39  706.29 1036.47  706.38  1038.5  706.18 1045.04  706.63
  1053.6  706.47 1059.95   706.2 1074.93  706.24 1139.28   706.6 1197.27  709.47
 1242.33  709.35 1287.17  709.13 1316.01  709.16 1431.04  709.67 1515.42  710.48
 1575.64  712.16 1646.39  714.43 1704.68  716.04 1745.66  717.46 1814.17  717.79
 1828.03  717.55 1847.39     718

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  423.36     .12     987     .07    1013     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           987    1013              259     259     259             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2880
```

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
404.3	723.22	415.19	723.48	431.78	723.68	439.79	723.96	470.21	723.9
476.16	724.09	487.36	724.03	493.3	724.16	502.99	724.3	531.86	723.7
545.63	723.62	618.74	723.43	639.01	723.99	656.15	723.89	689.98	721.08
715.9	720.98	803.78	714.97	832.83	712.35	853.83	711.76	869.74	710.45
887.78	709.75	900.58	709.31	906.7	708.45	944.3	706.28	953.52	705.97
962.4	705.82	967.24	706.08	969.62	705.88	977.59	706.41	985.26	706.12
986.24	705.89	989.6	704.12	991.26	703.05	993.39	702.23	998.07	701.72
1002.86	701.7	1003.71	702	1007.05	703.18	1008	704.08	1013.75	706.91
1028.46	706.59	1031.16	705.96	1039.89	706.25	1044	706.18	1044.6	706.12
1046.3	706.17	1048.28	706.16	1053.96	705.91	1059.04	706.01	1066.52	705.91
1068.1	705.69	1073.64	705.63	1085.04	706.1	1088.48	705.85	1096.48	705.89
1103.57	705.72	1111.22	706.08	1118.94	705.93	1136.82	706.09	1156.58	706.45
1188.26	708.45	1194.88	708.87	1204.52	709.25	1208.36	709.27	1212.04	709.46
1217.15	709.52	1225.12	709.34	1232.17	709.66	1235.09	709.43	1239.75	709.33
1242.45	709.46	1249.68	709.09	1257.78	709.13	1269.76	708.42	1308.47	707.78
1348.98	708.09	1390.81	707.76	1414.66	708.41	1429.61	709.62	1461.31	711.59
1527.54	715.21	1538.02	716.04	1553.28	716.11	1583.62	718.35	1620.71	720.15
1657.36	722.88	1697.38	724.78	1706.99	725.81	1717.53	726.15	1722.78	725.84
1733.32	727.38	1741.44	727.73	1765.47	728.33	1781.06	729.62	1857.1	731

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
404.3	.12	986.24	.07	1013.75	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
986.24	1013.75	233	233	233	.1	.3

Right Levee Station= 1217.15 Elevation=

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2647

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
388.38	720.6	499.07	721.76	612.18	721.6	622.04	722.32	632.68	722.17
645.15	723.94	658.77	723.22	670.68	723.7	680.57	722.41	701.2	722.11
711.07	721.91	725.47	722.3	733.79	721.32	742.08	721.59	747.98	721.43
798.18	717.22	843.82	713.82	853.43	712.28	860.33	711.61	877.53	710.47
886.21	710.42	910.76	708.76	989.04	705.68	992.48	703.16	994.77	702
1000	701.49	1001.26	701.59	1004.3	701.82	1006.57	702.9	1007.24	704.07
1011.35	705.96	1104.05	705.99	1208.19	706.16	1274.15	706.93	1300.39	707.79
1359	708.06	1390.36	709	1435.3	709.07	1491.56	712.48	1650.3	725.95
1741.73	731.94	1748.54	731.81	1806.73	734.14	1843.36	734.37	1858.06	734

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
388.38	.12	989.04	.07	1011.35	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
989.04	1011.35	225	225	225	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2422

INPUT
Description: IDNR 1985. C before CA 198
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
689.5	719.08	710.5	718.78	760.5	716.88	806.5	713.58	853.5	710.68

```
   900.5  708.38   943.5  706.48   990.5  705.28   993.5  702.88   996.5  702.08
  1001.5  701.98  1002.5  702.78  1009.5  705.38  1075.5  705.78  1123.5  705.28
  1168.5  705.48  1216.5  705.48  1259.5  705.18  1304.5  704.08  1344.5  708.68
  1385.5  709.48  1417.5  710.08  1475.5     712  1495.5     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   689.5     .12   990.5     .07  1009.5     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         990.5  1009.5                 7       7       7             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
  1259.5  1495.5  705.15

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2415

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      57
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  421.44  720.13   605.3  720.22   614.3  720.97  651.97  720.09  687.23  719.95
  695.02  718.83   727.3  718.58  743.24  718.24  767.76  717.29  772.52  717.49
  786.82  716.59   799.1  714.82  867.45  709.55  878.72  709.45  932.76  706.68
  936.71  706.82  963.66  705.73  968.17  706.12  982.77  706.27   988.1  705.75
  990.76   705.3  992.07  704.21  992.97  703.25  995.67  702.17    1000  702.06
 1003.54  702.11 1005.09  702.13 1006.76  702.94 1007.57  704.22 1010.73  705.52
 1013.72  705.55 1015.82  705.78 1017.78     706 1025.46  706.06 1028.89  706.38
 1047.29  705.89  1066.3  705.96 1115.66  705.19 1146.12  705.28 1172.55  705.35
 1176.61  705.56 1180.25  705.26 1202.95  705.16 1255.52  706.25 1297.46  707.96
 1329.69   708.1 1335.29   708.9 1346.82  708.42 1353.72  709.44 1370.12  708.66
 1392.36   708.7 1485.77  711.39 1545.39  717.61 1606.04   721.5 1727.56  729.84
 1790.33  731.52    1872  732.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  421.44     .12  990.76     .07 1010.73     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        990.76 1010.73               321     176     133             .1       .3

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2139

INPUT
Description: USGS IL 2001. . Approach CS to Rte 47-25

Outer 3 pts on RHS
             interpolated from the 2004 TIN, by BW 1-28-05
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  583.91  721.51     688  719.38  796.27  712.28  855.07  708.57  964.47  705.32
  988.03  704.68  989.87  702.77  991.88  701.58    1006  701.27 1008.95  703.57
 1011.97  705.27 1052.11  704.51 1228.51  704.74 1281.57  707.34 1307.81   710.2
 1368.01   714.2 1413.41   718.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  583.91     .12  988.03     .07 1011.97     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        988.03 1011.97                 3       3       3             .3       .5
```

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
583.91	840.9	715.28	F
1159.1	1413.41	715.28	F

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2136

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
537.66	721.44	553.41	721.55	555.96	721.46	558.52	721.41	564.32	721.53
568.67	721.45	571.27	721.73	572.59	721.61	577.1	721.78	584.95	721.49
586.27	721.47	643.09	720.87	668.39	721.02	669.93	721	729.27	716.64
742.83	715.46	758.09	714.4	762.04	714.24	765	714.05	767.53	713.89
778.02	713.23	781.16	713.04	782.18	712.92	816.49	710.8	822.16	710.46
834.01	709.59	841.76	709.52	856.21	708.56	893.4	707.36	894.56	707.31
926.32	706.45	958.61	705.56	978.67	705.48	984.26	705.49	987.42	704.35
989.3	703.3	993.7	701.82	997.41	701.47	998.16	701.41	1003.92	701.33
1004.73	701.62	1008.97	703.11	1010.11	704.48	1015.74	705.56	1024.82	705.31
1042.11	705.05	1046.21	704.06	1052.01	704.84	1056.45	704.96	1064.24	704.71
1069.85	704.77	1082.31	705.14	1085.15	705.18	1112.77	705.08	1120.67	705.19
1163.82	704.98	1164.24	704.96	1225.93	705.16	1276.85	706.68	1297.44	707.5
1367.87	713.48	1436.23	718.99	1470.38	722.75	1572.18	731.45		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
537.66	.12	984.26	.07	1015.74	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
984.26	1015.74	133	135	132	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
537.66	843.9	715.28	F
1156.1	1572.18	715.28	F

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 2101

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
524.05	718.55	534.31	717.76	548.83	718.97	562.77	719.13	579.25	718.02
584.7	717.22	605.54	716.59	640.12	715.33	667.28	715.58	694.26	714.77
706.95	714.72	728.94	713.87	736.7	713.62	751.33	712.34	758.63	711.4
761.74	710.97	767.83	710.66	773.2	710.86	777.64	711.03	797.54	711.32
827.23	709.3	834.41	709.06	898.59	707.94	944.44	708.05	956.48	707.69
958.81	707.16	961.33	707.21	964.77	707.36	976.71	706.23	979.08	705.42
980.09	705.13	980.6	704.37	982.37	703.56	990.11	701.27	993.75	701.3
997.29	701.33	1004.19	701.87	1010.82	702.51	1017.69	703.23	1020.04	704.44
1021.12	705.61	1021.62	705.74	1023.95	706.67	1029.82	707.52	1047.47	707.67
1101	706.19	1145.2	706.62	1192.88	708.35	1203.22	708.97	1221.63	708.89
1231.4	709.37	1239.77	709.51	1254.83	710.15	1272.02	710.42	1275.55	710.38
1286.48	710.64	1340.74	712.69	1349.67	713.39	1379.5	715.29	1401.86	716.3
1446.8	718.88	1448	718.58	1501.61	721.65	1506.57	721.91	1512.51	722.27
1539.59	724.15	1547.67	724.96						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
524.05	.12	979.08	.04	1021.12	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
979.08	1021.12	182	109	129	.3	.5

```
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  524.05   978.9  715.28       F
  1021.1 1547.67  715.28       F

CULVERT


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 2046

INPUT
Description: Exist IL 47 (updated w/ surveyed crossing)
Distance from Upstream XS =      10
Deck/Roadway Width        =      90
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      15
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************************************
  524.05 718.329          640.12 717.499           736.7 716.577
  797.59 715.865          834.53 715.552          898.72 714.904
  943.69  714.96         1001.19 715.046         1047.47 715.524
 1101.01 715.901         1145.23 716.822         1244.59 719.017
 1349.67 721.699         1446.96  724.61         1543.82 727.529

Upstream Bridge Cross Section Data
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  524.05 717.415  574.24 717.601  592.67 716.474  624.34 715.177  741.96 714.523
  800.78 713.266  842.04 712.761     900 711.544  944.54 711.352  966.37 711.155
  976.71  706.23  979.08  705.42  980.09  705.13   980.6  704.37  982.37  703.56
   988.9  701.26  1003.5  701.26  1004.1  701.31  1011.1  701.31 1017.69  703.23
 1020.04  704.44 1021.12  705.61 1021.62  705.74 1023.95  706.67 1032.15 710.704
  1048.1 711.192 1099.58 711.029 1144.62 712.966 1201.17 713.735 1244.16 714.778
 1349.08 717.449  1445.2 721.004 1543.82 724.961

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
  524.05      .1  979.08     .04   988.9    .014  1011.1     .04 1021.12      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        979.08 1021.12             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  524.05   978.9  715.28       F
  1021.1 1543.82  715.28       F

Downstream  Deck/Roadway Coordinates
    num=      15
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************************************
  543.01 717.578          641.73 716.761          745.66 715.861
  845.66 715.192          902.04 714.885          942.77 715.082
 1001.55 715.095         1050.94 715.619         1105.74 716.044
 1148.48 716.827         1204.01 717.753         1245.42 719.025
 1349.42 721.792         1447.42 724.723         1553.53 727.545

Downstream Bridge Cross Section Data
Station Elevation Data    num=      35
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  543.01  718.72  641.71 716.353  745.35 715.948  785.27 715.474  797.58 715.227
  842.01 714.684  897.33  714.38  939.89 712.806  971.74 709.092  979.13  706.63
  980.34  706.16  980.71  706.13  981.22  704.33  982.93  703.33   988.9  701.18
  1003.5  701.18  1004.1  701.15  1011.1  701.15 1016.13  702.79 1017.53   704.2
 1019.57  705.87 1020.11  705.97 1021.81  706.38 1024.23  707.06  1031.9 711.885
 1043.15 711.837 1111.23 715.462 1152.25 714.114 1211.62  717.13 1253.25 718.192
 1317.43 719.747 1354.85 721.113 1408.08 722.675 1453.69  724.28 1553.53 726.737

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*******************************************************************************
```

```
  543.01      .1  980.71     .04   988.9    .014  1011.1     .04 1019.57      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        980.71 1019.57             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  543.01   984.4   714.9       F
  1015.6 1553.53   714.9       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  3

Culvert Name     Shape      Rise    Span
Culvert #1           Box       8       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 10      90     .014     .014        0                   .3                1
Upstream   Elevation =  701.26
           Centerline Station =  992.4
Downstream Elevation =  701.18
           Centerline Station =  992.4

Culvert Name     Shape      Rise    Span
Culvert #2           Box       8       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 10      90     .014     .014        0                   .3                1
Upstream   Elevation =  701.26
           Centerline Station =  1000
Downstream Elevation =  701.18
           Centerline Station =  1000

Culvert Name     Shape      Rise    Span
Culvert #3           Box       8       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 10      90     .014     .014        0                   .3                1
Upstream   Elevation =  701.31
           Centerline Station =  1007.6
Downstream Elevation =  701.15
           Centerline Station =  1007.6

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1992

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      70
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  543.01  718.72   565.3  718.48  611.22  718.19  626.82  717.74  641.71  717.33
  663.65  716.65   695.1  716.56  700.41   716.2  724.54  715.34  743.46  714.54
  747.88  714.42  752.51  714.13  758.16   713.8  762.04  713.53  763.45  713.53
  787.79  712.49  801.02  711.61  817.89  711.18  827.27  710.98  838.93  710.73
  858.49  710.52  861.75   710.8  863.58  710.81  869.21  710.72   872.8   710.7
  900.48  710.85  902.04   710.9  910.27  710.92  919.41  710.53   926.4  709.84
  935.59  710.24  942.77  710.83   967.6  707.57  979.13  706.63  980.34  706.16
  980.71  706.13  981.22  704.33  982.93  703.33  989.86  701.48  994.95  701.16
 1001.55   701.1 1007.77  701.66 1009.39   701.8 1016.13  702.79 1017.53   704.2
```

```
 1019.57  705.87 1020.11  705.97 1021.81  706.38 1024.23  707.06 1034.19  708.35
 1105.74  711.26 1144.34  712.05 1158.81  712.27 1203.99  713.29 1218.88  713.63
 1233.69  714.16 1245.42  714.94 1265.81  714.69 1298.99  716.31 1321.45  718.58
 1323.19  718.66 1335.96  719.16 1349.14  719.17 1388.95  719.76 1406.19  720.06
 1411.21  719.68 1447.42  721.37 1491.15   723.2 1517.34  723.85 1546.68  725.23

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  543.01     .12  980.71     .04 1019.57     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        980.71 1019.57               85      70      62             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  543.01   984.4   714.9       F
  1015.6 1546.68   714.9       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1947

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   534.6  721.84  643.49  719.59  690.18  718.15  720.97  714.95  754.68  713.42
  800.06  710.97  829.72  708.73  847.33  708.43  853.77  707.99  897.93  707.01
  932.52  706.17  951.75  705.98  962.96  706.11  985.79  705.48  987.57  703.88
  989.34  702.74     993  701.76  999.48  701.47 1004.28  701.84 1005.44  702.11
 1009.54  703.03 1011.45  704.45 1014.22  704.93 1034.98  705.86 1105.57   705.6
  1138.5  706.84 1207.72  705.12 1252.59  706.58 1355.54  714.57 1434.09  719.83
 1450.28  722.33 1555.35  735.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   534.6     .12  985.79     .07 1014.22     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        985.79 1014.22               85      69      61             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   534.6   949.4   714.9       F
  1050.6 1555.35   714.9       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1903

INPUT
Description: USGS IL 2001.  Depart Rte 47-25
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  616.77  718.43  794.52     714  813.52     712  869.52     708  929.52  705.52
  987.71  705.81  992.43  704.98  993.49  703.55  995.76  703.21  997.12   701.6
 1010.91  703.72 1012.29  705.52  1079.7  706.84 1128.79  707.19 1218.83  705.17
 1247.52     708 1277.52     710 1293.52     712 1320.52     714

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
  616.77     .12  987.71     .07 1012.29     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        987.71 1012.29              161     158     199             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  616.77   914.9   714.9       F
```

```
  1085.1 1320.52   714.9       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1727

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      75
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  343.07  719.59  390.44   719.5  429.05  719.78  513.42  719.12  596.46  717.77
  647.71  714.57  690.31  712.98  724.07  710.86  781.74  709.17  811.91  707.61
  857.78  706.52  895.61  706.25  899.24  705.74  918.02  705.27  937.57  705.57
  943.69  705.39  949.46  705.57  957.32  705.57  960.34  705.64  963.51  705.53
  968.18  705.49  973.73  705.58  989.86  705.67  993.23  704.16   994.5  703.59
  996.04  702.93    1000  702.56 1004.63  702.86 1006.48  703.29 1008.86  704.94
 1023.73  705.51 1026.25  705.61 1042.76  705.65  1051.6  705.19 1062.84  705.31
 1071.73  705.04 1082.43  705.36 1097.64  705.09 1112.98   705.2 1120.82   704.4
 1131.16  705.51 1141.08  704.88 1158.24  704.76 1172.62  704.32 1184.35  704.77
 1208.37  704.78 1220.68  705.93 1235.89  705.68 1255.79  706.57 1269.02  706.34
 1276.48  707.68 1291.34  707.97 1304.02  708.76 1311.71  708.31 1315.79  708.34
 1328.45  709.68 1347.73  710.72 1354.59  711.84 1368.38  713.24 1376.48  713.67
 1385.26  714.77 1397.53  715.67 1403.24   715.7 1422.52  717.31 1428.11  718.79
  1437.4  718.89 1449.27  719.69 1453.37  719.63 1484.56   723.9 1509.67  726.49
  1532.3  727.11 1541.87  728.32 1555.94     729 1573.38  730.65 1579.78  730.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  343.07     .12  989.86     .07 1008.86     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        989.86 1008.86              192     188     237             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  343.07   835.9   714.9       F
  1164.1 1579.78   714.9       F

CROSS SECTION


RIVER: Blackberry Creek
REACH: Trib C Before CA   RS: 1517

INPUT
Description: Lin Eng - 2015
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  350.28   717.6  390.66  718.09  403.66  716.71  437.67  715.58  443.45  715.86
  459.85  714.38  475.41  714.88  494.72  714.23  545.37  710.31  663.96  709.19
  717.56  709.43  765.49   709.1  819.77  709.52   851.7  708.27  889.94  706.43
  913.37  705.32  961.91   705.1  981.66  705.52  994.86  702.51   996.5  701.86
 1003.57  702.19 1011.89  702.13 1013.28   702.5 1018.33  705.04 1096.97  704.22
 1149.99  704.75 1183.41  704.81 1185.69  705.19  1216.4   704.7 1236.15  705.16
 1249.98  704.64 1292.26  705.23 1316.31  707.72 1337.57  708.69 1341.95  709.86
 1348.72  709.16 1374.19  710.03 1382.28  711.26 1409.03  712.18 1562.14  723.08
 1566.73  722.88  1579.9     724

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  350.28     .12  981.66     .07 1018.33     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        981.66 1018.33              135     133     167             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  1258.1  1579.9   714.9       F

CROSS SECTION
```

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 1369

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
342.91	717.74	423.21	715.01	442.21	713.84	460.34	713.17	508.13	713.88
546.64	711.72	556.49	712.37	614.14	711.31	663.73	710.82	700.95	710.01
744.85	709.89	760.77	709.16	806.57	709.1	818.92	708.68	838.83	709.13
870.4	709.18	899.41	708.23	907.7	707.49	914.25	705.89	917.14	705.63
922.45	705.37	925.4	705.42	933.85	705.14	943.35	705.02	958.26	704.68
966.02	704.64	974.95	704.22	976.59	704.31	985.46	704.55	990.86	704.59
995.75	702.4	997.55	701.83	1000	701.33	1001.96	701.54	1002.94	701.64
1006.67	702.31	1011.02	704.44	1017.96	704.64	1022.14	704.64	1027.02	704.85
1031.61	704.32	1035.57	704.67	1041.72	705.65	1044.64	705.85	1047.75	705.91
1058.17	705.63	1064.28	704.82	1065.69	704.5	1106.99	704.18	1110.83	704.79
1119.25	704.41	1123.54	704.77	1130.54	704.3	1139.05	704.52	1143.04	704.09
1169.88	704.43	1179.35	705.54	1186.27	705.87	1188.9	706.24	1197.06	705.82
1205.74	704.72	1220.33	704.54	1222.13	704.78	1236.95	705.3	1245.89	705.44
1255.3	706.29	1257.51	706.38	1264.98	706.41	1276.63	706.78	1288.86	706.8
1290.73	706.62	1296.65	707.8	1306.09	707.24	1317.24	706.76	1325.62	707.29
1331.32	708.51	1342.76	707.95	1349.83	708.51	1353.97	708.1	1378.33	708.91
1393.68	709.84	1400.42	709.56	1412.19	710.39	1419.16	710.47	1431.33	711.81
1459.9	712.68	1486.22	714.75	1521.62	719.25	1567.85	721.34	1590.73	721.59

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
342.91	.12	985.46	.07	1017.96	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
985.46	1017.96	275	271	341	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 1067

INPUT
Description: Lin Eng - 2015
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
273.6	714	342.55	714.18	380.96	713.37	397.8	712.77	413.66	711.83
420.44	712.38	456.7	710.86	473.9	711.11	489.37	710.87	496.04	710.16
525.14	710.39	566.05	709.75	587.65	711.19	617.78	710.9	647.22	709.61
664.59	710.06	717.88	709.06	730.65	709.31	741.18	710.17	777.87	709.3
823.05	708.83	845.98	709.08	846.44	709.06	846.97	709.03	874.94	709.66
918.33	708.35	919.73	708.24	947.26	705.81	947.88	705.81	948.37	705.8
971.83	704.62	986.98	704.2	991.57	703.97	995.9	701.83	997.36	700.99
1000	700.14	1002.43	700.32	1005	701.02	1010.98	703.69	1013.94	704.35
1028.79	704.54	1063.57	704.05	1104.41	704.04	1112.5	704.49	1122.99	703.78
1129.11	702.1	1198.08	703	1248.62	702.48	1270.56	704.07	1304.18	704.28
1312.9	706.36	1317.79	706.41	1329.3	704.87	1361.45	707.9	1391.61	708.23
1419.58	709.93	1495.22	710.75	1582.46	718.68	1609.03	724.19	1642.39	724.41

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
273.6	.12	986.98	.07	1013.94	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
986.98	1013.94	124	122	154	.1	.3

CROSS SECTION

RIVER: Blackberry Creek
REACH: Trib C Before CA RS: 931

INPUT

Description: IDNR 1985. C before CA 051
extended points added on the
floodplain which were interpolated formt he 2004 TIN

Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
705.03	710.18	752.06	709.18	799.99	708.58	849.08	707.88	880.03	707.08
919.01	704.78	966.04	703.98	981.99	703.68	990.02	701.88	993	701.38
1000	701.08	1002	701.88	1006.05	704.28	1057.01	703.48	1101.01	703.68
1150.02	704.18	1191.08	703.88	1235.01	705.28	1285.06	704.78	1339.05	704.68
1388	704.28	1431.03	704.88	1493.73	705.7	1545.83	706	1594.83	708
1615.83	709.7	1641.53	711.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
705.03	.12	966.04	.07	1006.05	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
966.04	1006.05	0	0	0	.1	.3

Right Levee Station= 1006.03 Elevation=

SUMMARY OF MANNING'S N VALUES

River:Blackberry Creek

Reach	River Sta.	n1	n2	n3	n4
Trib C Before CA	15195	.105	.065	.105	
Trib C Before CA	13934	.105	.065	.105	
Trib C Before CA	13896	.105	.065	.105	
Trib C Before CA	13875	Culvert			
Trib C Before CA	13859	.105	.065	.105	
Trib C Before CA	13812	.105	.065	.105	
Trib C Before CA	11691	100	.105	.065	.105
Trib C Before CA	9184	.105	.06	.105	100
Trib C Before CA	7588	.105	.06	.105	
Trib C Before CA	7576	.105	.06	.105	
Trib C Before CA	7550	Culvert			
Trib C Before CA	7499	.105	.06	.105	
Trib C Before CA	7453	.105	.06	.105	
Trib C Before CA	5863	.105	.06	.105	
Trib C Before CA	5256	.075	.06	.075	
Trib C Before CA	5104	.105	.06	.105	
Trib C Before CA	5103	Culvert			
Trib C Before CA	4652	.105	.06	.105	
Trib C Before CA	4511	.105	.06	.105	
Trib C Before CA	3851	.105	.07	.105	
Trib C Before CA	3139	.12	.07	.12	
Trib C Before CA	2880	.12	.07	.12	
Trib C Before CA	2647	.12	.07	.12	
Trib C Before CA	2422	.12	.07	.12	
Trib C Before CA	2415	.12	.07	.12	
Trib C Before CA	2139	.12	.07	.12	
Trib C Before CA	2136	.12	.07	.12	
Trib C Before CA	2101	.12	.04	.12	
Trib C Before CA	2046	Culvert			
Trib C Before CA	1992	.12	.04	.12	
Trib C Before CA	1947	.12	.07	.12	
Trib C Before CA	1903	.12	.07	.12	
Trib C Before CA	1727	.12	.07	.12	
Trib C Before CA	1517	.12	.07	.12	
Trib C Before CA	1369	.12	.07	.12	
Trib C Before CA	1067	.12	.07	.12	
Trib C Before CA	931	.12	.07	.12	

SUMMARY OF REACH LENGTHS

River: Blackberry Creek

Reach	River Sta.	Left	Channel	Right
Trib C Before CA	15195	1162	1160	1140
Trib C Before CA	13934	110	100	110
Trib C Before CA	13896	60	46	50
Trib C Before CA	13875	Culvert		
Trib C Before CA	13859	145	130	154
Trib C Before CA	13812	2162	2021	1923
Trib C Before CA	11691	2140	2506	2590
Trib C Before CA	9184	1440	1496	1560
Trib C Before CA	7588	135	122	132
Trib C Before CA	7576	48	46	48
Trib C Before CA	7550	Culvert		
Trib C Before CA	7499	162	146	142
Trib C Before CA	7453	1540	1490	1570
Trib C Before CA	5863	530	608	703
Trib C Before CA	5256	175	152	108
Trib C Before CA	5104	250	230	240
Trib C Before CA	5103	Culvert		
Trib C Before CA	4652	138	120	140
Trib C Before CA	4511	485	660	768
Trib C Before CA	3851	649	712	738
Trib C Before CA	3139	259	259	259
Trib C Before CA	2880	233	233	233
Trib C Before CA	2647	225	225	225
Trib C Before CA	2422	7	7	7
Trib C Before CA	2415	321	176	133
Trib C Before CA	2139	3	3	3
Trib C Before CA	2136	133	135	132
Trib C Before CA	2101	182	109	129
Trib C Before CA	2046	Culvert		
Trib C Before CA	1992	85	70	62
Trib C Before CA	1947	85	69	61
Trib C Before CA	1903	161	158	199
Trib C Before CA	1727	192	188	237
Trib C Before CA	1517	135	133	167
Trib C Before CA	1369	275	271	341
Trib C Before CA	1067	124	122	154
Trib C Before CA	931	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Blackberry Creek

Reach	River Sta.	Contr.	Expan.
Trib C Before CA	15195	.1	.3
Trib C Before CA	13934	.3	.5
Trib C Before CA	13896	.3	.5
Trib C Before CA	13875	Culvert	
Trib C Before CA	13859	.3	.5
Trib C Before CA	13812	.1	.3
Trib C Before CA	11691	.1	.3
Trib C Before CA	9184	.1	.3
Trib C Before CA	7588	.3	.5
Trib C Before CA	7576	.3	.5
Trib C Before CA	7550	Culvert	
Trib C Before CA	7499	.3	.5
Trib C Before CA	7453	.1	.3
Trib C Before CA	5863	.1	.3
Trib C Before CA	5256	.2	.3
Trib C Before CA	5104	.3	.5
Trib C Before CA	5103	Culvert	
Trib C Before CA	4652	.3	.5
Trib C Before CA	4511	.1	.3
Trib C Before CA	3851	.1	.3
Trib C Before CA	3139	.1	.3
Trib C Before CA	2880	.1	.3
Trib C Before CA	2647	.1	.3
Trib C Before CA	2422	.1	.3
Trib C Before CA	2415	.1	.3
Trib C Before CA	2139	.3	.5

```
*Trib C Before CA*    2136    *       .3*       .5*
*Trib C Before CA*    2101    *       .3*       .5*
*Trib C Before CA*    2046    *Culvert  *         *
*Trib C Before CA*    1992    *       .3*       .5*
*Trib C Before CA*    1947    *       .3*       .5*
*Trib C Before CA*    1903    *       .3*       .5*
*Trib C Before CA*    1727    *       .3*       .5*
*Trib C Before CA*    1517    *       .3*       .5*
*Trib C Before CA*    1369    *       .1*       .3*
*Trib C Before CA*    1067    *       .1*       .3*
*Trib C Before CA*    931     *       .1*       .3*
*****************************************************
```

Trib C Blackberry Crk.

FIS_updated Reach Lengths

Original FIS Reach Lengths

* Denotes FIS OB & Channel Reach lengths

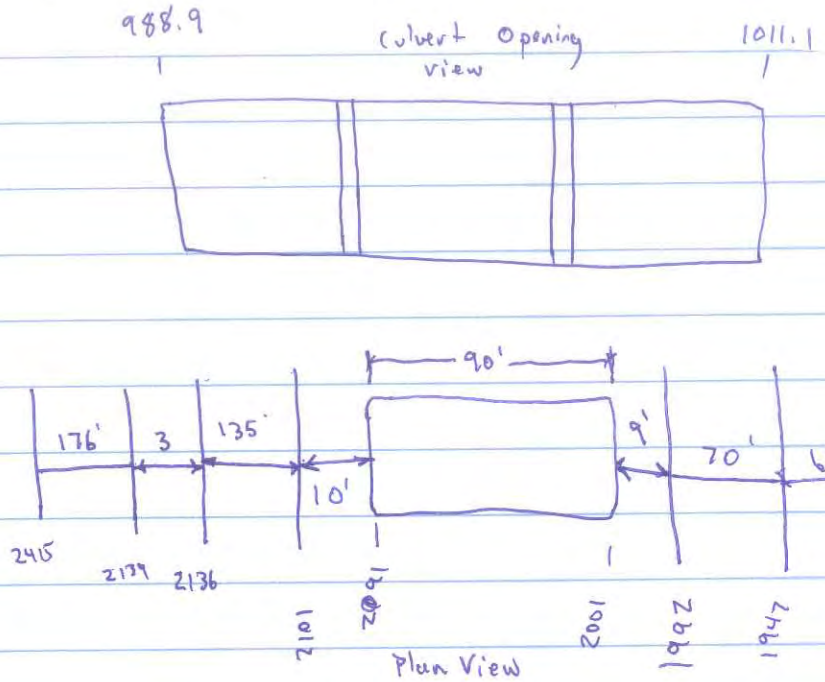
* (###) - Revised Length

* (###) - Reach Lengths 3rd Submittal

											931
				(124) 136	(122) 136	(154) 136					
											1067
(887') 972'	(872') 972'	(1098') 972'		(275) 302	(271) 302	(341) 302					
											1369
				(135) 148	(133) 148	(167) 148					
											1517
				(192) 210	(188) 210	(237) 210					
											1727
				(161) 176	(158) 176	(199) 176					
											1903
				(85) 49	(69) 44	(61) 44					
											1947
				(85) 45	(70) 45	(62) 45					
(488') 236	(386') 236	(387') 236									1992
				(182') 109	109 ✓	(129) 109					
											2101
				35 (133)	35 (135)	35 (132)					
											2136
				✓ 3	✓ 3	✓ 3					
											2139
(328') 283	(183') 283	(140') 327'		265	276	320					
				(321) ✓ 7	(176) ✓ 7	(133) ✓ 7					
											2415
											2422
				✓ 225	✓ 225	✓ 225					
											2647
(1366') ✓ 1366'	1429' ✓ 1429	1455' ✓ 1455		✓ 233	✓ 233	✓ 233					
											2880
				✓ 259	✓ 259	✓ 259					
											3139
				✓ 649	✓ 712	✓ 738					
											3851

		0	0	0
	'Δ' Sta			
				931
+100	972	887'	872'	1098'
				1903
-50	96'	177	146	130
(+50)				1999
±0	2920' 95'	168	95	115
				2094
-100	45'	143	145	142
				2139
+100	283'	328	183	140
				2422
±0	1429'	1366'	1429'	1455'
				3851

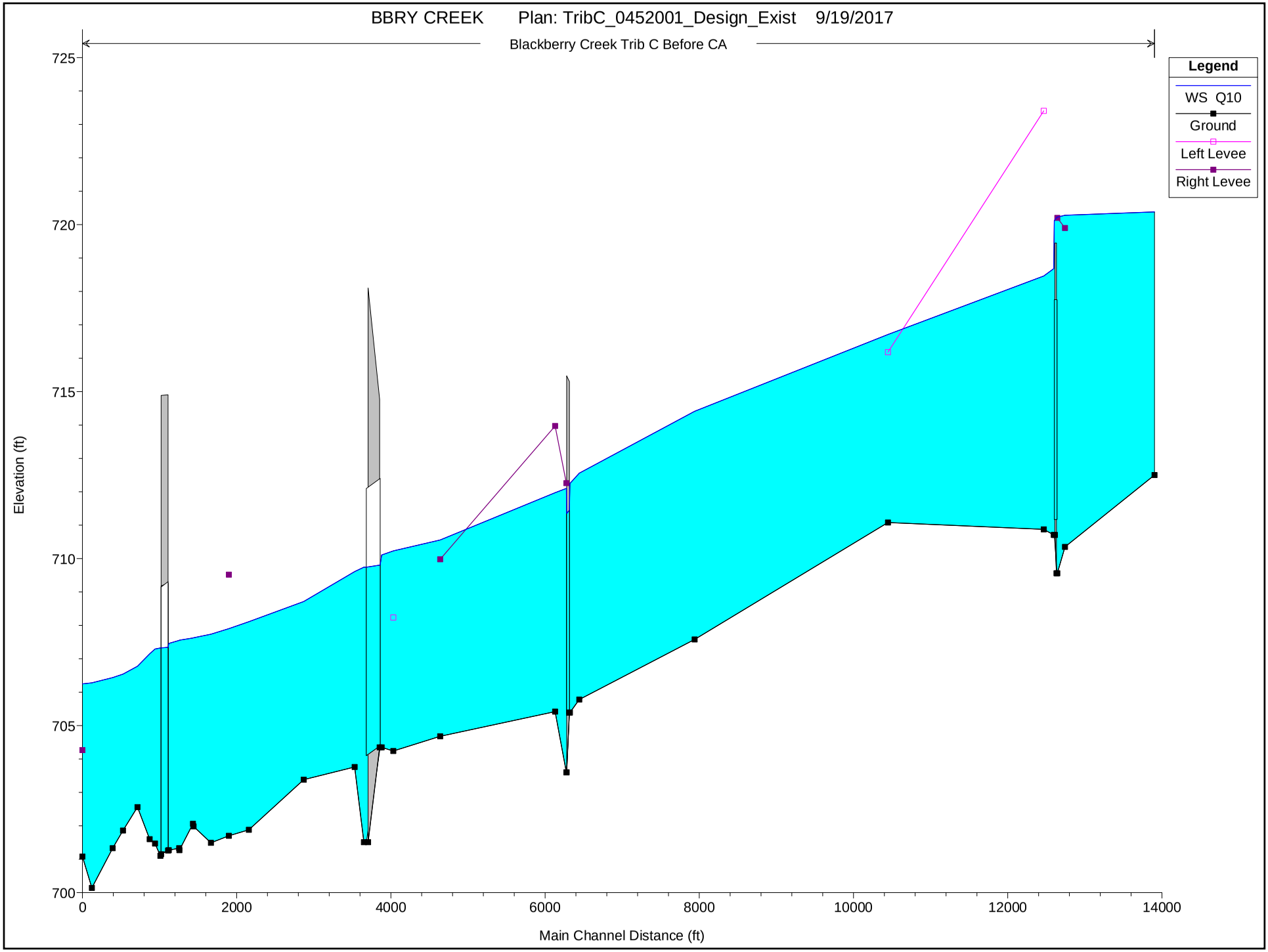
Ineffective Area Offsets Plan: Existing Design
Trib C BBC



2101		2136		2139	
LT IAO (988.9 - 10') = 978.9	RT IAO (1011.1 + 10') = 1021.1	LT IAO (988.9 - 145) 843.9	RT IAO (1011.1 + 145) 1156.1	LT IAO (988.9 - 148) 840.9	RT IAO (1011.1 + 148) 1159.1

2415		1992		1947	
LT IAO (988.9 - 324) 664.9	RT IAO (1011.1 + 324) 1335.1	LT IAO (988.9 - 9/2) 984.4	RT IAO (1011.1 + 9/2) 1015.6	LT IAO (988.9 - 79/2) 949.4	RT IAO (1011.1 + 79/2) 1050.6

1903		1727		1517	
LT IAO (988.9 - 148/2) 914.9	RT IAO (1011.1 + 148/2) 1085.1	LT IAO (988.9 - 306/2) 835.9	RT IAO (1011.1 + 306/2) 1164.1	LT IAO (988.9 - 494/2) 741.9	RT IAO (1011.1 + 494/2) 1258.1


BBRY CREEK Plan: TribC_0452001_Design_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q10
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

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                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 10:39:35 AM

Project in English units

Project Description:
0.0     787.6
68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q10	378.00	712.50	720.38	715.64	720.38	0.000049	0.38	1453.46	855.24	0.04
Trib C Before CA	13934	Q10	369.00	710.35	720.28	713.58	720.29	0.000209	0.96	629.45	282.87	0.07
Trib C Before CA	13896	Q10	369.00	709.56	720.22	714.24	720.25	0.000475	1.57	438.91	299.34	0.11
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q10	369.00	710.71	718.68	715.11	718.81	0.003348	2.95	144.55	130.80	0.27
Trib C Before CA	13812	Q10	369.00	710.88	718.46	713.48	718.51	0.000678	1.75	258.47	119.63	0.13
Trib C Before CA	11691	Q10	364.00	711.08	716.71	714.19	716.75	0.001172	1.92	429.54	369.27	0.17
Trib C Before CA	9184	Q10	349.00	707.58	714.41	711.48	714.44	0.000763	1.74	494.32	378.62	0.14
Trib C Before CA	7588	Q10	349.00	705.78	712.56	709.37	712.70	0.002342	3.18	152.08	106.92	0.25
Trib C Before CA	7576	Q10	349.00	705.39	712.25	707.83	712.40	0.002651	3.09	113.11	16.71	0.21
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q10	349.00	703.60	712.10	706.32	712.17	0.000849	2.06	170.46	29.09	0.14
Trib C Before CA	7453	Q10	347.00	705.42	711.97	707.95	712.04	0.000944	2.06	230.25	118.09	0.16
Trib C Before CA	5863	Q10	347.00	704.68	710.56	707.84	710.59	0.000964	1.77	441.91	365.13	0.16

Trib C Before CA	5256	Q10	361.00	704.24	710.23	705.85	710.24	0.000144	0.87	746.11	487.12	0.07
Trib C Before CA	5104	Q10	361.00	704.35	710.11	706.77	710.19	0.001032	2.24	161.01	514.43	0.18
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q10	361.00	701.51	709.74	704.03	709.81	0.000450	2.04	176.58	386.52	0.13
Trib C Before CA	4511	Q10	362.00	703.76	709.61	706.46	709.71	0.002049	2.56	180.57	152.44	0.23
Trib C Before CA	3851	Q10	362.00	703.38	708.71	707.08	708.73	0.000742	1.46	584.52	367.32	0.12
Trib C Before CA	3139	Q10	362.00	701.88	708.11	705.04	708.14	0.000901	1.69	459.69	269.01	0.14
Trib C Before CA	2880	Q10	362.00	701.70	707.90	704.67	707.92	0.000730	1.51	502.22	263.46	0.12
Trib C Before CA	2647	Q10	362.00	701.49	707.74	704.72	707.76	0.000715	1.51	586.01	362.06	0.12
Trib C Before CA	2422	Q10	363.00	701.98	707.63	705.84	707.63	0.000315	0.96	882.31	417.90	0.08
Trib C Before CA	2415	Q10	363.00	702.06	707.62	705.08	707.63	0.000503	1.24	704.75	374.80	0.10
Trib C Before CA	2139	Q10	363.00	701.27	707.56	703.92	707.56	0.000302	1.06	698.96	394.36	0.08
Trib C Before CA	2136	Q10	363.00	701.33	707.55	704.11	707.56	0.000406	1.14	620.41	410.61	0.09
Trib C Before CA	2101	Q10	363.00	701.27	707.46	703.57	707.51	0.000263	1.72	211.49	185.31	0.14
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q10	363.00	701.10	707.33	703.27	707.39	0.000306	2.05	176.91	55.67	0.15
Trib C Before CA	1947	Q10	363.00	701.47	707.29	704.11	707.35	0.001449	2.18	246.96	376.56	0.18
Trib C Before CA	1903	Q10	363.00	701.60	707.15	705.15	707.22	0.002820	2.53	264.18	340.96	0.23
Trib C Before CA	1727	Q10	363.00	702.56	706.78	705.76	706.80	0.001735	1.90	446.81	424.55	0.18
Trib C Before CA	1517	Q10	363.00	701.86	706.54	704.31	706.55	0.000532	1.11	673.35	417.27	0.10
Trib C Before CA	1369	Q10	363.00	701.33	706.44	704.89	706.45	0.000856	1.30	586.71	353.86	0.13
Trib C Before CA	1067	Q10	363.00	700.14	706.28	703.33	706.28	0.000186	0.70	1007.60	396.14	0.06
Trib C Before CA	931	Q10	364.00	701.08	706.25	704.27	706.25	0.000234	0.73	1143.90	657.86	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q10	720.38	720.38	0.00	0.09	0.00	12.94	287.25	77.80	855.24

Trib C Before CA	13934	Q10	720.29	720.28	0.01	0.03	0.01	26.40	278.58	64.02	282.87
Trib C Before CA	13896	Q10	720.25	720.22	0.03			40.85	292.55	35.60	299.34
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q10	718.81	718.68	0.13	0.26	0.04	2.00	362.39	4.61	130.80
Trib C Before CA	13812	Q10	718.51	718.46	0.05	1.76	0.00	7.07	352.66	9.28	119.63
Trib C Before CA	11691	Q10	716.75	716.71	0.03	2.31	0.00	144.38	210.81	8.82	369.27
Trib C Before CA	9184	Q10	714.44	714.41	0.03	1.72	0.01	94.94	187.50	66.56	378.62
Trib C Before CA	7588	Q10	712.70	712.56	0.15	0.30	0.00	7.35	324.60	17.06	106.92
Trib C Before CA	7576	Q10	712.40	712.25	0.15				349.00		16.71
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q10	712.17	712.10	0.07	0.13	0.00	0.11	348.89		29.09
Trib C Before CA	7453	Q10	712.04	711.97	0.06	1.44	0.01	30.76	316.24		118.09
Trib C Before CA	5863	Q10	710.59	710.56	0.03	0.34	0.01	24.35	202.57	120.09	365.13
Trib C Before CA	5256	Q10	710.24	710.23	0.01	0.04	0.01	92.25	227.89	40.85	487.12
Trib C Before CA	5104	Q10	710.19	710.11	0.08				361.00		514.43
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q10	709.81	709.74	0.06	0.09	0.01		361.00		386.52
Trib C Before CA	4511	Q10	709.71	709.61	0.10	0.96	0.03		346.67	15.33	152.44
Trib C Before CA	3851	Q10	708.73	708.71	0.01	0.58	0.00	27.11	106.80	228.09	367.32
Trib C Before CA	3139	Q10	708.14	708.11	0.03	0.21	0.00	42.85	203.65	115.50	269.01
Trib C Before CA	2880	Q10	707.92	707.90	0.02	0.17	0.00	42.07	190.18	129.75	263.46
Trib C Before CA	2647	Q10	707.76	707.74	0.02	0.12	0.00	18.16	161.00	182.85	362.06
Trib C Before CA	2422	Q10	707.63	707.63	0.00	0.00	0.00	25.83	80.79	256.38	417.90
Trib C Before CA	2415	Q10	707.63	707.62	0.01	0.07	0.00	28.41	115.19	219.40	374.80
Trib C Before CA	2139	Q10	707.56	707.56	0.01	0.00	0.00	39.97	137.33	185.71	394.36
Trib C Before CA	2136	Q10	707.56	707.55	0.01	0.04	0.01	36.68	165.12	161.20	410.61
Trib C Before CA	2101	Q10	707.51	707.46	0.05			0.11	362.89		185.31
Trib C Before CA	2046		Culvert								
Trib C Before CA	1992	Q10	707.39	707.33	0.07	0.04	0.00		363.00		55.67
Trib C Before CA	1947	Q10	707.35	707.29	0.06	0.14	0.00	30.32	290.78	41.91	376.56
Trib C Before CA	1903	Q10	707.22	707.15	0.07	0.39	0.02	89.06	232.47	41.47	340.96
Trib C Before CA	1727	Q10	706.80	706.78	0.02	0.24	0.01	65.58	120.21	177.21	424.55
Trib C Before CA	1517	Q10	706.55	706.54	0.01	0.10	0.00	32.06	142.62	188.31	417.27
Trib C Before CA	1369	Q10	706.45	706.44	0.01	0.16	0.00	52.20	132.31	178.50	353.86
Trib C Before CA	1067	Q10	706.28	706.28	0.00	0.03	0.00	10.69	73.87	278.44	396.14
Trib C Before CA	931	Q10	706.25	706.25	0.00			26.08	100.18	237.74	657.86

****

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q10
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q10
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13875 Profile: Q10 Culv: Culvert #1
Warning:During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.

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River: Blackberry Creek  Reach: Trib C Before CA     RS: 13859     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 9184     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q10
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3851     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2647     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
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River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q10
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1727     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1517     Profile: Q10
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q10
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1067     Profile: Q10
     Warning:Divided flow computed for this cross-section.
```

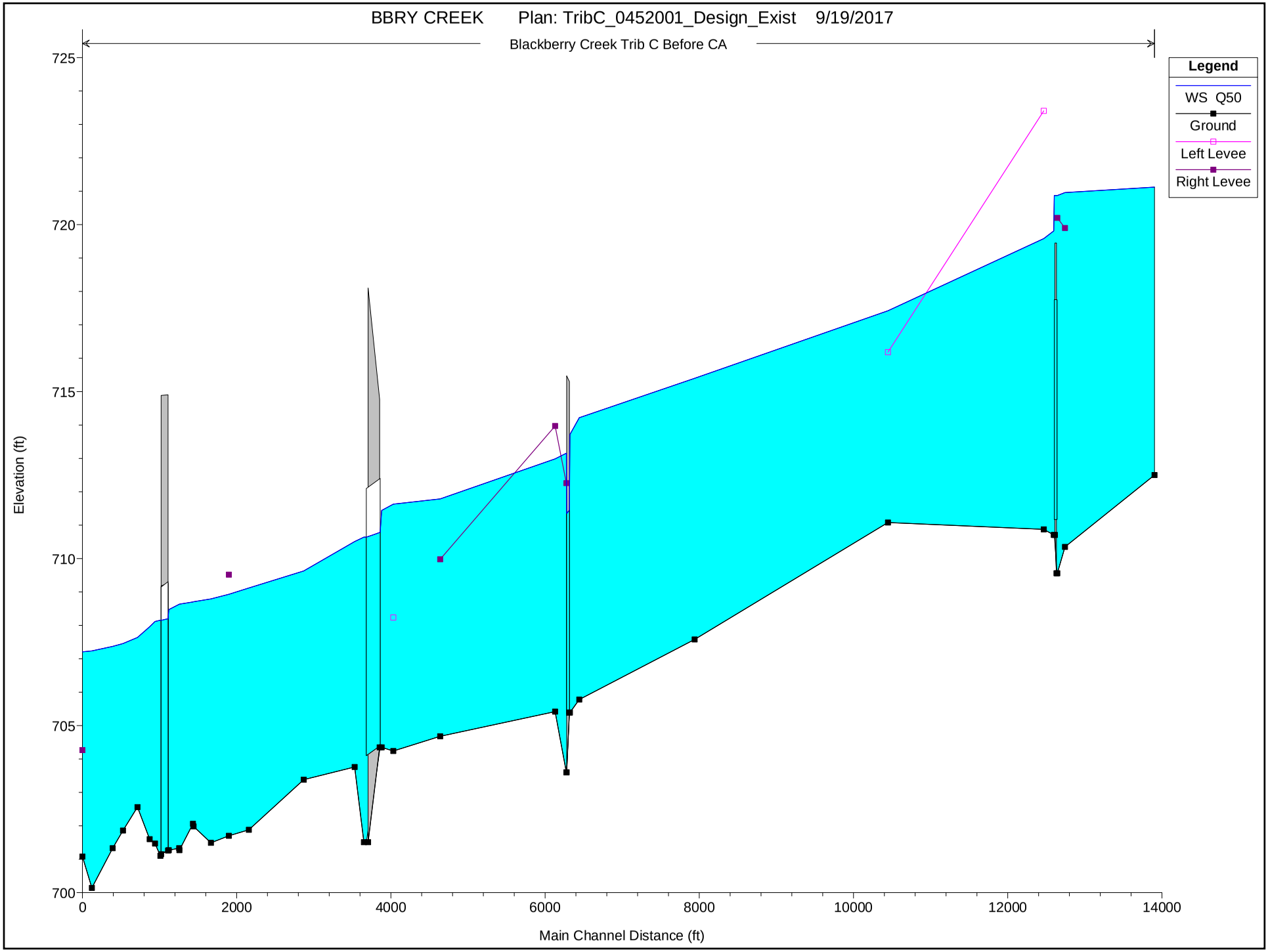
BBRY CREEK Plan: TribC_0452001_Design_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q50
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 10:39:35 AM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q50	706.00	712.50	721.12	716.98	721.13	0.000075	0.53	2110.85	916.31	0.04
Trib C Before CA	13934	Q50	670.00	710.35	720.96	714.96	720.98	0.000366	1.37	826.47	294.91	0.10
Trib C Before CA	13896	Q50	670.00	709.56	720.87	715.60	720.92	0.000805	2.17	644.06	334.27	0.14
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q50	670.00	710.71	719.81	716.85	719.94	0.002887	3.27	361.18	243.30	0.26
Trib C Before CA	13812	Q50	670.00	710.88	719.58	714.53	719.66	0.000971	2.37	414.86	160.22	0.16
Trib C Before CA	11691	Q50	652.00	711.08	717.42	715.33	717.45	0.001186	2.15	714.37	435.52	0.17
Trib C Before CA	9184	Q50	592.00	707.58	715.40	712.53	715.42	0.000533	1.66	910.27	463.57	0.13
Trib C Before CA	7588	Q50	592.00	705.78	714.22	710.50	714.30	0.001229	2.79	483.97	280.91	0.19
Trib C Before CA	7576	Q50	592.00	705.39	713.72	708.85	714.00	0.004035	4.30	137.96	125.60	0.26
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q50	592.00	703.60	713.16	707.31	713.28	0.001438	2.92	259.72	153.70	0.18
Trib C Before CA	7453	Q50	587.00	705.42	712.98	708.83	713.07	0.001188	2.55	372.07	162.46	0.19
Trib C Before CA	5863	Q50	587.00	704.68	711.79	708.84	711.80	0.000450	1.46	964.91	476.39	0.11

Trib C Before CA	5256	Q50	619.00	704.24	711.63	706.46	711.63	0.000081	0.76	1580.04	669.04	0.05
Trib C Before CA	5104	Q50	619.00	704.35	711.44	707.45	711.58	0.001355	3.02	205.03	666.51	0.21
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q50	619.00	701.51	710.64	704.89	710.80	0.000915	3.14	197.25	580.18	0.19
Trib C Before CA	4511	Q50	621.00	703.76	710.51	707.39	710.62	0.002099	2.89	371.57	253.16	0.24
Trib C Before CA	3851	Q50	621.00	703.38	709.63	707.70	709.64	0.000599	1.49	949.81	429.15	0.11
Trib C Before CA	3139	Q50	621.00	701.88	709.12	706.05	709.15	0.000815	1.83	762.39	331.04	0.14
Trib C Before CA	2880	Q50	621.00	701.70	708.93	705.70	708.95	0.000675	1.66	788.96	293.14	0.12
Trib C Before CA	2647	Q50	621.00	701.49	708.79	705.83	708.81	0.000545	1.50	1044.01	473.22	0.11
Trib C Before CA	2422	Q50	623.00	701.98	708.71	706.09	708.71	0.000265	1.02	1351.02	452.16	0.08
Trib C Before CA	2415	Q50	623.00	702.06	708.70	706.21	708.71	0.000406	1.28	1153.06	472.49	0.09
Trib C Before CA	2139	Q50	623.00	701.27	708.64	705.31	708.65	0.000331	1.26	1010.30	439.47	0.09
Trib C Before CA	2136	Q50	623.00	701.33	708.63	705.60	708.65	0.000406	1.31	928.91	455.68	0.10
Trib C Before CA	2101	Q50	623.00	701.27	708.47	704.23	708.57	0.000421	2.46	254.17	326.87	0.18
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q50	623.00	701.10	708.15	703.96	708.30	0.000571	3.07	202.76	69.52	0.21
Trib C Before CA	1947	Q50	623.00	701.47	708.12	705.02	708.21	0.002027	2.87	330.31	420.45	0.22
Trib C Before CA	1903	Q50	624.00	701.60	707.96	706.42	708.03	0.002773	2.87	402.55	376.66	0.24
Trib C Before CA	1727	Q50	624.00	702.56	707.64	706.02	707.66	0.001255	1.88	728.05	464.92	0.16
Trib C Before CA	1517	Q50	624.00	701.86	707.46	705.26	707.47	0.000470	1.22	1022.10	445.21	0.10
Trib C Before CA	1369	Q50	624.00	701.33	707.37	705.19	707.38	0.000663	1.36	944.30	408.47	0.12
Trib C Before CA	1067	Q50	624.00	700.14	707.24	703.63	707.24	0.000216	0.86	1402.41	423.35	0.07
Trib C Before CA	931	Q50	625.00	701.08	707.21	704.52	707.21	0.000181	0.75	1794.74	700.48	0.06

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q50	721.13	721.12	0.00	0.14	0.00	69.74	478.07	158.19	916.31

* Trib C Before CA *	13934	* Q50	*	720.98 *	720.96 *	0.02 *	0.05 *	0.01 *	56.52 *	450.85 *	162.63 *	294.91 *
* Trib C Before CA *	13896	* Q50	*	720.92 *	720.87 *	0.05 *	*	*	102.27 *	443.32 *	124.42 *	334.27 *
* Trib C Before CA *	13875	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA *	13859	* Q50	*	719.94 *	719.81 *	0.13 *	0.26 *	0.03 *	54.13 *	520.60 *	95.27 *	243.30 *
* Trib C Before CA *	13812	* Q50	*	719.66 *	719.58 *	0.08 *	2.19 *	0.01 *	33.18 *	575.63 *	61.19 *	160.22 *
* Trib C Before CA *	11691	* Q50	*	717.45 *	717.42 *	0.03 *	2.03 *	0.00 *	334.90 *	277.10 *	40.00 *	435.52 *
* Trib C Before CA *	9184	* Q50	*	715.42 *	715.40 *	0.02 *	1.11 *	0.01 *	200.30 *	218.40 *	173.30 *	463.57 *
* Trib C Before CA *	7588	* Q50	*	714.30 *	714.22 *	0.08 *	0.23 *	0.06 *	105.88 *	380.66 *	105.46 *	280.91 *
* Trib C Before CA *	7576	* Q50	*	714.00 *	713.72 *	0.29 *	*	*	0.12 *	591.65 *	0.22 *	125.60 *
* Trib C Before CA *	7550	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA *	7499	* Q50	*	713.28 *	713.16 *	0.13 *	0.19 *	0.02 *	10.14 *	568.50 *	13.36 *	153.70 *
* Trib C Before CA *	7453	* Q50	*	713.07 *	712.98 *	0.08 *	1.24 *	0.02 *	115.96 *	471.04 *	*	162.46 *
* Trib C Before CA *	5863	* Q50	*	711.80 *	711.79 *	0.01 *	0.17 *	0.00 *	87.34 *	220.71 *	278.94 *	476.39 *
* Trib C Before CA *	5256	* Q50	*	711.63 *	711.63 *	0.00 *	0.02 *	0.03 *	183.99 *	255.07 *	179.94 *	669.04 *
* Trib C Before CA *	5104	* Q50	*	711.58 *	711.44 *	0.14 *	*	*	*	619.00 *	*	666.51 *
* Trib C Before CA *	5103	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA *	4652	* Q50	*	710.80 *	710.64 *	0.15 *	0.16 *	0.02 *	*	619.00 *	*	580.18 *
* Trib C Before CA *	4511	* Q50	*	710.62 *	710.51 *	0.10 *	0.94 *	0.03 *	0.53 *	492.57 *	127.91 *	253.16 *
* Trib C Before CA *	3851	* Q50	*	709.64 *	709.63 *	0.01 *	0.50 *	0.00 *	63.74 *	132.25 *	425.01 *	429.15 *
* Trib C Before CA *	3139	* Q50	*	709.15 *	709.12 *	0.03 *	0.19 *	0.00 *	103.84 *	268.91 *	248.26 *	331.04 *
* Trib C Before CA *	2880	* Q50	*	708.95 *	708.93 *	0.02 *	0.14 *	0.00 *	96.45 *	255.96 *	268.60 *	293.14 *
* Trib C Before CA *	2647	* Q50	*	708.81 *	708.79 *	0.01 *	0.09 *	0.00 *	47.95 *	195.73 *	377.32 *	473.22 *
* Trib C Before CA *	2422	* Q50	*	708.71 *	708.71 *	0.01 *	0.00 *	0.00 *	59.51 *	106.57 *	456.92 *	452.16 *
* Trib C Before CA *	2415	* Q50	*	708.71 *	708.70 *	0.01 *	0.06 *	0.00 *	70.69 *	146.61 *	405.70 *	472.49 *
* Trib C Before CA *	2139	* Q50	*	708.65 *	708.64 *	0.01 *	0.00 *	0.00 *	97.52 *	195.13 *	330.35 *	439.47 *
* Trib C Before CA *	2136	* Q50	*	708.65 *	708.63 *	0.01 *	0.06 *	0.02 *	94.98 *	234.71 *	293.31 *	455.68 *
* Trib C Before CA *	2101	* Q50	*	708.57 *	708.47 *	0.09 *	*	*	0.28 *	622.72 *	*	326.87 *
* Trib C Before CA *	2046	*	*	Culvert *	*	*	*	*	*	*	*	*
* Trib C Before CA *	1992	* Q50	*	708.30 *	708.15 *	0.15 *	0.06 *	0.02 *	*	623.00 *	*	69.52 *
* Trib C Before CA *	1947	* Q50	*	708.21 *	708.12 *	0.10 *	0.17 *	0.01 *	77.28 *	450.26 *	95.46 *	420.45 *
* Trib C Before CA *	1903	* Q50	*	708.03 *	707.96 *	0.07 *	0.35 *	0.03 *	185.36 *	320.22 *	118.41 *	376.66 *
* Trib C Before CA *	1727	* Q50	*	707.66 *	707.64 *	0.02 *	0.19 *	0.00 *	166.34 *	149.94 *	307.72 *	464.92 *
* Trib C Before CA *	1517	* Q50	*	707.47 *	707.46 *	0.01 *	0.08 *	0.00 *	78.29 *	197.56 *	348.16 *	445.21 *
* Trib C Before CA *	1369	* Q50	*	707.38 *	707.37 *	0.01 *	0.14 *	0.00 *	101.12 *	179.84 *	343.03 *	408.47 *
* Trib C Before CA *	1067	* Q50	*	707.24 *	707.24 *	0.00 *	0.03 *	0.00 *	28.37 *	114.17 *	481.46 *	423.35 *
* Trib C Before CA *	931	* Q50	*	707.21 *	707.21 *	0.00 *	*	*	48.73 *	132.96 *	443.32 *	700.48 *

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q50
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q50
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

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     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q50
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q50
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 9184     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 3139     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2647     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
```

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            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q50
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1727     Profile: Q50
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1517     Profile: Q50
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q50
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```

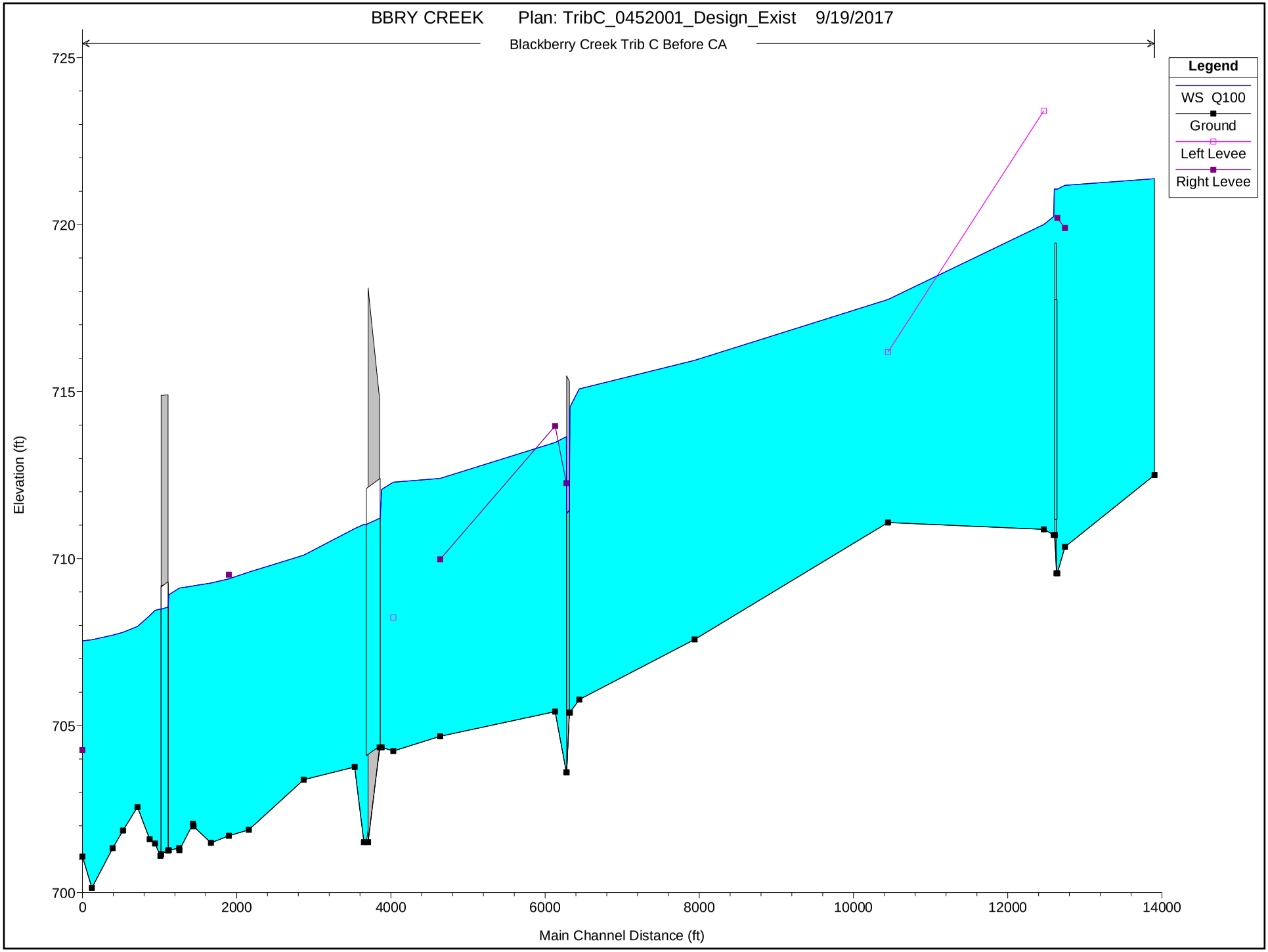
BBRY CREEK Plan: TribC_0452001_Design_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q100
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

```
                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 10:39:35 AM

Project in English units

Project Description:
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68.6    782.8
125.8   778.6
205.9   768.9
263.1   764.6
343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
```

385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q100	879.00	712.50	721.37	717.20	721.38	0.000090	0.61	2344.28	936.67	0.05
Trib C Before CA	13934	Q100	828.00	710.35	721.18	715.50	721.20	0.000466	1.59	890.44	298.71	0.11
Trib C Before CA	13896	Q100	828.00	709.56	721.06	716.23	721.13	0.001019	2.48	709.77	346.66	0.16
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q100	828.00	710.71	720.24	717.77	720.36	0.002680	3.33	474.01	280.99	0.25
Trib C Before CA	13812	Q100	828.00	710.88	720.00	714.99	720.09	0.001101	2.63	485.83	175.57	0.17
Trib C Before CA	11691	Q100	800.00	711.08	717.76	715.84	717.79	0.001124	2.19	868.65	478.63	0.17
Trib C Before CA	9184	Q100	713.00	707.58	715.94	713.52	715.95	0.000432	1.59	1174.03	535.27	0.11
Trib C Before CA	7588	Q100	713.00	705.78	715.08	710.94	715.13	0.000745	2.36	753.76	345.63	0.15
Trib C Before CA	7576	Q100	713.00	705.39	714.54	709.30	714.88	0.004261	4.71	151.89	189.16	0.28
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q100	713.00	703.60	713.65	707.75	713.79	0.001511	3.12	355.81	236.87	0.19
Trib C Before CA	7453	Q100	705.00	705.42	713.48	709.21	713.56	0.001168	2.63	457.34	183.50	0.19
Trib C Before CA	5863	Q100	705.00	704.68	712.40	709.23	712.41	0.000317	1.32	1269.29	514.92	0.10

Trib C Before CA	5256	Q100	749.00	704.24	712.29	706.73	712.29	0.000061	0.71	2034.45	709.39	0.05
Trib C Before CA	5104	Q100	749.00	704.35	712.07	707.74	712.24	0.001440	3.32	225.72	711.68	0.22
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q100	749.00	701.51	711.02	705.27	711.23	0.001159	3.64	206.01	631.81	0.21
Trib C Before CA	4511	Q100	752.00	703.76	710.90	707.84	711.00	0.001927	2.93	476.00	286.05	0.24
Trib C Before CA	3851	Q100	752.00	703.38	710.10	707.81	710.11	0.000520	1.47	1160.16	466.93	0.11
Trib C Before CA	3139	Q100	752.00	701.88	709.60	707.06	709.63	0.000952	2.09	985.47	574.85	0.15
Trib C Before CA	2880	Q100	752.00	701.70	709.40	706.64	709.42	0.000654	1.72	929.16	312.70	0.12
Trib C Before CA	2647	Q100	752.00	701.49	709.27	706.75	709.28	0.000497	1.51	1283.08	535.30	0.11
Trib C Before CA	2422	Q100	755.00	701.98	709.19	706.18	709.19	0.000261	1.07	1575.57	486.46	0.08
Trib C Before CA	2415	Q100	755.00	702.06	709.18	706.34	709.19	0.000369	1.29	1391.32	517.94	0.09
Trib C Before CA	2139	Q100	755.00	701.27	709.12	705.49	709.13	0.000331	1.32	1158.71	451.49	0.09
Trib C Before CA	2136	Q100	755.00	701.33	709.11	705.78	709.13	0.000395	1.37	1075.30	468.57	0.10
Trib C Before CA	2101	Q100	755.00	701.27	708.92	704.52	709.04	0.000488	2.77	272.95	366.75	0.19
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q100	755.00	701.10	708.49	704.29	708.68	0.000710	3.54	213.17	76.95	0.24
Trib C Before CA	1947	Q100	755.00	701.47	708.45	705.45	708.57	0.002281	3.17	364.22	430.60	0.23
Trib C Before CA	1903	Q100	756.00	701.60	708.29	706.63	708.37	0.002816	3.03	458.47	386.39	0.24
Trib C Before CA	1727	Q100	756.00	702.56	707.97	706.13	707.99	0.001201	1.94	836.71	486.42	0.16
Trib C Before CA	1517	Q100	756.00	701.86	707.79	705.39	707.80	0.000483	1.29	1153.96	456.33	0.10
Trib C Before CA	1369	Q100	756.00	701.33	707.71	705.30	707.72	0.000653	1.42	1082.98	420.28	0.12
Trib C Before CA	1067	Q100	756.00	700.14	707.57	703.76	707.57	0.000237	0.95	1543.98	430.62	0.07
Trib C Before CA	931	Q100	758.00	701.08	707.54	704.63	707.54	0.000186	0.80	2029.31	721.32	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q100	721.38	721.37	0.00	0.17	0.00	104.12	574.49	200.39	936.67

Trib C Before CA	13934	Q100	721.20	721.18	0.03	0.07	0.01	72.90	539.27	215.83	298.71
Trib C Before CA	13896	Q100	721.13	721.06	0.06			135.32	520.54	172.15	346.66
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q100	720.36	720.24	0.12	0.26	0.02	88.16	577.15	162.69	280.99
Trib C Before CA	13812	Q100	720.09	720.00	0.09	2.28	0.02	50.52	680.02	97.46	175.57
Trib C Before CA	11691	Q100	717.79	717.76	0.03	1.83	0.01	436.46	302.20	61.34	478.63
Trib C Before CA	9184	Q100	715.95	715.94	0.02	0.82	0.00	245.49	229.79	237.72	535.27
Trib C Before CA	7588	Q100	715.13	715.08	0.05	0.16	0.09	191.86	363.29	157.85	345.63
Trib C Before CA	7576	Q100	714.88	714.54	0.34			0.27	712.16	0.57	189.16
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q100	713.79	713.65	0.14	0.20	0.03	39.28	642.14	31.58	236.87
Trib C Before CA	7453	Q100	713.56	713.48	0.08	1.13	0.02	176.49	528.51		183.50
Trib C Before CA	5863	Q100	712.41	712.40	0.01	0.12	0.00	122.38	224.57	358.05	514.92
Trib C Before CA	5256	Q100	712.29	712.29	0.00	0.02	0.03	223.44	261.09	264.46	709.39
Trib C Before CA	5104	Q100	712.24	712.07	0.17				749.00		711.68
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q100	711.23	711.02	0.21	0.18	0.05		749.00		631.81
Trib C Before CA	4511	Q100	711.00	710.90	0.10	0.86	0.03	3.26	544.41	204.32	286.05
Trib C Before CA	3851	Q100	710.11	710.10	0.01	0.48	0.00	85.51	142.23	524.25	466.93
Trib C Before CA	3139	Q100	709.63	709.60	0.03	0.21	0.00	160.17	332.52	259.31	574.85
Trib C Before CA	2880	Q100	709.42	709.40	0.02	0.13	0.00	126.89	287.58	337.54	312.70
Trib C Before CA	2647	Q100	709.28	709.27	0.01	0.09	0.00	68.43	212.96	470.60	535.30
Trib C Before CA	2422	Q100	709.19	709.19	0.01	0.00	0.00	81.11	121.51	552.39	486.46
Trib C Before CA	2415	Q100	709.19	709.18	0.01	0.06	0.00	93.74	159.72	501.55	517.94
Trib C Before CA	2139	Q100	709.13	709.12	0.01	0.00	0.00	135.37	219.93	399.70	451.49
Trib C Before CA	2136	Q100	709.13	709.11	0.01	0.06	0.03	132.57	265.28	357.15	468.57
Trib C Before CA	2101	Q100	709.04	708.92	0.12			0.38	754.62		366.75
Trib C Before CA	2046		Culvert								
Trib C Before CA	1992	Q100	708.68	708.49	0.19	0.08	0.04		755.00		76.95
Trib C Before CA	1947	Q100	708.57	708.45	0.11	0.18	0.02	103.50	526.93	124.56	430.60
Trib C Before CA	1903	Q100	708.37	708.29	0.08	0.35	0.03	234.10	362.48	159.42	386.39
Trib C Before CA	1727	Q100	707.99	707.97	0.02	0.18	0.00	218.31	166.49	371.20	486.42
Trib C Before CA	1517	Q100	707.80	707.79	0.01	0.08	0.00	102.69	226.06	427.25	456.33
Trib C Before CA	1369	Q100	707.72	707.71	0.01	0.14	0.00	122.85	203.74	429.41	420.28
Trib C Before CA	1067	Q100	707.57	707.57	0.01	0.03	0.00	37.77	133.42	584.81	430.62
Trib C Before CA	931	Q100	707.54	707.54	0.00			59.20	151.93	546.87	721.32

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q100
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13859 Profile: Q100
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

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River: Blackberry Creek  Reach: Trib C Before CA     RS: 13812     Profile: Q100
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2415     Profile: Q100
     Warning:Divided flow computed for this cross-section.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
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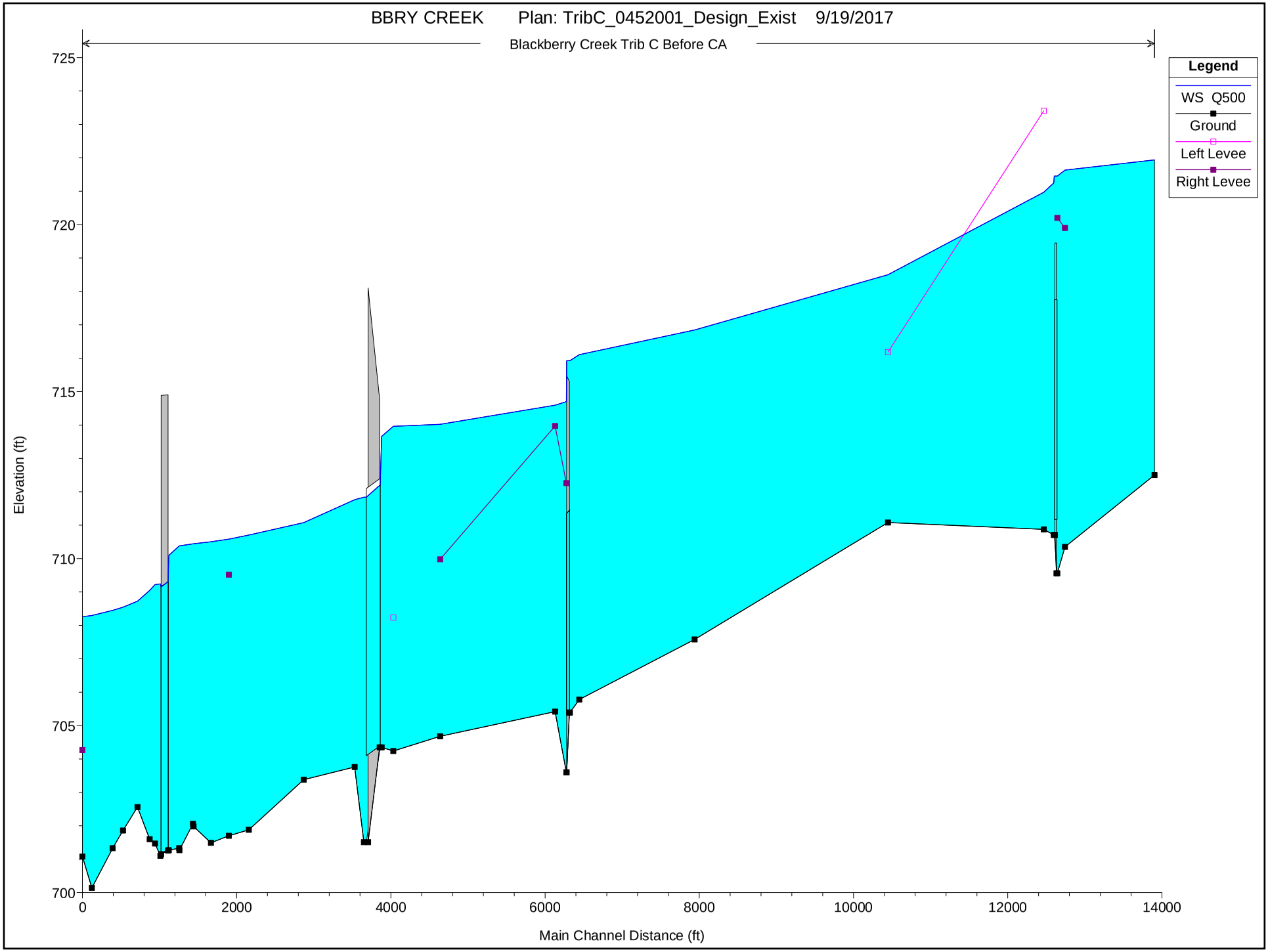
            This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1727     Profile: Q100
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1517     Profile: Q100
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q100
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```


BBRY CREEK Plan: TribC_0452001_Design_Exist 9/19/2017
Blackberry Creek Trib C Before CA
Legend
WS Q500
Ground
Left Levee
Right Levee
Elevation (ft)
725
720
715
710
705
700
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

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                    HEC-RAS HEC-RAS 5.0.3 September 2016
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: BBRY CREEK
Project File : IL47.prj
Run Date and Time: 9/19/2017 10:39:35 AM

Project in English units

Project Description:
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125.8   778.6
205.9   768.9
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343.1   760.6
377.4
        758.8
391.0   756.3
399.0   755.5
401.8   754.5
408.0   751.2
413.0   753.5
420.0   7
54.7
437.0   756.2
469.7   756.5
539.2   756.8
619.3   756.6
687.9   756.7
790.9   756
.8
905.2   760.1
0.00    712.00
114.68  710.00
369.07  708.00
375.00  707.99
381.8
3       707.95
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385.96 703.87
392.75 703.73
396.12 702.94
397.39 702.73
399.73 702
.59
400.06 702.76
400.35 703.82
400.86 703.81
401.21 707.84
406.47 707.80

412.35 707.76
676.65 708.00
798.43 709.94
887.26 712.07
Blackberry Creek
model with interpolation updated to 2004 DEM.

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib C Before CA	15195	Q500	1373.00	712.50	721.94	717.69	721.94	0.000130	0.79	2883.10	982.05	0.06
Trib C Before CA	13934	Q500	1268.00	710.35	721.63	716.94	721.68	0.000787	2.16	1041.78	350.03	0.15
Trib C Before CA	13896	Q500	1268.00	709.56	721.45	717.79	721.55	0.001657	3.27	850.03	371.73	0.20
Trib C Before CA	13875		Culvert									
Trib C Before CA	13859	Q500	1268.00	710.71	721.25	719.24	721.35	0.002122	3.32	788.37	338.58	0.23
Trib C Before CA	13812	Q500	1268.00	710.88	720.97	716.10	721.10	0.001426	3.26	704.35	291.09	0.20
Trib C Before CA	11691	Q500	1213.00	711.08	718.50	716.58	718.53	0.001046	2.31	1252.63	550.59	0.17
Trib C Before CA	9184	Q500	1036.00	707.58	716.85	713.87	716.86	0.000381	1.64	1723.87	685.53	0.11
Trib C Before CA	7588	Q500	1036.00	705.78	716.11	712.31	716.14	0.000626	2.36	1147.74	420.52	0.14
Trib C Before CA	7576	Q500	1036.00	705.39	715.93	710.40	716.01	0.001603	3.17	759.22	358.93	0.17
Trib C Before CA	7550		Culvert									
Trib C Before CA	7499	Q500	1036.00	703.60	714.70	708.83	714.82	0.001368	3.20	705.72	386.97	0.18
Trib C Before CA	7453	Q500	1020.00	705.42	714.59	710.11	714.63	0.000616	2.12	1089.61	410.04	0.14
Trib C Before CA	5863	Q500	1020.00	704.68	714.02	710.22	714.03	0.000158	1.10	2188.71	625.45	0.07

Trib C Before CA	5256	Q500	1105.00	704.24	713.96	707.40	713.96	0.000036	0.62	3300.07	807.45	0.04
Trib C Before CA	5104	Q500	1105.00	704.35	713.66	708.49	713.91	0.001562	3.97	278.21	861.51	0.24
Trib C Before CA	5103		Culvert									
Trib C Before CA	4652	Q500	1105.00	701.51	711.84	706.22	712.21	0.001887	4.92	224.77	713.39	0.28
Trib C Before CA	4511	Q500	1109.00	703.76	711.76	708.86	711.85	0.001664	3.05	875.83	724.50	0.23
Trib C Before CA	3851	Q500	1109.00	703.38	711.08	708.05	711.09	0.000450	1.52	1663.49	559.19	0.10
Trib C Before CA	3139	Q500	1109.00	701.88	710.71	707.48	710.72	0.000574	1.81	1720.83	727.15	0.12
Trib C Before CA	2880	Q500	1109.00	701.70	710.58	707.08	710.60	0.000396	1.51	1804.39	577.02	0.10
Trib C Before CA	2647	Q500	1109.00	701.49	710.50	707.10	710.51	0.000322	1.37	1968.95	581.91	0.09
Trib C Before CA	2422	Q500	1115.00	701.98	710.44	706.38	710.45	0.000223	1.12	2243.27	570.18	0.07
Trib C Before CA	2415	Q500	1115.00	702.06	710.44	706.66	710.45	0.000286	1.28	2100.59	596.89	0.08
Trib C Before CA	2139	Q500	1115.00	701.27	710.38	705.84	710.40	0.000301	1.41	1560.31	484.22	0.09
Trib C Before CA	2136	Q500	1115.00	701.33	710.38	706.14	710.39	0.000342	1.44	1469.86	508.09	0.09
Trib C Before CA	2101	Q500	1115.00	701.27	710.10	705.21	710.28	0.000609	3.46	322.72	438.07	0.22
Trib C Before CA	2046		Culvert									
Trib C Before CA	1992	Q500	1115.00	701.10	709.24	705.07	709.59	0.001092	4.71	236.73	101.27	0.30
Trib C Before CA	1947	Q500	1115.00	701.47	709.22	706.62	709.39	0.002876	3.86	442.18	463.41	0.26
Trib C Before CA	1903	Q500	1118.00	701.60	709.05	707.11	709.14	0.002969	3.42	587.42	408.36	0.25
Trib C Before CA	1727	Q500	1118.00	702.56	708.72	706.36	708.75	0.001167	2.11	1083.62	527.80	0.16
Trib C Before CA	1517	Q500	1118.00	701.86	708.55	705.63	708.56	0.000529	1.49	1457.94	489.72	0.11
Trib C Before CA	1369	Q500	1118.00	701.33	708.45	705.58	708.47	0.000695	1.63	1408.74	469.12	0.13
Trib C Before CA	1067	Q500	1118.00	700.14	708.30	704.07	708.30	0.000314	1.19	1868.65	473.68	0.09
Trib C Before CA	931	Q500	1122.00	701.08	708.26	704.89	708.26	0.000206	0.93	2566.92	775.61	0.07

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Trib C Before CA	15195	Q500	721.94	721.94	0.01	0.26	0.00	215.37	835.71	321.92	982.05

Trib C Before CA	13934	Q500	721.68	721.63	0.05	0.11	0.02	100.74	788.71	378.55	350.03
Trib C Before CA	13896	Q500	721.55	721.45	0.10			230.75	721.55	315.70	371.73
Trib C Before CA	13875		Culvert								
Trib C Before CA	13859	Q500	721.35	721.25	0.10	0.24	0.01	185.96	685.16	396.88	338.58
Trib C Before CA	13812	Q500	721.10	720.97	0.13	2.54	0.03	111.12	960.17	196.71	291.09
Trib C Before CA	11691	Q500	718.53	718.50	0.03	1.67	0.01	702.34	365.22	145.44	550.59
Trib C Before CA	9184	Q500	716.86	716.85	0.01	0.71	0.00	397.26	273.13	365.60	685.53
Trib C Before CA	7588	Q500	716.14	716.11	0.04	0.12	0.02	359.39	412.56	264.06	420.52
Trib C Before CA	7576	Q500	716.01	715.93	0.09			184.11	554.14	297.76	358.93
Trib C Before CA	7550		Culvert								
Trib C Before CA	7499	Q500	714.82	714.70	0.12	0.15	0.04	162.24	738.60	135.16	386.97
Trib C Before CA	7453	Q500	714.63	714.59	0.04	0.59	0.01	283.82	503.37	232.81	410.04
Trib C Before CA	5863	Q500	714.03	714.02	0.01	0.06	0.00	220.50	240.98	558.52	625.45
Trib C Before CA	5256	Q500	713.96	713.96	0.00	0.01	0.05	325.46	283.52	496.01	807.45
Trib C Before CA	5104	Q500	713.91	713.66	0.25				1105.00		861.51
Trib C Before CA	5103		Culvert								
Trib C Before CA	4652	Q500	712.21	711.84	0.38	0.22	0.14		1105.00		713.39
Trib C Before CA	4511	Q500	711.85	711.76	0.09	0.74	0.02	50.40	669.14	389.46	724.50
Trib C Before CA	3851	Q500	711.09	711.08	0.01	0.36	0.00	143.83	172.09	793.08	559.19
Trib C Before CA	3139	Q500	710.72	710.71	0.02	0.13	0.00	250.04	340.92	518.05	727.15
Trib C Before CA	2880	Q500	710.60	710.58	0.01	0.08	0.00	171.89	301.57	635.54	577.02
Trib C Before CA	2647	Q500	710.51	710.50	0.01	0.06	0.00	114.53	230.82	763.66	581.91
Trib C Before CA	2422	Q500	710.45	710.44	0.01	0.00	0.00	146.84	154.40	813.76	570.18
Trib C Before CA	2415	Q500	710.45	710.44	0.01	0.05	0.00	165.63	191.24	758.13	596.89
Trib C Before CA	2139	Q500	710.40	710.38	0.01	0.00	0.00	260.76	276.76	577.48	484.22
Trib C Before CA	2136	Q500	710.39	710.38	0.01	0.06	0.05	256.35	336.77	521.87	508.09
Trib C Before CA	2101	Q500	710.28	710.10	0.19			0.69	1114.31		438.07
Trib C Before CA	2046		Culvert								
Trib C Before CA	1992	Q500	709.59	709.24	0.34	0.11	0.09		1115.00		101.27
Trib C Before CA	1947	Q500	709.39	709.22	0.16	0.21	0.03	180.02	727.06	207.92	463.41
Trib C Before CA	1903	Q500	709.14	709.05	0.10	0.36	0.04	368.50	473.57	275.94	408.36
Trib C Before CA	1727	Q500	708.75	708.72	0.02	0.18	0.00	362.36	211.98	543.66	527.80
Trib C Before CA	1517	Q500	708.56	708.55	0.01	0.09	0.00	173.11	302.04	642.85	489.72
Trib C Before CA	1369	Q500	708.47	708.45	0.02	0.16	0.00	179.28	272.51	666.20	469.12
Trib C Before CA	1067	Q500	708.30	708.30	0.01	0.04	0.00	68.02	190.95	859.03	473.68
Trib C Before CA	931	Q500	708.26	708.26	0.00			88.31	202.37	831.32	775.61

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Exist_Design

River: Blackberry Creek Reach: Trib C Before CA RS: 15195 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Blackberry Creek Reach: Trib C Before CA RS: 13934 Profile: Q500
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13896 Profile: Q500
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Blackberry Creek Reach: Trib C Before CA RS: 13812 Profile: Q500
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

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     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 11691     Profile: Q500
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7588     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7576     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7499     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 7453     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5863     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5256     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5104     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 5103     Profile: Q500     Culv: Culvert #1
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the height
             of the culvert.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4652     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 4511     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2880     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2139     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2136     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 2101     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1992     Profile: Q500
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1947     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1903     Profile: Q500
```

```
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1727     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1517     Profile: Q500
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.
River: Blackberry Creek  Reach: Trib C Before CA     RS: 1369     Profile: Q500
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
```

EXHIBIT K

CORRESPONDENCE

FILE COPY

Illinois Department of Transportation

Memorandum

To:	James Stumpner	Attn:	Mike Eurkaitis (St. Charles #129 - Kane)
From:	Peter E. Harmet		Sarah Wilson
Subject:	*Drainage Study		
Date:	April 18, 2014		

*Route: IL 47
Limits: at I-88 (Ronald Regan Memorial Tollway)
County: Kane

We are in the process of collecting information from the various sources that pertain to flooding or erosion at the subject location. (Please refer to the attached location map for study limits.)

We have reviewed the Pavement Flooding Prioritization listing and

☐ The area is identified to have pavement flooding.

√ The area is not included in the listing.

Please review your records and provide any additional information you may have regarding flooding, drainage complaints and/or erosion and siltation problems for the concerned area.

Because of the major drainage structures (SN: 045-0024, 045-2001, 045-3057, 045-0270) located within the project limits, please also have your Bridge Maintenance Section check their records for any flooding occurrences or drainage related problems such as debris and/or icing at the subject structure.

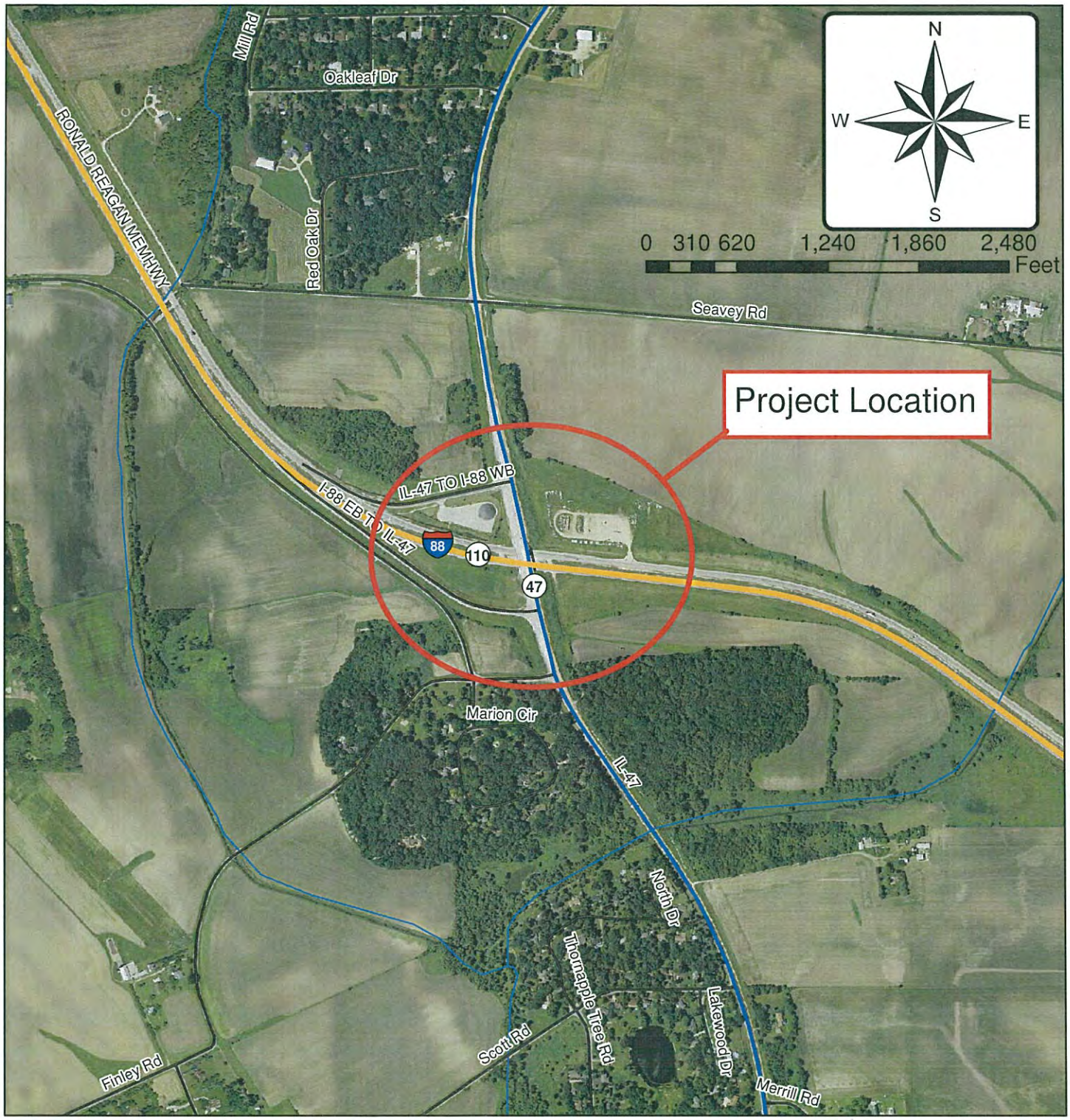
Your early consideration of this request is greatly appreciated.

If you have any questions, or need additional information, please contact Jorge Jimenez, Hydraulics Analysis Engineer, at (847) 705-4711

By: Richard F. Wojcik
Richard F. Wojcik, P.E.
Hydraulics Section Chief

S:\Gen\WP\HYD\H&H\JJ\I-88 @ IL 47\1Flood memo to MTN.docx

General Location Map



I-88 at IL 47
Sugar Grove, IL
Kane County

Jimenez, Jorge L.

From: Mastny, Steve C
Sent: Monday, May 12, 2014 7:57 AM
To: Jimenez, Jorge L.; Burnell, Bryant A; Wilson, Sarah M
Cc: Shirani, Agar B; Valentine, Michael A
Subject: Re: Drainage Investigation IL 47 at I-88

We also do not have any records or recollection of flooding issues in that area, or at the specific structures 045-0082, 045-2001, and 045-0024.

Steve Mastny
Area Bridge Inspection Engineer

----- Original Message -----
From: Jimenez, Jorge L.
Sent: Monday, May 12, 2014 07:17 AM Central Standard Time
To: Burnell, Bryant A; Wilson, Sarah M; Mastny, Steve C
Cc: Shirani, Agar B
Subject: RE: Drainage Investigation IL 47 at I-88

Thank you very much for the speedy response. I will incorporate the information below into the Location's drainage study.

-Jorge Jimenez

-----Original Message-----
From: Burnell, Bryant A
Sent: Monday, May 12, 2014 7:12 AM
To: Wilson, Sarah M; Mastny, Steve C
Cc: Jimenez, Jorge L.
Subject: RE: Drainage Investigation IL 47 at I-88

No flooding issues exist at this location.

Bryant Burnell
Operations Supervisor II
Woodstock Office (815) 338-4680
St. Charles Office (630) 584-4360
Cell (847) 715-8423
· Please consider the environment before printing this e-mail.

-----Original Message-----
From: Wilson, Sarah M
Sent: Thursday, May 08, 2014 12:03 PM
To: Mastny, Steve C; Burnell, Bryant A
Cc: Jimenez, Jorge L.
Subject: Drainage Investigation IL 47 at I-88

Steve / Bryant - please check to see if you have drainage issues to share with Hydraulics on IL 47 in the vicinity of I-88.

Jorge - for your information, Seavy Road is not an IDOT route, so the Bureau of Maintenance has no knowledge of any problems along Seavey Road..

Sarah

Krystian Ustupski

From: Johnston, Peter <peter.johnston@graef-usa.com>
Sent: Monday, July 27, 2015 2:32 PM
To: Geoffrey Elfers
Cc: Bahr, Jon; Sikes, Ryan; Fred Lin; Zhengzhong Zhang
Subject: FW: Rt. 47 @ I-88, files for Lin
Attachments: RE: Drainage Investigation IL 47 at I-88; Re: Drainage Investigation IL 47 at I-88; Drainage Investigation IL 47 at I-88

Per your request. Per below, we can coordinate directly with Hydraulics provided we cc the IDOT PM.

Thanks

From: Bochte, Kyle [mailto:Kyle.Bochte@Illinois.gov]
Sent: Monday, July 27, 2015 2:28 PM
To: Johnston, Peter
Cc: Baldauf, John E.
Subject: FW: Rt. 47 @ I-88, files for Lin

Good Afternoon Pete,

Please see the below response by Jorge (IDOT – Hydraulics Engineer) and attachments pertaining to your below request.

Also, in the future please feel free to coordinate with our Hydraulics Section directly.

- Agar Shirani (Agar.Shirani@illinois.gov)
- Jorge Jimenez (Jorge.Jimenez@Illinois.gov)

Please be sure to CC us on this coordination so we can track its progress.

Thanks,
Kyle

From: Jimenez, Jorge L.
Sent: Monday, July 27, 2015 2:18 PM
To: Bochte, Kyle
Cc: Shirani, Agar B; Baldauf, John E.
Subject: RE: Rt. 47 @ I-88, files for Lin

Hello Kyle,

We do not have any flooding records for the project location here in hydraulics and it looks like maintenance did not have any problems or records either. Please see attached emails for correspondence. They will need these emails to include in the HR.

There is no problem if Graef wants to coordinate with us directly. We would actually prefer it that way. Let me know if there are any other requests submitted by Graef regarding any hydraulic items. I did not know they were waiting for these flooding memos and I never received the request. I feel like some of these requests got lost in transit over to our section.

As always, please let me know if I can do anything to help this project along.

-Jorge

From: Bochte, Kyle
Sent: Monday, July 27, 2015 1:38 PM
To: Jimenez, Jorge L.
Cc: Shirani, Agar B; Baldauf, John E.
Subject: FW: Rt. 47 @ I-88, files for Lin

Good Afternoon Jorge,

Below is a question from our consultant regarding the IL 47 at I-88 Phase 1 project. Can you shed some light on this situation? Also, in the future are you okay if we tell Graef (prime consultant) to directly coordinate with you regarding hydraulics? If so, we will ask them that we are still CCed.

Thanks,
Kyle

From: Johnston, Peter [mailto:peter.johnston@graef-usa.com]
Sent: Monday, July 27, 2015 1:25 PM
To: Bochte, Kyle; Baldauf, John E.
Subject: FW: Rt. 47 @ I-88, files for Lin

Kyle/John,

See below. Do you know if anything was recd. regarding flooding records for the two waterway crossings south of the interchange?

Thanks
Pete

From: Geoffrey Elfers [mailto:gelfers@lineng.com]
Sent: Monday, July 27, 2015 11:42 AM
To: Johnston, Peter
Cc: Bahr, Jon; Fred Lin; Sikes, Ryan; Zhengzhong Zhang
Subject: RE: Rt. 47 @ I-88, files for Lin

Pete,

Regarding the IL 47 creek crossings, were the IDOT maintenance and flooding reports ever provided? We had previously mentioned them and a request was sent to IDOT but I don't believe we received anything back.

Thank you,

Geoffrey Elfers, P.E.
gelfers@lineng.com

Lin Engineering, Ltd.
576 Oakmont Lane, Westmont, IL 60559
Phone: (630)323-5168 ext. 621
Fax: (630)323-5174
www.lineng.com

From: Sikes, Ryan [mailto:Ryan.Sikes@graef-usa.com]
Sent: Friday, February 27, 2015 1:23 PM
To: Geoffrey Elfers
Cc: Johnston, Peter; Bahr, Jon; Fred Lin
Subject: RE: Rt. 47 @ I-88, files for Lin

Hi Geoff,

Pete said he touched base with you, but I wanted to complete the list of questions you had.

Please see my answers below in red. Let me know if you need anything else.

-Ryan

Ryan Sikes
GRAEF
8501 W. Higgins Road
Suite #280
Chicago, IL 60631
(773) 399-5453

From: Geoffrey Elfers <gelfers@lineng.com>
Date: February 26, 2015 at 11:51:47 AM CST
To: "Johnston, Peter" <peter.johnston@graef-usa.com>
Cc: Fred Lin <flin@lineng.com>
Subject: RE: Rt. 47 @ I-88, files for Lin

Pete,

I am working on the hydraulic report for Rt. 47 over Blackberry Creek and there are a few questions/ bits of information I was hoping you could help me with:

- Are photographs of the stream/bridges available from the survey? I would like to add the photographs to the appendices and use them to support roughness coefficients. (I was able to locate two pictures taken during the feasibility study of the bridges/stream, hopefully this will suffice)
- Does GRAEF have aerial-imagery base files and Kane County contour files? I believe these are online but I wanted to check to see if you already had them and if they could be uploaded to the ftp if so. (I was able to locate aerial images we had saved in our directory. I am having the GIS group create a contour map of the project area, and I will upload that to the FTP once it is available. I did upload a larger scale USGS map with contours for the time being)
- We will need correspondence from IDOT maintenance and Kane County regarding any flooding reports they may have on file. Does GRAEF already have correspondence along these lines or do we need to make these requests? Please let me know if you would like me to make these requests and if you have already established contacts for these requests. (We have requested these files and are just waiting on IDOT staff to send them over to us)
- The creek cross sections dgn that GRAEF provided has creek cross sections cut every 25'. I was going to abridge the number of cross sections in the hydraulic model to only those cross sections that were surveyed as part of the stream survey. I wanted to check with you though, were these other cross sections just interpolated from the stream survey and did GRAEF want us to use all of the cross sections in the dgn provided? (Please re-cut the cross sections at the surveyed locations and use those)

Thanks, feel free to give me a call if you think it would be easier to discuss these over the phone.

Geoffrey Elfers, P.E.
gelfers@lineng.com

Lin Engineering, Ltd.
576 Oakmont Lane, Westmont, IL 60559
Phone: (630)323-5168 ext. 621
Fax: (630)323-5174
www.lineng.com

From: Johnston, Peter [mailto:peter.johnston@graef-usa.com]
Sent: Friday, February 13, 2015 3:44 PM
To: Fred Lin
Subject: Rt. 47 @ I-88, files for Lin

Fred,

We have uploaded files to the Lin – In folder, and the following files should be available to you now:

- topo.dgn (Rte 47 Survey)
- CreekTopo.dgn (Blackberry Creek Survey)
- T_00_50CreekAlign000.dgn (Alignments for both Blackberry Creek and Tributary C)
- T_00_XSCreek000.dgn" (Cross Sections for both Blackberry Creek and Tributary C)
- T_00_Existing_BBCreekProf000.dgn (Existing Blackberry Creek profile along existing alignment)
- T_00_Existing_TribCCreekProf000.dgn (Existing Tributary C profile along existing alignment)

Please let us know if you need anything else. We are currently working on inserting the existing ROW.

Thanks
Pete

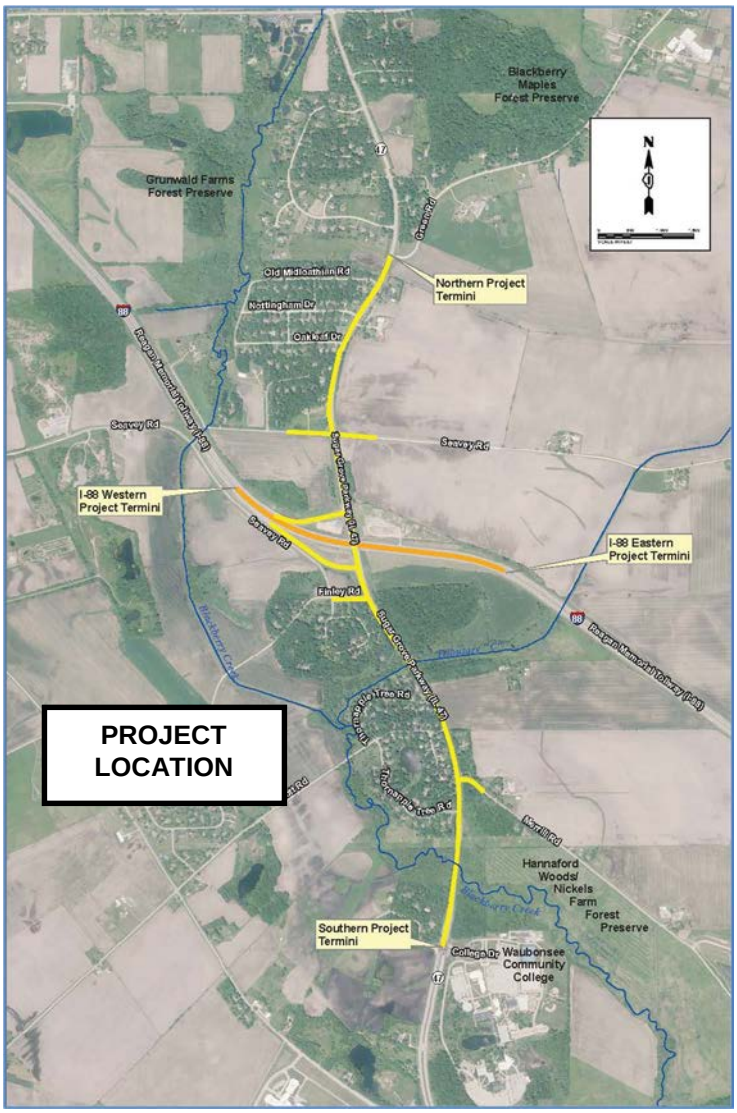
EXHIBIT L

CD OF HEC-RAS MODELS AND PDF OF REPORT

Illinois Department of Transportation

TRANSPORTATION MANAGEMENT PLAN

FAP 326 (IL Route 47) at FAI 88 (Reagan Memorial Tollway) Interchange Improvements



P-91-015-14

Kane County, Illinois

IDOT – Division of Highways – District One

June 2018

Contact Information

Job Number: P-91-015-14

Project: FAP 326 (IL Route 47) at FAI 88 (Ronald Reagan Memorial Tollway)

Location: Kane County, Illinois

IDOT Unit Head: Steve Schilke **Phone:** (847) 705-4125

Email: steven.schilke@illinois.gov

IDOT Manager: Corey Smith **Phone:** (847) 705-4103

Email: corey.smith@illinois.gov

IDOT Engineer: Kyle Bochte **Phone:** (847) 705-4678

Email: kyle.bochte@illinois.gov

Consultant:

PTB: N/A **FIRM:** GRAEF-USA Inc.

Project Manager: Peter Johnston **Phone:** (773) 399-5443

Email: peter.johnston@graef-usa.com

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1. EXECUTIVE SUMMARY

The purpose of the project is to improve system linkage and accommodate land use and economic development within the Illinois Route (IL 47) and Ronald Reagan Memorial Tollway (I-88) project study area. Levels of Service are acceptable for existing conditions, but become problematic for the 2040 No Build condition. There is considerable population growth anticipated for Kane County over the next 25 years. Additionally, both Sugar Grove and Elburn are each anticipating populations to increase close to 200% over the next 25 years.

The purpose of the Transportation Management Plan (TMP) is to provide guidance for maintenance of traffic (MOT) measures in Phase II and Phase III.

The centerline of the proposed roadway is shifting east, so staging is expected to occur without impacting traffic flow since one lane in each direction will remain open to traffic throughout the project. This will, presumably, eliminate any traffic backups.

Public outreach will be important throughout the duration of this project. Because this area is close to Waubonsee Community College and because this route is one of the main northbound/southbound roadways, it will be important to coordinate any impacts to emergency responders and general motorists.

2. PROJECT DESCRIPTION

2.1 BACKGROUND

The purpose of the project is to improve system linkage and accommodate land use and economic development within the IL 47 and I-88 project study area. Planning documents from the Village of Sugar Grove, Village of Elburn, and the Chicago Metropolitan Agency for Planning (CMAP) indicate a significant potential for residential and commercial/industrial development with associated traffic growth in the project area over the next several years. This facility will help to address the inappropriate usage of local roadways by regional traffic. Kane County supports the full interchange as integral to their land use and transportation planning, as evidenced by their Long-Range Transportation Plan.

The transportation management plan (TMP) is for the widening of Illinois Route 47 (IL 47), from approximately one (1) mile south of I-88 just over the south bridge of Blackberry Creek to approximately to approximately one (1) mile north of I-88 just north the Green Road intersection and includes the addition of two (2) interchange ramps (WB exit and EB entrance). The center line of IL 47 is being relocated approximately 30 feet to the east between Blackberry Creek and I-88, and between I-88 and Green Road.

2.2 PROJECT DESCRIPTION

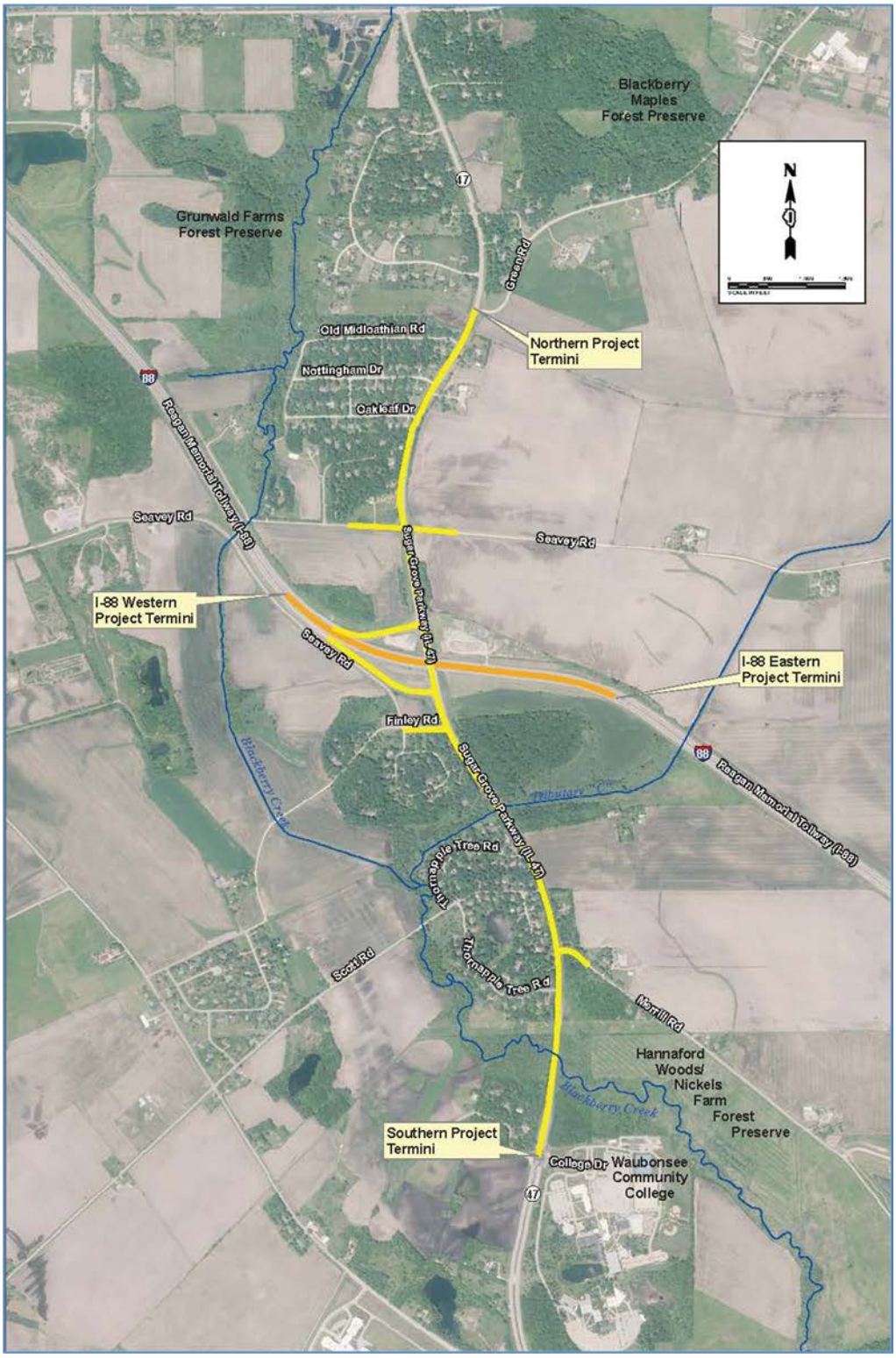
The existing IL 47 Interchange at the Ronald Reagan Memorial Tollway (I-88) is a partial service interchange that provides access to and from the west only. A need has been identified to construct a full service interchange as well as to widen IL 47 within the project limits.

The project is in southern Kane County in Blackberry and Sugar Grove Townships. Peace Road is the closest full access service interchange to the west of IL 47 (15.5 miles), while to the east the closest full access service interchange is Orchard Road (5.3 miles).

The project extends from the Waubonsee Community College north entrance as the southern logical termini to Green Road as the northern logical termini along IL 47. The study area on I-88 extends a half mile both east and west of IL 47. The Village of Sugar Grove is located south of the interchange and the Village of Elburn is located to the north. The interchange is located at milepost 109.5 on I-88.

The project will include the partial reconstruction of the existing ramps to and from the west. New toll plazas are anticipated to be constructed on some or all ramps of the proposed interchange. Modifications to IL 47 will also be included. This includes adding a lane on IL 47 in each direction of travel and modification of the IL 47 over I-88 bridge to accommodate the proposed interchange geometry.

Figure 2-1: PROJECT LOCATION MAP



2.3 CONSTRUCTION PHASING

The proposed construction will match the existing centerline at both the south and north project limits (Blackberry Creek and Green Road) and at the IL 47 bridge over I-88.

A pre-stage and three construction phases will be required in order to keep the roadway operational during construction.

The pre-stage will consist of temporary pavement construction on the west side of existing IL 47 at the northern and southern job limits (Blackberry Creek and Green Road) and in the vicinity of the IL 47 bridge over I-88.

Stage 1 will include moving traffic to the west side of the pavement and constructing the NB roadway widening and the new traffic lanes on the eastern portion of the right-of-way.

Stage 2 will consist of moving traffic to the eastside of the pavement and constructing the SB roadway widening and the new traffic lanes on the western portion of the right-of-way.

Stage 3 will consist of moving traffic onto the new lanes and completing the median work. During this stage, the inside lanes will need to remain closed in order to provide a work space for the shoulder, curb and gutter, and median installations.

2.4 CONSTRUCTION SCHEDULE

The widening and reconstruction is anticipated to last for two construction seasons.

2.5 INTERACTION WITH OTHER PROJECTS

The Tollway interchange improvement is expected to precede the IL 47 widening project. Since the interchange work is expected to be completed before this project, this TMP is being prepared for the widening of IL 47 only.

3. EXISTING CONDITIONS

3.1 EXISTING TRAFFIC DATA, COUNTS, AND QUEUES

Illinois Route 47

IL 47 is classified as a rural Strategic Regional Arterial (SRA) and is included as part of the National Highway System. IL 47 is important to the north-south transportation linkage because it provides access to residential, retail, commercial, agricultural, and recreational lands throughout the region. The section of IL 47 within the study limits is between the Villages of Sugar Grove and Elburn.

IL 47 is a two-lane undivided highway north and south of the existing half diamond interchange at I-88. The roadway becomes a four-lane, raised median divided roadway at I-88 between Finley Road and Seavey Road. IL 47 is a primary north-south thoroughfare serving the Village of Sugar Grove, Village of Elburn and the Kane County region. The posted speed limit along IL 47 is 55 MPH.

There are several collector roadways that intersect IL 47 within the project limits. At the north termini of the project, Green Road is a two-lane undivided road that is approximately 4,800 feet north of I-88 and forms a T-intersection with IL 47. Approximately 1,800 feet north of I-88, there is an unsignalized intersection with Seavey Road, an east-west undivided roadway. Finley Road is an east-west two-lane undivided roadway that forms a T-intersection with IL 47 roughly 800 feet south of the Tollway centerline. Approximately 3,300 feet south of I-88, Scott Road is an east-west two-lane undivided roadway that forms a T-intersection with IL 47. Merrill Road is approximately 4,100 feet south of I-88 and forms a T-intersection with IL Route 47.

Additionally, there are local roadways that intersect IL 47 within the project limits. North of I-88, these roadways are (from north to south): Old Midlothian Road, Nottingham Drive, and Oakleaf Drive. All three roads intersect IL 47 at a stop controlled T-intersection and are located west of IL 47. Local roads south of I-88 include: Thornapple Tree Road (North), Thornapple Tree Road (South), and Waubonsee Drive/Old Oaks Road. The two Thornapple Tree Road intersections are T-controlled stop intersections while the College Drive/Old Oaks Road is a signalized 4-way intersection located approximately 6,750 feet south of I-88.

The roads intersecting IL 47 can be seen in Figure 2-1.

The existing IL 47 pavement includes an asphalt surface over continuously reinforced concrete pavement. The through lanes are 12’ wide. There is typically a 10’ wide asphalt outside shoulder and an 8’ wide asphalt inside shoulder. A typical section of the pavement structure is shown in **Exhibit 1**.

The existing average daily traffic (ADT) volumes along IL 47 are presented in Table 3-1. Heavy vehicles comprise approximately 23% of total traffic volumes along IL 47.

Table 3-1: Existing IL 47 Traffic Volumes

ROAD SEGMENT	Existing (2014) ADT
IL 47 north of Main St	7,900
IL 47 from Main St to Green Rd	7,450
IL 47 from Green Rd to Seavey Rd	7,450
IL 47 from Seavey Rd to WB I-88 Ramp(s)	7,450
IL 47 from EB I-88 Ramp(s) to Finley Rd	10,900
IL 47 from Finley Rd to Scott Rd	10,900
IL 47 from Scott Rd to Merrill Road	10,900
IL 47 from Merrill Road to Old Oaks Rd/College Drive	10,900
IL 47 south of Old Oaks Rd/College Drive	10,900

With the exception of the IL 47/Old Oaks Road/College Drive signalized intersection, all intersections within the project limits currently operate under minor-leg stop-control. Therefore, existing conditions along mainline IL 47 operate as free-flow, with a posted speed limit of 55 mph. No known queuing occurs where IL 47 transitions from four through lanes to two through lanes north and south of the I-88 interchange, as adequate transition areas are provided.

Reagan Memorial Tollway (I-88)

The Reagan Memorial Tollway (I-88) is a tolled Interstate Highway located in northern Illinois. I-88 was previously known as the East-West Tollway and is now part of the Chicago to Kansas City Expressway.

I-88 is classified as a tollway and has two mainline lanes in each direction within the project limits. An open grassed median separates the lanes. Median cable guard is adjacent to westbound lanes west of the IL 47 bridge, while median cable guard is adjacent to the eastbound lanes east of the IL 47 bridge. The posted speed limit is 65 mph eastbound and 70 mph westbound.

The existing pavement includes an asphalt surface over a concrete base. Mainline lanes are 12.5’ wide. There is an 11’ wide asphalt shoulder on the outside and 5’ asphalt shoulder on the inside. The inside shoulder also includes a 3’ aggregate shoulder adjacent to the asphalt shoulder. A typical section of the pavement structure is shown in **Exhibit 1**.

Aerial photography of the interchange is shown in **Figure 2-1.**

The average daily traffic on I-88 are presented in Table 3-2 below. Heavy vehicles comprise approximately 11% of total traffic volumes along I-88.

Table 3-2: Existing I-88 Traffic Volumes

ROAD SEGMENT	Existing (2014) ADT
I-88 WB On-Ramp	1,550
I-88 WB Off-Ramp	N/A
I-88 west of IL 47 interchange	31,000
I-88 east of IL 47 interchange	28,000
I-88 EB Off -Ramp	1,500
I-88 EB On -Ramp	N/A

Traffic currently operates under free-flow conditions along I-88 within the project limits. Both the westbound merge and diverge areas operate at LOS B during peak hours, with no queuing along I-88.

Table 3-3: Existing Conditions Data

Design Element	IL 47 (FAP 326)	I-88 (Ronald Reagan Memorial Tollway)
Highway Functional Classification	Other Principal Arterial	Interstate
Truck Route Classification	Class II	Class I
Strategic Regional Arterial (yes/no)	Yes	No
On NHS (yes/no)	Yes	Yes
Jurisdiction	IDOT	IL Tollway
Current ADT	10,900 S of I-88 7,450 N of I-88	31,000 W of IL 47 28,000 E of IL 47
% Trucks	23%	11%
Posted Speed	55	70
Design Speed	60	75
Number of through lanes and widths	2 @ 12’	4 @ 12.5’
Turn lanes and widths	NB @ I-88 WB Ramp - 12’	N/A

Design Element	IL 47 (FAP 326)	I-88 (Ronald Reagan Memorial Tollway)
	SB @ Old Oaks Dr. - 12’	
Shoulder or Curb Type	Asphalt/Gravel	Asphalt
Shoulder Width	10’	12’ Outside 6’ Inside
Clear Zone Width	44’	44’
Pavement Surface Condition in CRS (year)	7.3 (Green Rd. to Seavey) 5.5 (Seavey to Old Oaks Dr.) (2015)	7.9 (East Project limit to existing ramp gores) 7.4 (existing ramp gores to west project limit) (2014)
Sidewalks/paths	None	None
Parking	None	None
Roadway Lighting	Single light standard at intersections	On ramps
Traffic Control Type	Stop signs at side streets. Signal at Old Oaks Rd.	N/A

3.2 INCIDENT, CRASH DATA, AND ANALYSIS

A crash analysis was performed along an approximate three-mile section of Illinois Route 47 between Old Oaks Road/College Drive and Main Street over a five-year period between 2011 and 2015. Within these project limits and the study period, a total of 69 crashes occurred along both mainline Illinois Route 47 and alongside street approaches (within approximately 500 feet of Illinois Route 47). A summary of the crash data throughout the project limits is provided in Tables 3-4 through 3-8. As outlined in this figure, the number of crashes occurring is similar in each of the five years; however, approximately 48 percent of total crashes occurred in either 2011 (17 total crashes) or 2015 (16 total crashes).

Table 3-4: Collision Type

Collision Type	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
Rear End	5	7	4	5	6	27	39%
Turning	4	3	2	3	3	15	22%
Fixed-Object	3	1	1	2	3	10	14%
Sideswipe - Same Direction	0	0	2	0	0	2	3%
Sideswipe - Opposite Direction	0	0	0	1	0	1	1%
Angle	0	1	0	0	2	4	4%
Animal	3	0	2	2	1	8	12%
Pedalcyclist	0	0	0	0	0	0	0%
Pedestrian	0	0	0	0	0	0	0%
Other Object	0	0	0	0	0	0	0%
Other Collisions	2	0	0	0	1	2	4%
Total	17	12	11	13	16	69	100%

Table 3-5: Collision Weather Conditions

Weather Condition	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
Clear	15	11	10	10	11	57	83%
Rain	1	0	1	1	3	6	9%
Snow	1	0	0	1	2	4	6%
Fog/smoke/haze	0	1	0	0	0	1	1%
Sleet/hail	0	0	0	0	0	0	0%
Severe cross wind	0	0	0	0	0	0	0%
Other	0	0	0	1	0	1	1%
Cloudy/overcast	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0%
Total	17	12	11	13	16	69	100%

Table 3-6: Collision Severity

Crash Severity and Number of Injuries	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
A Injury (Incapacitating)	1	1	0	0	2	4	5%
B Injury (Non-incapacitating)	1	2	3	6	6	18	22%
C Injury (Reported, not apparent)	6	2	0	1	1	10	12%
K Fatality	0	0	0	1	0	1	1%
Property Damage Only	13	9	9	8	9	48	59%
Total	21	14	12	16	18	81	100%

Table 3-7: Collision Light Condition

Light Condition	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
Daylight	11	11	8	8	12	50	72%
Dawn	0	1	0	0	0	1	1%
Dusk	1	0	0	1	0	2	3%
Darkness	5	0	3	3	1	12	17%
Darkness; lighted road	0	0	0	1	3	4	6%
Unknown	0	0	0	0	0	0	0%
Total	17	12	11	13	16	69	100%

Table 3-8: Collision Peak Period

Peak Period	Year					Total	% of Total Crashes
	2011	2012	2013	2014	2015		
AM Peak	1	5	2	1	2	11	16%
PM Peak	3	2	2	3	4	14	20%
Off Peak	13	5	7	9	10	44	64%
Total	17	12	11	13	16	69	100%

Approximately 70 percent of crashes (48 total) resulted in property damage only. The remaining 30 percent of crashes (21 total) resulted in at least one injury. Accounting for all vehicle occupants among the 21 injury crashes, 1 type K, 4 type A, 18 type B, and 10 type C injuries occurred during the analysis period. The State of Illinois identifies injury types as follows:

- Type K: Fatal – victim dies within 30 days of crash
- Type A: Incapacitating – victim requires help from the scene
- Type B: Non-Incapacitating – visible signs of injury but victim is able to walk away from the scene
- Type C: Reported/Not evident – not visible but victim complains of pain

One fatality crash occurred within the study period at the intersection of Illinois Route 47 and the I-88 Eastbound Off-Ramp. This crash occurred when a passenger car attempted to make a left-turn onto northbound Illinois Route 47 from the off-ramp. According to the crash report, the passenger car disregarded the stop sign and was struck by an SUV traveling southbound on Illinois Route 47. The driver of the passenger car died on the scene. The three occupants of the SUV sustained type B injuries.

Out of the 4 type A crashes, two were rear end crashes at the intersection of Illinois Route 47 and Merrill Road. One crash occurred in 2011 and one occurred in 2015. Both crashes appear to have occurred due to a vehicle not stopping for another vehicle that was waiting in the southbound through lane to make a left-turn onto Merrill Road. Both crashes occurred during daylight and dry conditions, and both involved motorcycles. The third type A crash occurred in 2012 approximately 300 feet south of Finley Road. The crash occurred due to a vehicle attempting to make an illegal U-turn on Illinois Route 47. The fourth type A crash occurred in 2015 approximately 200 feet south of Seavey Road. This was a head-on crash that occurred when a pickup truck traveling southbound lost control and struck a northbound passenger car. This crash occurred during daylight and snowy conditions. It was documented that the roadway was covered with snow/slush.

Rear end crashes are the most common type of crash within the project limits (approximately 39 percent), followed by turning crashes (approximately 22 percent), and fixed-object crashes (approximately 14 percent). It should also be noted that eight crashes, or 12 percent of total crashes, involved a vehicle striking an animal. This is presumably related to the rural environment within the project limits.

From the 27 total rear end crashes, approximately 44 percent (12 crashes) occurred at the intersection of Illinois Route 47 and I-88 Eastbound Off-Ramp. Eight of those 12 rear end crashes occurred along the off-ramp (eastbound approach). Approximately 22 percent (6 crashes) of total rear end crashes occurred when vehicles were struck from behind while waiting to make a left turn onto a side street or ramp from Illinois Route 47 without an exclusive left-turn lane provided. Providing exclusive left-turn lanes at these locations could limit the potential for similar rear end crashes from reoccurring.

All turning crashes occurred at intersections or driveways along Illinois Route 47, which is not atypical for this crash type. The fixed object crashes occurred sporadically throughout the project limits and do not appear to indicate any observable crash pattern.

Approximately 59 percent of total crashes (41 crashes) occurred at a key intersection within the project limits:

- Illinois Route 47 & Green Street (2 crashes)
- Illinois Route 47 & Green Road (4 crashes)
- Illinois Route 47 & Seavey Road (2 crashes)
- Illinois Route 47 & I-88 Westbound On-Ramp (1 crash)
- Illinois Route 47 & I-88 Eastbound Off-Ramp (15 crashes)
- Illinois Route 47 & Finley Road (2 crashes)
- Illinois Route 47 & Scott Road (2 crashes)
- Illinois Route 47 & Merrill Road (9 crashes)
- Illinois Route 47 & Old Oaks Road/College Drive (4 crashes)

The intersections that experienced the most crashes were the Illinois Route 47 and I-88 Eastbound Off-Ramp intersection and the Illinois Route 47 and Merrill Road intersection. As previously noted, I-88 Eastbound Off-Ramp intersection experienced a high number of rear end crashes, specifically on the eastbound approach, which is the off-ramp from I-88. The majority of crashes at the Merrill Road intersection were also rear end type collisions, most of which occurred along the southbound approach where vehicles were struck from behind while waiting to turn left from Illinois Route 47 onto Merrill Road. This was a common crash pattern observed during the study period.

The remaining 41 percent of total crashes (28 crashes) occurred along mainline Illinois Route 47 between each key intersection. The segments are defined as follows:

- Segment 1 – Main Street to Green Road (3 crashes)
- Segment 2 – Green Road to Seavey Road (2 crashes)
- Segment 3 – Seavey Road to I-88 Westbound On-Ramp (2 crashes)
- Segment 4 – I-88 Westbound On-Ramp to I-88 Eastbound Off-Ramp (3 crashes)
- Segment 5 – I-88 Eastbound Off-Ramp to Finley Road (1 crash)
- Segment 6 – Finley Road to Scott Road (4 crashes)
- Segment 7 – Scott Road to Merrill Road (1 crash)
- Segment 8 – Merrill Road to Old Oaks Road/College Drive (12 crashes)

Segment 8 experienced more crashes than any other segment. The length of Segment 8 is 0.5 miles, which is not the longest segment, indicating it experienced the highest crash rate of any segment. Five crashes within Segment 8 involved vehicles striking animals – 3 of which took place during nighttime conditions. This segment of Illinois Route 47 does not currently have roadway lighting, which could limit drivers' ability to see animals when it is dark.

As part of the Highway Safety Improvement Program (HSIP), Illinois identifies five percent of the total highway segments statewide that exhibit the most pressing safety needs. This project is not located within a Five Percent segment.

The majority of crashes, approximately 70 percent, occurred during daylight conditions. Approximately 24 percent of the total crashes occurred during dark or lighted conditions, which suggests lighting may not be a contributing factor in the majority of crashes that occurred within the project limits. Certain crash types, however, occurred more frequently during dark conditions. Approximately 75 percent of the animal crashes and 30 percent of the fixed object crashes occurred under dark conditions where no roadway lighting is provided. This indicates a lack of roadway lighting could be limiting visibility of roadside objects and animals when it is dark.

Approximately 36 percent of total crashes occurred during the AM (6:00-9:00AM) and PM (6:00-9:00PM) peak periods (based on traffic volumes). Eleven crashes occurred during the AM peak period, while 14 occurred during the PM. The remaining 44 crashes occurred during off-peak hours.

3.3 LOCAL COMMUNITY AND BUSINESS CONCERNS

The area located in and around the project site includes several subdivisions and Waubonsee Community College will be minimally impacted due to construction traffic. The stage plan shifts traffic and does not reduce the existing lane usage, but some flagging operations may be needed to keep work moving. This may be minimal during Stage 1 and Stage 2, but may be more common during Stage 3. The impacts may include stopped or slowed construction traffic while construction equipment enter or leave the site.

3.4 TRAFFIC GROWTH RATES

Average Daily Traffic (ADT) projections were developed for the corridor for the Build Condition (Year 2040) by the Chicago Metropolitan Agency for Planning (CMAP). Existing (Year 2014), Build Condition, and respective growth rates are provided in **Table 3-9** for IL 47 and I-88.

Table 3-9: Traffic Volume Projections

ROAD SEGMENT	Existing (2014) ADT	Build (2040) ADT	Growth Rate
IL 47 north of Main St	7,900	15,530	2.6%
IL 47 from Main St to Green Rd	7,450	16,400	3.1%
IL 47 from Green Rd to Seavey Rd	7,450	18,800	3.6%
IL 47 from Seavey Rd to WB I-88 Ramp(s)	7,450	23,300	4.5%
IL 47 from EB I-88 Ramp(s) to Finley Rd	10,900	24,100	3.1%
IL 47 from Finley Rd to Scott Rd	10,900	26,600	3.5%
IL 47 from Scott Rd to Merrill Road	10,900	20,800	2.5%
IL 47 from Merrill Road to Old Oaks Rd/College Drive	10,900	14,400	1.1%
IL 47 south of Old Oaks Rd/College Drive	10,900	14,400	1.1%
I-88 WB On-Ramp	1,550	3,900	3.6%
I-88 WB Off-Ramp	N/A	5,700	--
I-88 west of IL 47 interchange	31,000	43,600	1.3%
I-88 east of IL 47 interchange	28,000	47,200	2.0%
I-88 EB Off -Ramp	1,500	3,900	3.7%
I-88 EB On -Ramp	N/A	5,700	--

4. TRAFFIC CONTROL PLAN (TCP) STRATEGIES

4.1 PROPOSED STAGING

Pre-stage

Prior to any work starting on the IL 47 mainline, temporary pavement will be installed west of the existing pavement. Traffic will be minimally impacted.

Stage 1

Traffic will shift to the west so two-way traffic is maintained northbound and southbound. Northbound traffic will utilize the existing southbound lane and southbound traffic will utilize the temporary pavement constructed to the west. During this stage the new northbound lanes will be constructed.

Stage 2

Traffic will shift to the east so two-way traffic is maintained northbound and southbound. Traffic will utilize the newly constructed northbound lanes, one lane in each direction.

Stage 3

Traffic will shift to the outermost northbound and southbound lanes so that the median work can be completed. The interior lanes will remain closed for construction activities. During this stage, landscaping, permanent striping and any other items will be completed to finish the project.

4.2 STAGING ALTERNATIVES

An alternative to detour traffic was considered, but due to IL 47 being a truck route this was abandoned. The detour would include utilizing Bliss Road (Kane County Road 78) to Main Street (Kane County Road 10). This would detour traffic East of IL 47 before turning West on to Main Street. The total length of this detour is approximately 8.5 miles. Since the IL 47 bridge over I-88 is the only bridge nearby for Class II trucks, this was disregarded.

4.3 QUEUE ANALYSIS

The proposed traffic staging will maintain existing capacity along IL 47 (one through lane in each direction). As all intersections along IL 47 currently operate as minor-leg stop-controlled, existing conditions along IL 47 are free flow. It is anticipated that adequate lane shift transition areas will be provided during construction to maintain free-flow conditions. Therefore, minimal, if any, queuing is anticipated during construction. The only turn lanes on the existing segment is on Northbound IL 47 which is a left turn on to the entrance ramp to Westbound I-88 and a Southbound IL 47 left turn lane into Waubonsee Community College. The turn lane on to the entrance ramp to Westbound I-88 will be shortened during Stage 1 construction which may create short queues in the Northbound through lane by utilizing the existing outside shoulder for Southbound traffic for the length of the Northbound left turn lane. Southbound traffic should merge back over into the outermost lane prior to the bridge. The turn lane on to the entrance ramp to Westbound I-88 can be gapped during Stage 2 construction which should provide minimal impacts to the through lanes. The Southbound turn lane into Waubonsee Community College will be impacted during Stage 1 so that Northbound traffic can cross over on to the existing Southbound lanes. The impact will shorten the storage lane. The timing of the impact can be pushed to the summer to minimize any backups during the school year.

4.4 SAFETY IMPACTS

Safety is a priority of the project for the general public and for construction workers. Strategies to mitigate safety impacts include but certainly are not limited to public awareness of the project, work zone monitoring, and law enforcement presence in the work zone.

To better make the public aware of the project, public information meetings should be held involving residents and employees from Waubonsee Community College.

The contractor and resident engineer will be responsible for monitoring the jobsite and correcting any safety concerns that arise.

4.5 TRAFFIC CONTROL DEVICES

All traffic control devices will conform to the Illinois Manual on Uniform Traffic Control Devices (ILMUTCD). All signs, barricades, and temporary striping will conform to the ILMUTCD. Vehicular access to local properties will be maintained at all times during construction by gapping intersections or completing intersections in stages, when necessary, except when paving operations occur directly on or in front of entrances. In this case, flag persons will be used to direct traffic.

An example of potential devices to be used are portable changeable message signs. Signs and barricades will be used throughout the work zone and temporary roadway pavement will be employed in order to diminish traffic backups.

5. PUBLIC INFORMATION PLAN

The impact that the IL 47 widening will have on the surrounding communities, businesses, travelers, emergency services, and schools requires an informative public information campaign before, during, and after the project. The strategies utilized can include brochures/mailers, press releases, telephone hot lines, websites, Public Hearings and/or Meetings, press conferences, Community Task Forces, coordination with media outlets, municipalities, schools and emergency services, and signage among others.

The Public Information Plan (PIP) should employ a public outreach program. This can consist of:

- Town hall public information meetings
- Advanced changeable message boards
- Meetings or presentations to major employers, such as Waubonsee Community College
- Neighborhood associations meeting presentations
- Newspaper articles
- IDOT website for updated project information.

Factors to include during the outreach program include local emergency response teams. This project does not anticipate lane shutdowns, with the exception of the bridge during median work, so traffic should be continuously moving.

In order to keep safety the number one priority, this information should be distributed or broadcasted to the general public in a timely manner.

6. TRANSPORTATION OPERATIONS PLAN (TOP)

IDOT utilizes various Transportation Operations Plan (TOP) strategies which include:

- Demand Management
- Corridor Management
- Work Zone Safety Management
- Traffic and Incident Management
- Enforcement

Demand management includes techniques to reduce the volume of traffic traveling through the work zone. Examples include: working with local businesses to promote flexible work hours.

Corridor management is key during construction and something the Resident Engineer will need to monitor to avoid safety issues. One idea that could be utilized is temporary truck restrictions. Since the phasing includes installing temporary pavement to keep traffic moving, queues should be at a minimum.

Work zone safety management should be employed in order to protect workers and the general public. Temporary traffic barriers, traffic monitoring, and construction safety supervisors are examples of work zone safety tactics. The Resident Engineer and contractor should perform daily traffic safety checks.

Traffic and incident management can include traffic radio, Intelligent Transportation System (ITS) monitoring, surveillance through closed circuit TV (CCTV) and loop detectors, traffic screens, and local detour routes among others. Incident management is highly important in order to efficiently minimize traffic delays after an incident has taken place. Even though there is no impact to existing traffic conditions, local police and fire departments will be coordinated with in addition to the Villages of Sugar Grove and Elburn.

Enforcement is an important tool in order to protect workers and drivers. Increasing the presence of law enforcement will help reduce speed. Another option is to use photo speed enforcement devices.

Due to the unique staging for this project, we expect minimal traffic impacts to local residents and we do not expect any queues due to construction traffic with the exception of temporary stops during material deliveries, lateral storm crossings etc.…

7. TMP IMPLEMENTATION AND MONITORING

The Resident Engineer and contractor should monitor user delay and traffic control devices on a daily basis. Monitoring will be conducted by district personnel. Extra consideration should be given during peak travel times.

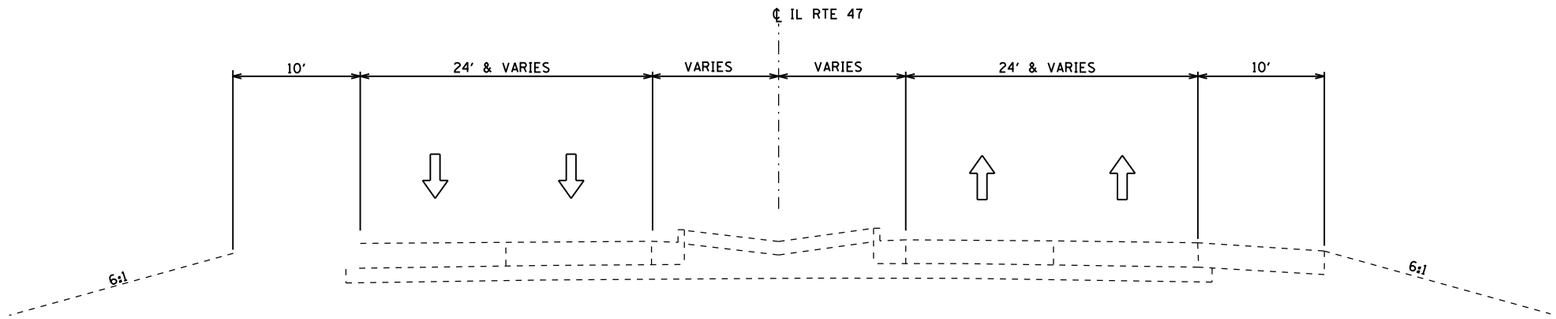
As design and construction progress, the TMP should be revised and updated to reflect changes in the plan set. IDOT, the Phase 2 and Phase 3 engineer, and the contractor should all be involved to ensure accuracy of the plan and to coordinate meetings with local residents.

Any changes or additional plans may be developed with the assistance of the Bureau of Construction, the Bureau of Operations and with the input of the contractor.

Exhibit 1

Staging Typical Sections

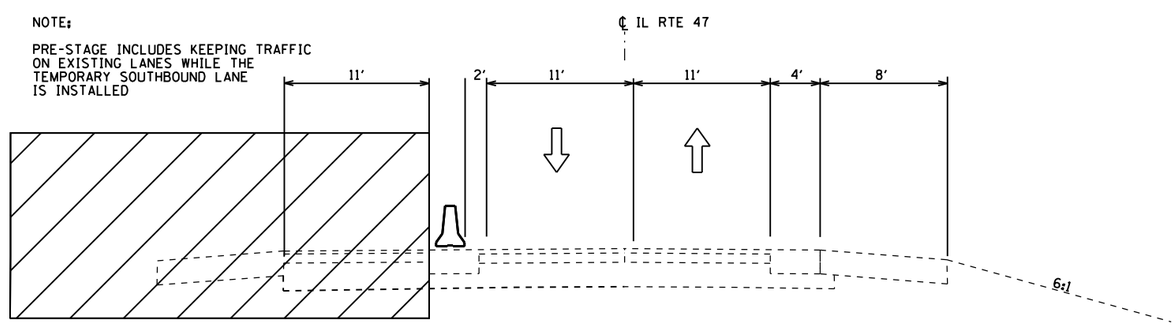
POTENTIAL CONSTRUCTION STAGING
IL RTE 47
PRE-STAGE



EXISTING TYPICAL SECTION
IL RTE 47
SECTION BETWEEN WB ON AND EB OFF RAMPS

NOTE:

PRE-STAGE INCLUDES KEEPING TRAFFIC ON EXISTING LANES WHILE THE TEMPORARY SOUTHBOUND LANE IS INSTALLED



EXISTING TYPICAL SECTION
IL RTE 47
SECTION NORTH AND SOUTH OF INTERCHANGE

8:48:45 AM
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7/11/2018

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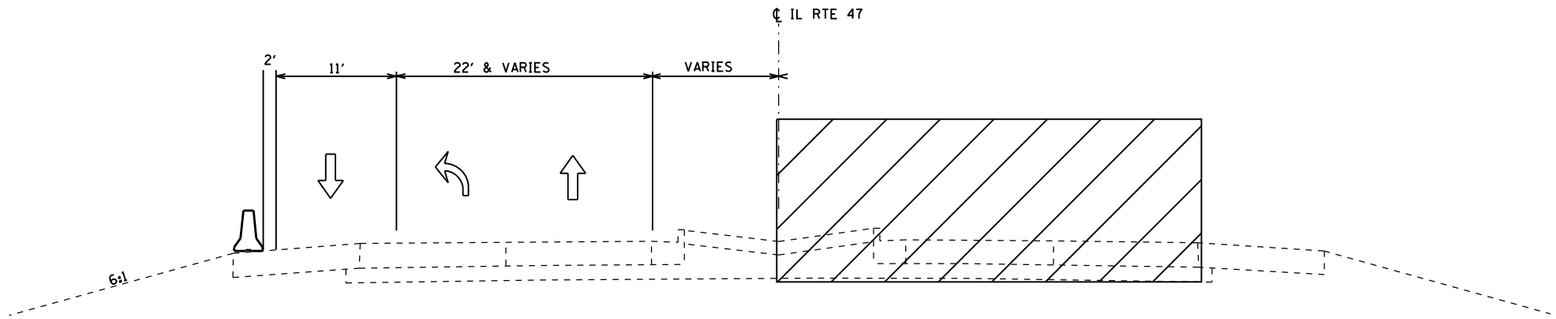
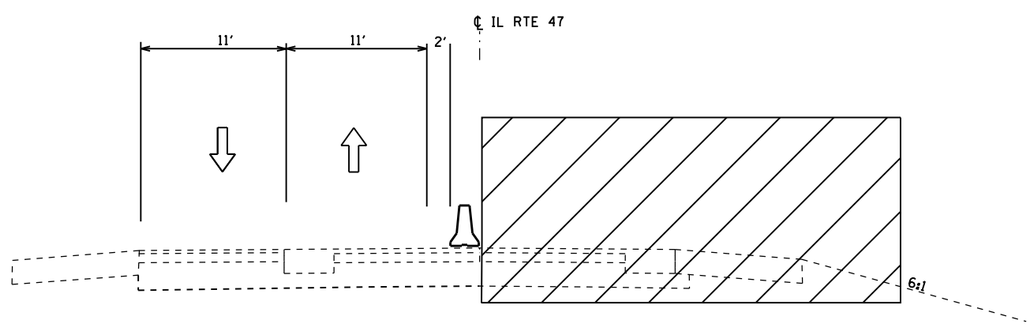
	PLOT DATE = 7/11/2018	DATE - 01/09/2017	REVISED -		SCALE:	SHEET OF SHEETS	STA. TO STA.		ILLINOIS	FED. AID PROJECT P-91-015-14		

POTENTIAL CONSTRUCTION STAGING
IL RTE 47
STAGE 1



EXISTING TYPICAL SECTION
IL RTE 47
SECTION BETWEEN BRIDGE AND WB ON RAMP



EXISTING TYPICAL SECTION
IL RTE 47
SECTION NORTH AND SOUTH OF INTERCHANGE

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8/1/2018

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PLOT DATE = 8/1/2018	DATE - 01/09/2017	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL RTE 47 & I-88 INTERCHANGE IMPROVEMENTS
STAGE 1 PLAN

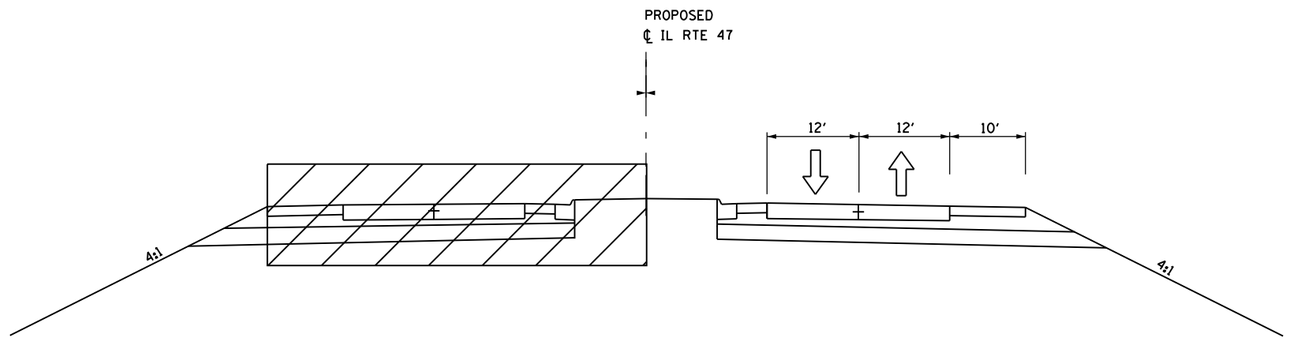
SCALE: | SHEET OF SHEETS | STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	14-00028-00-CH	KANE		

CONTRACT NO. XXXXX

ILLINOIS FED. AID PROJECT P-91-015-14

POTENTIAL CONSTRUCTION STAGING
IL RTE 47
STAGE 2



PROPOSED TYPICAL SECTION - IL RTE 47

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7/11/2018

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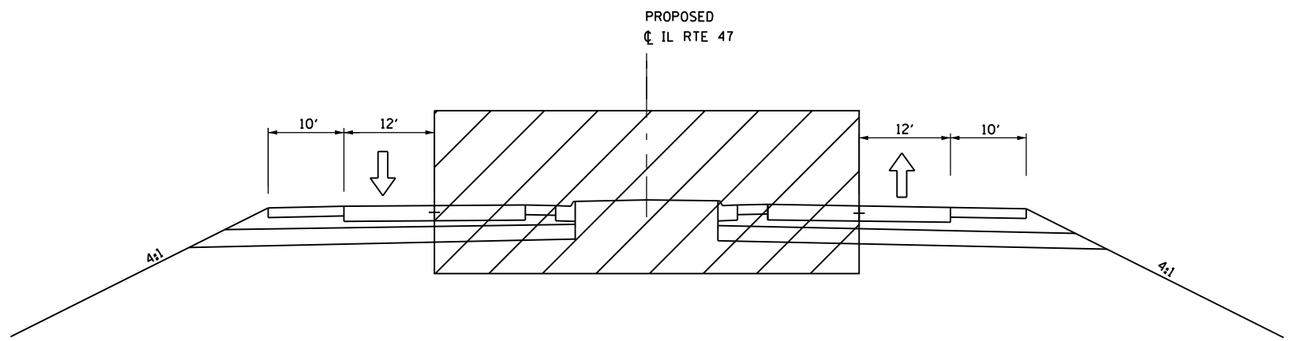
POTENTIAL CONSTRUCTION STAGING
IL RTE 47
STAGE 3



PROPOSED TYPICAL SECTION - IL RTE 47

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	PLOT DATE = 7/11/2018	DATE - 01/09/2017	REVISED -		SCALE: SHEET OF SHEETS STA. TO STA.		ILLINOIS FED. AID PROJECT		

ERRATA

Illinois Route 47 (FAP 326)
at Ronald Reagan Memorial Tollway I-88
Kane County, Illinois

Job No. P-91-015-14

May 15, 2018

This Errata includes corrections, revisions, and/or additions to the Environmental Assessment (EA), November 2017, for the proposed project for Illinois Route 47 (FAP 326) at Ronald Reagan Memorial Tollway I-88 in Kane County, Illinois. The Environmental Assessment was approved for public release by the Federal Highway Administration on November 21, 2017. Corrections, revisions, and/or additions are shown in *italics.*

3.4.2.3 Illinois 47 Alternatives to be Carried Forward

Page 23, Table for Alternative M-1C: 4-Lane on Existing Alignment, in the header of table remove the word *food* and insert the word *foot* in its place.

3.4.4.1 IL 47 Mainline Preferred Alternative

Page 39, first paragraph. Remove *"It is recommended that the Preferred Alternative for the IL 47 Mainline be Alternative M-2C; which consists of two 12-foot lanes in each direction, a 30-foot raised median through the majority of the corridor but reduced through the Hannaford Woods/ Nickels Farm Forest Preserve, and shifts the alignment to the east, north of Thornapple Tree Road. The Preferred Alternative is proposing a five-foot sidewalk on the west side of IL 47 and a 10-foot multi-use path on the east side."*

Replace with *"It is recommended that the Preferred Alternative for the IL 47 Mainline be Alternative M-2C; which consists of two 12-foot lanes in each direction, a 30-foot raised median which includes a 4 foot inside shoulder with rumble strips into a mountable raised curb in each direction, through the majority of the corridor but reduced through the Hannaford Woods/ Nickels Farm Forest Preserve, and shifts the alignment to the east, north of Thornapple Tree Road. The Preferred Alternative is proposing a five-foot sidewalk on the west side of IL 47 and a 10-foot multi-use path on the east side."*

4.13 Section 4(f) Evaluation

Page 90, fourth paragraph. Remove *"The Preferred Alternative will impact approximately 1.5 acres of the Hannaford Woods/Nickels Farm Forest Preserve. A total of 0.2 acres on the west side of IL 47 and 1.3 acres on the east side of IL 47. All of the 1.3 acres on the east side of IL 47 are inside the 60 foot strip of land planned for transportation purposes. After subtracting the acreage of land that is planned for transportation purposes, the approximate impacts are 0.2 acres. This impact is not anticipated to adversely affect the activities, features, or attributes of the Hannaford Woods/Nickels Farm Forest Preserve."*

Replace with *"The amount of property impacted by this project is approximately 1.74 acres from the Hannaford Woods/Nickels Farm Forest Preserve. A total of 0.22 acres on the west side of IL 47 and 1.52 acres on the east side of IL 47. 1.51 acres on the east side are within the 60 foot strip of land planned for transportation purposes, and 0.01 acres are outside of that 60 foot strip. After*

removing the acreage of land that is planned for transportation purposes, this project is anticipated to impact 0.23 acres from the Hannaford Woods/Nickels Farm Forest Preserve."

Page 90, insert after the fourth paragraph, "*The Forest Preserve District of Kane County (FPDKC) provided their concurrence in writing on February 16, 2018 that the proposed use of property from Hannaford Woods/Nickels Farm Forest Preserve will not have an adverse effect on the activities, features and attributes of the property. On this basis, and based upon the Section 4(f) de minimis documentation for Hannaford Woods/Nickels Farm Forest Preserve included in* ***Appendix E****, the FHWA made a de minimis impact finding on March 19, 2018. A copy of the letter from the FPDKC is in* ***Appendix A****. A copy of the de minimis determination from FHWA is located in* ***Appendix E****."*

5.1 Environmental Commitments
Page 94, to the first bullet add the following, "*This coordination will occur with the USACE during 404 Permitting coordination."*

6.9 Public Hearing
Page 98, in heading title, *remove "(Tentatively Scheduled)"* add *(December 14, 2017).*
Remove- *"The next public outreach meeting is the Public Hearing, which is tentatively scheduled for the end of 2017."*

Add –
"The Public Hearing for the project was held on Thursday, December 14, 2017 from 4:00 P.M. to 7:00 P.M. in the APC Event Room at Waubonsee Community College. Advertisement for the meeting was published in the Daily Herald on November 27, 2017 and December 7, 2017 and in the Kane County Chronicle on December 7, 2017. In addition, meeting invitations/brochures were sent out in the mail. The meeting was attended by 98 people and 14 comment forms were received at the meeting. For more information, please see ***Appendix H****.*

Attendees signed in and a brochure was provided. There were two rooms for attendees to learn more about the project. One room contained a continuous audio-visual presentation that described the project summary, provided the study process and schedule, outlined the alternative screening process, and described the alternatives carried forward. The second room contained more detailed information, comment forms, and project study team representatives. Information in the second room included exhibit boards and roll plot maps.

A third room was utilized for the public forum. A court reporter for verbal comments was available in the second room from 4:00 P.M. to 6:00 P.M. and recorded verbal comments at the public forum from 6:00 to 7:00 P.M.

The purpose of the meeting was to attain public input on the project study including the Environmental Assessment (EA) and the impacts to the Section 4(f) Hannaford Woods/Nickels Farm Forest Preserve (Kane County Forest Preserve)."

Appendix A NEPA/404 Merger Meeting Minutes and Concurrence Letters
Insert January 10, 2018 letter from USEPA to FHWA acknowledging their comments made during the scoping process were addressed and they have no further comments on the EA.

Insert February 12, 2018 letter from USACE to FHWA regarding information to be provided in future 404 Permitting coordination.

Appendix E Environmental Surveys and Coordination
Replace page 339-340 with Final AD-1006 form completed by IDOA dated November 6, 2017.

Insert November 28, 2017 letter from IDOA to IDOT determining the proposed project complies with Illinois' Farmland Preservation Act.

Insert Section 4(f) De Minimis Documentation Report dated February, 2018.

Insert February 9, 2018 letter from Village of Sugar Grove to Forest Preserve District of Kane County with signature page showing Forest Preserve District concurrence of no adverse impacts to 4(f) property.

Insert March 19, 2018 email from FHWA to IDOT making a Section 4(f) de minimis determination for proposed impacts to Hannaford Woods/Nickels Farm Forest Preserve.

Appendix H Public Involvement Meeting Minutes
Insert Public Hearing Short Summary, Court Reporter transcript and Response to Comments.

Insert January 24, 2018 from Elburn Community Development Corporation to IDOT stating support for the project.

Insert Village of Elburn Resolution No. 2018-02 supporting the project.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JAN 1 0 2018

REPLY TO THE ATTENTION OF:

Matt Fuller
Federal Highway Administration – Illinois Division
3250 Executive Park Drive
Springfield, Illinois 62703

Re: Draft Environmental Assessment for the Proposed IL 47/Interstate 88 Interchange Project, Kane County, Illinois

Dear Mr. Fuller:

EPA has reviewed the referenced draft environmental assessment (EA), which was prepared by Bolton-Menk, consultant to the Federal Highway Administration (FHWA) and the Illinois Department of Transportation (IDOT). Our comments are provided pursuant to our authorities under the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), Section 309 of the Clean Air Act, and as a cooperating agency under the NEPA-Clean Water Act Section 404 (NEPA/404) Merger Process. EPA previously provided project scoping comments (August 26, 2015), concurrence on purpose and need (February 29, 2016), and concurrence on alternatives to be carried forward (February 22, 2017).

The purpose of the proposed action is to improve system linkage and accommodate land use and economic development for IL 47 and I-88 from the north entrance of Waubonsee Community College (at the south end of the project) to Green Road (at the north end of the project). The proposed action is broken into two functional components—the IL-47/I-88 Interchange component, and a mainline component between the proposed interchange and the college. Four alternatives have been provided for each component, as indicated below.

Interchange Alternatives:

No Build Alternative. The proposed interchange project will not proceed;

Alternative I-1. A conventional diamond interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. Finley Road will be a right-in/right-out road onto IL 47. This alternative requires dual-left turn lanes for IL 47 traffic to access the I-88 entrance ramps at both ends of the bridge. Also included is a 10-ft multi-use path on both sides.

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (100% Post-Consumer)

Alternative I-2. A conventional diamond interchange with roundabouts, including an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. Finley Road would be a right-in/right-out road onto IL 47. This alternative provides for a 95-ft wide roadway section for IL 47, which includes a 10-ft multi-use path on both sides.

Alternative I-3. A Diverging Diamond Interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. Opposing lanes of IL 47 crisscross at traffic signals on the north and south sides of I-88. Finley Road would be a right-in/right-out road onto IL 47. This alternative provides for an 88-ft wide roadway section for IL 47, which includes a 10-ft multi-use path within the median.

Alternative I-4. A partial cloverleaf interchange with a loop ramp in the northeast quadrant interchange would include an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. It also includes a loop ramp for northbound IL 47 traffic to enter I-88 westbound. Finley Road would be a right-in/right-out road onto IL 47. The NE quadrant requires a tapered exit lane for northbound vehicles to access the I-88 WB entrance loop ramp. The taper begins on the bridge, and requires additional widening beyond the limits of the existing structure. This also includes a 10-ft multi-use path on both sides of the roadway.

IL 47 Mainline Alternatives:

No Build Alternative. The proposed project will not proceed;

Alternative M-1A. This alternative includes two 12-foot lanes in each direction with a 30-foot raised median and 10-foot shoulders. The alternative maintains the existing centerline of IL 47. The alternative takes into account the potential for a 10-ft wide multi-use trail to be located on either side of IL 47.

Alternative M-1C. This alternative includes two 12-foot lanes in each direction with a 30 foot raised median through most of the corridor. The median is reduced to 6 feet through the Hannaford Woods/Nickels Farm Forest Preserve. The alternative maintains the existing centerline of IL 47. The alternative takes into account the potential for a 10-ft wide multi-use trail to be located on either side of IL 47.

Alternative M-2C. The alternative includes two 12-foot lanes in each direction with a 30 foot raised median through most of the corridor. The median is reduced to 6 feet through the Hannaford Woods/Nickels Farm Forest Preserve. The alternative shifts the centerline north of the forest preserve to the east to avoid residences. The alternative takes into account the potential for a 10-foot wide multi-use trail to be located on both sides of IL 47.

The lead agencies have selected Alternative I-4 as the interchange component preferred alternative, and M-2C component as the mainline component preferred alternative.

In our scoping comments, we provided comments relating to water quality, wetlands, stormwater management, consultation records, reuse of construction material, and reseeding using native grasses. We appreciate FHWA and IDOT addressing each of our scoping comments in the EA.

We commend FHWA and IDOT for committing to a reduced project footprint at the Blackberry Creek crossing and where the project encroaches on the Hannaford Woods/Nickels Farm Forest Preserve. We concur with the commitment to install a wildlife crossing, to use pollinator-friendly plants, and to use best management practices for stormwater management, air quality, and erosion control. Based on our review of the EA, we have no further comments.

We are available to discuss the contents of this letter at your convenience. Please feel free to contact Mike Sedlacek of my staff at 312-886-1765, or by email at sedlacek.michael@epa.gov.

Sincerely,

Kenneth A. Westlake, Chief
NEPA Implementation Section
Office of Enforcement and Compliance Assurance

cc: Kimberly Murphy, Illinois Department of Transportation
Shawn Cirton, U.S. Fish and Wildlife Service
Soren Hall, U.S. Army Corps of Engineers – Chicago District

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
231 SOUTH LASALLE STREET
CHICAGO, ILLINOIS 60604-1437

REPLY TO
ATTENTION OF:

February 12, 2018

Technical Services Division
Regulatory Branch
LRC-2015-00378

SUBJECT: NEPA/404 Merger Process Comments on the Draft Environmental Assessment for the IL Route 47 and I-88, Kane County, Illinois Project

Catherine Batey
Federal Highway Administration
3250 Executive Park Drive
Springfield, Illinois 62703

Dear Ms. Batey:

This letter is in response to your request that the Department of the Army (Corps) provide comments on the Draft Environmental Assessment for the project titled "Route: FAP 326 IL Route 47 at FAI 88 Ronald Reagan Memorial Tollway I-88 Section: Old Oaks Road to Green Road Kane County." Various Federal and State agencies are providing a concurrent review of the project under the terms and conditions as set forth in the "Statewide Implementation Agreement National Environmental Policy Act and Clean Water Act Section 404 Concurrent NEPA/404 Processes for Transportation Projects in Illinois".

Following a review of the EA, the Corps provides the following comments:

1. Water Resources Impacts

In the permit application, proposed impacts should be presented as either permanent or temporary and each impact should be described. Avoidance and minimization should also be discussed for each impact. This information could be presented in the form of a table.

The project proposes to replace a bridge over Blackberry Creek and extend a culvert located within Seavey Road Run. The information in the permit application will need to contain information on the stream channel width, as well as a stream channel cross section taken upstream, at and downstream of the bridge and culvert. These cross sections will need to show the proposed structures. In addition, while the project does not call for a full replacement of the culvert, the Corps had previously noted that the culvert is currently accommodating base flow throughout the three cells. Should the applicant decide to replace the culvert, the new culvert shall be designed so that only the center cell accommodates the base flow.

2. Best Management Practices (BMP) for the Preferred Alternative

The BMP information provided in the EA lacks details. The permit application will need to provide a detailed BMP proposal that includes information on what efforts were made to mitigate the direct and indirect degradation of surface water quality from the project. Please make sure to label all wetlands and streams in the BMP proposal.

3. Proposed Mitigation

The EA indicates that a mitigation ratio of 1.5:1 will be applied to all non-ADID wetlands and a mitigation ratio of 3:1 will be applied to ADID wetlands, except for Site 8 where the proposed mitigation ratio goes up to 5.5:1. There are instances where a mitigation ratio of 6:1 is applied for ADID wetlands depending on the type of ADID classification. Note that stream mitigation will be required for areas that are considered stream loss.

Thank you for the opportunity to comment. If you have any questions, please contact Julie Rimbault of my staff by telephone at 312-846-5542, or email at Julie.C.Rimbault@usace.army.mil.

Sincerely,

Diedra McLaurin
Team Lead, West Section
Regulatory Branch

Copy Furnished:

U.S. Environmental Protection Agency (Ken Westlake)
U.S. Fish and Wildlife Service (Shawn Cirton)
Illinois Department of Natural Resources (Natalia Jones)
Illinois Department of Transportation (Anthony Quigley)

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 11/1/17
Name of Project IL47 I88 Interchange	Federal Agency Involved FHWA
Proposed Land Use Highway Interchange	County and State Kane County IL
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 11/1/17 / Person Completing Form: Tim Prescott

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑	NO ☐	Acres Irrigated N/A	Average Farm Size 372

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount of Farmland As Defined in FPPA
Corn, Soybeans, Wheat, Hay	Acres: 29,633 % 97	Acres: 27,695 % 91
Name of Land Evaluation System Used	**Name of State or Local Site Assessment System**	**Date Land Evaluation Returned by NRCS**
Illinois	Statewide	11/6/17

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	11			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site				
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	7.5			
B. Total Acres Statewide Important or Local Important Farmland	2.1			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	.000035			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	73.3			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	111**			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Non-farmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0

See the attached
Illinois LESA System
Site Assessment **CORRIDOR** Factors

PART VII *(To be completed by Federal Agency)*			Site A	Site B	Site C	Site D
Relative Value Of Farmland *(From Part V)*	150	~~100~~	111	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	150	~~160~~	74	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	300	~~260~~	185	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

** When utilizing the Illinois State Site Assessment Corridor factors, 150 points are assigned to the Land Evaluation portion, and 150 points are assigned to the Site Assessment portion of the LESA System for a maximum score of 300 points.

Name of Federal agency representative completing this form: Tim Prescott — Date: 11/6/17

(See Instructions on reverse side)

Form AD-1006 (03-02)

IL Route 47 at I-88 Interchange Improvements
Kane County, Illinois
Federal Highway Administration Funds

PART VI-B **Illinois Site Assessment *CORRIDOR* Factors**	**Maximum Points**	**Site A**
1. Amount of agricultural land required	30	19
2. Location of the proposed alignment	30	30
3. Acres of off-site agricultural land required for borrow materials	15	15
4. Acres of Prime and Important farmland required for mitigation	15	0
5. Creation of severed farm parcels	10	0
6. Creation of uneconomical remnants	10	0
7. Creation of landlocked parcels	10	0
8. Creation of adverse travel	10	10
9. Relocations of rural residences and farm buildings	10	0
10. Utilization of minimum design standards	10	0
TOTAL SITE ASSESSMENT *CORRIDOR* POINTS	**150**	**74**

PART VII		
Relative Value of Farmland	150	111
Total Site Assessment ***CORRIDOR*** Factors	150	74
TOTAL ILLINOIS LESA POINTS	**300**	185

110917
JL

* *The Illinois LESA System applies the **225 point cutoff** when evaluating state and federally funded projects. Site or Corridor alternatives receiving **175 or fewer points** have a **low rating** for protection, and it is not necessary to evaluate additional alternatives. Those alternatives receiving **176 to 225 points** are in the **moderate range** for protection. In most cases, alternatives **exceeding the 225 point level should be retained for agricultural use**, and an alternate site should be utilized for the intended project. Selecting the alternative with the lowest total points will usually protect the best farmland located in the most agriculturally viable areas. LESA also serves to maintain and promote the agricultural industry in Illinois.*

Illinois Department of Agriculture

Bruce Rauner, Governor
Raymond Poe, Director

Bureau of Land and Water Resources
State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281 • 217/782-6297 • TDD 866/287-2999 • Fax 217/557-0993

November 28, 2017

Mr. Corey Smith, P.E.
Illinois Department of Transportation
Bureau of Programming, Consultant Studies Unit
201 W. Center Court
Schaumburg, Illinois 60196

Re: Illinois Route 47 and Interstate 88 Interchange
Kane County, Illinois
USDA NRCS Form AD-1006

Dear Mr. Smith:

The Illinois Department of Agriculture (IDOA) has completed its review of the agricultural impacts associated with proposed improvements to 2.2 miles of Illinois Route 47 and Interstate 88 between Old Oaks Drive and Green Road in Kane County. The project was examined for its compliance with IDOT's Agricultural Land Preservation Policy as well as the Illinois Farmland Preservation Act (505 ILCS 75/1 et seq.).

The project involves construction of an interchange which includes an entrance ramp from IL 47 to I-88 eastbound, an exit ramp from westbound I-88 to IL 47, and a loop ramp in the northeast quadrant for northbound IL 47 traffic to enter I-88 westbound. The IL 47 Mainline improvements consist of widening to two 12-foot lanes in each direction throughout the project study area.

These improvements are required to improve system linkage and accommodate economic growth in an area planned by the Village of Sugar Grove for non-agricultural uses. A total of 11 cropland acres will be converted to a non-agricultural use.

Because the project has been designed to acquire the least possible amount of land while meeting the public's safety needs, the IDOA has determined that the project complies with IDOT's Agricultural Land Preservation Policy and Illinois' Farmland Preservation Act.

Enclosed are two copies of the USDA NRCS form AD-1006. One copy must be included in the project's environmental assessment; the other is for your files.

Sincerely,

Steven D. Chard

Steven D. Chard, Acting Chief
Bureau of Land and Water Resources

SDC:JL
Enclosures-2
cc: Ashley Curran, Kane County SWCD; Agency project file

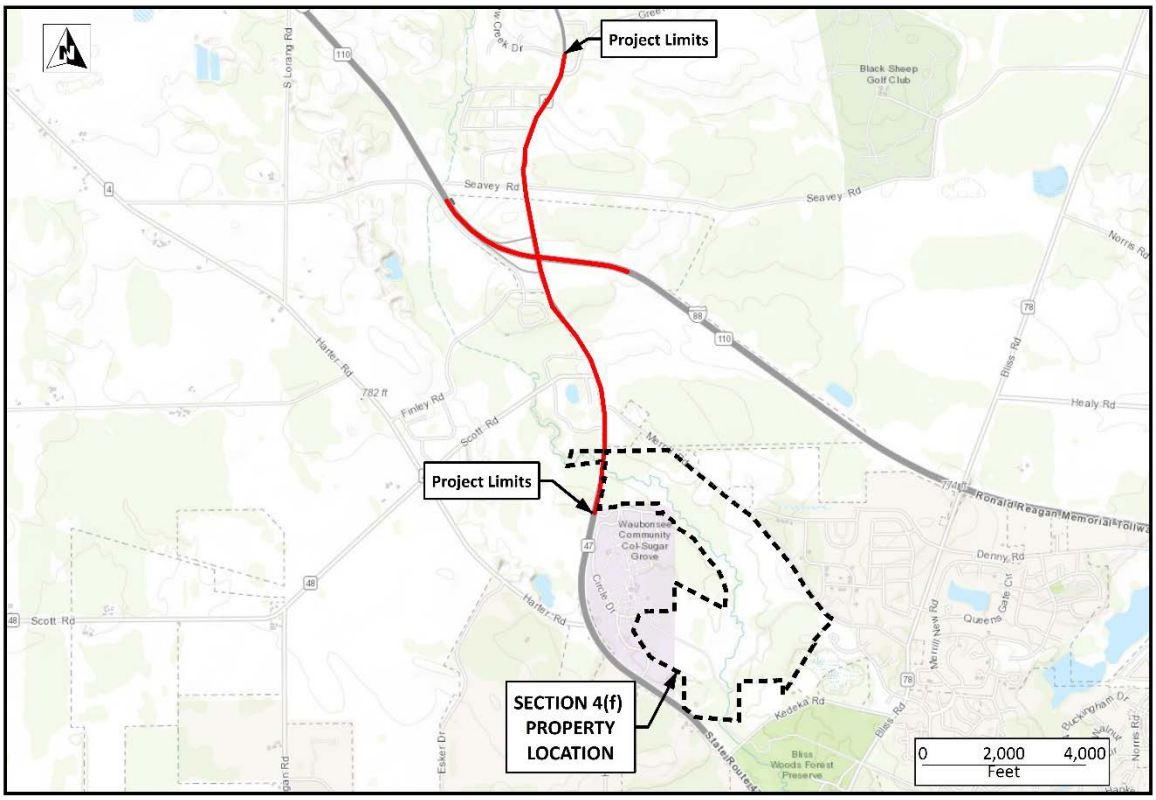
SECTION 4(f) DE MINIMIS

DOCUMENTATION

Ronald Reagan Memorial Tollway (I-88) at Illinois Route 47

Kane County

P-91-015-14



Forest Preserve District of Kane County

Hannaford Woods/Nickels Farm Forest Preserve

February 2018

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and IL 47 Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

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Appendices

Appendix A	Public Meetings
Appendix B	Official with Jurisdiction
Appendix C	Special Warranty Deed
Appendix D	Project Drawings
Appendix E	Photographs

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and IL 47 Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

1. Project Description

a. **Project Number:** P-91-015-14

b. **Project Name:** IL 47 at I-88 (Ronald Reagan Memorial Tollway)

c. **Project Location:** IL 47 from Old Oaks Road to Green Road, Sugar Grove, Kane County, Illinois

d. **Project Type:** Completion of the partial I-88 Interchange at IL 47, facilitating travel to and from the east. Improvements include widening of the existing two-lane IL 47 from Old Oaks Road to Green Road.

e. **Project Length:** The IL 47 realignment and widening is 2.2 miles from Old Oaks Road to Green Road. The Interchange Improvements are 0.5 miles on either side of IL 47.

f. **NEPA Class of Action:** Environmental Assessment

g. **NEPA Purpose and Need:** The purpose of the proposed action is to improve system linkage and accommodate land use and economic development for IL 47 and I-88 from the north entrance of Waubonssee College at the south end of the project to Green Road at the north end.

h. **Project Status:** The Illinois Department of Transportation (Department) is nearing completion of the preliminary engineering and environmental study. The anticipated design approval is December 2017. The project is partially funded in the Departments FY 2018-2023 Proposed Highway Improvement Program and requires additional local cost participation to advance beyond Phase I.

2. Section 4(f) Resources

a. **Resource Type:** Public park

b. **Resource Name:** Hannaford Woods/Nickels Farm Forest Preserve

c. **Official with Jurisdiction (OWJ):** Forest Preserve District of Kane County, 1996 South Kirk Road, Suite 320, Geneva, IL 60134, 630-232-5980

d. **Resource Role / Significance:** The Hannaford Woods/Nickels Farm Forest Preserve is 402 acres. Recreational activities include picnic areas, hiking, and bike/nature trails totaling 2.89

miles. It should be noted that Kane County Forest Preserve purchased the portion of the Hannaford Woods/Nickels Farm Forest Preserve east of IL 47 from Waubonsee Community College on August 9, 2012. As part of the Special Warranty Deed, a 60 foot strip was planned to be purchased by the Department at a fair market value if IL 47 was ever widened. A copy of the deed is provided in Appendix C, which was obtained from Kane County and confirmed by the Official with Jurisdiction (OWJ).

Hannaford Woods/Nickels Farm is part of the Bliss Woods-Waubonsee College Forest Preserve. Portions of the Bliss Woods-Waubonsee College Forest Preserve were purchased using Open Space Land Acquisition and Development (OSLAD) and Land and Water Conservation (LAWCON) funds. Portions of the Hannaford/Nickels Farm Forest Preserve did utilize these funds; however, Kane County Forest Preserve has confirmed that the parcels bordering both east and west of IL 47 did not utilize these funds. A map showing the border of the OSLAD/LAWCON funds is included in Appendix D.

3. Description of Intended Section 4(f) Resource Use

a. **Type and Area of Impacts:** The amount of property impacted by this project is approximately 1.74 acres from the Hannaford Woods/Nickels Farm Forest Preserve. A total of 0.22 acres on the west side of IL 47 and 1.52 acres on the east side of IL 47. 1.51 acres on the east side are within the 60 foot strip of land planned for transportation purposes, and 0.01 acres are outside of that 60 foot strip. After removing the acreage of land that is planned for transportation purposes, this project is anticipated to impact 0.23 acres from the Hannaford Woods/Nickels Farm Forest Preserve.

b. **Existing Function of the Impacted Area:** The area being impacted is a wooded area with no designated trails or recreational areas. It also includes portions of Blackberry Creek and its associated wetlands and floodplains. Impacts to the waters and floodplains will be mitigated through appropriate permits.

c. **Description of the Relationship of the Area Impacted to the Function and Significance of the Resource:** The functionality of the forest preserve will not be affected by the proposed improvements. There are no trails or designated facilities in the area of the proposed improvements. The addition of a multi-use path on the east side of IL 47 will allow the Hannaford Woods/Nickels Farm Forest Preserve to be connected with the Virgil Gilman Trail to the south and potentially the Anderson Road Trail to the north.

4. Description of the Efforts to Avoid, Minimize, and Mitigate or Enhance the Resource

a. Efforts have been made to avoid, minimize and mitigate right-of-way needs within the Forest Preserve. The Forest Preserve is located on both sides of IL 47, resulting in Forest Preserve impacts when widened to either the east or the west. A new roadway alignment was created as an avoidance alternative. This alternative shifted the alignment to the west at Old Oaks Road and merges back on the existing alignment south of the I-88 interchange. This alternative was studied, but resulted in high numbers of environmental impacts and residential displacements, making it an unfeasible alternative.

   In order to minimize impacts, the median will be reduced from 30 foot to 18 foot through the forest preserve and the road will be widened on existing alignment through the Forest Preserve. A 60 foot strip of land has been planned on the east side of the existing roadway within the Forest Preserve for transportation purposes. Additional right-of-way is required to provide compensatory storage for the floodplain impacts in Blackberry Creek.

b. A wildlife crossing will be incorporated into the design of the replacement structure over Blackberry Creek. This will reduce the potential of vehicle/wildlife conflicts and allow wildlife movement to both sides of the Forest Preserve. The replacement bridge will incorporate a 20 foot wide shelf with at least 9 feet of vertical clearance from the bottom of the structure. The shelf elevation would be at least two feet above ordinary high water in order to facilitate a dry crossing except during infrequent events. This crossing can also be used as a shared use path in the future.

5. Evidence of Opportunity for Public Review and Comment

The public was afforded the opportunity to review and comment on the Section 4(f) impacts on the Hannaford Woods/Nickels Farm Forest Preserve during a Public Hearing held on December 14, 2017, and a public comment period held from November 30, 2017 through January 19, 2018. One public comment regarding the Section 4(f) property was received. Copies of the advertisement notices, public hearing summary and Section 4(f) comments are found in Appendix A.

6. Evidence of Coordination with Official(s) with Jurisdiction

a. September 13, 2016: Initial coordination meeting and project introduction with the Department and Forest Preserve District of Kane County (Appendix B).

b. June 15, 2017: Meeting with Forest Preserve District of Kane County to provide update on the project, present the Preferred Alternative and discuss associated impacts to the Hannaford Woods/Nickels Farm Forest Preserve (Appendix B).

7. Supporting Documentation

a. Project Location Map .....Appendix D
b. Kane County Forest Preserve LAWCON / OSLAD Fund Properties .....Appendix D
c. Section 4(f) Property with Impacts.....Appendix D
d. Aerial Photo.....Appendix D
e. Photographs of Resource .....Appendix E

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and IL 47 Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

APPENDICES

Appendix A	Public Meetings
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Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and IL 47 Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

Appendix A

Public Meetings

Public Meeting #1

July 29, 2015

General Information

The first public information meeting for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) was held on Wednesday, July 29, 2015 at the Academic and Professional Center (APC) Event Room at Waubonsee Community College, Route 47 at Waubonsee Drive, Sugar Grove, IL 60554, from 4:00 PM to 7:00 PM, and the meeting was conducted in an open house format.

There were two rooms, one which contained a continuous audio-visual presentation that described the project, outlined the study process, provided a background and history, provided some information regarding the existing conditions, and described the opportunities for stakeholder involvement. The second room contained information, comment forms, and project study representatives. Information in the second room included boards and strip maps. The boards included information regarding the existing access along I-88, the limits of the project study, land use plans, existing and projected no-build traffic volumes, crash locations and statistics, and the project study timeline. Attendees were provided an opportunity to speak with representatives from the Village of Sugar Grove, IDOT, and the Illinois Tollway. The meeting was attended by one hundred and three (103) people. Seventeen (17) comment forms were received. Four (4) Community Advisory Group applications were received.

Attendees

Public Officials

The following public officials were in attendance:

- Beth Goncher on behalf of U.S. Congressman Hultgren (14th District)
- Jim Oberweis, Illinois State Senate (25th District)
- Sean Michels, President, Village of Sugar Grove
- Dave Anderson, President, Village of Elburn
- Tom Rowe, Sugar Grove Township Supervisor
- Fred Dornback, Blackberry Township Supervisor
- Rod Feece, Blackberry Township Highway Commissioner

CAG Members

The following representatives from the initial stakeholder meetings were in attendance (all have applied to be on CAG):

- Tom Rowe, Sugar Grove Township Supervisor
- Fred Dornback, Blackberry Township Supervisor
- Rod Feece, Blackberry Township Highway Commissioner
- Dan Larsen, Waubonsee Community College

Businesses

No businesses were represented. The area is generally agriculture and residential. Jennifer Cowan attended on behalf of Crown Community Development (CCD).

Other Agencies/Organizations

Additional agencies/organizations represented included:

- Chief Pat Rollins, Sugar Grove Police Department
- Assistant Chief Wayne Parson, Sugar Grove Fire Protection District
- Craig Hanson, Elburn Fire Department
- Michelle Piotrowski, EEI (EEI is Village Engineer)
- Julie Ann Fuchs, Kaneland CUSD 302
- Dan Larsen, Waubonsee Community College
- Walter Magdziarz, Development Director, Village of Sugar Grove

Comments

Seventeen (17) comment forms were received and fifteen (15) comments were posted on strip maps at the areas of concern. The topics include the following:

General

- Concerns about stormwater runoff from the roadways and protecting the water quality of the watershed.
- Consider Prairie plantings to eliminate or minimize mowing maintenance.
- Consider including a representative from Kane DuPage Soil and Water Conservation District on the CAG
- Concerns about Village land use plan for commercial on their property (agricultural with homestead)
- Do not zone southwest quadrant of interchange for commercial. Don't want a gas station there.
- Can commercial be limited to very light industry at Northwest quadrant of interchange. Limit warehouses with multiple truck bays.
- People were helpful and informative

Interchange/I-88

- Interchange needed for Community Development
- Investigate cloverleaf interchange type
- Opposed to eastbound access
- Existing emergency turnaround located one mile west of IL 47. Consider an emergency turnaround near Bliss Road for emergency services (half way between IL 47 and IL 56).

Illinois Route 47

- Concerns about Traffic (safety/capacity) at the intersection of IL 47 and Finley Road in relationship to proximity of interchange
- Don't remove Finley Road access to IL 47
- Need Safer access to residential areas
- Concern about finding gaps in traffic to enter IL 47 (side-street LOS)
- Consider channelization of intersections
- Consider traffic signals at intersections
- Consider moving IL 47 to the east away from the residential land uses
- Consider straightening of horizontal curve of IL 47 to improve safety
- Concern about noise impacts, Consider noise abatement for existing surrounding residential areas
- Consider replacement narrow aggregate shoulders with wider paved shoulders
- Safety concerns with vehicles potentially leaving roadway and entering yards and houses
- Sight Distance (safety) concerns at intersection of Scott Road and IL 47
- Need widened from 2-lane to 4-lane highway

Public Meeting #2

May 3, 2016

Sugar Grove Parkway (IL 47) Interchange
at the Reagan Memorial Tollway (I-88)
Improvement Study

Public Information Meeting #2
Short Summary

General Information

The second public information meeting for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) was held on Tuesday, May 3, 2016 at the Academic and Professional Center (APC) Event Room at Waubonsee Community College, Route 47 at Waubonsee Drive, Sugar Grove, IL 60554, from 4:00 PM to 7:00 PM. The meeting was conducted in an open house format.

There were two rooms, one which contained a continuous audio-visual presentation that described the project summary, provided the study process and schedule, reviewed the purpose and need, and described development of project alternatives. The second room contained information, comment forms, and the project study representatives. Information in the second room included boards, binders and strip maps. The boards included: information regarding the existing access along I-88, the limits of the project study, the purpose and need information, the public involvement process, environmental study overview, existing and projected no-build traffic volumes, existing level of service, crash locations and statistics, the community advisory group summary to date, and the project study timeline. The binders and strip maps included the project location, the CAG interchange alternative sketches, and the range of interchange alternatives. Attendees were provided an opportunity to speak with representatives from the Village of Sugar Grove, IDOT, Kane County, and the Illinois Tollway. The meeting was attended by fifty-eight (58) people. Eleven (11) comment forms were received.

Attendees

Public Officials

The following public officials were in attendance:

- Ben Marcum on behalf of Illinois State Representative Wheeler (50th District)
- Sean Michels, President, Village of Sugar Grove
- Rod Feece, Blackberry Township Highway Commissioner

Other Agencies/Organizations

Additional agencies/organizations represented included:

- Jim Michels, Blackberry Township
- Assistant Chief Wayne Parson, Sugar Grove Fire Protection District
- Michelle Piotrowski, EEI (EEI is Village Engineer)
- Dan Lobbes, The Conservation Foundation
- Daniel Olsem, Crown Community Development

Businesses

No businesses were represented. The area is generally agriculture and residential.

Media

The following Media were represented:

- Doug Michaels, WSPYnews.com

CAG Members

The following CAG members were in attendance:

- Wayne Parson, Sugar Grove Fire Protection District
- Rod Feece, Blackberry Township
- Dan Lobbes, The Conservation Foundation
- Daniel Olsem, Crown Community Development
- Dorothy Carlson, Resident
- Leroy Karp, Resident
- David Livengood, Resident
- Christopher Kruse, Resident

Comments

Eleven (11) comment forms and one (1) email comment were received. Twenty-one (21) comments were posted on strip maps at the areas of concern. The topics include the following:

General

- Request to build soon as possible for economic development.
- Concern about ending the study at Green Road and preferably should be to Main Street.

Interchange Alternatives

- Indirect interchange access alternatives not preferred.
- Prefer new interchange moved east and existing IL-47 to remain.
- Consider option to keep existing interchange and widening to a diamond configuration with added ramps.
- Diverging Diamond Interchange preferred and works.
- Conventional Diamond Interchange seems simple and clean.
- Single Point Urban Interchange seems reasonable but question of cost effectiveness.
- Roundabout option not preferred and seems complicated.

Illinois Route 47 Alignment Alternatives

- Moving new interchange east and keeping existing IL-47 to remain is the most preferred option among all re-alignment alternatives.
- Prefer keeping existing IL-47 and existing bridge for local access.
- Like the idea of a frontage road with the re-alignment.
- Concern over the need for a noise barrier wall if IL-47 is to be widened.
- Keep Finley Road access to both north and south to IL-47.
- Prefer to have a turning and by-pass lane for IL-47.

15201-03-00

CERTIFICATE OF PUBLICATION

Paddock Publications, Inc.

Daily Herald

Corporation organized and existing under and by virtue of the laws of the State of Illinois, DOES HEREBY CERTIFY that it is the publisher of the **DAILY HERALD**. That said **DAILY HERALD** is a secular newspaper and has been circulated daily in the Village(s) of Algonquin, Antioch, Arlington Heights, Aurora, Barrington, Barrington Hills, Lake Barrington, North Barrington, South Barrington, Bartlett, Batavia, Buffalo Grove, Burlington, Campton Hills, Carpentersville,Cary,Deer Park, Des Plaines, South Elgin, East Dundee, Elburn, Elgin,Elk Grove Village, Fox Lake, Fox River Grove, Geneva, Gilberts,Grayslake, Green Oaks, Gurnee, Hainesville, Hampshire, Hanover Park,Hawthorn Woods, Hoffman Estates, Huntley, Inverness, Island Lake,Kildeer, Lake Villa, Lake in the Hills, Lake Zurich, Libertyville,Lincolnshire, Lindenhurst, Long Grove, Mt.Prospect, Mundelein,Palatine, Prospect Heights, Rolling Meadows, Round Lake, Round Lake Beach,Round Lake Heights,Round Lake park,Schaumburg, Sleepy Hollow, St. Charles, Streamwood, Tower Lakes, Vernon Hills, Volo, Wauconda, Wheeling, West Dundee, Wildwood, Sugar Grove, North Aurora

County(ies) of Cook, Kane, Lake, McHenry and State of Illinois, continuously for more than one year prior to the date of the first publication of the notice hereinafter referred to and is of general circulation throughout said Village(s), County(ies) and State.

I further certify that the DAILY HERALD is a newspaper as defined in "an Act to revise the law in relation to notices" as amended in 1992 Illinois Compiled Statutes, Chapter 7150, Act 5, Section 1 and 5. That a notice of which the annexed printed slip is a true copy, was published April 19 , 26, 2016 in said DAILY HERALD.

IN WITNESS WHEREOF, the undersigned, the said PADDOCK PUBLICATIONS, Inc., has caused this certificate to be signed by, this authorized agent, at Arlington Heights, Illinois.

PADDOCK PUBLICATIONS, INC.
DAILY HERALD NEWSPAPERS

BY Paula Baltzer
Authorized Agent

Control # 4437522

SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

PUBLIC MEETING

MAY 3, 2016
4:00 PM - 7:00 PM

The Village of Sugar Grove (Village) in partnership with Kane County, the Illinois Department of Transportation (IDOT), and the Illinois Tollway invites you to attend the second public meeting (open house format) regarding the planning for the potential improvements to the IL 47 (Sugar Grove Parkway) interchange at the I-88 (Ronald Reagan Memorial Tollway) in Kane County.

The Open House Public Meeting will take place on:

Date: Tuesday, May 3, 2016
Time: 4:00 pm to 7:00 pm
Location: Academic and Professional Center
Event Room (use North Entrance)
Waubonsee Community College
Route 47 at Waubonsee Drive
Sugar Grove, IL 60554-9454

Meeting Purpose:

- Present the project Purpose and Need
- Present the initial range of alternatives
- Obtain public input

Exhibits will be on display and an audio-visual presentation will be operating continuously for review any time throughout the evening. The Village, Kane County, IDOT, and Illinois Tollway staff as well as project consultant representatives will be available to discuss the project and answer questions.

If a reasonable accommodation is needed under the Americans with Disabilities Act, please contact Peter Johnston, phone 773.399.0112. Person planning to attend who will need a sign language interpreter or other similar accommodations should notify the TTY/TDD number (800) 526-0844 or 711; TTY users (Spanish) (800) 501-0864 or 711; and for Telebraille dial (877) 526-6670 at least five (5) days prior to the meeting.

All written correspondence regarding this project should be sent to:

GRAEF
Attn: Peter Johnston, P.E.
8501 W. Higgins Road - Suite 280
Chicago, IL 60631-28014
Phone: 773.399.0112
Email: SugarGroveInterchange@graef-usa.com

Or submitted through the project website: www.SugarGroveInterchange.org

15201-03-00

Certificate of the Publisher

Kane County Chronicle

Description: PUBLIC MEETING
1175306
15232-09-00-06

CRAWFORD, MURPHY, AND TILLY
550 N COMMONS DRIVE - SUITE 11
AURORA IL 60504

Shaw Media certifies that it is the publisher of the Kane County Chronicle. The Kane County Chronicle is a secular newspaper, has been continuously published daily for more than fifty (50) weeks prior to the first publication of the attached notice, is published in the City of St. Charles, County of Kane, State of Illinois, is of general circulation throughout that county and surrounding area, and is a newspaper as defined by 715 ILCS 5/5.

A notice, a true copy of which is attached, was published 2 time(s) in the Kane County Chronicle, namely one time per week for two successive week(s). Publication of the notice was made in the newspaper, dated and published on
04/07/2016 04/28/2016

This notice was also placed on a statewide public notice website as required by 5 ILCS 5/2.1.
In witness, Shaw Media has signed this certificate by Karen Pletsch, its publisher, at St. Charles, Illinois, on
28th day of April, A.D. 2016

Shaw Media By: Karen Pletsch

Karen Pletsch, Publisher

Account Number 10054621 Amount $288.60

PUBLIC NOTICE
PUBLIC MEETING
MAY 3, 2016 4:00 PM-7:00 PM

The Village of Sugar Grove (Village) in partnership with Kane County, the Illinois Department of Transportation (IDOT), and the Illinois Tollway invites you to attend the second public meeting (open house format) regarding the planning for the potential improvements to the IL 47 (Sugar Grove Parkway) Interchange at the I-88 (Ronald Reagan Memorial Tollway) in Kane County.

The Open House Public Meeting will take place on:
Date: Tuesday, May 3, 2016
Time: 4:00 pm to 7:00 pm
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Waubonsee Community College
Route 47 at W.aubonsee Drive
Sugar Grove, IL 60554-9454

Meeting Purpose:
Present the project Purpose and Need
Present the initial range of alternatives
Obtain public input

Exhibits will be on display and an audio-visual presentation will be operating continuously for review any time throughout the evening. The Village, Kane County, IDOT, and Illinois Tollway staff as well as project consultant representatives will be available to discuss the project and answer questions.

If a reasonable accommodation is needed under the Americans with Disabilities Act, please contact Peter Johnston, phone 773.399.0112. Person planning to attend who will need a sign language interpreter or other similar accommodations should notify the TTY/TDD number (800) 526-0844 or 711; TTY users (Spanish) (800) 501-0864 or 711; and for Telebraille dial (877) 526-6670 at least five (5) days prior to the meeting.

All written correspondence regarding this project should be sent to:
GRAEF
Attn: Peter Johnston, P.E.
8501 W. Higgins Road - Suite 280
Chicago, IL 60631-28014
Phone: 773.399.0112
Email: SugarGroveInterchange@graef-usa.com

Or submitted through the project website: www.SugarGroveInterchange.org

(Published in the Kane County Chronicle on April 7, 28, 2016) 1175306

Public Meeting #3

March 28, 2017

General Information

The third public meeting for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) was held on Tuesday, March 28, 2017 at the Academic and Professional Center (APC) Event Room at Waubonsee Community College, IL Route 47 at Waubonsee Drive, Sugar Grove, IL 60554, from 4:00 PM to 7:00 PM. The meeting was conducted in an open house format.

Attendees signed in and a brochure unique to public meeting 3 was provided. There were two rooms for attendees to learn more about the project. One room contained a continuous audio-visual presentation that described the project summary, provided the study process and schedule, outlined the alternative screening process, and described the alternatives carried forward. The second room contained more detailed information, comment forms, and project study team representatives. Information in the second room included exhibit boards and roll plot maps.

The exhibit boards generally included: the limits of the project study; the purpose and need for the project; the public involvement process and schedule; an environmental study overview; traffic volumes and projections; capacity analysis results, crash locations and statistics; the alternatives evaluation, screening process and results; and the alternatives to be carried forward.

Roll plot maps included plan layouts of the IL 47 and I-88 alternatives carried forward which identified impacts.

Attendees were provided an opportunity to speak with representatives from the Village of Sugar Grove, The Illinois Department of Transportation (IDOT), Kane County, and the Illinois Tollway. The meeting was attended by ninety-nine (99) people. Sixteen (16) comment forms were received at the meeting.

Attendees

Public Officials

The following public officials were in attendance:

- Drew Frasz, Kane County Board District-18
- Fred Dornback, Blackberry Township Supervisor
- Tom Rowe, Sugar Grove Township Supervisor
- Rod Feece, Blackberry Township Highway Commissioner

Other Agencies/Organizations

Additional agencies/organizations attending included:

- Jim Michels, Blackberry Township
- Assistant Chief Wayne Parson, Sugar Grove Fire Protection District
- Sergeant Korey Wallace, Kane County Sheriff's Office
- Craig Hanson, Elburn Fire Department
- Tom Reynolds, Elburn Fire Department

- Mike Anderson, Elburn Fire Department
- Lisa Engberg, Elburn Fire Department
- Leroy Herra, Elburn Fire Department
- David Burroughs, EEI (EEI is Village Engineer)
- Matthew Stegeman, Pace Suburban Bus
- Marvin Bailey, Crown Community Development
- Randy Mapes, Waubonsee Community College

Businesses

No businesses were represented. The area is generally agriculture and residential.

Media

No media were represented.

CAG Members

The following CAG members were in attendance:

- Walter Magdziarz, Village of Sugar Grove
- Wayne Parson, Sugar Grove Fire Protection District
- Patrick Knapp, Kane Kendall Council of Mayors
- Tom Rowe, Sugar Grove Township
- Fred Dornback, Blackberry Township
- Rod Feece, Blackberry Township
- Jennifer Becker, Kane County DOT/Kane Kendall Council of Mayors
- Marvin Bailey, Crown Community Development
- Leroy Karp, Resident
- Kathryn Kruse representing Christopher Kruse, Resident
- Brenda Ross, Resident
- Christopher Stepnoski, Resident
- John Stepnoski, Resident

Comments

Sixteen (16) comment forms were received at the meeting. Comments can continue to be submitted and included in the public meeting record until April 11, 2017. The topics include the following:

General

- Want a decision quickly and to build ASAP
- Concerns regarding a decrease in home value and to accommodate existing residents
- Prefer to do all the improvements at one time and don't come back with future improvements
- Would like to have seen a timeline for each build alternative.

Interchange

- Preference for the No-Build Alternative
- Preference for Alternative I-1 Conventional Diamond Interchange
- Preferences for and against Alternative I-2 Conventional Diamond Interchange with Roundabout Intersections
- Preferences for and against Alternative I-3 Diverging Diamond Interchange
- Preferences for Alternative I-4 Partial Cloverleaf Interchange

Illinois Route 47

- Preference for No-Build Alternative
- Preferences for Alternative M-2C
- Preferences for Alternative M-3 which was shown as eliminated
- Concerns regarding Finley Road restricted access and the conceptual U-turn mitigation proposed
- Concerns regarding traffic volumes, noise pollution, and impacts to residents and property
- Concerns regarding access consolidation impacts and safely accessing IL 47 from side street
- Concerns regarding septic field proximity to the ROW

CERTIFICATE OF PUBLICATION

Paddock Publications, Inc.

Daily Herald

Corporation organized and existing under and by virtue of the laws of the State of Illinois, DOES HEREBY CERTIFY that it is the publisher of the **DAILY HERALD**. That said **DAILY HERALD** is a secular newspaper and has been circulated daily in the Village(s) of Addison, Algonquin, Antioch, Arlington Heights, Aurora,Barrington, Barrington Hills, Bartlett, Batavia, Bensenville, Bloomingdale, Buffalo Grove, Burlington, Campton Hills, Carol Stream, Carpentersville, Cary, Deer Park, Des Plaines, East Dundee, Elburn, Elgin, Elk Grove Village,Elmhurst,Fox Lake,Fox River Grove,Geneva, Gilberts,Glen Ellyn,Glendale Heights,Glenview,Grayslake,Green Oaks, Gurnee, Hainesville, Hampshire, Hanover Park, Hawthorn Woods, Hoffman Estates, Huntley, Inverness, Island Lake, Itasca, Keeneyville, Kildeer, Lake Barrington, Lake Villa, Lake in the Hills, Lake Zurich, Libertyville, Lincolnshire, Lindenhurst, Lisle, Lombard, Long Grove, Medinah, Mt. Prospect, Mundelein, Naperville, North Aurora, North Barrington, Oakbrook, Oakbrook Terrace, Palatine, Prospect Heights, Rolling Meadows, Roselle, Schaumburg, Sleepy Hollow, South Barrington, South Elgin, St. Charles, Woodridge, Streamwood, Tower Lakes,Vernon Hills, Villa Park, Volo,Warrenville, Wauconda, Wayne, West Chicago, West Dundee, Wheaton, Wheeling, Wildwood, Winfield, Wood Dale, Round Lake Park, Pingree Grove County(ies) of Cook, DuPage, Kane, Lake, McHenry and State of Illinois, continuously for more than one year prior to the date of the first publication of the notice hereinafter referred to and is of general circulation throughout said Village(s), County(ies) and State.

I further certify that the DAILY HERALD is a newspaper as defined in "an Act to revise the law in relation to notices" as amended in 1992 Illinois Compiled Statutes, Chapter 715, Act 5, Section 1 and 5. That a notice of which the annexed printed slip is a true copy, was published March 7 , 21, 2017 in said DAILY HERALD.

IN WITNESS WHEREOF, the undersigned, the said PADDOCK PUBLICATIONS, Inc., has caused this certificate to be signed by, this authorized agent, at Arlington Heights, Illinois.

PADDOCK PUBLICATIONS, INC.
DAILY HERALD NEWSPAPERS

BY Paula Raltzman
Authorized Agent

Control # 4465504

RECEIVED

MAR 27 2017

Initial:

Appendix A

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. only - McCalla Raymer Leibert
ttorneys, 1 N. Dearborn St. Suite
l. No. (312) 346-9088. Please refer

IR DEBT COLLECTION PRAC-
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SUANT TO JUDGMENT OF

GAGE FORECLOSURE ACT
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nd Sale entered by the Court in
on January 13, 2017, Sheriff of
18, 2017, in 25 South Martin Lu-
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o the highest bidder for cash, all
described real estate mentioned
in the County of Lake, State of
as shall be sufficient to satisfy

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No. (312) 346-9088. Please refer

DEBT COLLECTION PRAC-
AINTIFF'S ATTORNEY IS
COLLECTOR ATTEMPTING
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CHICAGO, ILLINOIS, 60606
(312) 629-0099
1717541 (4467397)

IN THE CIRCUIT COURT
OF THE 18TH JUDICIAL
CIRCUIT
DUPAGE COUNTY,
WHEATON, ILLINOIS
ESTATE OF ELEANOR
KUZMA, DECEASED.
17P 207
Notice is given to creditors of the death of the above named decedent.
Letters of office were issued to KENNETH KUZMA, 15753 CHESTERFIELD LANE, ORLAND PARK, ILLINOIS, 60462, as independent ADMINISTRATOR whose attorney of record is MARNY E. KRAVENAS, LAW OFFICES OF STEVEN J. MALMAN & ASSOCIATES, P.C., 205 WEST RANDOLPH STREET, SUITE 610, CHICAGO, ILLINOIS, 60606
The estate will be administered without court supervision, unless under section 5/28-4 of the Probate Act Ill. Compiled Stat. 1992, Ch. 755, par. 5/28-4) any interested person terminates independent administration at any time by mailing or delivering a petition to terminate to the clerk.
Claims against the estate may be filed in the office of the clerk
Chris Kachiroubas
505 COUNTY FARM ROAD
P.O. Box 707
Wheaton, Illinois 60187-0707
or with the representative, or both, on or before SEPTEMBER 21, 2017, or, if mailing or delivery of a notice from the representative is required by section 5/18-3 of the Probate Act, the date stated in that notice. Any claim not filed on or before that date is barred. Copies of a claim filed with the clerk must be mailed or delivered by the claimant to the representative and to the attorney within 10 days after it has been filed.
MARNY E. KRAVENAS
LAW OFFICES OF
STEVEN J. MALMAN &
ASSOCIATES, P.C.
205 WEST RANDOLPH
STREET, SUITE 610
CHICAGO, ILLINOIS, 60606
(312) 629-0099
1717542 (4467398)

Public Hearings & Notices

ANNUAL TOWN MEETING OF WINFIELD TOWNSHIP
7:00 P.M. TUESDAY, APRIL 11, 2017 AT THE WINFIELD TOWNSHIP HIGHWAY GARAGE 30W575 W. ROOSEVELT RD, WEST CHICAGO, IL 60185
AGENDA
1. Town Clerk calls the meeting to order at 7:00 p.m.
2. Pledge of Allegiance to the flag.
3. Introduction of the Township Elected Officials.
4. Clerk reads the notice of meeting we published in the Daily Herald Newspapers.
5. Clerk appoints Sergeant of Arms.
6. Clerk conducts the nomination and election of a Moderator of the meeting.
7. Clerk administers the Oath of Office to the Moderator. Moderator signs oath form and assumes duties of Moderator of meeting.
8. Discussion and approval of Minutes of the last Annual Town Meeting (April 12, 2016)
9. Reading and discussion of Financial Statement.
10. Report of Mark W. Malay, Township Assessor.
11. Report of John S. Duszo, Township Highway Commissioner.
12. Report of Dana L. Smith, Township Supervisor.
13. Public Comments. (2 minute limit per person)
14. Motion to set time of next Annual Town Meeting. (April 10, 2018, second Tuesday in April, 7:00 p.m.)
15. Motion to set time of any Special Meeting that may be called.
16. Motion to adjourn.
The Township of Winfield does not discriminate on the basis of handicapped status in the admission or access to, or treatment of employment in its programs or activities.
Published in Daily Herald March 21, 2017 (4467393)

condition. The sale is further subject to confirmation by the court.
If the property is a condominium and the foreclosure takes place after 7/1/2007, purchasers other than the mortgagees will be required to pay any assessment and legal fees due under The Condominium Property Act, 765 ILCS 605/9(g)(1) and (g)(4).
If the property is located in a common interest community, purchasers other than mortgagees will be required to pay any assessment and legal fees due under the Condominium Property Act, 765 ILCS 605/18.5(g-1).
If the sale is set aside for any reason, the Purchaser at the sale shall be entitled only to a return of the deposit paid. The Purchaser shall have no further recourse against the Mortgagor, the Mortgagee or the Mortgagee's attorney.
Upon payment in full of the amount bid, the purchaser shall receive a Certificate of Sale, which will entitle the purchaser to a Deed to the real estate after Confirmation of the sale. The successful purchaser has the sole responsibility/expense of evicting any tenants or other individuals presently in possession of the subject premises.
The property will NOT be open for inspection and Plaintiff makes no representation as to the condition of the property. Prospective bidders are admonished to check the Court file to verify all information.
IF YOU ARE THE MORTGAGOR (HOMEOWNER), YOU HAVE THE RIGHT TO REMAIN IN POSSESSION FOR 30 DAYS AFTER ENTRY OF AN ORDER OF POSSESSION, IN ACCORDANCE WITH SECTION 15-1701(C) OF THE ILLINOIS MORTGAGE FORECLOSURE LAW.
For information: Examine the court file or contact Plaintiff's attorney: Codilis & Associates, P.C., 15W030 North Frontage Road, Suite 100, Burr Ridge, IL 60527, (630) 794-9876. Please refer to file number 14-16-05989.
1716062
(4465849)

Did You Know That All Service Directory Advertisements Can Also Be Found In Our Online Service Directory?

Just Go To:

www.dailyherald.com

Then Click on the Service Directory Link Under the Marketplace Heading to Find All of Your Local Service Providers

Zoning Ordinance
1. Variation to Section 17.20.050 allowing for private streets as depicted on the plans submitted as part of the petition.
2. Variation to Section 17.28.050 reducing the required perimeter setback as depicted on the plans submitted as part of the petition.
3. Variation to Section 17.40.020 decreasing the minimum front yard, interior side yard, corner side yard and rear yard setbacks as depicted on the plans submitted as part of the petition.
4. Variation to Section 17.40.050 decreasing the minimum front yard, interior side yard, corner side yard and rear yard setbacks as depicted on the plans submitted as part of the petition.
5. Variation to Section 17.28.050 reducing the minimum building separations as depicted on the plans submitted as part of the petition.
6. Variation to Section 17.40.020 decreasing the minimum lot width for the R6A Zoning District as depicted on the plans submitted as part of the petition.
7. Variation to Section 17.40.020 decreasing the minimum lot size for the R6A Zoning District as depicted on the plans submitted as part of the petition.
8. Variation to Chapter 17.36 decreasing the driveway and parking lot requirements as depicted on the plans submitted as part of the petition.
9. Any additional Variations to Chapters 17.28 and 17.36 and Sections 17.40.020 and 17.40.050 that may be necessary to accommodate the proposed development as depicted on the plans submitted as part of the petition.

Sign Code
1. Variation to Chapter 14.16 to allow for multiple subdivision identification signs as depicted on the plans submitted as part of the petition.

Development Ordinance
1. A Variation to Section 16.50.070 reducing the minimum right-of-way and parkway requirements.
2. A Variation to Section 16.50.150 reducing the parking lot requirements.

The Petitioner is proposing a residential development consisting of 70 single-family detached homes, 73 2-story townhomes and 71 3-story townhomes on the northern 50 acres of the Link Farm (north of the existing Didier Farmstand and Greenhouse). The improvements also include enhancements to the existing Prairie Grove Park to the east. An aerial highlighting the location of the proposed residential development is attached.
PETITIONER: K. Hovnanian T&C Homes at Illinois, LLC
1804 N. Naper Blvd., Suite 200
Naperville, IL 60563
PARCEL INDEX NUMBERS: 15-20-401-001, 15-21-300-026, 15-21-304-001, 15-21-304-002, 15-21-304-003, 15-21-304-004
SUBJECT PROPERTY COMMON ADDRESS:
The approximately 50 acre unincorporated vacant property south of Brandywine Lane, east of Buffalo Grove Road and west of Meridan Way with an address of 16802 Aptakisic Road, Prairie View, IL. The proposed development also includes improvements to the existing Prairie Grove Park located at 2020 Olive Hill Drive, Buffalo Grove, IL
Documents submitted by the petitioner for the public hearing concerning this petition are on file with the Department of Community Development, 50 Raupp Boulevard, and may be examined by any interested persons. Anyone with questions concerning the hearing may contact Christopher Stilling, 847-459-5530.
All persons present at the public hearing will be given the opportunity to be heard.
Dated this 16th day of March, 2017.
Eric Smith, Chair
Buffalo Grove Plan Commission
Published in Daily Herald March 21, 2017 (4467531)

must be removed at the time of purchase. Sale is subjected to adjournment.
Published in Daily Herald March 14, 21, 2017 (4466721)

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Initial

NOTICE OF PUBLIC SALE OF PERSONAL PROPERTY
Notice is hereby given that pursuant to Section 17 of the Self-Service Storage Facility Act, State of Illinois, that Public Storage / PS Orangeco, Inc. will conduct sale(s) at Public Storage by Competitive bidding on March 30th, 2017 at 9:30 am at the Premises where property has been stored, which are located at **Public Storage #28421/243 N. Western Ave., Carpentersville, IL 60110-1764. (847) 844-9545.** In the matters of the personal property for the individuals listed below.
Unit - Customer
A010 Overman, Adam
B055 Myers, Tyler
B063 Trainor, Mary
B065 Creighton II, John Peter
D004 Kahler, Paul
D020 Rodriguez, Nora
D030 Starkey, Maurice
F012 Turner, Roxann
G048 Lucas, Charlotte
G051 Smiley, Bob
G064 Dempski, Olga
Public Storage / PS Orangeco, Inc.
Purchases must be made with cash only and paid at the time of sale.
All goods are sold as is and must be removed at the time of purchase. Sale is subjected to adjournment.
Published in Daily Herald March 14, 21, 2017 (4466722)

TIRED???
If you are tired of having a garage or basement full of junk, empty it FAST with an ACTION AD in the DAILY HERALD
Classified

Public Hearings & Notices

PUBLIC MEETING

Tuesday, March 28, 2017
4:00 PM - 7:00 PM

The Village of Sugar Grove (Village) in partnership with Kane County, the Illinois Department of Transportation (IDOT), and the Illinois Tollway invites you to attend the third public meeting (open house format) regarding the planning for the potential improvements to the IL 47 (Sugar Grove Parkway) interchange at the I-88 (Ronald Reagan Memorial Tollway) in Kane County.

The Open House Public Meeting will take place on:

Date: Tuesday, March 28, 2017
Time: 4:00 pm to 7:00 pm
Location: Academic and Professional Center
Event Room (use North Entrance)
Waubonsee Community College
Route 47 at Waubonsee Drive
Sugar Grove, IL 60554-9454

Meeting Purpose:
- Review the alternatives screening results
- Provide input on the alternatives to be carried forward

Exhibits will be on display and an audio-visual presentation will be operating continuously for review any time throughout the evening. The Village, Kane County, IDOT, and Illinois Tollway staff as well as project consultant representatives will be available to discuss the project and answer questions.

If a reasonable accommodation is needed under the Americans with Disabilities Act, please contact Peter Johnston, phone 773.399.0112. Persons planning to attend who will need a sign language interpreter or other similar accommodations should notify the TTY/TDD number (800) 526-0844 or 711; TTY users (Spanish) (800) 501-0864 or 711; and for Telebraille dial (877) 526-6670 at least five (5) days prior to the meeting.

All written correspondence regarding this project should be sent to:
GRAEF
Attn: Peter Johnston, P.E.
8601 W. Higgins Road - Suite 280
Chicago, IL 60631-28014
Phone: 773.399.0112
Email: SugarGroveInterchange@graef-usa.com

Or submitted through the project website: www.SugarGroveInterchange.org

Certificate of the Publisher

Kane County Chronicle

Description: PUBLIC MEETING
1268502
POJ#15201-03-00

RECEIVED
MAR 24 2017
Initial: _____

CRAWFORD, MURPHY, AND TILLY
550 N COMMONS DRIVE - SUITE 11
AURORA IL 60504

Shaw Media certifies that it is the publisher of the Kane County Chronicle. The Kane County Chronicle is a secular newspaper, has been continuously published daily for more than fifty (50) weeks prior to the first publication of the attached notice, is published in the City of St. Charles, County of Kane, State of Illinois, is of general circulation throughout that county and surrounding area, and is a newspaper as defined by 715 ILCS 5/5.

A notice, a true copy of which is attached, was published 2 time(s) in the Kane County Chronicle, namely one time per week for two successive week(s). Publication of the notice was made in the newspaper, dated and published on
03/09/2017 03/16/2017

This notice was also placed on a statewide public notice website as required by 5 ILCS 5/2.1.
In witness, Shaw Media has signed this certificate by Karen Pletsch, its publisher, at St. Charles, Illinois, on
16th day of March, A.D. 2017

Shaw Media By: Karen Pletsch

Karen Pletsch, Publisher

Account Number 10054621 Amount $308.04

PUBLIC NOTICE
PUBLIC MEETING
Tuesday, March 28, 2017 - 4:00 pm to 7:00 pm

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All written correspondence regarding this project should be sent to:
GRAEF
Attn: Peter Johnston, P.E.
8501 W. Higgins Road - Suite 280
Chicago, IL 60631-28014
Phone: 773.399.0112
Email: SugarGroveInterchange@graef-usa.com
Or submitted through the project website: www.SugarGroveInterchange.org

(Published in the Kane County Chronicle on March 9, 16, 2017) 1268502

SUGAR GROVE PARKWAY
IL 47
Interchange at I-88

Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) Improvement Study

COMMENT FORM

PUBLIC INFORMATION MEETING #3

Contact information

Name: [redacted] **Organization/Group:**

Street Address: [redacted] **City, State & Zip:** [redacted]

Email: [redacted] **Phone:** [redacted]

How would you like to stay informed? X Email __ Mail __ Do not send study updates to me.

Help shape the future of transportation surrounding the IL 47 at I-88 interchange

Please share your comments and ideas about the IL 47 at I-88 Interchange project. Please place your comments in the comment box tonight or send them by the **April 11, 2017 deadline** via:

Mail:
GRAEF
Attn: Peter Johnston, P.E.
8501 W. Higgins Road
Suite 280
Chicago, IL 60631

Email: SugarGroveInterchange@graef-usa.com

Website: www.SugarGroveInterchange.org

M2C - least impact to current homeowners & Forest Preserve
~~I4 - least budge impacts~~
I2 - least land impact & Cheapest alternative
It is ridiculous how long we have been waiting for this.
Should've outlined time to build for each alternative.

OVER →

Public Hearing

December 14, 2017

Sugar Grove Parkway (IL 47) Interchange
at the Reagan Memorial Tollway (I-88)
Improvement Study

Public Hearing
Short Summary

Prepared 12/15/2017

General Information

The public hearing for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) was held on Thursday, December 14, 2017 at the Academic and Professional Center (APC) Event Room at Waubonsee Community College, IL Route 47 at Waubonsee Drive, Sugar Grove, IL 60554, from 4:00 PM to 7:00 PM. The meeting was conducted in an open house format. A public forum was held from 6:00 PM to 7:00 PM.

Attendees signed in and a brochure was provided. There were two rooms for attendees to learn more about the project. One room contained a continuous audio-visual presentation that described the project summary, provided the study process and schedule, outlined the alternative screening process, and described the alternatives carried forward. The second room contained more detailed information, comment forms, and project study team representatives. Information in the second room included exhibit boards and roll plot maps. A third room was utilized for the public forum. A court reporter for verbal comments was available in the second room from 4:00-6:00 PM and recorded verbal comments at the public form from 6:00-7:00 PM.

The purpose of the meeting was to attain public input on the project study including the Environmental Assessment (EA) and the impacts to the Section 4(f) Hannaford Woods/Nickels Farm Forest Preserve (Kane County Forest Preserve).

Attendees were provided an opportunity to speak with representatives from the Village of Sugar Grove, The Illinois Department of Transportation (IDOT), Kane County, and the Illinois Tollway. The meeting was attended by ninety-eight (98) people.

Attendees

Public Officials

The following public officials were in attendance:

- State Representative, Bob Pritchard
- Sean Michels, Village of Sugar Grove
- Fred Dornback, Blackberry Township Supervisor
- John Larkin, Kaneville Trustee and Kaneville Fire Protection District
- John Nevenhoven, Village of Elburn
- Bill Grabarsk, Village of Elburn
- Tom Rowe, Sugar Grove Township Supervisor
- Jim Michels, Blackberry Township
- Rod Feece, Blackberry Township Highway Commissioner

Media

Chris Walker, Kane County Chronicle

Other Agencies/Organizations

Additional agencies/organizations attending included:

- Art Nicholas, CMAP
- Jason Wald, Pace Bus
- Pat Rollins, Sugar Grove Police Department
- Assistant Chief Wayne Parson, Sugar Grove Fire Protection District
- Walter Magdziarz, Village of Sugar Grove
- Gary Kecskes Sugar Grove Economic Development Corporation
- Tom Reynolds, Elburn and Countryside Fire Protection District
- Lisa Enberg, Elburn and Countryside Fire Protection District
- Joe, Cluchey Elburn and Countryside Fire Protection District
- Pete Adams, Waubonsee Community College
- Dave Sigmund, Kaneville Fire Protection District
- Todd Leden, Kaneland School District 302

Businesses

Jennifer Cowan from Crown Community Development presented a letter to the Tollway for the hearing record regarding access control on IL 47 from the interchange to Seavey Road.

Comments

Fourteen (14) comment forms were received at the meeting. Comments can continue to be submitted and included in the public meeting record until January 19, 2018. There were approximately ten (10) comments given at the public forum. The topics include the following:

General Support or Opposition to Preferred Alternative

- Support Project due to Travel Time Savings and Reduces IL 47 congestion
- Support for the No-Build Alternative
- Like the improvements to IL 47 north of the interchange

Schedule/Implementation

- Build the improvements soon
- Safety concerns regarding the interchange moving forward and the IL 47 project being delayed
- Desire the interim improvement to the interchange extend on IL 47 to the proposed U-turn

Safety

- Safety concerns regarding traffic control devices at Local Street Intersections with IL 47
- Safety concerns regarding the speed of truck traffic on hills; wanting right turn lanes
- Safety concerns regarding the location of the bike path on the IL 47 bridge over I-88

Access and Other

- Want more access to IL 47 from adjacent land use
- Do not want Finley Road access restricted to IL 47
- Want to Realign Merill Road to align with opposing cross street
- Want Emergency Vehicle Accommodations at Finley to access interchange
- Want Emergency Vehicle Access to Restricted Access Side Streets
- Want Emergency Vehicle Accommodations at U-Turn
- Desires to restrict adjacent land uses and development

NOTICE

The Village of Sugar Grove (Village) in partnership with Kane County, the Illinois Department of Transportation and the Illinois Tollway will host a public hearing regarding potential improvements to the Illinois 47 (Sugar Grove Parkway) interchange with Interstate 88 (Reagan Memorial Tollway) in Kane County.

Date: Thursday, Dec. 14, 2017
Time: 4-7 p.m.
Location: Waubonsee Community College
Academic and Professional Center
Event Room (use North Entrance)
Illinois 47 at Waubonsee Drive
Sugar Grove, IL 60554

The purpose of the hearing is to obtain public input on the preferred alternative, Environmental Assessment (EA), and the Section 4(f) document. The Environmental Assessment documents the purpose and need of the proposed project, alternatives considered, the preferred alternative, anticipated environmental impacts, project benefits, and potential mitigation measures. Section 4(f) requires consideration of publicly-owned parks and recreation areas in transportation project development. The Section 4(f) document identifies impacts to the Hannaford Woods/Nickels Farm Forest Preserve and efforts to avoid, minimize and mitigate or enhance the resource.

Interested persons may attend anytime between 4 and 7 p.m. Exhibits will be on display, and an audio-visual presentation will be shown continuously during the hearing. Project team members will be present to discuss the project and answer questions. A public forum will begin at 6 p.m., where the public will be invited to make a statement to a court reporter to be included in the official record of the project.

The EA has been completed and will be presented at the public hearing. The EA will be available for public review and comment on the project website at www.sugargroveinterchange.org, at the Sugar Grove Village Hall, the Sugar Grove Public Library, and at the IDOT District 1 office at 201 W. Center Court in Schaumburg. Comments will be accepted through Friday, Jan. 19, 2018.

This hearing will be accessible to people with disabilities. Anyone needing special assistance should contact Peter Johnston at (773) 399-0112. Persons planning to attend who will need a sign language interpreter or other similar accommodations should notify the department's TTY/TTD number (800) 526-0844/or 711; TTY users (Spanish) (800) 501-0864/or 711; and Telebroille (877) 526-6670 at least five (5) days prior to the meeting.

Published in Daily Herald Nov 27, Dec 7, 2017 (4487942)

CERTIFICATE OF PUBLICATION

Paddock Publications, Inc.

Daily Herald

Corporation organized and existing under and by virtue of the laws of the State of Illinois, DOES HEREBY CERTIFY that it is the publisher of the **DAILY HERALD**. That said **DAILY HERALD** is a secular newspaper and has been circulated daily in the Village(s) of Addison, Algonquin, Antioch, Arlington Heights, Aurora, Barrington, Barrington Hills, Bartlett, Batavia, Bensenville, Bloomingdale, Buffalo Grove, Burlington, Campton Hills, Carol Stream, Carpentersville, Cary, Deer Park, Des Plaines, East Dundee, Elburn, Elgin, Elk Grove Village, Elmhurst, Fox Lake, Fox River Grove, Geneva, Gilberts, Glen Ellyn, Glendale Heights, Glenview, Grayslake, Green Oaks, Gurnee, Hainesville, Hampshire, Hanover Park, Hawthorn Woods, Hoffman Estates, Huntley, Inverness, Island Lake, Itasca, Keeneyville, Kildeer, Lake Barrington, Lake Villa, Lake in the Hills, Lake Zurich, Libertyville, Lincolnshire, Lindenhurst, Lisle, Lombard, Long Grove, Medinah, Mt. Prospect, Mundelein, Naperville, North Aurora, North Barrington, Oakbrook, Oakbrook Terrace, Palatine, Prospect Heights, Rolling Meadows, Roselle, Schaumburg, Sleepy Hollow, South Barrington, South Elgin, St. Charles, Woodridge, Streamwood, Tower Lakes, Vernon Hills, Villa Park, Volo, Warrenville, Wauconda, Wayne, West Chicago, West Dundee, Wheaton, Wheeling, Wildwood, Winfield, Wood Dale, Round Lake Park, Pingree Grove, Sugar Grove

County(ies) of Cook, DuPage, Kane, Lake, McHenry

and State of Illinois, continuously for more than one year prior to the date of the first publication of the notice hereinafter referred to and is of general circulation throughout said Village(s), County(ies) and State.

I further certify that the DAILY HERALD is a newspaper as defined in "an Act to revise the law in relation to notices" as amended in 1992 Illinois Compiled Statutes, Chapter 715, Act 5, Section 1 and 5. That a notice of which the annexed printed slip is a true copy, was published November 27, December 7, 2017 in said DAILY HERALD.

IN WITNESS WHEREOF, the undersigned, the said PADDOCK PUBLICATIONS, Inc., has caused this certificate to be signed by, this authorized agent, at Arlington Heights, Illinois.

PADDOCK PUBLICATIONS, INC.
DAILY HERALD NEWSPAPERS

BY Paula Baltzer
Authorized Agent

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AURORA IL 60504

Start: 12/07/2017 Stop: 12/07/2017
Times Ord: 1 Times Run: ***
CLEG 2.00 X 51.00 Words: 370
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Rate: LEGAL Cost: 149.64
Affidavits: 1

Contact: DONENE ENDE
Phone: (630)820-1022
Fax#: (630)820-0350
Email: dende@cmtengr.com
Agency:

Ad Descrpt: PUBLIC HEARING
Given by: *
P.O. #:
Created: csuar 12/05/17 09:20
Last Changed: csuar 12/05/17 09:35

Source: _____
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(CONTINUED ON NEXT PAGE)

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ORDER CONFIRMATION (CONTINUED)

Salesperson: CINDY SUAREZ Printed at 12/05/17 09:36 by csuar-sm

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Acct #: 10054621 Ad #: 1486687 Status: New CHOLD CHOL

PUBLIC NOTICE

The Village of Sugar Grove (Village) in partnership with Kane County, the Illinois Department of Transportation and the Illinois Tollway will host a public hearing regarding potential improvements to the Illinois 47 (Sugar Grove Parkway) interchange with Interstate 88 (Reagan Memorial Tollway) in Kane County.

Date: Thursday, Dec. 14, 2017
Time: 4-7 p.m.
Location: Waubonsee Community College
Academic and Professional Center
Event Room (use North Entrance)
Illinois 47 at Waubonsee Drive
Sugar Grove, IL 60554

The purpose of the hearing is to obtain public input on the preferred alternative, Environmental Assessment (EA), and the Section 4(f) document. The Environmental Assessment documents the purpose and need of the proposed project, alternatives considered, the preferred alternative, anticipated environmental impacts, project benefits, and potential mitigation measures. Section 4(f) requires consideration of publicly-owned parks and recreation areas in transportation project development. The Section 4(f) document identifies impacts to the Hannaford Woods/Nickels Farm Forest Preserve and efforts to avoid, minimize and mitigate or enhance the resource.

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(Published in the Kane County Chronicle on December 7, 2017)

and forth to the hospital going through there. Just a single lane, an emergency access is all we need. Nothing special.

No. 4. [redacted]. I'm the Community Development Director for the Village of Sugar Grove. Being responsible for cultivating economic development in Sugar Grove I understand the limitations of proximity and limited access that this area of Sugar Grove possesses. The proposed interchange at Illinois 47 widening project is a needed public investment. The recommended interchange improvement will stimulate the local economy by providing access to the tollway for land that is inaccessible to the market trade area. It will also increase public travel convenience, particularly for the population to the north, as it will permit Illinois 47 to provide direct access to eastbound I88. The recommendations for widening Illinois 47 in the study area will improve safety along the highway which has implications for economic development as well. I support the recommendations for minimizing the road widening impact on forest preserve lanes along Illinois 47 as well as the accommodation of pedestrian bicycle transportation in the corridor. The recommendations for the interchange are consistent with the Sugar Grove

conference and plan, the transportation plan and the future land use plan.

No.5. [redacted] [redacted]. To increase the impact area north of Green Road to include Willow Creek Drive and to add a turn lane off of 47 onto Willow Creek Drive due to accidents and traffic flow, I mean, basically backing up traffic and we already have accident problems turning into Willow Creek Drive off of 47 and we fear with the increase of traffic flow and the impact area not including Willow Creek Drive that there's going to be more accidents. So the lanes cut down just before Green Road on the plan and it goes back to a single lane road right at Willow Creek Drive.

(Which were all the open house public comments.)

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and IL 47 Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

Appendix B

Official with Jurisdiction

Meeting Minutes
Status: Draft

Illinois Route 47 @ I-88 Interchange
Potential Impacts to Hannaford Woods – Nickels Farm Forest Preserve
September 13, 2016, 11:00 am
Meeting Location: Forest Preserve District of Kane County
Geneva, IL
(Attendance Roster is included as a separate file)

The purpose of the meeting was to discuss the potential improvement and widening of Illinois Route 47 and any associated impact to the Hannaford Woods – Nickels Farm Forest Preserve. A potential location of a shared use path was also discussed.

Introductions

The attendees introduced themselves.

Project Scope

The project scope was discussed. The project team is approximately 50% complete with the Phase I report. Final approval of the Phase I report is anticipated in December 2017. A project Location Map was distributed.

Input from Forest Preserve:

J. Culp indicated that the Forest Preserve is interested in a shared use path along Route 47 extending to the north over I-88. This would help in linking paths both north and south of I-88. There was discussion regarding which side of the road the path would be preferred. IDOT and the Forest Preserve were both favoring the east side of IL 47 with crossings at Main Street (north of project limit) and Old Oaks Drive/College Drive.

There was discussion on whether any LAWCON or OSLAD funds have been used for the development of the Hannaford Woods – Nickel Farms Forest Preserve. A related exhibit was produced and provided to IDOT. The exhibit indicates that these funds were not used for the land that is adjacent to Route 47. Therefore, any widening of Route 47 would not be restricted by any requirements of these funding mechanisms. **Action Item: J. Culp to provide Grant language for transfer of land from Waubonsee Community College to the Forest Preserve.**

J. Culp indicated that the Forest Preserve property on the west side of Route 47 is a low area which is frequently saturated. There is currently no access to this portion of the preserve. If access is installed later, it will not be off of IL 47.

J. Culp asked that the project team contact Ken Anderson of Kane Co. with regard to prior hydraulic studies along Blackberry Creek. A concern was raised whether any modifications to the Route 47 bridge over Blackberry Creek would exacerbate flooding that has occurred downstream of the bridge in the past. An Existing Drainage Plan is being developed which will highlight any sensitive outlets on the project.

The existing trail that was identified by the project team on the east side of Route 47 is likely for maintenance purposes and not a designated trail per the Forest Preserve.

J. Culp will investigate Forest Preserve records for the presence of any threatened or endangered species. **Action Item: J. Culp to provide any record of threatened or endangered species.**

A 60’ strip of land adjacent and east of Route 47 is reserved for subsequent purchase by IDOT if Route 47 is widened. The Forest Preserve did not indicate a preference of fee simple vs. permanent easement. The form of purchase would be worked out in negotiations. There are no restrictions on the Forest Preserve property to the west of Route 47, so any subsequent purchase for widening should not be an issue. The project team is reviewing options for minimizing impact to Forest Preserve land when widening thru this area.

The Forest Preserve is unlikely to request access to their property directly from Route 47.

Input from IDOT:

IDOT indicated that local meetings would be held to discuss any flooding and drainage issues associated with the project.

IDOT asked J. Culp to send Grant language for transfer of land from Waubonsee Community College to the Forest Preserve.

IDOT indicated that best management practices (BMPs) will be used to protect the water quality of Blackberry Creek; however, right of way may be required on forest preserve property in order to implement these BMPs.

Adjourn

Prepared by: Peter Johnston. I may be contacted by telephone at (773) 399-5443, facsimile at (773) 399-0170 or by e-mail at peter.johnston@graef-usa.com. Please notify the author of the minutes of any corrections and/or clarifications within three (3) business days. If no comments are made within this time frame, these minutes are assumed accurate.

SIGN-IN SHEET

Illinois Route 47 @ I-88 Interchange
Potential Impacts to Hannaford Woods
September 13, 2016, 11:00 am
Meeting Location: Forest Preserve District of Kane County
Geneva, IL

Name	Organization	Phone	E-mail
KYLE BOCHTE	IDOT - PROGRAMMING	(847) 705-4678	KYLE.BOCHTE@ILLINOIS.GOV
Jerry Culp	FPDKC	(630)232-5980	Culpgerald@Kaneforest.com
Tony Speciale	Village of Sugar Grove	630-466-7508	aspeciale@sugargrove.il.gov
PETE JOHNSTON	GRAEF	312-420-6078	peter.johnston@graef-usa.com
April Holmes	Quigg	217-670-0563	aholmes@quiggengineering.com
Jennifer Becker	KDOT	630.444.2957	beckerjennifer@co.kane.il.us
Steve Schilke	IDOT	847 705-4125	steven.schilke@illinois.gov
JOHN BALDANF	IDOT	847.705.4103	JOHN.BALDANF@ILLINOIS.GOV
Nicole Nutter	Tollway	630.335.6883	nnutter@getipass.com

Meeting Minutes
Status: Final

Illinois Route 47 @ I-88 Interchange
Preferred Alternative
Hannaford Woods – Nickels Farm Forest Preserve
June 15, 2017, 9:00 am
Meeting Location: Forest Preserve District of Kane County
Geneva, IL
(Attendance Roster is included as a separate file)

The purpose of the meeting was to discuss the Preferred Alternative and associated impacts to the Hannaford Woods – Nickels Farm Forest Preserve (FP). A potential location of a shared use path was also discussed.

Introductions

The attendees introduced themselves. Steve Schilke discussed the overall schedule for the project.

Project Overview

The project scope was discussed. Preferred Alternatives along IL 47 (M-2C) and at the I-88 Interchange (I-4: Parclo) were reviewed.

IL 47 Adjacent to Hannaford Woods:

The proposed IL 47 cross section adjacent to Hannaford Woods was reviewed. The profile of IL 47 in this area would need to be raised approximately 3.3' in order to account for a wildlife crossing/future shared use path with 9' vertical clearance under the Blackberry Creek Bridge. J. Culp indicated that a 10' clearance may be necessary beneath the bridge when applying for CMAQ funding. The Project Team will look further into the potential raised clearance and the requirements for clearance for a shared use path.

J. Culp indicated that the FP would be interested in a shared use path to be included in the Phase I instead of converting the wildlife crossing in the future to a path. The FP is concerned with Army Corps permitting issues to convert to a path after the IL 47 improvement occurs. The FP also indicated they would like the Project Team to look into possible trail connections to the path along IL 47 and include the additional impacts in our Phase I study. The Project Team will investigate the clearance requirement further and look into concept trail connections.

There was some discussion regarding which side the shared use path would be located under the Blackberry Creek Bridge. Subsequent to the meeting, IDOT requested that the path stay on the north side of the Creek with a wildlife crossing for small mammals next to it and a shelf be added on the south side of the creek for large mammals to pass under the bridge.

Best Management Practices (BMP's) are being considered at Blackberry Creek and Tributary C and will need to be constructed outside wetland limits, but they may impact FP ROW.

Exhibits from the draft 4(f) document were handed out. The FP ROW impact is generally a 60' take required on the east side of IL 47 and nominally 50' required on the west side of IL 47. The take on the east side is approximately the same as the 60' strip that was identified in the Special Warranty Deed previously negotiated between the FP and IDOT. Approximately 0.5 acre of FP take on the west side of IL 47 has been identified as necessary in order to complete the IL 47 widening and replace the Blackberry Creek bridge.

. The Forest Preserve agreed that the land acquisitions are proper and do not take away the attributes inherent in the forest preserve. They therefore indicated they would likely sign after reviewing the final document. J. Culp wasn't sure if the document needs to be presented to the board, but said he will follow up.

Schedule

It is anticipated that BMP's and geometry will be conceptually complete by August or September of this year. A Public Hearing would be scheduled near the end of the year. After the Public Hearing comment period is closed, a concurrence letter and 4(f) document will be sent to the FP for concurrence.

Action Items:

- **J. Culp to provide information regarding the 10' vertical clearance requirement.**
- **IDOT to provide wildlife crossing standard, wildlife crossing example plan, and example 4(f) letter to FP.**

Adjourn

Prepared by: Peter Johnston. I may be contacted by telephone at (773) 399-5443, facsimile at (773) 399-0170 or by e-mail at peter.johnston@graef-usa.com. Please notify the author of the minutes of any corrections and/or clarifications within three (3) business days. If no comments are made within this time frame, these minutes are assumed accurate.

Illinois Department of Transportation

Attendance Roster
Bureau of Programming

Project / Topic: IL 47 at I-88 | FPDKC Discussion

Date: June 15, 2017 **Time:** 9:00 AM

Location: FPDKC **Address:** 1996 S. Kirk Rd. Geneva IL 60134

	Name (Please Print)	Representing	Phone Number	Email Address
1	Steve Schilke	IDOT-Programming	(847) 705-4125	Steven.Schilke@illinois.gov
2	Corey Smith	IDOT-Programming	(847) 705-4103	Corey.Smith@illinois.gov
3	Kyle Bochte	IDOT-Programming	(847) 705-4088	Kyle.Bochte@illinois.gov
4	Tony Speciale	Sugar Grove	(630) 466-7508	Aspeciale@sugar-grove.il.us
5	Pete Johnston	GRAEF	(773) 399-5443	Peter.Johnston@graef-usa.com
6	Elizabeth Serdynski	Quigg	(863) 422-5517	ESerdynski@QuiggEngineering.com
7	Jerry Culp	FPDKC	(630) 232-5980	CulpGerald@Kaneforest.com
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Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and IL 47 Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

Appendix C

Special Warranty Deed

Instrument prepared by:

Rachel K. Robert
Day & Robert, P.C.
300 East 5th Avenue - Suite 365
Naperville, Illinois 60563

2012K052818
SANDY WEGMAN
RECORDER - KANE COUNTY, IL

RECORDED: 8/9/2012 3:06 PM
REC FEE: 34.00 RHSPS FEE: 10.00
PAGES: 6

After recording mail to:

Rachel K. Robert
Day & Robert, P.C.
300 East 5th Avenue - Suite 365
Naperville, Illinois 60563

8873343

SPECIAL WARRANTY DEED
Illinois Statutory

The Grantor, COMMUNITY COLLEGE DISTRICT NO. 516 ALSO KNOWN AS BOARD OF COMMUNITY COLLEGE DISTRICT NO. 516, ALSO KNOWN AS BOARD OF JUNIOR COLLEGE DISTRICT 516, KANE, KENDALL, DEKALB, LASALLE AND WILL COUINTIES, ILLINOIS ALSO KNOWN AS WAUBONSEE JUNIOR COLLEGE DISTRICT 516, an Illinois community college organized and existing under the laws of the State of Illinois, having its principal address at Route 47 at Waubonsee Drive, Sugar Grove, Illinois 60544 for and in consideration of Ten Dollars ($10.00), and other good and valuable considerations in hand paid, does hereby REMISE, RELEASE, ALIEN AND CONVEY unto the FOREST PRESERVE DISTRICT OF KANE COUNTY, a forest preserve district and municipal corporation organized and existing under the laws of the State of Illinois, having its principal address at 1996 South Kirk Road, Suite 320, Geneva, Illinois 60134 all interest in the following described real estate situated in the County of Kane, in the State of Illinois, to wit:

Legal description attached hereto and incorporated herein as **Exhibit A**.

Subject to: (a) covenants, conditions, and restrictions of record that do not restrict the receiving party's intended use of the real estate; (b) private, public and utility easements of record and roads and highways, if any; (c) general real estate taxes not yet due and payable as of the closing; (d) rights of adjoining owners to the uninterrupted flow of any stream which may cross the land; (e) rights of way for drainage tiles, ditches, feeders and laterals, if any; and (f) the possible subsequent purchase by the Illinois Department of Transportation at its then fair market value of a 60 foot wide strip along the westerly boundary of the 13.374 acre parcel as it is within the area of a planned widening for Illinois Route 47.

To Have and to Hold the said premises as above described, with the appurtenances, unto the Grantee, forever.

Chicago Title Insurance Company
1795 West State Street
Geneva, IL 60134

Unofficial

Grantor for itself, and its successors, does covenant, promise and agree to and with Grantee, and its successors, that it has not done or suffered to be done, anything whereby the said premises hereby granted are, or may be, in any manner encumbered or charged, except as herein recited.

Permanent Index Nos.: 14-05-400-011, 14-08-200-015, 14-09-100-017, 14-05-400-018, 14-08-200-024, 14-05-200-026, 14-05-400-030

Address of Real Estate: Vacant land located at Illinois Route 47 at Waubonsee Drive, Sugar Grove, Illinois 60544

This transaction is exempt from Illinois Real Estate Transfer Tax under provisions of paragraph (b), Section 31-45 of the Real Estate Transfer Tax Law (35 ILCS 200/31-45).

BY: _____ 08-03-12

Dated this 3rd day of August, 2012.

COMMUNITY COLLEGE DISTRICT NO. 516 ALSO KNOWN AS BOARD OF COMMUNITY COLLEGE DISTRICT NO. 516, ALSO KNOWN AS BOARD OF JUNIOR COLLEGE DISTRICT 516, KANE, KENDALL, DEKALB, LASALLE AND WILL COUINTIES, ILLINOIS ALSO KNOWN AS WAUBONSEE JUNIOR COLLEGE DISTRICT 516, an Illinois community college organized and existing under the laws of the State of Illinois

BY: _____
Richard W. Dickson, Chairman

ATTEST: _____
Karen L. Cotter, Secretary

Unofficial

Mail tax bill to:
Forest Preserve District of Kane County
1996 South Kirk Road
Suite 320
Geneva, IL 60134

STATE OF ILLINOIS)
) SS
COUNTY OF KANE)

I, the undersigned, a Notary Public in and for the County and State aforesaid, DO HEREBY CERTIFY that RICHARD W. DICKSON personally known to me to be the Chairman of the Board of Trustees of the COMMUNITY COLLEGE DISTRICT NO. 516 ALSO KNOWN AS BOARD OF COMMUNITY COLLEGE DISTRICT NO. 516, ALSO KNOWN AS BOARD OF JUNIOR COLLEGE DISTRICT 516, KANE, KENDALL, DEKALB, LASALLE AND WILL COUINTIES, ILLINOIS ALSO KNOWN AS WAUBONSEE JUNIOR COLLEGE DISTRICT 516, an Illinois community college organized and existing under the laws of the State of Illinois, ("corporation") and KAREN L. COTTER personally known to me to be the Secretary of said corporation, and personally known to me to be the same persons whose names are subscribed to the foregoing instrument, appeared before me this day in person and severally acknowledged that as such Chairman and Secretary, they signed and delivered the said instrument and caused the corporate seal of said corporation to be affixed thereto, pursuant to authority given by the Board of Trustees of said corporation, as their free and voluntary act, and as the free and voluntary act and deed of said corporation, for the uses and purposes therein set forth.

Given under my hand and official seal, this 18th day of July, 2012.

"OFFICIAL SEAL"
SALLY A. LUMAN
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 02/22/2015

Sally Luman
Notary Public

Unofficial

CHICAGO TITLE INSURANCE COMPANY

ORDER NUMBER: 1410 008873343 KA
STREET ADDRESS: WAUBONSEE CC AND FOREST PRESERVE SWAP
CITY: **COUNTY:** KANE
TAX NUMBER:

LEGAL DESCRIPTION:

PARCEL ONE:

THAT PART OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER AND THAT PART OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION FIVE, TOWNSHIP THIRTY-EIGHT NORTH, RANGE SEVEN, EAST OF THE THIRD PRINCIPAL MERIDIAN, BOUNDED AND DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION FIVE; THENCE SOUTH 00 DEGREES 25 MINUTES 02 SECONDS WEST ON THE EAST LINE OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION SAID FIVE, A DISTANCE OF 1318.74 FEET TO THE SOUTHEAST CORNER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION SAID FIVE; THENCE CONTINUING SOUTH 00 DEGREES 25 MINUTES 02 SECONDS WEST A DISTANCE OF 58.80 FEET; THENCE SOUTH 83 DEGREES 35 MINUTES 12 SECONDS WEST A DISTANCE OF 531.76 FEET TO THE EASTERLY RIGHT OF WAY LINE OF ILLINOIS ROUTE 47; THENCE NORTH 12 DEGREES 13 MINUTES 48 SECONDS EAST ON SAID EASTERLY RIGHT OF WAY LINE A DISTANCE OF 242.43 FEET TO A POINT OF CURVE; THENCE CONTINUING NORTHEASTERLY 524.23 FEET ON SAID EASTERLY RIGHT OF WAY LINE, BEING A CURVED LINE CONCAVED TO THE WEST HAVING A RADIUS OF 8367.84 FEET, WITH A CHORD BEARING OF NORTH 10 DEGREES 26 MINUTES 07 SECONDS EAST, AND A CHORD LENGTH OF 524.15 FEET TO AN ANGLE POINT IN SAID LINE; THENCE NORTH 81 DEGREES 21 MINUTES 34 SECONDS WEST ON SAID ANGLED LINE A DISTANCE OF 30.00 FEET; THENCE NORTHEASTERLY 679.12 FEET ON SAID EASTERLY RIGHT OF WAY LINE, BEING A CURVED LINE CONCAVED TO THE WEST HAVING A RADIUS OF 8337.84 FEET, WITH A CHORD BEARING OF NORTH 06 DEGREES 18 MINUTES 26 SECONDS EAST AND A CHORD LENGTH OF 678.93 FEET TO THE NORTH LINE OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION SAID FIVE; THENCE NORTH 89 DEGREES 08 MINUTES 55 SECONDS EAST ON SAID NORTH LINE, A DISTANCE OF 347.28 FEET; TO THE POINT OF BEGINNING, ALL IN THE TOWNSHIP OF SUGAR GROVE, KANE COUNTY, ILLINOIS.

PARCEL TWO:

THAT PART OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION FIVE, TOWNSHIP THIRTY-EIGHT NORTH, RANGE SEVEN, EAST OF THE THIRD PRINCIPAL MERIDIAN, BOUNDED AND DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SAID SECTION FIVE; THENCE SOUTH 00 DEGREES 06 MINUTES 55 SECONDS WEST ON THE EAST LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION SAID FIVE, A DISTANCE OF 465.43 FEET; THENCE NORTH 52 DEGREES 28 MINUTES 35 SECONDS WEST A DISTANCE OF 364.52 FT.; THENCE SOUTH 88 DEGREES 55 MINUTES 35 SECONDS WEST A DISTANCE OF 100.84 FT.; THENCE

(CONTINUED)

CHICAGO TITLE INSURANCE COMPANY

ORDER NUMBER: 1410 008873343 KA
STREET ADDRESS: WAUBONSEE CC AND FOREST PRESERVE SWAP
CITY: **COUNTY:** KANE
TAX NUMBER:

LEGAL DESCRIPTION:

NORTH 01 DEGREES 06 MINUTES 05 SECONDS WEST A DISTANCE OF 237.78 FT. TO THE NORTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION SAID FIVE; NORTH 88 DEGREES 55 MINUTES 35 SECONDS EAST A DISTANCE OF 395.51 FT. TO THE POINT OF BEGINNING, ALL IN THE TOWNSHIP OF SUGAR GROVE, KANE COUNTY, ILLINOIS.

PARCEL THREE:

THAT PART OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION EIGHT AND PART OF THE NORTHWEST QUARTER OF SECTION NINE, ALL IN TOWNSHIP THIRTY-EIGHT NORTH, RANGE SEVEN, EAST OF THE THIRD PRINCIPAL MERIDIAN, BOUNDED AND DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SECTION 5, TOWNSHIP THIRTY-EIGHT NORTH, RANGE SEVEN, EAST OF THE THIRD PRINCIPAL MERIDIAN; THENCE SOUTH 89 DEGREES 31 MINUTES 58 SECONDS WEST A DISTANCE OF 484.57 FEET TO THE POINT OF BEGINNING; THENCE SOUTH 11 DEGREES 40 MINUTES 50 SECONDS WEST A DISTANCE OF 343.37 FEET; THENCE SOUTH 11 DEGREES 40 MINUTES 50 SECONDS WEST A DISTANCE OF 51.92 FEET; THENCE SOUTH 62 DEGREES 41 MINUTES 19 SECONDS EAST A DISTANCE OF 1817.53 FEET; THENCE SOUTH 00 DEGREES 14 MINUTES 50 SECONDS EAST A DISTANCE OF 1416.79 FEET; THENCE NORTH 85 DEGREES 27 MINUTES 37 SECONDS WEST A DISTANCE OF 534.09 FEET TO THE NORTHERLY RIGHT OF WAY LINE OF ILLINOIS ROUTE 47; THENCE NORTHWESTERLY 356.04 FEET ON A CURVED LINE CONCAVED TO THE NORTHWEST HAVING A RADIUS OF 3627.40 FEET, WITH A CHORD BEARING OF NORTH 49 DEGREES 11 MINUTES 04 SECONDS WEST AND A CHORD LENGTH OF 355.89 FEET; THENCE NORTH 00 DEGREES 29 MINUTES 26 SECONDS WEST A DISTANCE OF 805.46 FEET; THENCE NORTH 62 DEGREES 41 MINUTES 19 SECONDS WEST A DISTANCE OF 853.53 FEET; THENCE NORTH 14 DEGREES 45 MINUTES 20 SECONDS WEST A DISTANCE OF 8.22 FEET; THENCE NORTH 59 DEGREES 56 MINUTES 19 SECONDS WEST A DISTANCE OF 92.01 FEET; THENCE NORTH 30 DEGREES 33 MINUTES 20 SECONDS WEST A DISTANCE OF 133.09 FEET; THENCE NORTH 49 DEGREES 10 MINUTES 28 SECONDS WEST A DISTANCE OF 34.46 FEET; THENCE NORTH 33 DEGREES 01 MINUTES 39 SECONDS WEST A DISTANCE OF 587.72 FEET; THENCE NORTH 20 DEGREES 18 MINUTES 10 SECONDS EAST A DISTANCE OF 400.00 FEET; THENCE NORTHEASTERLY 165.28 FEET ON A CURVED LINE CONCAVED TO THE NORTHWEST HAVING A RADIUS OF 535.00 FEET, WITH A CHORD BEARING OF NORTH 50 DEGREES 30 MINUTES 42 SECONDS EAST AND A CHORD LENGTH OF 164.62 FEET; THENCE NORTH 89 DEGREES 31 MINUTES 58 SECONDS EAST A DISTANCE OF 256.00 FEET TO THE POINT OF BEGINNING, ALL IN THE TOWNSHIP OF SUGAR GROVE, KANE COUNTY, ILLINOIS.

Original

SANDY WEGMAN - RECORDER OF KANE COUNTY

AFFIDAVIT - PLAT ACT

STATE OF ILLINOIS
} SS
COUNTY OF KANE

Rachel K. Robert, Attorney, being duly sworn on oath, states that she resides at 300 East 5th Avenue, Suite 365, Naperville, Illinois 60563. That the attached deed is not in violation of 765 ILCS 205/1 for one of the following reasons:

1. The sale or exchange is of an entire tract of land not being a part of a larger tract of land.
2. The division or subdivision of the land is into parcels or tracts of five acres or more of size which does not involve any new streets or easements of access.
3. The division is of lots or blocks of less than one acre in any recorded subdivision which does not involve any new streets or easements of access.
4. The sale or exchange of parcels of land is between owners of adjoining and contiguous land.
5. The conveyance is of parcels of land or interests therein for use as right of way for railroads or other public utility facilities, which does not involve any new streets or easement of access.
6. The conveyance is of land owned by a railroad or other public utility which does not involve any new streets or easements of access.
7. The conveyance is of land for highway or other public purposes or grants or conveyances relating to the dedication of land for public use or instruments relating to the vacation of land impressed with a public use.
8. The conveyance is made to correct descriptions in prior conveyances.
9. The sale or exchange is of parcels or tracts of land following the division into no more than two parts of a particular parcel or tract of land existing on July 17, 1959, and not involving any new streets or easements of access.
10. The sale is of a single lot of less than five acres from a larger tract, the dimensions and configurations of said larger tract having been determined by the dimensions and configurations of said larger tract on October 1, 1973, and no sale prior to this sale, or any lot or lots from said larger tract having taken place since October 1, 1973, and a survey of said single lot having been made by a registered land surveyor.

THE APPLICABLE STATEMENT OR STATEMENTS ABOVE ARE CIRCLED.

Affiant further states that she makes this affidavit for the purpose of inducing the Recorder of Deeds of Kane County, Illinois, to accept the attached deed for recording, and that all local requirements applicable to the subdivision of land are met by the attached deed and the tract described therein.

Rachel K. Robert

SUBSCRIBED AND SWORN to before me

this 3rd day of Aug., 2012.

"OFFICIAL SEAL"
CYNTHIA TOVAR
Notary Public, State of Illinois
My Commission Expires 9/9/2015

Notary public

KAPLATAF

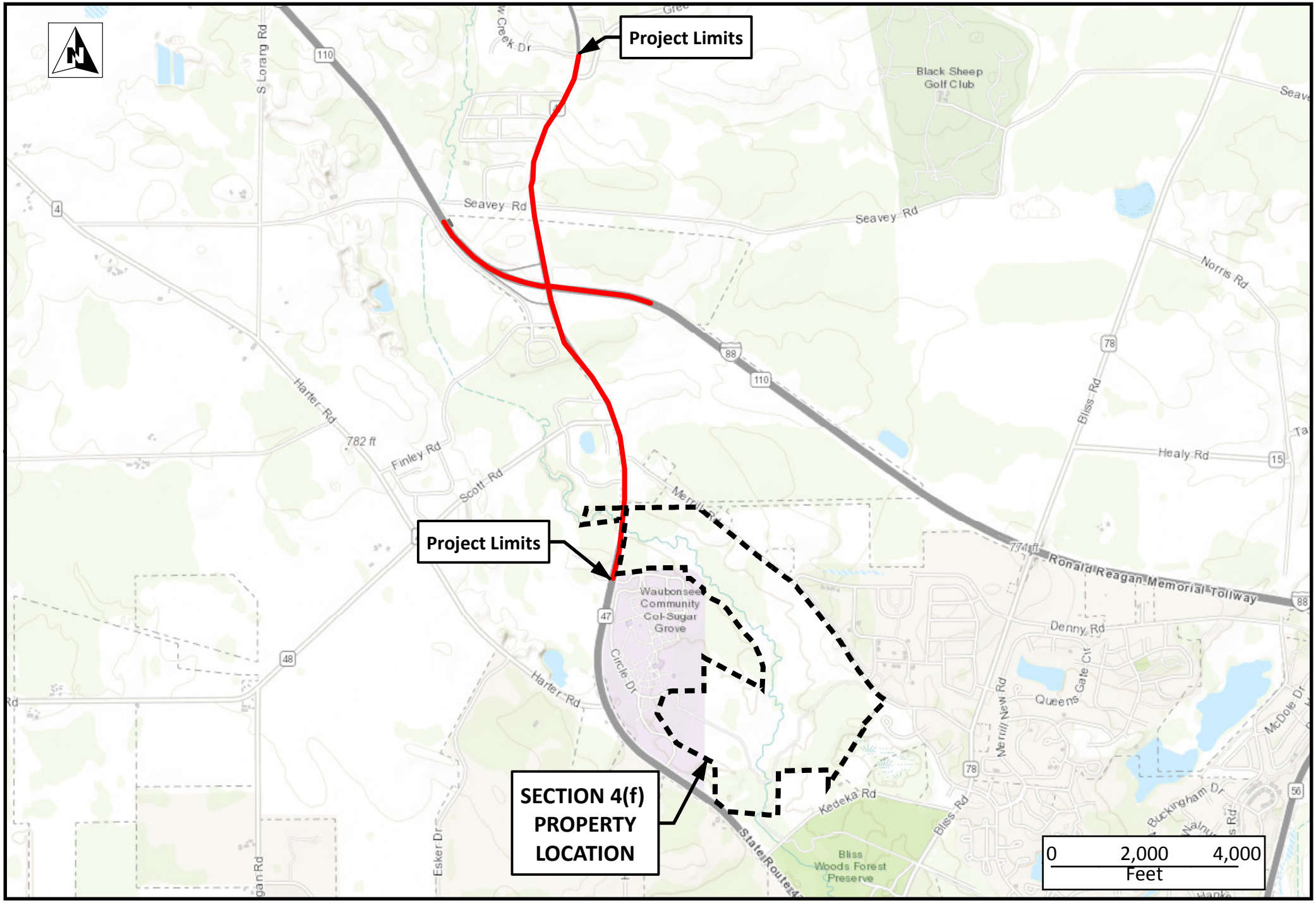
Unofficial

Appendix C

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

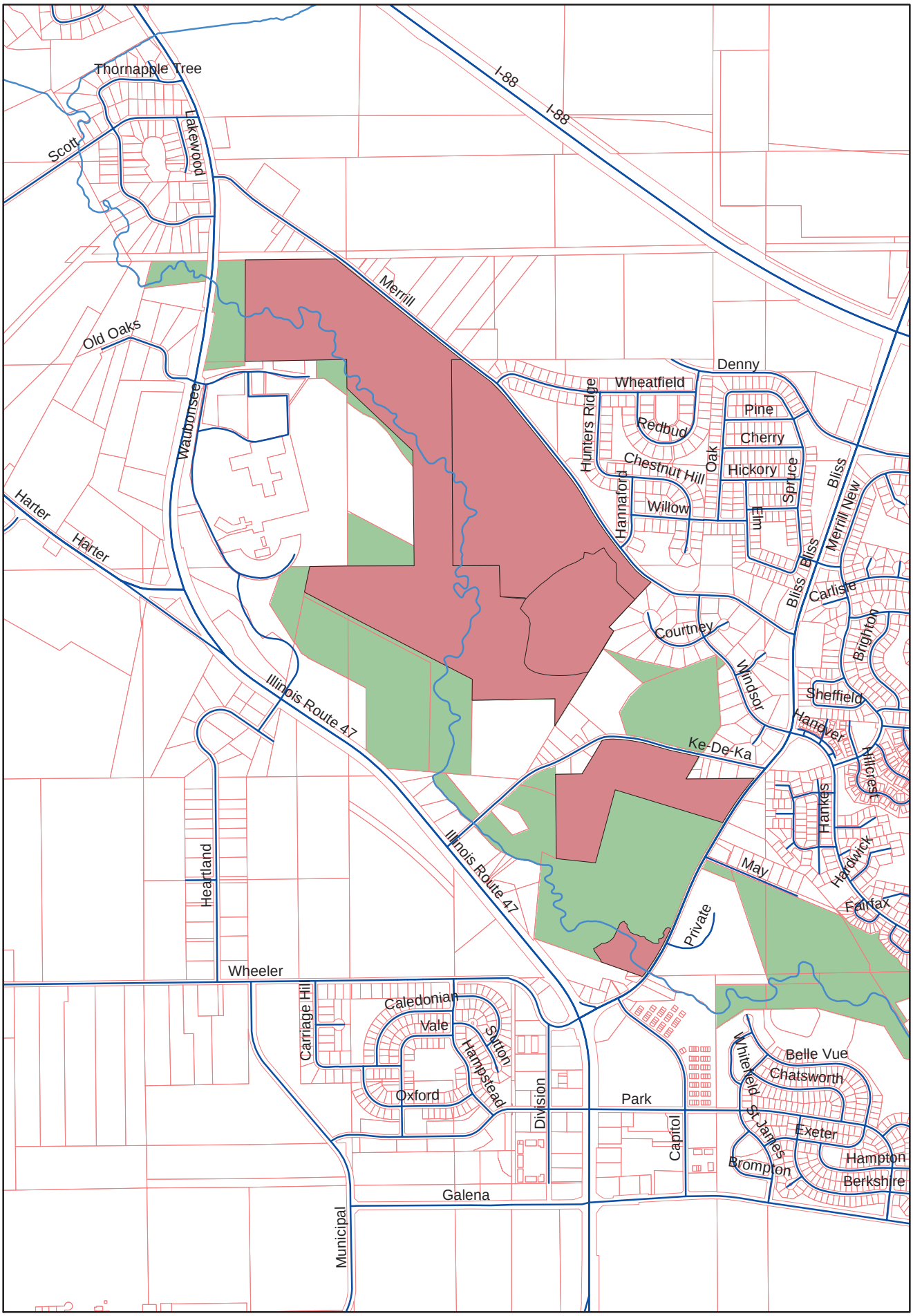
Appendix D

Project Drawings



Section 4(f) De Minimis Documentation
For IL 47 / I-88 Interchange and Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road, Sugar Grove, IL 60554

Appendix D



Kane County Forest Preserve LAWCON / OSLAD Fund Properties

No LAWCON / OSLAD Funding

LAWCON / OSLAD Funding

0.95 0.475 0 0.95 Miles

N

Appendix D

NOTE:
THE DETERMINATION OF THE PROPOSED RIGHT-OF-WAY ALONG IL ROUTE 47 INCLUDES FUTURE CONSIDERATIONS FOR SIDEWALK ALONG THE WEST SIDE AND A SHARED-USE PATH ALONG THE EAST SIDE.

HANNAFORD WOODS - NICKELS FARM FOREST PRESERVE

SECTION 4(f) LANDS IMPACT
FEE SIMPLE ACQUISITION - 0.22 ACRES (9,609 SF)

105+00.00
93.68' LT

107+00.00
105.00' LT

110+40.00
95.00' LT

111+50.00
115.00' LT

113+64.13
115.00' LT

CREEK

105+00

110+00

IL ROUTE 47

100+00.00
100.00' RT

100+00.00
130.00' RT

104+00.37
100.00' RT

109+03.42
62.27' RT

113+73.02
78.64' LT

113+85.42
62.60' RT

103+00.00
130.00' RT

104+00.00
150.00' RT

106+00.00
150.00' RT

107+00.00
115.00' RT

113+64.13
115.00' RT

BLACKBERRY

SECTION 4(f) LANDS IMPACT
FEE SIMPLE ACQUISITION - 1.52 ACRES (66,242 SF)

HANNAFORD WOODS - NICKELS FARM FOREST PRESERVE

LEGEND

- PROPOSED RIGHT-OF-WAY
- EXISTING RIGHT-OF-WAY
- SLOPE INTERCEPT
- SECTION 4(f) LANDS
- FEE SIMPLE ACQUISITION
- SHARED-USE PATH

0 100 200 300
SCALE IN FEET

H:\Jobs2015\2015300\CAD\Transportation\dgn\misc\18-0208_Forest_Preserve_Impacts_Exhibit\Forest_Preserve_Impact_Exhibit-Sheet_1.dgn
2/8/2018 1:47:51 PM

GRAEF 8501 W. Higgins Road, Suite 280 Chicago, Illinois 60631 (773) 399-0112

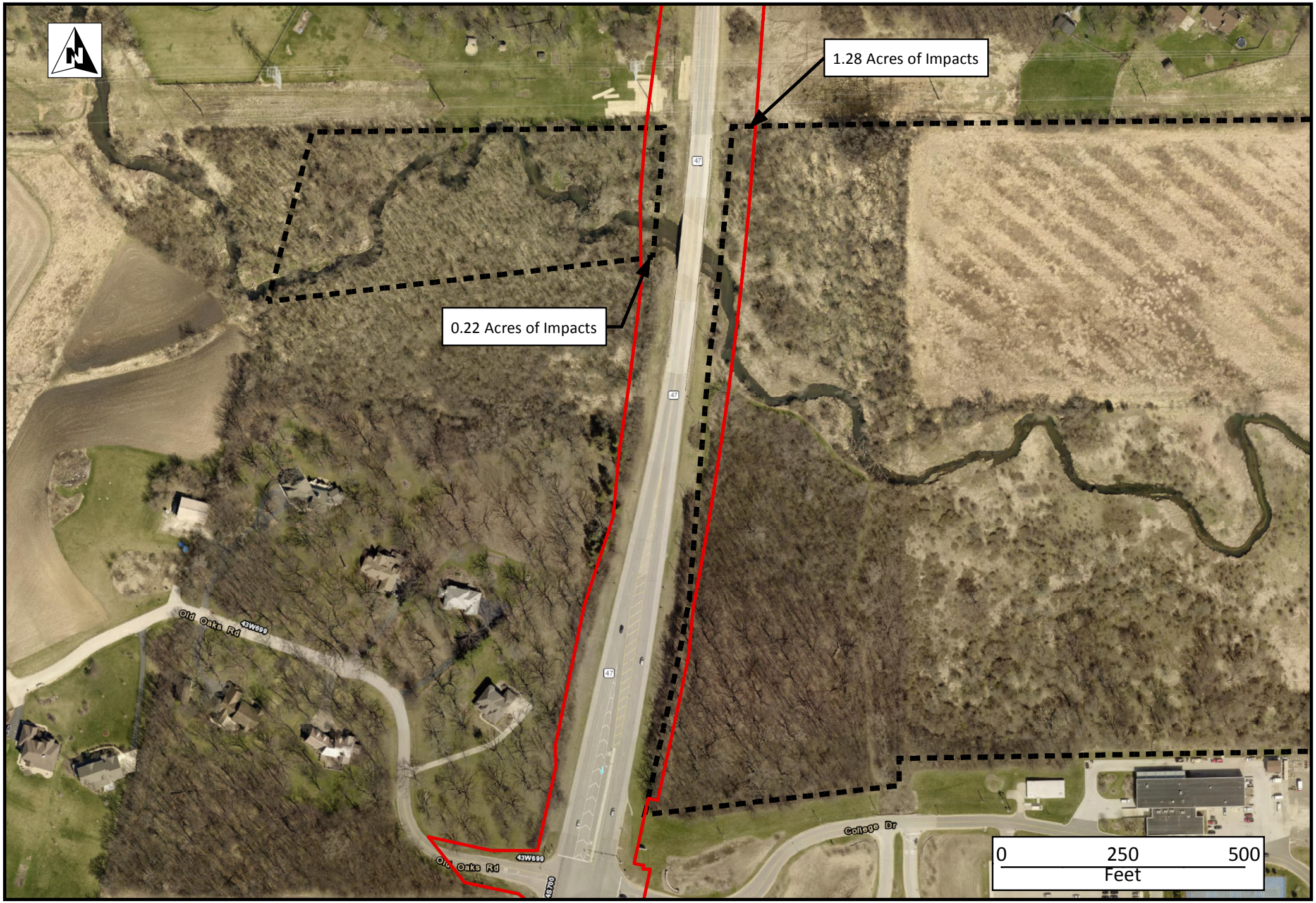
USER NAME = _USER_	DESIGNED - JWB	REVISED -	
	DRAWN - JWB	REVISED -	
PLOT SCALE = 50.0000 ' / in.	CHECKED - PMJ	REVISED -	
PLOT DATE = 2/8/2018	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

IL ROUTE 47 AT I-88 INTERCHANGE
SECTION 4(f) IMPACTS

SCALE: SHEET OF SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	14-00028-00-CH	KANE		1
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



Sugar Grove Parkway
IL 47
Interchange at I-88

4(f) Property Location
Proposed ROW

Section 4(f) De Minimis Documentation
For IL 47 / I-88 Interchange and Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

Appendix E

Photographs

Section 4(f) *De Minimis* Documentation
For IL 47 / I-88 Interchange and Widening
Hannaford Woods/Nickels Farm Forest Preserve
5S002 Merrill Road
Sugar Grove, IL 60554

Photo 1: Looking northeast at Old Oaks Road.

Photo 2: Looking east from IL 47.

Photo 3: Looking northeast at Blackberry Creek.

Photo 4: Looking west at Blackberry Creek.

VILLAGE PRESIDENT
P. Sean Michels

VILLAGE ADMINISTRATOR
Brent M. Eichelberger

VILLAGE CLERK
Cynthia Galbreath

VILLAGE TRUSTEES

Sean Herron
Mari Johnson
Ted A. Koch
Heidi Lendi
Rick Montalto
David Paluch

Project and Environmental Studies
IL 47 at I-88
Old Oaks Road/Waubonsee Drive to Green Road
Kane County

February 9, 2018

Mr. Jerry Culp
Director of Planning & Development
Forest Preserve District of Kane County
1996 South Kirk Road, Suite 320
Geneva, IL 60134

Dear Mr. Culp:

The Illinois Department of Transportation (Department) is nearing completion of preliminary engineering and environmental studies (Phase I) for the proposed improvement to the Illinois 47 (IL 47) interchange with Interstate 88 (I-88). The Village of Sugar Grove is leading this Phase I study in partnership with the Department, Kane County, and the Illinois Tollway. The purpose of the proposed project is to improve system linkage and accommodate land use and economic development. The general scope of work for this improvement is anticipated to consist of roadway widening and reconstruction along IL 47 from Old Oaks Road/Waubonsee Drive to Green Road and improvement to the interchange with I-88 to provide access to and from the east.

As discussed in meetings with the Forest Preserve District of Kane County (FPDKC) on September 13, 2016, June 15, 2017, and November 21, 2017, as well as presented at the December 14, 2017 Public Hearing, the IL 47 at I-88 Interchange improvement will impact FPDKC property. As this project is being processed to utilize federal funds, the FPDKC property is eligible for protection under federal regulations 23 U.S.C. 138 and 49 U.S.C. 303, which were originally enacted as Section 4(f) of the Department of Transportation Act of 1966 and are still commonly referred to as "Section 4(f)." Section 4(f), now implemented under 23 CFR 774, is the federal act that protects publicly owned parks, recreation areas, and wildlife and waterfowl refuges. The Department anticipates a *de minimis* impact finding for the FPDKC property, based on the determination that the project will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f). The Federal Highway Administration has evaluated the impacts and has determined that the impacts qualify for a *de minimis* processing. The purpose of this letter is to request the FPDKC concurrence that no adverse effects will occur to publicly owned lands maintained by the FPDKC as a result of the IL 47 at I-88 Interchange improvement.

10 S Municipal Dr
Sugar Grove, Illinois 60554

www.sugargroveil.gov

Phone (630) 466-4507
Facsimile (630) 391-7210

The impacts to the Hannaford Woods/Nickels Farm Forest Preserve are near the IL 47 bridge over Blackberry Creek. Due to the proposed widening of IL 47, right-of-way is needed to construct additional through lanes. The right-of-way acquisition was minimized by use of a narrowed (18') median on the bridge over Blackberry Creek. Additionally, steeper side slopes and retaining walls are proposed to the extent practicable. This modified design minimizes the footprint of the roadway improvement and lessens the necessary acquisition, while still accomplishing the purpose of the project.

At the request of the FPDKC accommodations for a shared use path is included in the project in the vicinity of the Blackberry Creek bridge. The path is proposed to be placed underneath the bridge on the north side of Blackberry Creek and will extend along the east side of IL 47.

The Department will be acquiring approximately 1.74 acres of fee simple right-of-way for the construction of the proposed roadway widening, shared use path, associated drainage, and grading. See "Section 4(f) Impacts" exhibit for the plan view.

The Department has determined that the impacts of this transportation project on the Hannaford Woods/Nickels Farm Forest Preserve qualify for *de minimis* as outlined in 23 CFR 774 because:

1. The transportation use of the Section 4(f) Resource, together with the impacts and mitigation measures incorporated into the project, does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f).

2. The FPDKC, with jurisdiction over Hannaford Woods/Nickels Farm Forest Preserve, has been informed by the Department about the *de minimis* impact findings at a meeting on November 21, 2017, that the project will not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f).

3. The public was afforded the opportunity to review and comment on the Section 4(f) impacts on the Hannaford Woods/Nickels Farm Forest Preserve during a Public Hearing held on December 14, 2017, and a public comment period held from November 30, 2017 through January 19, 2018. One public comment regarding the Section 4(f) property was received.

As condition of the concurrence, the Department will add a Special Design and Construction Consideration to the Combined Design Report regarding the following as discussed at the June 15, 2017 and November 21, 2018 meetings:

> The Department will continue to coordinate with the FPDKC about the shared use path. Local cost participation and maintenance will be required.

By signing this letter, the FPDKC concurs with the determination that the IL 47 at I-88 Interchange improvement will not have an adverse effect on the activities, features, and attributes that qualify the properties described in the enclosure for protection under Section 4(f). The FPDKC acknowledges that the Federal Highway Administration will use this concurrence as the basis for making a *de minimis* finding for each of the properties impacted and described in the enclosure.

Please review the enclosed *de minimis* documentation and public comment documentation for a more detailed description of the Section 4(f) properties that will be affected. If the FPDKC concurs with the determination of no adverse effect to the activities, features, and attributes that qualify the resources for protection under Section 4(f), please sign one copy of this letter and return it to the Department. The second copy is for your files.

At the completion of the Phase I study, the Department will begin Phase II, contract plan preparation and right-of-way acquisition. At that time, your agency will be contacted by the Department about the acquisition of the 1.74 acres needed for highway purposes. Your signature on this letter in no way affects any future negotiations with the Department for land being acquired.

If you have any questions or need additional information, please contact Peter Johnston, the project manager for the consultant team, at (773) 399-5443.

Very truly yours,

P. Sean Michels /AB

P. Sean Michels
President

Enclosure

Project and Environmental Studies
IL 47 at I-88
Old Oaks Road/Waubonsee Drive to Green Road
Kane County

Concurrence on determination of no adverse effects to
Forest Preserve District of Kane County 4(f) lands

Concur _____

Do Not Concur _____

Name Jerry Culp

Title Director of Planning + Dev.

Date 2/16/18

Comments _____

From: Bochte, Kyle
To: Johnston, Peter
Cc: Smith, Corey J.; Schilke, Steven E; Elizabeth Serdynski
Subject: FW: [External] RE: IL 47 at I-88 | De Minimis Concurrence
Date: Monday, March 19, 2018 9:10:19 AM

Good Morning Pete,

Please see the below correspondence with FHWA concurring to a de minimis impact of Hannaford Woods/Nickels Farm Forest Preserve. As Corey mentioned on Friday please include where appropriate.

Thanks,
Kyle

From: Qudus, Omar [mailto:omar.qudus@dot.gov]
Sent: Monday, March 19, 2018 7:34 AM
To: Bochte, Kyle <Kyle.Bochte@Illinois.gov>; Fuller, Matt <matt.fuller@dot.gov>
Cc: Schilke, Steven E <Steven.Schilke@illinois.gov>; Smith, Corey J. <Corey.Smith@Illinois.gov>; Sherrill, John <John.Sherrill@Illinois.gov>; Ruiz, Vanessa V <Vanessa.Ruiz@illinois.gov>
Subject: [External] RE: IL 47 at I-88 | De Minimis Concurrence

March 19, 2018

IL 47 from Old Oaks Road to Green Road, Sugar Grove, Kane County, Illinois, will result in the use of the Hannaford Woods/Nickels Farm Forest Preserve, a Section 4(f) resource. FHWA hereby makes a de minimis impact finding for this use as it will not adversely affect this resource's activities features and attributes. The de minimis impact finding is based upon the impact avoidance, minimization, and mitigation or enhancement measures detailed in the documentation submitted on March 15, 2018.

Omar A. Qudus, P.E.
Acting Field Engineering Manager
FHWA- IL Division
3250 Executive Park Drive
Springfield, Illinois 62703
(217) 492-4634

From: Bochte, Kyle [mailto:Kyle.Bochte@Illinois.gov]
Sent: Thursday, March 15, 2018 10:38 AM
To: Qudus, Omar <omar.qudus@dot.gov>; Fuller, Matt (FHWA) <Matt.Fuller@dot.gov>
Cc: Schilke, Steven E <Steven.Schilke@illinois.gov>; Smith, Corey J. <Corey.Smith@Illinois.gov>; Sherrill, John <John.Sherrill@Illinois.gov>; Ruiz, Vanessa V <Vanessa.Ruiz@illinois.gov>
Subject: IL 47 at I-88 | De Minimis Concurrence

IL 47 at I-88
Old Oaks Road/College Drive to Green Road

P-91-015-14
Sugar Grove
Kane County

Good Morning Omar and Matt,

We are seeking FHWA concurrence on a de minimis regarding the impact to Hannaford Woods/Nickels Farm Forest Preserve for the above mentioned project. For your reference I have attached the final Section 4(f) De Minimis Document.

The owner with jurisdiction (OWJ) is the Forest Preserve District of Kane County (FPDKC). The impact was extensively coordinated with the FPDKC at one-on-one meetings on 9/13/2016, 6/15/2017, and 11/21/2017, as well as presented at the 12/14/2017 Public Hearing. As you can see from the attached signed letter, the FPDKC concurred to a determination of no adverse effects on 2/16/2018.

Please let us know if you need anything else. We thank you in advance for your time and consideration.

Thanks,
Kyle

Kyle R. Bochte
Illinois Department of Transportation | Bureau of Programming
Consultant Studies Unit | Project Engineer
201 West Center Court | Schaumburg, IL 60196
Phone: (847) 705-4088
kyle.bochte@illinois.gov

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Sugar Grove Parkway (IL 47) Interchange
at the Reagan Memorial Tollway (I-88)
Improvement Study

Public Hearing
Short Summary

Prepared 12/15/2017

General Information

The public hearing for the Sugar Grove Parkway (IL 47) Interchange at the Reagan Memorial Tollway (I-88) was held on Thursday, December 14, 2017 at the Academic and Professional Center (APC) Event Room at Waubonsee Community College, IL Route 47 at Waubonsee Drive, Sugar Grove, IL 60554, from 4:00 PM to 7:00 PM. The meeting was conducted in an open house format. A public forum was held from 6:00 PM to 7:00 PM.

Attendees signed in and a brochure was provided. There were two rooms for attendees to learn more about the project. One room contained a continuous audio-visual presentation that described the project summary, provided the study process and schedule, outlined the alternative screening process, and described the alternatives carried forward. The second room contained more detailed information, comment forms, and project study team representatives. Information in the second room included exhibit boards and roll plot maps. A third room was utilized for the public forum. A court reporter for verbal comments was available in the second room from 4:00-6:00 PM and recorded verbal comments at the public form from 6:00-7:00 PM.

The purpose of the meeting was to attain public input on the project study including the Environmental Assessment (EA) and the impacts to the Section 4(f) Hannaford Woods/Nickels Farm Forest Preserve (Kane County Forest Preserve).

Attendees were provided an opportunity to speak with representatives from the Village of Sugar Grove, The Illinois Department of Transportation (IDOT), Kane County, and the Illinois Tollway. The meeting was attended by ninety-eight (98) people.

Attendees

Public Officials

The following public officials were in attendance:

- State Representative, Bob Pritchard
- Sean Michels, Village of Sugar Grove
- Fred Dornback, Blackberry Township Supervisor
- John Larkin, Kaneville Trustee and Kaneville Fire Protection District
- John Nevenhoven, Village of Elburn
- Bill Grabarsk, Village of Elburn
- Tom Rowe, Sugar Grove Township Supervisor
- Jim Michels, Blackberry Township
- Rod Feece, Blackberry Township Highway Commissioner

Media

Chris Walker, Kane County Chronicle

Other Agencies/Organizations

Additional agencies/organizations attending included:

- Art Nicholas, CMAP
- Jason Wald, Pace Bus
- Pat Rollins, Sugar Grove Police Department
- Assistant Chief Wayne Parson, Sugar Grove Fire Protection District
- Walter Magdziarz, Village of Sugar Grove
- Gary Kecskes Sugar Grove Economic Development Corporation
- Tom Reynolds, Elburn and Countryside Fire Protection District
- Lisa Enberg, Elburn and Countryside Fire Protection District
- Joe, Cluchey Elburn and Countryside Fire Protection District
- Pete Adams, Waubonsee Community College
- Dave Sigmund, Kaneville Fire Protection District
- Todd Leden, Kaneland School District 302

Businesses

Jennifer Cowan from Crown Community Development presented a letter to the Tollway for the hearing record regarding access control on IL 47 from the interchange to Seavey Road.

Comments

Fourteen (14) comment forms were received at the meeting. Comments can continue to be submitted and included in the public meeting record until January 19, 2018. There were approximately ten (10) comments given at the public forum. The topics include the following:

General Support or Opposition to Preferred Alternative

- Support Project due to Travel Time Savings and Reduces IL 47 congestion
- Support for the No-Build Alternative
- Like the improvements to IL 47 north of the interchange

Schedule/Implementation

- Build the improvements soon
- Safety concerns regarding the interchange moving forward and the IL 47 project being delayed
- Desire the interim improvement to the interchange extend on IL 47 to the proposed U-turn

Safety

- Safety concerns regarding traffic control devices at Local Street Intersections with IL 47
- Safety concerns regarding the speed of truck traffic on hills; wanting right turn lanes
- Safety concerns regarding the location of the bike path on the IL 47 bridge over I-88

Access and Other

- Want more access to IL 47 from adjacent land use
- Do not want Finley Road access restricted to IL 47
- Want to Realign Merill Road to align with opposing cross street
- Want Emergency Vehicle Accommodations at Finley to access interchange
- Want Emergency Vehicle Access to Restricted Access Side Streets
- Want Emergency Vehicle Accommodations at U-Turn
- Desires to restrict adjacent land uses and development

Comments

Agency

1. United States Army Corps of Engineers
2. United States Army Corps of Engineers
3. United States Army Corps of Engineers
4. United States Environmental Protection Agency

Received at Meeting

5. Michael Anderson
6. Donna Baughman
7. Kurt Heims
8. Mary Heims
9. Gary Kecskes
10. Chris Kruse
11. Kathryn Kruse
12. C. David Livengood
13. C. David Livengood
14. Wayne Parson
15. Dave Sigmund
16. Unknown
17. Jennifer Cowan

Open House Comments

18. Scott Martens
19. Gary Kecskes
20. Wayne Parson
21. Walter Magdziarz
22. Brian Smith

Public Forum Comments

23. Jennifer Cowan
24. Dan Ryan
25. Peter Baughman
26. Diane Spehar
27. Michael Anderson
28. Debbie Stober
29. Jody Leonard
30. Fred Morelli
31. Michael Anderson
32. Bill Suhayda

Emailed Comments

33. Jeff Patula
34. Tony Crabb
35. George Palatine

Response to EA Comments
C = Comment R = Response
All comments listed below have been incorporated into the project record

#	Agency		Comment / Response
1	U.S. Army Corps of Engineers (USACE)	C	In the permit application, proposed impacts should be presented as either permanent or temporary and each impact should be described. Avoidance and minimization should also be discussed for each impact. The project proposes to replace a bridge over Blackberry Creek and extend a culvert located within Seavey Road Run. The information in the permit application will need to contain information on the stream channel width, as well as a stream channel cross section taken upstream, at and downstream of the bridge and culvert. These cross sections will need to show the proposed structures. In addition, while the project does not call for a full replacement of the culvert, the Corps had previously noted that the culvert is currently accommodating base flow throughout the three cells. Should the applicant decide to replace the culvert, the new culvert shall be designed so that only the center cell accommodates the base flow.
		R	This coordination will occur with the USACE during the 404 Permitting coordination.
2	U.S. Army Corps of Engineers (USACE)	C	The BMP information provided in the EA lacks details. The permit application will need to provide a detailed BMP proposal that includes information on what efforts were made to mitigate the direct and indirect degradation of surface water quality from the project. Please make sure to label all wetlands and streams in the BMP proposal.
		R	This will occur with the USACE during the 404 Permitting coordination.
3	U.S. Army Corps of Engineers (USACE)	C	The EA indicates that a mitigation ratio of 1.5:1 will be applied to all non-ADID wetlands and a mitigation ratio of 3:1 will be applied to ADID wetlands, except for Site 8 where the proposed mitigation ratio goes up to 5.5:1. There are instances where a mitigation ratio of 6:1 is applied for ADID wetlands depending on the type of ADID classification. Note that stream mitigation will be required for areas that are considered stream loss.
		R	This coordination will occur with the USACE during the 404 Permitting coordination.
4	U.S. Environmental Protection Agency (USEPA)	C	In our scoping comments, we provided comments relating to water quality, wetlands, stormwater management, consultation records, reuse of construction materials, and reseeding using native grasses. We appreciate FHWA and IDOT addressing each of our scoping comments in the EA. We commend FHWA and IDOT for committing to a reduced footprint at the Blackberry Creek crossing and where the project encroaches on the Hannaford Woods/Nickels Farm Forest preserve. We concur with the commitment to install a wildlife crossing, to use pollinator-friendly plants, and to use best management practices for stormwater management, air quality, and erosion control. Based on our review of the EA, we have no further comments.

		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.

#	Individual		Comment / Response received at Meeting
5	Anderson, Michael	C	The goal is for traffic to flow efficiently down Rt. 47 to/from the Tollway. I feel it would be necessary to have southbound turn lanes into Willow Creek and Nottingham Woods, or at least a paved shoulder. As well, I see a need for Willow Creek to have at least one left turn lane on the northbound side to keep everyone moving safely and efficiently. Also, people cutting through from Green Rd. southbound turning onto southbound Rt. 47 are going to be severely exposed to southbound trucks. A traffic signal at Green Rd should be considered in the future or at least 4 lanes to help make that transition better.
		R	Thank you for your comments regarding turn lanes to and from Willow Creek Drive/Nottingham Woods and the implementation of a traffic signal at Green Road. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. The Illinois Department of Transportation (Department) will continue to monitor this location and if a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time. The Project Study Group is adding right turn lanes for southbound traffic traveling into Nottingham Woods subdivision. A signal warrant analysis was done during this project study, and the current and projected traffic volumes did not warrant a traffic signal at Green Road. The Department continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate.
6	Baughman, Donna	C	Major concern is traffic control along Rt. 47. Stop signs will not be sufficient to allow left and right turns onto Rt 47 from the side roads. Example, a left turn onto Rt. 47 from Seavey will require crossing 4 lanes of traffic, in addition to a turn lane. This is a huge safety issue!
		R	Thank you for your comments regarding traffic control access to IL 47, specifically turning movements from the side roads. A signal warrant analysis was done during this project study, and the current and near term projected traffic volumes do not warrant a traffic signal at Seavey Road. The Illinois Department of Transportation (Department) continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate.
7	Heims, Kurt	C	I fully support this project. It will significantly help with travel toward the city. I work in Downers Grove, so it will cut down on travel time from

			Maple Park. It would also ease future congestion along Galena and Rt. 47 going north.
		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.
8	Heims, Mary	C	I support this project completely. It will save me time when going east to visit family and Chicago.
		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.
9	Kecskes, Gary	C	Get it done! The sooner the better. Thank you. Nice Job.
		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.
10	Kruse, Chris	C	The southern terminus of the interchange should extend south of the u-turn and include the stacking and turning lanes at the u-turn and at the Finely Road Left Turn Lane. Whether or not the southern edge is extend south (above) options of the transitions between the interchange project (initial phase) and the existing/remaining Rt. 47 should be studied and presented for public review and comment. The reality is that this condition is likely to be in use for years. The parcel between Finley, Rt. 47, I-88 and Seavey should remain non-commercial and should ideally be developed as open park land.
		R	Thank you for your comments to extend the terminus of the interchange south of the U-turn and the parcel between Finley Road, IL 47 and Seavey Road should remain non-commercial. The Illinois Department of Transportation (Department) and Illinois Tollway (Tollway) are currently coordinating building the interchange and the add lane project as separate projects. The Tollway will develop a plan that will meet safety and operational standards which may or may not include Finley Road. The Tollway is leading Phase II, contract plan preparation, for the interchange portion. The IL 47 improvements are currently not included in the Department's Proposed Highway Improvement Program. However, this project will be included in our priorities for future funding consideration among similar improvement needs throughout the region. Once funding is identified, Phase II, land acquisition and contract plan preparation, typically takes two years to complete. Phase III, construction and construction engineering, typically takes two to three years to complete. According to the Village of Sugar Grove – Final Future Land Use Plan North Amendment – Approved 11-18-14, the area for the southwest corner of the Interchange is planned for commercial development.

11	Kruse, Kathryn	C	The Interchange Project and the improvements/widening of Rt. 47 from Finley Rd. to Scott Rd. are two separately funded projects with different timelines. This was not made clear in the drawings. If the interchange project is funded and approved, the improvements to Rt. 47 from the interchange to Scott Rd. must be done at the same time. It will be dangerous to turn left from Finley onto Rt. 47 with all the additional traffic the interchange will bring. Access from Finley Rd to Rt. 47 north and south, and from Rt. 47 turning onto Finley from both north and south must continue to be available for residents to get in and out of neighborhoods. It is not acceptable to block access to/from Finley Rd. The Forest Preserve on SE side of the proposed Interchange should not be used for commercial business. The farmland on southwest corner of the Interchange (along Finely Rd) should never be developed. It should be left as wetland/farmland.
		R	Thank you for comments regarding separate funding for the interchange project and the IL 47 roadway improvements, access to and from Finley Road at IL 47, commercial usage on the southeast side of the proposed interchange, and future development at the southwest corner of the Interchange. The Illinois Department of Transportation (Department) and Illinois Tollway (Tollway) are currently coordinating building the interchange and the add lane project as separate projects. The Tollway will develop a plan that will meet safety and operational standards which may or may not include Finley Road. The Tollway is leading Phase II, contract plan preparation, for the interchange portion. The IL 47 improvements are currently not included in the Department's Proposed Highway Improvement Program. However, this project will be included in our priorities for future funding consideration among similar improvement needs throughout the region. Once funding is identified, Phase II, land acquisition and contract plan preparation, typically takes two years to complete. Phase III, construction and construction engineering, typically takes two to three years to complete. Currently the proposed preferred alternative has a ¾ access at Finley Road. The restricted movement, eastbound Finley Road to northbound IL 47, will be accommodated by a U-turn south of Finley Road. According to the Village of Sugar Grove – Final Future Land Use Plan North Amendment – Approved 11-18-14, the area for the southeast corner of the Interchange is planned for single family units and environmental areas. The area for the southwest corner of the Interchange is planned for commercial development.

12	Livengood, C. David	C	The current design for a bike/pedestrian path is a disaster waiting to happen. Asking walkers and bikers to cross entrance ramps, including the free-flowing loop for westbound I-88 cannot be done. You must find a better solution. Underpass bridges?? Don't wait until someone is killed and then try to retrofit.
		R	Thank you for your comments regarding safety along the pedestrian/bike path across the interchange ramps. The proposed multi-use path is designed based on our policies and procedures while also minimizing impacts and is based on future and existing land use needs.
13	Livengood, C. David	C	The best option would be to align Merrill Rd. with Scott Rd. and have a single intersection with a stop light. If that isn't done, a light should be planned for Merill Rd. It is already difficult to turn left from Merill onto IL 47 due to traffic. That can be expected to worsen, and accidents are sure to happen. A light should be installed at Green Rd. for the same reason.
		R	Thank you for comments regarding a single intersection connection of Merrill Road, Scott Road and IL 47. According the Village of Sugar Grove – Final Future Land Use North Amendment Approved 11-18-14, there will be a future roadway that connects Merrill Road and Scott Road at a separate intersection, with the existing intersection at Merrill Road and IL 47 to be removed. A signal warrant analysis was done during this project study, and the current and near term projected traffic volumes did not warrant a traffic signal at Green Road and Merrill Road. The Illinois Department of Transportation (Department) continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate.
14	Parson, Wayne	C	Need emergency access at Thornapple Tree Rd and North Thornapple Tree Rd. Enlarge turn around at Finley Rd. big enough for Fire Engine.
		R	Thank you for your comments regarding emergency vehicle access at Thornapple Tree Road, and a larger turn around for emergency vehicle access at Finley Road. The median at Thornapple Tree Road and North Thornapple Tree Road will be mountable and emergency vehicles will be permitted to traverse the median at these locations. Regarding a larger turn around at Finley Road for emergency, the Illinois Department of Transportation (Department) will make accommodations for emergency vehicle access to and from Finley Road. A section of the median in this location will be mountable for emergency vehicle access only.
15	Sigmund, Dave	C	Access road to Finley to go northbound with fire emergency vehicles. Move barricade allow emergency vehicles to go left to access 47 (emergency vehicles only)
		R	Thank you for your comments. The Illinois Department of Transportation (Department) will make accommodations for emergency vehicle access to

			and from Finley Road. A section of the median in this location will be mountable for emergency vehicle access only.
16	Wood, David	C	I very much like the design as shown this evening. I especially like the widening of Rt. 47 north to Green Road. These improvements should have been done long ago and can't be completed soon enough.
		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.
17	Unknown	C	The interchange is not needed or wanted. Prefer the no-build option.
		R	Thank you for your comments. We acknowledge your preference for the no-build alternative.
18	Cowan, Jennifer	C	Dear Mr. Bedalov, Crown Community Development is requesting access control variances to the Illinois Tollway's minimum access control distance specified in the Tollway's Interchange and Roadway Cost Share Policy dated October 2012. These variances are critical to ensuring future commercial economic growth anticipated to occur on Crown's property as a result of the interchange completion. We are submitting a request for these needed variances as part of the public record. With the preferred design alternative receiving NEPA concurrence and the Phase 1 Study nearing completion, now is the time to ensure that right-in right-out access rights to the parcels located in the NE and NW quadrants are preserved. This preservation of access is additive in fostering economic growth in the area, one of the priorities identified in the Phase 1 Purpose and Need Statement. It is our understanding that access control along Route 47 property frontage in the vicinity of the interchange is dictated by Tollway policy. The current policy restricts access for 1050' under 55 mph design condition in the Phase 1 study. There are two concerns with this restriction. 1. When Crown's land north of the interchange is developed, the character of the area converts rural to urban, resulting in the ultimate reduction in posted speed limits, and over restriction of access rights. 2. Once access restrictions are recorded on the Highway Plat, it is very challenging, if not impossible to modify to a less restrictive requirement. Given these concerns, we are seeking access variances as depicted on the approved Feasibility Study Exhibit 6. Specifically, a 625' variance for right-in right -out access to our property in the NE quadrant of the interchange and a 750' variance for a right-in right out access to our property located in the NW quadrant of the interchange. The NE quadrant access variance provides the additional benefit of siphoning traffic that would otherwise

			burden the Seavey Road/Route 47 intersection, improving traffic flow through the corridor.
		R	Thank you for your comments inquiring about a variance to the Tollway's access control policy regarding Illinois Route 47 near Seavey Road. Access control is the condition where the public authority regulates the right of adjacent owners to have access to and from a public highway. To ensure safe traffic movements to and from the Interstate 88 at Illinois Route 47 ramp intersections, access control was acquired by the Tollway in 1971 through the purchase of narrow strips of land along IL-47 from the interchange north to Seavey Road. In order to ensure safety, requests for modifications to existing access control will require an analysis of future traffic conditions and processing the request through the Tollway's Excess Property Policy. A traffic analysis will need to be conducted and submitted to the Tollway contingent on the proposed development. This analysis will be evaluated to better understand how the reduction in existing access control limits could impact the functionality of our system. Further information is needed in order for the Tollway to fully evaluate a request for access point within established access limits. The Tollway wants to ensure that any alterations to our system take into account both the existing conditions and future proposed improvements. In a parallel process, the requester would have to pursue obtaining rights to the Tollway's property via the procedure outlined in the Tollway's Excess Property Policy. In abidance with this policy, a formal request with the outlined materials and a letter of concurrence from the Village are needed. Approval of the land transfer will be contingent on several things including the traffic analysis. Should you have any further questions about the policies or required materials, you are encouraged to work with the Village to reach out to Tollway staff for more information.

#	Individual		Comment / Response received at Open House
19	Martens, Scott	C	I live in Willow Creek Subdivision. Speed limit right now is 55. People are doing 60, 65 coming down the hill headed south. With all that extra traffic we'll never get on. The speed limit needs to be reduced. That's one comment. And the second one, relatively speaking there are a lot of accidents at the corner of Willow Creek and 47, rear end, maybe one a year. That's quite a bit for that little intersection. Increased traffic, people turning left waiting for all the new traffic coming south, you're going to have more rear ends without a turn lane. You need a turn lane in that subdivision. Probably need a turn lane into Green Road, too, to the east. A lot of traffic goes in there. There's going to be rear ends. That's all.
		R	Thank you for your comments regarding the speed limit and additional turn lanes at Willow Creek Drive and Green Road. As required by the Illinois Department of Transportation (Department) Policy, a speed study would be required to reduce the speed on IL 47 and follow current Department Policy on speed limits. After the project is implemented, the Department will respond to speed study requests. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. Similarly, a southbound left turn lane to Green Road is not warranted at this time. The Department will continue to monitor this location and if a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time.
20	Kecskes, Gary	C	Get it built, the sooner the better. Waiting way too long. Absolutely. Hope to see it happen.
		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.
21	Parson, Wayne	C	We need an emergency access at Thornapple Tree Road and North Thornapple Tree. They've closed those roads off where we can't get in and out to go back and forth north and south. It makes it -- for the ambulance we don't have any way to go back and forth to the hospital going through there. Just a single lane, an emergency access is all we need. Nothing special.
		R	Thank you for your comments regarding emergency vehicle access at Thornapple Tree Road. The median at Thornapple Tree Road and North Thornapple Tree Road will be mountable and emergency vehicles will be permitted to traverse the median at these locations.
22	Magdziarz, Walter	C	I'm the Community Development Director for the Village of Sugar Grove. Being responsible for cultivating economic development in Sugar Grove I

			understand the limitations of proximity and limited access that this area of Sugar Grove possesses. The proposed interchange at Illinois 47 widening project is a needed public investment. The recommended interchange improvement will stimulate the local economy by providing access to the tollway for land that is inaccessible to the market trade area. It will also increase public travel convenience, particularly for the population to the north, as it will permit Illinois 47 to provide direct access to eastbound I88. The recommendations for widening Illinois 47 in the study area will improve safety along the highway which has implications for economic development as well. I support the recommendations for minimizing the road widening impact on forest preserve lanes along Illinois 47 as well as the accommodation of pedestrian bicycle transportation in the corridor. The recommendations for the interchange are consistent with the Sugar Grove conference and plan, the transportation plan and the future land use plan.
		R	Thank you for your comment. We appreciate your support for the project and look forward to your continued participation.
23	Smith, Brian	C	To increase the impact area north of Green Road to include Willow Creek Drive and to add a turn lane off of 47 onto Willow Creek Drive due to accidents and traffic flow, I mean, basically backing up traffic and we already have accident problems turning into Willow Creek Drive off of 47 and we fear with the increase of traffic flow and the impact area not including Willow Creek Drive that there's going to be more accidents. So the lanes cut down just before Green Road on the plan and it goes back to a single lane road right at Willow Creek Drive.
		R	Thank you for your comments regarding turn lanes at Willow Creek Drive. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. The Illinois Department of Transportation (Department) will continue to monitor this location and if a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time.

#	Individual		Comment / Response received at Public Forum
24	Cowan, Jennifer	C	I'm with Crown Community Development and I represent Crown's interest in the interchange as it pertains to our adjacent property. The phase one study exhibits indicated 10,050 feet of access control along our property frontage north and south of the interchange. It is Crown's understanding that access control is dictated by tollway policy and we are seeking an exception to access control limits north of the interchange. I would like to submit this letter to the public record which details our request and provides specifics in terms of the exception we are seeking. Thank you.
		R	Thank you for your comments inquiring about a variance to the Tollway's access control policy regarding Illinois Route 47 near Seavey Road. Access control is the condition where the public authority regulates the right of adjacent owners to have access to and from a public highway. To ensure safe traffic movements to and from the Interstate 88 at Illinois Route 47 ramp intersections, access control was acquired by the Tollway in 1971 through the purchase of narrow strips of land along IL-47 from the interchange north to Seavey Road. In order to ensure safety, requests for modifications to existing access control will require an analysis of future traffic conditions and processing the request through the Tollway's Excess Property Policy. A traffic analysis will need to be conducted and submitted to the Tollway contingent on the proposed development. This analysis will be evaluated to better understand how the reduction in existing access control limits could impact the functionality of our system. Further information is needed in order for the Tollway to fully evaluate a request for access point within established access limits. The Tollway wants to ensure that any alterations to our system take into account both the existing conditions and future proposed improvements. In a parallel process, the requester would have to pursue obtaining rights to the Tollway's property via the procedure outlined in the Tollway's Excess Property Policy. In abidance with this policy, a formal request with the outlined materials and a letter of concurrence from the Village are needed. Approval of the land transfer will be contingent on several things including the traffic analysis. Should you have any further questions about the policies or required materials, you are encouraged to work with the Village to reach out to Tollway staff for more information.
25	Ryan, Dan	C	My concern is there will be no left turn going north into Willow Creek. Now you've got to go two lanes, one is going to go -- the right lane is going to go into Green Road, the other is going to continue ahead. You have no left-turn lane there. You're setting up a situation for some nasty accident because already people when you're trying to make a left turn

			into Willow Creek trucks especially will pass you on the right, go off on the shoulder to do it. That's my complaint. Coming down the other way if you have any power as far as the speed limits, there's a long hill coming south from the stop sign up and there's a big curve and by the time they're at the top of the hill, and I know because I drove a truck many years ago, they're shifted into high gear already so by the time they come around that curve they're doing 55 and trying to get on to Willow Creek is a monster. I had to the other day, two days ago, pull off on the shoulder myself or take the chance of being run down by a tractor trailer. That's my comments.
		R	Thank you for your comments regarding the speed limit and additional turn lanes at Willow Creek Drive. As required by the Illinois Department of Transportation (Department) Policy, a speed study would be required to reduce the speed on IL 47 and follow current Department Policy on speed limits. After the project is implemented, the Department will respond to speed study requests. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. The Department will continue to monitor this location and if a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time.
26	Baughman, Peter	C	I am just concerned with the traffic control at the intersections in the affected area. Originally you were stating it was going to be considering stoplights and it appears now in the final plan there's nothing but stop signs at all of the intersections. I was talking to a few of the people next door and they're commenting that today's study, the traffic amount is not requiring anything other than stop signs. My concern is the improvement of the tollway intersection is going to immediately impact that traffic amount. I mean, we live in Red Oaks Subdivision and we come off on Seavey Road right now and it's difficult at times to make a left-hand turn from our two-lane street into the two-lane 47. We're going to have four lanes of traffic and a turn lane to cross with traffic preceding at approximately 55 or who knows what miles an hour and we're going to be taking a chance making a left-hand turn out on to 47. So I really think they need to reconsider the stop signs and put in some type of traffic control. Thank you.
		R	Thank you for your comments regarding traffic control at the intersections. A signal warrant analysis was done during this project study, and the current and near term projected traffic volumes do not warrant traffic signals along the corridor. The Illinois Department of Transportation

			(Department) continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate. As required by Department Policy, a speed study would be required to reduce the speed on IL 47 and follow current Department Policy on speed limits. After the project is implemented, the Department will respond to speed study requests.
27	Spehar, Diane	C	I live off of 47 in Nottingham Woods and my biggest concern is the speed and the fact that you're adding lanes and we've got semi-trucks, because that's why we're increasing this roadway is so we can accommodate the truck traffic, and the left-hand turn or right-hand turn going south is now down to a single lane instead of two lanes which was the original proposal and there were some comments made about being able to get out on to 47 going north from the multiple streets so now they've gotten rid of the median, they've painted it and so now you're going to still have trucks going 55 miles an hour because if they're coming southbound on 47th at the intersection of Main Street, which is now a four-way stop, I just saw a gentleman there, by the change next year that's going to become a major intersection. Between Main Street and Green Road it will be two lanes. By the time those trucks get to the top of the hill going south on 47 they are now doing 55, changing gears and going full speed and now you're telling me I want to make a right-hand turn at Midlothian or Nottingham Drive or Oak Leaf Drive and I've got a semi going 55 miles an hour behind me because I have no right-turn lane to get out of the way. Thank you.
		R	Thank you for your comments regarding the speed limit and turn lane access going southbound on IL 47 near Nottingham Woods. As required by the Illinois Department of Transportation (Department) Policy, a speed study would be required to reduce the speed on IL 47 and follow current Department Policy on speed limits. After the project is implemented, the Department will respond to speed study requests. The Project Study Group is adding right turn lanes for southbound traffic traveling into Nottingham Woods subdivision.
28	Anderson, Michael	C	I have to agree with the previous comment. I drive a semi for a living in that area and live there as well. So coming south on 47 there's a lot of potential for problems, one of them being that you're going from two lanes to four lanes increased speeds, increased volume in traffic, people turning right, and also bringing to that people coming off of Green Road, cutting through to get on southbound 47. I see a lot of potential for accidents. I think there needs to be maybe a consideration to widen 47 further up to the north and maybe even consider a traffic signal at Green Road so it's a safer interchange for anybody and also I know some of the neighborhood out there by Willow Creek or whatever it is has no turn lane going northbound. That's another concern I have. That's it. I know that's not pertaining to the tollway but future planning.

		R	Thank you for your comments to extend the IL Route 47 widening up to Green Road, to include a traffic signal at Green Road, and for access turn lanes at Willow Creek Drive. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. The Illinois Department of Transportation (Department) will continue to monitor this location and if a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time. The Project Study Group is adding right turn lanes for southbound traffic traveling into Nottingham Woods subdivision. A signal warrant analysis was done during this project study, and the current and projected traffic volumes did not warrant a traffic signal at Green Road. The Department continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate.
29	Stober, Debbie	C	I also live in Nottingham Woods, Mike's neighbor, who previously talked. I think another thing to add on to him is the school buses. We have a lot of school buses that come in and out of Nottingham Woods and Willow Creek and if they don't have a proper lane to turn, I work from home, so I hear cars honking at the semi drivers and all that so it's just -- I don't want four lanes, I want to live in the country, but if it needs protection I think we also need to look at it for school buses. Thank you.
		R	Thank you for your comments regarding turn lanes at Nottingham Woods and Willow Creek Drive. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. The Illinois Department of Transportation (Department) will continue to monitor this location and if a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time. The Project Study Group is adding right turn lanes for southbound traffic traveling into Nottingham Woods subdivision. A signal warrant analysis was done during this project study, and the current and projected traffic volumes did not warrant a traffic signal at Green Road. The Department continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate.
30	Leonard, Jody	C	I live in Hannaford Farm Subdivision off of Merrill Road and I was looking at the projected numbers for traffic flow 20 years from now and it is kind of alarming. Merrill Road will be a shortcut for anyone from the southeast who wants to get onto 88 east. Currently Merrill Road Ts into Bliss Road and anybody in the subdivisions around there and anybody

			else possibly to the east would definitely use Merrill Road as a shortcut and currently I think it says 1200 per day, the amount of traffic. That may go up as much as eight or nine times in the future and it's just a two-lane road as it stands and runs right by our subdivision and right between our subdivision and Hannaford Farm, the park district, not the park district but the -- what am I'm trying to say, the woods and the bike trails and people cross, walking across Merrill Road from either our subdivision to get to the nature preserve and I'm just concerned about when people find out this is a shortcut in the road and they will within a week it's going to be a really busy road and I'm hoping maybe Sugar Grove or IDOT will take into consideration the amount of stress that road is going to see as far as traffic and that's it.
		R	Thank you for your comments regarding Merrill Road. According the Village of Sugar Grove – Final Future Land Use North Amendment Approved 11-18-14, there will a future roadway that connects Merrill Road and Scott Road at a separate intersection, with the existing intersection at Merrill Road and IL 47 to be removed.
31	Morelli. Fred	C	We live off of Scott Road. We moved out here in 1972. Same house, same wife, and we moved out here because it was quiet and it was dark at night and I don't -- and I just don't see that continuing. It's gotten louder, it's gotten more lights and I just wonder if anything that anybody says here is going to make any difference or if the government is just going to steamroll over us all, which seems to be the program. I'm not a happy camper.
		R	Thank you for your comments. We acknowledge your preference for the no-build alternative.
32	Anderson, Michael	C	One more thing I was just thinking about was just the Green Road intersection with 47 and I'm just thinking, I mean, everybody wants to see traffic move swiftly through there and efficiently to the tollway and back and I'm just thinking, you know, as a truck driver, you know, if you've got a lot of people turning off of Green in the morning rush hour, a lot of Canton Hill people will probably be coming through on Green to access 47 to get to the tollway, I see a lot of potential accidents, you know, people trying to make that left to go south. It would be nice to see if there was some way to maybe further that four lanes a little more just to give a little more of a buffer zone for people coming out. Also the Willow Creek neighborhood, like I said, have a better access in and out of there, safer access and then everybody is moving smoothly. That's all.
		R	Thank you for your comments to extend the roadway widening past Green Road near Willow Creek Drive. The logical termini and project study limits were extended to Green Road due to the significant decrease in projected traffic north of Green Road. At this time, we noted no operational or safety concerns beyond Green Road or more specifically Willow Creek Drive. The Illinois Department of Transportation (Department) will continue to monitor this location and if

			a safety or operational issue is noted then appropriate countermeasures, such as channelization, will be reassessed at that time. The Project Study Group is adding right turn lanes for southbound traffic traveling into Nottingham Woods subdivision. A signal warrant analysis was done during this project study, and the current and projected traffic volumes did not warrant a traffic signal at Green Road. The Department continuously tracks traffic volumes, crash, and other data and identifies needs where appropriate.
33	Suhayda, Bill	C	My name is Bill Suhayda, last name is S-U-H-A-Y-D-A. I'm at 43 West 445 Thornapple Tree Road right on the corner of 47 and Thornapple Tree Road. Two concerns. Actually one or two concerns but if I can remember all of them. Noise abatement, quality of life, resale value of my house if the noise gets too much, too high and I anticipate the noise will get greater because we're going from two lanes to four and when a highway project like this is completed I would assume that industry will increase in the area which would also impact even a higher volume of traffic on the highway. So noise abatement is a concern. I have also been told that the trees I have along Route 47 which protects my house from any vehicles coming off the highway would be cleared, they would come off. So I have no buffer zone in terms of safety from any trucks that may come off or any cars that may come off. Anybody in the yard that -- and I have two granddaughters, if they are in the yard would be severely impacted obviously from anybody coming off that highway. So those are my concerns. Resale value if I decided to leave is also a concern of mine. Thank you.
		R	Thank you for your comments regarding noise abatement, quality of life, resale value of your home, and barrier protection if the trees along your property are removed. We would like to note that as part of this project, in conformance with FHWA requirements contained in Title 23 Code of Federal Regulations Part 772, the Illinois Department of Transportation (Department) conducted a highway traffic noise study which evaluated noise impacts within the project study limits. In order for a noise abatement measure to be constructed, it must meet both the feasibility and reasonableness criteria. Feasibility requires achievement of at least a 5 decibel traffic noise reduction at an impacted receptor. Reasonability is determined based on achieving three evaluation criteria which are the noise reduction design goal, cost effectiveness of the noise barrier (cost per benefitted receptor), and viewpoints of benefitted receptors. A benefitted receptor is defined as a recipient of a noticeable (five decibels or more) reduction in noise level as a result of the proposed wall.

			The noise barrier analysis indicated that the proposed noise wall did not meet the cost-effective (not reasonable) criteria and was therefore eliminated from further consideration. Any trees removed would be placed in kind in accordance with the Department's Tree Replacement policy.

	Individual		Comment / Response received by Email
34	Patula, Jeff	C	I would like to know who is procuring this project, and if it is the Tollway will there be tolls at this interchange?
		R	Thank you for your comments regarding the procurement of the project and if there will be tolls at the interchange. The project is being funded by the local agencies, the Illinois Tollway (Tollway), and the Illinois Department of Transportation (Department). At this time, the northbound to eastbound entrance ramp and the westbound exit ramp at the interchange are anticipated to be tolled. The rate of the tolls will be set by the Tollway and will be determined closer to the project construction date.
35	Crabb, Tony	C	My wife and I just recently purchased a house on Merrill road. We are concerned about the traffic, it seems like people don't know or don't care that the speed limit is 45mph and it is NOT enforced. We think that it will only get worse if the interchange goes in. Sugar Grove police can't enforce the speed limit on the roads with the traffic they have now. What are they going to do when the traffic gets heavier? We also have concerns about crime. It would be easy for people to exit the tollway rob the surrounding homes, and get back on the tollway.
		R	Thank you for your comments regarding the speed limit near Merrill Road and your concern for crime with the new interchange built. As required by the Illinois Department of Transportation (Department) Policy, a speed study would be required to reduce the speed on IL 47 and follow current Department Policy on speed limits. After the project is implemented, the Department will respond to speed study requests. No concerns or issues have been identified in terms of increased crime as a result of the proposed improvements.
36	Palatine, George	C	Hi. Just wondering if this project was approved and any rough timeline for development?
		R	Thank you for your comments regarding the status and timeline of the project. The Illinois Department of Transportation (Department) and Illinois Tollway (Tollway) are currently coordinating building the interchange and

			the add lane project as separate projects. The Tollway is leading Phase II, contract plan preparation, for the interchange portion. The IL 47 improvements are currently not included in the Department's Proposed Highway Improvement Program. However, this project will be included in our priorities for future funding consideration among similar improvement needs throughout the region. Once funding is identified, Phase II, land acquisition and contract plan preparation, typically takes two years to complete. Phase III, construction and construction engineering, typically takes two to three years to complete.

IN RE: THE MATTER OF:)
)
SUGAR GROVE PARKWAY)
)
PUBLIC HEARING)

PUBLIC HEARING
OPEN HOUSE COMMENTS
DECEMBER 14, 2017
4:00 P.M.

The Public Hearing Open House Comments regarding the Sugar Grove Parkway taken before Christine Golden, Certified Shorthand Reporter in the State of Illinois, at Waubonsee Community College, Route 47 and Waubonsee Drive, Sugar Grove, Illinois.

OPEN HOUSE COMMENTS:

No. 1: Scott Martens. I live in Willow Creek Subdivision. Speed limit right now is 55. People are doing 60, 65 coming down the hill headed south. With all that extra traffic we'll never get on. The speed limit needs to be reduced. That's one comment. And the second one, relatively speaking there are a lot of accidents at the corner of Willow Creek and 47, rear end, maybe one a year. That's quite a bit for that little intersection. Increased traffic, people turning left waiting for all the new traffic coming south, you're going to have more rear ends without a turn lane. You need a turn lane in that subdivision. Probably need a turn lane into Green Road, too, to the east. A lot of traffic goes in there. There's going to be rear ends. That's all.

No. 2. Gary Kecskes. Get it built, the sooner the better. Waiting way too long. Absolutely. Hope to see it happen.

No. 3. Wayne Parson. We need an emergency access at Thornapple Tree Road and North Thornapple Tree. They've closed those roads off where we can't get in and out to go back and forth north and south. It makes it -- for the ambulance we don't have any way to go back

and forth to the hospital going through there. Just a single lane, an emergency access is all we need. Nothing special.

No. 4. Walter Magdziarz. I'm the Community Development Director for the Village of Sugar Grove. Being responsible for cultivating economic development in Sugar Grove I understand the limitations of proximity and limited access that this area of Sugar Grove possesses. The proposed interchange at Illinois 47 widening project is a needed public investment. The recommended interchange improvement will stimulate the local economy by providing access to the tollway for land that is inaccessible to the market trade area. It will also increase public travel convenience, particularly for the population to the north, as it will permit Illinois 47 to provide direct access to eastbound I88. The recommendations for widening Illinois 47 in the study area will improve safety along the highway which has implications for economic development as well. I support the recommendations for minimizing the road widening impact on forest preserve lanes along Illinois 47 as well as the accommodation of pedestrian bicycle transportation in the corridor. The recommendations for the interchange are consistent with the Sugar Grove

conference and plan, the transportation plan and the future land use plan.

No.5. Brian Smith. To increase the impact area north of Green Road to include Willow Creek Drive and to add a turn lane off of 47 onto Willow Creek Drive due to accidents and traffic flow, I mean, basically backing up traffic and we already have accident problems turning into Willow Creek Drive off of 47 and we fear with the increase of traffic flow and the impact area not including Willow Creek Drive that there's going to be more accidents. So the lanes cut down just before Green Road on the plan and it goes back to a single lane road right at Willow Creek Drive.

(Which were all the open house public comments.)

STATE OF ILLINOIS)
) SS
COUNTY OF DUPAGE)

I, Christine Golden, CSR No. 84-2126 in and for the State of Illinois, do hereby certify that I reported in shorthand the proceedings at the public hearing of the above-entitled cause, and that the foregoing transcript is a true, correct and complete report of the entire proceedings so taken at the time and place hereinabove set forth.

_____
Christine Golden, CSR

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84-2126 5:3

IN RE: THE MATTER OF:)
)
SUGAR GROVE PARKWAY)
)
PUBLIC HEARING)

PUBLIC FORUM
COMMENTS
DECEMBER 14, 2017
6:00 P.M.

The Public Hearing Public Forum Comments regarding the Sugar Grove Parkway taken before Christine Golden, Certified Shorthand Reporter in the State of Illinois, at Waubonsee Community College, Route 47 and Waubonsee Drive, Sugar Grove, Illinois.

PRESENT:
MR. TICE COLE
Crawford, Murphy & Tilly.

MR. COLE: I guess I already announced this in the other room and they'll be streaming in, whoever wants to attend. Welcome everyone to the Public Forum for the Sugar Grove Parkway, Illinois Route 47 at the Reagan Memorial Tollway I88 interchange permit study. We will now provide some brief guidelines for the public forum and get started.

The purpose of tonight's forum is to provide an opportunity for anyone to publicly state their opinion about the interchange study. Any comments regarding this project are welcome. We have a court reporter here this evening and they will be documenting all the verbal comments made. This document will become part of the public hearing record.

In order to participate you must fill out the yellow sign-up form. If you would like to participate and have not already done so or have already not signed up please raise your hand and I will get you a form and pen, raise your hand and when you're finished I'll pick it up. I don't have any current forms. So if you are going to speak the way it works is you're going to come up and state your first and last name and spell your last name for the court reporter and then comments should be concise and two minutes.

The only form I have right now is from Bill and he is in the other room getting his questions answered. We'll see if he comes back with any comments after he gets those answers to his questions. Does anybody else want to sign up?

MS. COWAN: Hello. My name is Jennifer Cowan, J-E-N-N-I-F-E-R, C-O-W-A-N. I'm with Crown Community Development and I represent Crown's interest in the interchange as it pertains to our adjacent property. The phase one study exhibits indicated 10,050 feet of access control along our property frontage north and south of the interchange. It is Crown's understanding that access control is dictated by tollway policy and we are seeking an exception to access control limits north of the interchange. I would like to submit this letter to the public record which details our request and provides specifics in terms of the exception we are seeking. Thank you.

MR. COLE: Anybody else? We'll be here till 7:00 for anybody else that wants to make a public comment regarding the interchange study. Maybe other people from the other room will trickle in and want to make a comment. Anybody who wants to speak can do so now.

Hold on. You have to step up to the microphone

and we have a court reporter to my left.

MR. RYAN: Identify myself?

MR. COLE: Say your first and last name and spell your last name for the court reporter.

MR. RYAN: My name is Dan Ryan, R-Y-A-N. I live in Willow Creek. My concern is there will be no left turn going north into Willow Creek. Now you've got to go two lanes, one is going to go -- the right lane is going to go into Green Road, the other is going to continue ahead. You have no left-turn lane there. You're setting up a situation for some nasty accident because already people when you're trying to make a left turn into Willow Creek trucks especially will pass you on the right, go off on the shoulder to do it. That's my complaint.

MR. COLE: Okay.

MR. RYAN: Coming down the other way if you have any power as far as the speed limits, there's a long hill coming south from the stop sign up and there's a big curve and by the time they're at the top of the hill, and I know because I drove a truck many years ago, they're shifted into high gear already so by the time they come around that curve they're doing 55 and trying to get on to Willow Creek is a monster. I had to the

other day, two days ago, pull off on the shoulder myself or take the chance of being run down by a tractor trailer. That's my comments.

MR. COLE: Thank you.

MR. BAUGHMAN: My first name is Peter Baughman, B, like boy, A-U-G-H-M-A-N. Do you want my address or anything?

MR. COLE: No.

MR. BAUGHMAN: Okay. I am just concerned with the traffic control at the intersections in the affected area. Originally you were stating it was going to be considering stoplights and it appears now in the final plan there's nothing but stop signs at all of the intersections. I was talking to a few of the people next door and they're commenting that today's study, the traffic amount is not requiring anything other than stop signs. My concern is the improvement of the tollway intersection is going to immediately impact that traffic amount. I mean, we live in Red Oaks Subdivision and we come off on Seavey Road right now and it's difficult at times to make a left-hand turn from our two-lane street into the two-lane 47. We're going to have four lanes of traffic and a turn lane to cross with traffic preceding at approximately 55 or who knows what miles an hour and

we're going to be taking a chance making a left-hand turn out on to 47. So I really think they need to reconsider the stop signs and put in some type of traffic control. Thank you.

MR. COLE: Thank you.

MS. SPEHAR: My name is Diane Spehar, S-P-E-H-A-R, and I live off of 47 in Nottingham Woods and my biggest concern is the speed and the fact that you're adding lanes and we've got semi-trucks, because that's why we're increasing this roadway is so we can accommodate the truck traffic, and the left-hand turn or right-hand turn going south is now down to a single lane instead of two lanes which was the original proposal and there were some comments made about being able to get out on to 47 going north from the multiple streets so now they've gotten rid of the median, they've painted it and so now you're going to still have trucks going 55 miles an hour because if they're coming southbound on 47th at the intersection of Main Street, which is now a four-way stop, I just saw a gentleman there, by the change next year that's going to become a major intersection. Between Main Street and Green Road it will be two lanes. By the time those trucks get to the top of the hill going south on 47 they are now doing 55, changing gears

and going full speed and now you're telling me I want to make a right-hand turn at Midlothian or Nottingham Drive or Oak Leaf Drive and I've got a semi going 55 miles an hour behind me because I have no right-turn lane to get out of the way. Thank you.

MR ANDERSON: My name is Michael Anderson, spelled A-N-D-E-R-S-O-N. And I have to agree with the previous comment. I drive a semi for a living in that area and live there as well. So coming south on 47 there's a lot of potential for problems, one of them being that you're going from two lanes to four lanes increased speeds, increased volume in traffic, people turning right, and also bringing to that people coming off of Green Road, cutting through to get on southbound 47. I see a lot of potential for accidents. I think there needs to be maybe a consideration to widen 47 further up to the north and maybe even consider a traffic signal at Green Road so it's a safer interchange for anybody and also I know some of the neighborhood out there by Willow Creek or whatever it is has no turn lane going northbound. That's another concern I have. That's it. I know that's not pertaining to the tollway but future planning.

MR. COLE: Thank you.

MS. STOBER: I'm Debbie Stober, S-T-O-B-E-R. I also live in Nottingham Woods, Mike's neighbor, who previously talked. I think another thing to add on to him is the school buses. We have a lot of school buses that come in and out of Nottingham Woods and Willow Creek and if they don't have a proper lane to turn, I work from home so I hear cars honking at the semi drivers and all that so it's just -- I don't want four lanes, I want to live in the country, but if it needs protection I think we also need to look at it for school buses. Thank you.

MR. LEONARD: Hello, my name is Jodie Leonard. Last name L-E-O-N-A-R-D. I live in Hannaford Farm Subdivision off of Merrill Road and I was looking at the projected numbers for traffic flow 20 years from now and it is kind of alarming. Merrill Road will be a shortcut for anyone from the southeast who wants to get onto 88 east. Currently Merrill Road Ts into Bliss Road and anybody in the subdivisions around there and anybody else possibly to the east would definitely use Merrill Road as a shortcut and currently I think it says 1200 per day, the amount of traffic. That may go up as much as eight or nine times in the future and it's just a two-lane road as it stands and runs right by our

subdivision and right between our subdivision and Hannaford Farm, the park district, not the park district but the -- what am I'm trying to say, the woods and the bike trails and people cross, walking across Merrill Road from either our subdivision to get to the nature preserve and I'm just concerned about when people find out this is a shortcut in the road and they will within a week it's going to be a really busy road and I'm hoping maybe Sugar Grove or IDOT will take into consideration the amount of stress that road is going to see as far as traffic and that's it.

MR. COLE: Thank you.

MR. MORELLI: My name is Fred Morelli, M-O-R-E-L-L-I. We live off of Scott Road. We moved out here in 1972. Same house, same wife, and we moved out here because it was quiet and it was dark at night and I don't -- and I just don't see that continuing. It's gotten louder, it's gotten more lights and I just wonder if anything that anybody says here is going to make any difference or if the government is just going to steamroll over us all, which seems to be the program. I'm not a happy camper.

MR. ANDERSON: Michael Anderson, A-N-D-E-R-S-O-N. One more thing I was just thinking about was just the

Green Road intersection with 47 and I'm just thinking, I mean, everybody wants to see traffic move swiftly through there and efficiently to the tollway and back and I'm just thinking, you know, as a truck driver, you know, if you've got a lot of people turning off of Green in the morning rush hour, a lot of Canton Hill people will probably be coming through on Green to access 47 to get to the tollway, I see a lot of potential accidents, you know, people trying to make that left to go south. It would be nice to see if there was some way to maybe further that four lanes a little more just to give a little more of a buffer zone for people coming out. Also the Willow Creek neighborhood, like I said, have a better access in and out of there, safer access and then everybody is moving smoothly. That's all.

MR. COLE: Thank you.

MR. SUHAYDA: My name is Bill Suhayda, last name is S-U-H-A-Y-D-A. I'm at 43 West 445 Thornapple Tree Road right on the corner of 47 and Thornapple Tree Road. Two concerns. Actually one or two concerns but if I can remember all of them. Noise abatement, quality of life, resale value of my house if the noise gets too much, too high and I anticipate the noise will get greater because we're going from two lanes to four and when a highway

project like this is completed I would assume that industry will increase in the area which would also impact even a higher volume of traffic on the highway. So noise abatement is a concern. I have also been told that the trees I have along Route 47 which protects my house from any vehicles coming off the highway would be cleared, they would come off. So I have no buffer zone in terms of safety from any trucks that may come off or any cars that may come off. Anybody in the yard that -- and I have two granddaughters, if they are in the yard would be severely impacted obviously from anybody coming off that highway. So those are my concerns. Resale value if I decided to leave is also a concern of mine. Thank you.

(Which were all the comments made at the Public Forum.)

STATE OF ILLINOIS)
) SS
COUNTY OF DUPAGE)

I, Christine Golden, CSR No. 84-2126 in and for the State of Illinois, do hereby certify that I reported in shorthand the proceedings at the public hearing of the above-entitled cause, and that the foregoing transcript is a true, correct and complete report of the entire proceedings so taken at the time and place hereinabove set forth.

_____
Christine Golden, CSR

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ELBURN COMMUNITY DEVELOPMENT CORPORATION
Elburn, Illinois 60119

BUREAU OF PROGRAMMING
RECEIVED
JAN 30 2018
DISTRICT #1

January 24, 2018

Mr. Rocco Zucchero
Illinois Tollway Authority
2700 Ogden Avenue
Downers Grove, Illinois 60515

Mr. Anthony Quigley
Illinois Department of Transportation
201 Center Court
Schaumburg, Illinois 60195

Re: Tollway Interchange at Interstate 88 and Illinois Route 47, Elburn/Sugar Grove

Gentlemen:

The Elburn Community Development Corporation (the "ECDC") is an Illinois Not-For-Profit Corporation whose purpose is to promote the development, establishment, and expansion of all businesses within the Village of Elburn, Illinois. We write today to provide you with a voice enthusiastically supporting the construction of a full East/West interchange on Interstate 88 at Illinois Route 47 near Elburn.

It is our understanding that at recent public hearings some opposition to the project may have been voiced, due to an anticipated increase in truck traffic up and down Route 47. The members of the ECDC believe any increase from the already busy truck traffic moving up and down Route 47 will be minimal, and the economic benefits to the area in general would be substantial. Elburn already has a Metra train station. It is our view that a full interstate interchange would allow the Village to brag about an almost unparalleled infrastructure system for a Village of Elburn's size. Certainly in the far western suburbs we can think of few municipalities with a residential population between 5,000 and 6,000 residents that host both a full east/west interchange, and a train station. This, we believe, will be very attractive to companies contemplating Elburn as a place to do business. Therefore, the ECDC strongly favors the construction of a full interchange as soon as is possible.

If you have any questions, seek further comment, or need any additional information about anything connected with the business environment in Elburn, or the likely benefits the area would receive from construction of a full interchange at Interstate 88 and Route 47, please don't hesitate to contact the undersigned at (331) 303-7002.

Very truly yours,

Cece Rocha
President

VILLAGE OF ELBURN

RESOLUTION NO. 2018 – 02

RESOLUTION SUPPORTING THE I-88 and RT. 47
INTERCHANGE IMPROVEMENT

ADOPTED BY
THE BOARD OF TRUSTEES
OF THE
VILLAGE OF ELBURN

This 2nd day of January, 2018

RESOLUTION NO. 2018 - 02

RESOLUTION SUPPORTING THE I-88 and Route 47
INTERCHANGE IMPROVEMENT

WHEREAS, the Village of Elburn, Kane County, Illinois (the "Village") is a municipal corporation duly organized under the laws of the State of Illinois; and

WHEREAS, the Village of Sugar Grove, Kane County, Illinois Department of Transportation, and Illinois Tollway Authority are seeking public comment concerning the I-88 and Route 47 Interchange Improvement; and

WHEREAS, the Village of Elburn is appreciative of the Village of Sugar Grove, Kane County, Illinois Department of Transportation, and Illinois Tollway Authority in considering the value of the input of the public; and

WHEREAS, the Village of Elburn is appreciative of the Village of Sugar Grove, Kane County, Illinois Department of Transportation, and Illinois Tollway Authority for their recognition of the positive impact that transportation projects have on a community, the transportation system, and the economic well-being of a community, a region and the state; and

WHEREAS, the Village of Elburn recognizes that a full interchange at I-88 and Route 47 would benefit commercial traffic, the motoring public, and enhance the economic development of the region; and

WHEREAS, IDOT, KDOT, and the Illinois Toll Authority have agreed that the long- term traffic assumptions contained within the study are correctly presented; and

WHEREAS, this interchange would allow for motorist to access I-88 eastbound in addition to the current westbound access; and

WHEREAS, the Village has determined that it is vital to the economic development of the Village and the region, and its ability to attract and retain industrial and commercial development, job creation, encouraging tourism and to the enhancement of the tax base, and to keep traffic flowing efficiently to improve access to I-88; and

NOW, THEREFORE, BE IT HEREBY RESOLVED by the Board of Trustees of the Village of Elburn, Kane County, Illinois as follows:

The Village of Elburn strongly supports the Interchange Improvement as proposed by the Village of Sugar Grove, Kane County, Illinois Department of Transportation, and Illinois Tollway Authority.

That the Village further supports and encourages the Illinois Tollway Authority to begin the necessary engineering and construction of a full interchange at I-88 and Route 47.

PRESENTED to the President and Board of Trustees of the Village of Elburn, Kane County, Illinois, this 2nd day of January, 2018.

PASSED by the President and Board of Trustees of the Village of Elburn, Kane County, Illinois, this 2nd day of January, 2018.

SIGNED by the President of the Board of Trustees of the Village of Elburn, Kane County, Illinois, this 2nd day of January, 2018.

Trustee Name	Aye	Nay	Absent	Abstain
Ken Anderson	✓			
Sue Filek	✓			
Bill Grabarek	✓			
Dave Gualdoni			✓	
Patricia Schuberg	✓			
Matthew Wilson	✓			
Mayor Jeffrey Walter				

(SEAL)

Jeffrey D. Walter
President
Village of Elburn, Kane County, Illinois.

ATTEST:

Diane McQuilkin
Clerk
Village of Elburn, Kane County, Illinois

STATE OF ILLINOIS)
) SS
COUNTY OF KANE)

CLERK'S CERTIFICATE

I, Diane McQuilkin, the duly qualified and acting Village Clerk of the Board of Trustees of the Village of Elburn, Kane County, Illinois, do hereby certify that attached hereto is a true and correct copy of a Resolution entitled:

RESOLUTION NO. 2018-02

RESOLUTION SUPPORTING THE I-88 and Route 47
INTERCHANGE IMPROVEMENT

which Resolution was duly adopted by said Board of Trustees at a regular meeting held on the 2nd day of January, 2018.

I do further certify that a quorum of said Board of Trustees was present at said meeting, and that the Board of Trustees complied with all the requirements of the Illinois Open Meetings Act.

IN WITNESS WHEREOF, I have hereunto set my hand this 2 day of Jan, 2018.

[SEAL]

Diane McQuilkin
Village Clerk
Village of Elburn, Kane County, Illinois

Federal Highway Administration

FINDING OF NO SIGNIFICANT IMPACT

for
Illinois Route 47 (FAP 326) at
Ronald Reagan Memorial Tollway I-88 (FAI 88)
from Old Oaks Road to Green Road
Kane County, Illinois

INTRODUCTION

The Illinois Department of Transportation (IDOT) proposes interchange improvements at Illinois Route 47 (IL 47) and the Ronald Reagan Memorial Tollway (I-88). The project also proposes the widening of IL 47 from the Waubonsee Community College north entrance as the southern logical termini to Green Road as the northern logical termini in Sugar Grove, Illinois. The purpose of the proposed action is to improve system linkage and accommodate land use and economic development on IL 47 and I-88 from the north entrance of Waubonsee College at the south end of the project to Green Road at the north end.

The Preferred Alternative meets the purpose and need, while minimizing impacts where possible. The Preferred Alternative for the IL 47 Mainline consists of two 12-foot lanes in each direction, a 30-foot raised median through the majority of the corridor but reduced through the Hannaford Woods/Nickels Farm Forest Preserve, and shifts the alignment to the east, north of Thornapple Tree Road. The Preferred Alternative proposes a five-foot sidewalk on the west side of IL 47 and a 10-foot multi-use path on the east side. The Preferred Alternative for the IL 47/I-88 Interchange consists of a partial cloverleaf, with loop ramp in northeast quadrant of the interchange. This alternative creates a full access service interchange by adding an entrance ramp from IL 47 to I-88 eastbound and an exit ramp from westbound I-88 to IL 47. It also includes a loop ramp in the northeast quadrant for northbound IL 47 traffic to enter I-88 westbound. The loop ramp improves the operations of travelers utilizing the entrance ramps of the interchange.

This project is included in the FY 2014-2019 Transportation Improvement Plan (TIP) endorsed by the Metropolitan Planning Organization Policy Committee of the CMAP for the region in which the project is located. Phase II (final design) and Phase III (construction) funding is also identified in the TIP. The TIP number for this project is 09-14-0010.

ENVIRONMENTAL IMPACTS

The direct result of implementing these improvements will result in the following impacts:

Right-of-Way: Construction of the proposed improvement will require approximately 16.1 acres of proposed right-of-way.

Displacements: The proposed improvements would not result in any residential or commercial displacements.

Agricultural Lands: The proposed improvements would convert 11.0 acres of land identified by CMAP as land use: agricultural. Of this, only 6.1 acres is actively being farmed.

There are two Centennial Farms in the Blackberry Township and three Centennial Farms in the Sugar Grove Township. Based on coordination with the IDOA, there are no registered Centennial Farms located within the project limits. IDOA determined the proposed project was compliant with the Illinois Farmland Preservation Act on November 28, 2017.

Historic Properties: There are two archaeological sites within the Area of Potential Effect (APE). These two sites lack integrity and information potential and do not warrant National Register consideration or preservation in place. No architectural resources eligible for the National Register are located within the study area. The State Historic Preservation Officer concurred with a "no historic properties affected" finding on November 2, 2016.

Air Quality: All areas of Illinois currently are in attainment of the standards for four of the six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. For the eight-hour ozone and PM2.5 standards, Kane County is designated as a nonattainment area.

This project is included in the FY 2014-2019 Transportation Improvement Program (TIP) endorsed by the Metropolitan Planning Organization Policy Committee of the CMAP for the region in which the project is located. Projects in the TIP are considered to be consistent with the 2040 regional transportation plan endorsed by CMAP. The project is within the fiscally constrained portion of the plan.

On October 9, 2014, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) determined that the 2040 regional transportation plan conforms with the SIP and the transportation-related requirements of the 1990 Clean Air Act Amendments. On October 9, 2014, the FHWA and the FTA determined that the TIP also conforms with the SIP and

the Clean Air Act Amendments. These findings were in accordance with Determining Conformity of Federal Actions to State or Federal Implementation Plans 40 CFR Part 93.

The project's design concept and scope are consistent with the project information used for the TIP conformity analysis. Therefore, this project conforms to the existing State Implementation Plan and the transportation-related requirements of the 1990 Clean Air Act Amendments.

Noise: There are five common noise environments (CNE), representing 84 noise sensitive receptors that are predicted to experience noise levels that approach, meet or exceed the NAC in the 2040 Build conditions. These five (5) CNEs were determined to have traffic noise impacts from the proposed action. The results for the proposed improvements indicate no substantial increases in noise (15 dBA or greater) over the existing noise levels will occur. The most practical type of noise abatement for this project was determined to be a noise wall.

Noise walls were evaluated at each impacted CNE to determine if they were feasible (able to be constructed and can provide a substantial noise reduction), and if they were reasonable (able to achieve IDOT's noise reduction design goal and cost effective).

Potential noise barriers were considered at five (5) receptor locations under the predicted 2040 Build condition (CNE 2, CNE 3, CNE 5, CNE 6 and CNE 8). The noise barriers evaluated at CNE 6 and CNE 8 are not feasible, as they do not satisfy the five-dB(A) noise reduction for at least two (2) impacted receptors. Three (3) feasible noise barriers were assessed for reasonableness (CNE 2, CNE 3 and CNE 5).

The three (3) feasible noise barriers are not reasonable because the cost per benefitted receptor exceeds the adjusted allowable cost per benefitted receptor (CNE 2, CNE 3, and CNE 5).

Cost averaging of noise abatement among CNEs also may be used when conducting the economic reasonableness evaluation. For a single noise abatement measure to be considered a part of a cost averaging evaluation, the estimated build cost of noise abatement per benefitted receptor may not exceed two times the adjusted allowable noise abatement cost per benefitted receptor. For cost averaging analyses, the noise abatement measures achieve the cost reasonableness criterion if the common CNE collective average estimated build cost of noise abatement per benefitted receptor is less than the collective average adjusted allowable cost per benefitted receptor. The three (3) feasible nois**e** barriers were not found to be reasonable through cost averaging (CNE 2, CNE 3, and CNE 5).

The third component of reasonableness is obtaining the viewpoints of benefitted receptors. Since the noise barriers evaluated failed to meet the IDOT feasibility or reasonableness criteria, obtaining the viewpoints of benefitted receptors was not required.

The proposed project is anticipated to have traffic noise impacts, but the noise barriers studied and identified in Table 4.8 do not meet IDOT's feasibility and reasonableness criteria. Due to this, traffic noise abatement measures are not likely to be implemented based on preliminary design. If the project's final design is different from the preliminary design, IDOT will determine if revisions to the traffic noise analysis are necessary. A final decision on noise abatement will not be made until the project's final design is approved and the public involvement processes is complete.

Threatened and Endangered Species: According to USFWS, three federally-protected species are known to occur within Kane County, the eastern prairie fringed orchid (*Platanthaera leucophaea*), rusty patched bumble bee (*Bombus affinis*), and northern long-eared bat (*Myotis septentrionalis*).

Utilizing the USFWS January 5, 2016 Programmatic BO for the northern long-eared bat *(M. septentrionalis)*, a streamlined consultation form was submitted by IDOT on September 15, 2017 to USFWS. No response was received from USFWS, therefore, the "may affect, not likely to adversely affect" determination can be presumed agreed upon. No tree clearing will occur between April 1st and October 14 of any year per IDOT commitment to IDNR.

The project area had field surveys conducted for the Eastern Prairie Fringed Orchid **(***P. leucophaea***)** in June and July of 2016; none were located. The project will have "no effect" on the Eastern Prairie Fringed Orchid.

The project was evaluated using USFWS guidance dated March 21, 2017 and titled "The Rusty Patched Bumble Bee (*Bombus affinis*), Interagency Cooperation under Section 7(a)(2) of the Endangered Species Act, Voluntary Implementation Guidance." According to the guidance, if a project is outside of a high potential zone, then the USFWS advises that a "no effect" determination is appropriate. USFWS shapefiles dated March 15, 2018, were reviewed on April 30, 2018. This project is located outside of the High Potential Zone. Therefore, the project will not effect the Rusty Patched Bumble Bee.

Five state protected species were identified in the project study area: the Blanding's turtle (*Emydoidea blandingii*), Wilson's phalarope (*Phalaropus tricolor*), American Bittern (*Botaurus lentiginosus*), Least Bittern (*Ixobrychus exilis*), and Northern Harrier (*Circus cyaneus*).

Surveys were conducted and no threatened and endangered reptiles or amphibians were encountered, and no suitable habitats for Blanding's turtle (*E. blandingii*) were documented in the project area.

Avian surveys were conducted over three seasons and no breeding habitat for the Wilson's phalarope (*P. tricolor*), Least Bittern (*I. exilis*), American Bittern (*B. lentiginosus*), or Northern Harrier (*C. cyaneus*) was found in the project area.

No state-listed species are anticipated to be impacted by the proposed improvements.

Wetlands: The proposed improvements will impact a total of 1.7 acres of wetlands. Impacts were calculated based on proposed construction limits. The proposed improvements were designed to minimize the amount of wetland impacts to the greatest extent practicable. Once the alternatives were selected, they were further refined in order to minimize impacts.

For those wetland impacts that cannot be avoided, compensatory mitigation must be provided. IDOT will provide compensatory mitigation through coordination with and approval from USACE during the Clean Water Act Section 404 Permitting process. Wetland mitigation will also be in compliance under the Interagency Wetland Policy Act.

Federal Executive Order 11990 requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The proposed improvements were designed to avoid and minimize wetland impacts to the greatest extent possible. There are no practicable alternatives that could avoid wetland impacts entirely. All impacts have been avoided and minimized to the greatest extent practicable, as discussed above. Based upon these considerations, there is no practicable alternative to the proposed construction in wetlands and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

Floodplains: The proposed improvements will impact three regulatory floodplains. All of the Regulatory floodplain within the project study area are associated with Blackberry Creek and Seavey Road Run. The roadway corridor is constrained to the setting where the current IL 47 is located. Construction on an entirely new corridor was studied in Alternatives M-3 and M-4; both will create new crossings of Blackberry Creek and Seavey Road Run, which increases waterway and floodplain impacts. The median at the Blackberry Creek crossing has been narrowed from 30 feet to 18 feet which will reduce waterway, and floodplain impacts. The proposed improvements will impact 3.2 acres associated with Blackberry Creek and 1.5 acres associated with Seavey Road Run for a total floodplain impact of 4.7 acres.

Compensatory storage will be provided at the Blackberry Creek crossing by replacing the existing structure with a larger bridge that provides a wider effective waterway opening. The compensatory storage volume can be provided by grading the overbanks between the existing tops of banks to the proposed toes of abutments. Since the Seavey Road Run culvert is being extended rather than replaced, the compensatory storage at the tributary location will be provided within proposed ditch/basin grading along the proposed IL 47 embankment, adjacent to the regulatory floodway.

Water Resources: The project area is located within the Lower Fox River drainage basin, hydrologic unit code (HUC) 07120007. The project area contains eight streams or creeks identified as WOUS. Two relatively permanent streams cross the project, Blackberry Creek, approximately 771 feet south of Thornapple Tree Road and under I-88 approximately 3,355 feet west of IL 47, and Seavey Road Run (also known as Tributary C of Blackberry Creek), approximately 636 feet northwest of Thornapple Tree Road. There are no wild or scenic rivers located within the project study area.

The project improvements propose to replace the existing bridge over Blackberry Creek on the existing centerline. The median for the roadway is reduced from 30 feet to 18 feet in this area in order to minimize impacts.

Blackberry Creek has been given a Stream Integrity Rating of B and Stream Diversity Rating of C by the IDNR Illinois Biological Stream Characterization Study. No other WOUS in the project study area has been rated in the IDNR Illinois Biological Stream Characterization Study.

A total of 0.8 acres of WOUS will be impacted within the project study area, including 0.4 acres of impact to Blackberry Creek and 0.2 acres to Seavey Road Run. Impacts to the streams are not avoidable as the proposed road improvements are adjacent to or crossing these water bodies. Impacts were minimized by reducing the median to 18 feet at the Blackberry Creek.

In order to minimize impacts from entering either Blackberry Creek or Seavey Road Run, Best Management Practices (BMPs) will be implemented to the extent practicable.

Special Waste: The Illinois State Geological Survey (ISGS) performed a PESA for the project study area, ISGS PESA #3121, dated September 19, 2016. Several Recognized Environmental Concerns (RECs) were identified through the assessment. Per PESA 3121, 7 properties were identified with RECs.

Based on the results from the PESA, it has been determined that a preliminary site investigation (PSI) is required if any identified REC involves any of the following situations:

- New right-of-way or easement (temporary or permanent);
- Railroad right-of-way, other than single rail rural with no maintenance facilities; or
- Building demolition / modification.

Section 4(f): The proposed improvements will convert 1.74 acres of open space within the Hannaford Woods/Nickels Farm Forest Preserve to a transportation use. FHWA considers the Hannaford Woods/Nickels Farm Forest Preserve a Section 4(f) property. This conversion of Section 4(f) land to a transportation use will not adversely affect the activities, features, or attributes of the Hannaford Woods/Nickels Farm Forest Preserve. The public was given an opportunity to comment on the impacts to the Section 4(f) resource on December 14, 2017 and none were received. The Hannaford Woods/Nickels Farm Forest Preserve (the Officials with Jurisdiction) concurred with this conclusion on February 16, 2018. Based upon avoidance, minimization, and mitigation or enhancement measures, and concurrence from the Officials with Jurisdiction, FHWA approved a *de minimis* impact determination on March 19, 2018.

Indirect and Cumulative: Illinois Route 47 within the project is an existing 2 lane road with a partial interchange at Ronald Reagan Memorial Tollway I-88. This project will create a full interchange and widen IL 47 to 4 lanes in this area. This proposed action is expected to provide improved access to the area, potentially enhancing the likelihood of growth in the area already planned for development. The cumulative effects of actions taken will primarily be those associated with new development which may occur based on the improved access. Any future actions will be subject to applicable federal, state and local laws and regulations.

Public Involvement: The Public Hearing for the project was held on Thursday, December 14, 2017 from 4:00 P.M. to 7:00 P.M. in the APC Event Room at Waubonsee Community College. The public hearing was conducted in an open house format with a public comment forum. A court reporter was present to record verbal comments from 4:00 P.M. to 6:00 P.M. and then recorded comments at the public forum from 6:00 to 7:00 P.M.

The project comment period was open from November 27, 2017 to January 19, 2018. Throughout the public comment period, hard copies of the EA were available for public review at IDOT – District 1 offices as well as the Sugar Grove Village Hall, and Sugar Grove Public Library. The EA was also available on the project website.

The hearing was attended by 98 people including public officials from local Villages and Fire Protection Districts, businesses, media and local residents. Within the comment period 13 comments were received at the meeting, 5 comments received during the open house, 10 public forum comments and 3 emailed comments. The total is 31comments submitted during the public comment period. The comments received are summarized below.

General Support or Opposition to Preferred Alternative

- Support Project due to Travel Time Savings and Reduces IL 47 congestion
- Support for the No-Build Alternative
- Like the improvements to IL 47 north of the interchange

Schedule/Implementation

- Build the improvements soon
- Safety concerns regarding the interchange moving forward and the IL 47 project being delayed
- Desire the interim improvement to the interchange extend on IL 47 to the proposed U-turn

Safety

- Safety concerns regarding traffic control devices at Local Street Intersections with IL 47
- Safety concerns regarding the speed of truck traffic on hills; wanting right turn lanes
- Safety concerns regarding the location of the bike path on the IL 47 bridge over I-88

Access and Other

- Want more access to IL 47 from adjacent land use
- Do not want Finley Road access restricted to IL 47
- Want to Realign Merill Road to align with opposing cross street
- Want Emergency Vehicle Accommodations at Finley to access interchange
- Want Emergency Vehicle Access to Restricted Access Side Streets
- Want Emergency Vehicle Accommodations at U-Turn
- Desires to restrict adjacent land uses and development

IDOT responded to all comments received during the public comment period.

ENVIRONMENTAL COMMITMENTS

- Wetlands and waters of the U.S. will be mitigated per USACE and the Interagency Wetlands Policy Act, which will be identified during the Section 404 permitting process.

- All tree removal will occur between October 15 and March 31 to avoid impacts to the northern long-eared bat (*Myotis septentrionalis)* habitat.

- A wildlife crossing will be included at Blackberry Creek.

AGENCY FINDINGS

The following findings establish the project's adherence to applicable laws intended to protect sensitive environmental and socioeconomic resources.

Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended
Easements and partial right-of-way takes will be required from parcels along the corridor, but full parcel takes will not be required. The acquisition of any property will be accomplished in accordance with the Uniform *Relocation Assistance and Real Property Acquisition Act (Uniform Act)*, as amended, and the *IDOT Land Acquisition Procedure Manual*, as applicable.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
The project does not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations. This project is not located in or near minority and/or low income areas, or adjacent to minority and/or low income neighborhood communities.

Section 106 of the National Historic Preservation Act of 1966
There are two archaeological sites within the Area of Potential Effect (APE). These two sites lack integrity and information potential and do not warrant National Register consideration or preservation in place. No architectural resources eligible for the National Register are located within the study area. The State Historic Preservation Officer concurred with a "no historic properties affected" finding on November 2, 2016.

Federal Executive Order 11988, *Floodplain Management*
The project will impact three regulatory floodplains for a total of 4.7 acres. Compensatory storage will be provided at the Blackberry Creek crossing and Seavey Road Run for impacts to regulatory floodplains. Impacts from the loss of floodplain will not result in increased flood risks due to the incorporation of detention and compensatory storage. Natural and beneficial values, such as

wildlife habitat and water quality functions, will not be substantially impacted because these values are already minimized due to the presence of the existing road. The proposed roadway improvements will not promote incompatible floodplain development.

Section 176(c) of the Clean Air Act Amendments of 1990

This project is located in a nonattainment area for transportation-related criteria pollutants; therefore, the transportation conformity requirements of the Clean Air Act apply. FHWA has determined that the preferred alternative meets project level conformity requirements because it is included in the conforming metropolitan transportation plans and transportation improvement programs of the appropriate metropolitan planning organization.

The project was determined to be a project that is not an air quality concern under 40 CFR 93.123(b)(1), because it primarily services gasoline operated vehicular traffic. None of the roadways in the study area carry a substantial amount of diesel truck traffic currently nor are they expected to under the 2040 No-Build or Build condition. It has been determined that the project will not cause or contribute to any new localized PM2.5 or PM10 violations or increase the frequency or severity of any PM2.5 or PM10 violations.

Federal Executive Order 11990, *Protection of Wetlands*

The project will impact 1.7 acres of wetlands. Because wetlands exist on both sides of the roadway, complete avoidance was not practicable. However, the Preferred Alternative was designed to minimize impacts to wetlands. Mitigation for these impacts will be based on the Programmatic Agreement that IDOT has with the IDNR for compliance with the Interagency Wetland Protection Act. Mitigation ratios are determined based on whether or not the mitigation is provided within the watershed basin of the impacted wetland as well as the quality of the wetlands impacted. Wetland mitigation ratios can range from 1.5 to 1.0 up to 5.5 to 1.0 for higher quality wetlands.

Endangered Species Act of 1973

Threatened and endangered species are known to exist within Kane County. The project area had field surveys conducted for the Eastern Prairie Fringed Orchid (*P. leucophaea*) in June and July of 2016; none were located. Therefore, the project will have “no effect” on the Eastern Prairie Fringed Orchid.

The rusty patched bumble bee (*B. affinis*) was listed as endangered on March 21, 2017. The rusty patched bumblebee is not identified by IPaC within the project study area; therefore, the project will have “no effect” on the rusty patched bumble bee.

Utilizing the USFWS January 5, 2016 Programmatic BO for the northern long-eared bat *(M. septentrionalis)*, a streamlined consultation form was submitted by IDOT on September 15, 2017 to USFWS. No response was received from USFWS, therefore, the "may affect, not likely to adversely affect" determination can be presumed agreed upon. No tree clearing will occur between April 1st and October 14 of any year per IDOT commitment to IDNR.

Section 4(f) of the U.S.DOT Act of 1966

FHWA has determined that the proposed project will not adversely affect the activities, features, or attributes of the Hannaford Woods/Nickels Farm Forest Preserve and based upon the impact avoidance, minimization, and mitigation or enhancement has made a *de minimis* impact finding on March 19, 2018.

CONCLUSION

The Federal Highway Administration (FHWA) has determined that the project will not have a significant impact on the human environment. This Finding of No Significant Impact (FONSI) is based on the attached Environmental Assessment and Errata which has been independently evaluated by the FHWA and determined to adequately and accurately discuss the need, environmental issues, and impacts of the proposed project and appropriate mitigation measures. It provides sufficient evidence and analysis for determining that an Environmental Impact Statement is not required. The FHWA takes full responsibility for the accuracy, scope, and content of the attached Environmental Assessment.

Date	Catherine A. Batey, Division Administrator Federal Highway Administration