



# Illinois Department of Transportation

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To: Anthony J. Quigley                      Attn: John Baczek  
From: Jack A. Elston                        By: Michael Brand *Michael Brand*  
Subject: Pavement Design Approval  
Date: June 2, 2020

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Route: 143rd Street extension                      Job No.: D-91-407-09  
Section: 06-00040-00FP                              Contract No.:  
County: Will    Target Letting: Nov 2021  
Limits: IL 59 to IL 126

We have reviewed the pavement design for the above referenced project which was submitted on May 19, 2020. The project will extend 143rd Street to connect IL59 to IL 126; reconstruct IL 126 at the intersection with 143rd Street to provide additional through lanes and channelization; and widen IL 59 to provide exclusive right turn lanes. Pavement designs were performed for each of the three roadways:

143rd Street: This design compared 10.25" JPCP and 12.25" Full-Depth HMA with the life-cycle cost analysis resulting in a virtual tie. We agree with the District's recommendation to use alternate pavement bidding.

IL 126: This design compared 10" JPCP and 11.5" Full-Depth HMA with the life-cycle cost analysis favoring HMA by 5.5%. In lieu of alternative bidding for this short section, the District recommended the HMA option due to its lower cost and to provide uniformity with the adjoining sections of IL 126 which have an HMA overlay. We concur with the District.

IL 59: The design for this short segment of widening simply matches the existing 10" JPCP per Figure 54-1.A if the BDE Manual.

In summary, the approved pavement design is as follows:

143rd Street - New Construction/Reconstruction

Alternate Bidding

10.25" JPCP or 12.25" Full-Depth HMA with PCC Curb & Gutter

12" Aggregate Subgrade Improvement

IL 126 - Reconstruction

11.5" Full-Depth HMA with PCC Curb & Gutter / portions with HMA Shoulders

12" Aggregate Subgrade Improvement

IL 59 - Widening

10" JPCP with PCC Curb & Gutter

12" Aggregate Subgrade Improvement

If you have any questions, please contact Mike Brand at (217) 782-7651.



# Illinois Department of Transportation

## Memorandum

To: Jack Elston

Attn: Michael Brand

From: Jose A. Dominguez

By: Kari Smith / Ojas Patel

A handwritten signature in blue ink, likely belonging to Kari Smith or Ojas Patel, written over the 'By:' line.

Subject: Pavement Analysis (REVISED)\*

Date: May 19, 2020

\*Route: 143<sup>rd</sup> Street Extension  
Limits: (IL 59 to IL 126)  
Section: 06-00040-00FP  
Current target: November 2021

County: Will  
Contract No.: Unknown  
Job No.: D-91-407-09

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction/widening exceeds 4,750 Square Yards. The following is the scope of the project:

***143<sup>rd</sup> Street – New construction/reconstruction of a four lane roadway to provide connectivity from US 30/IL 59 to IL 126. This roadway will be a Jurisdictional Transfer to IDOT as future IL 126.***

***IL 126 – Reconstruction to provide additional through lanes and channelization at the intersection with 143<sup>rd</sup> Street.***

***IL 59 – Widening of existing PCC pavement to provide exclusive right turn lanes.***

A 20-year pavement analysis was performed on the above segments. For the reconstruction/new construction portions of 143<sup>rd</sup> Street and IL 126, the life-cycle cost analysis does not favor HMA or PCC pavement by more than 10% in any of the locations on the project. For 143<sup>rd</sup> Street, an alternate bid consideration with review by pavement selection committee is recommended according Figure 54-1.A of Chapter 54 of the BDE manual. For IL 126, full depth HMA pavement is recommended as the reconstruction is a short segment, existing IL 126 is HMA surfaced, and the life cycle cost analysis does favor HMA pavement by 5.5%.

As the widening on IL 59 is considered a short segment, it is recommended is to match the existing PCC pavement in-kind per Figure 54-1.A.

J. Elston  
May 19, 2020  
Page Two

**143<sup>rd</sup> Street**

Reconstruction/New Construction

PCC Curb and Gutter

Option 1

- 10 ¼" PCC Pavement (Jointed)<sup>1</sup>
- 12" Aggregate Subgrade Improvement<sup>5</sup>

Option 2

- 12 ¼" Full Depth HMA<sup>2, 6</sup>
  - 2" Polymerized HMA Surface Course, Mix "E", N70
  - 2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
  - 8" HMA Base Course, IL-19.0, N70
- 12" Aggregate Subgrade Improvement<sup>5</sup>

**IL 126**

Reconstruction

PCC Curb and Gutter/Portions HMA Shoulder

11 ½" Full Depth HMA<sup>3, 6</sup>

- 2" Polymerized HMA Surface Course, Mix "E", N70
- 2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
- 7 ¼" HMA Base Course, IL-19.0, N70

12" Aggregate Subgrade Improvement<sup>5</sup>

**IL 59**

Widening

PCC Curb and Gutter (Tied)

- 10" PCC Pavement (Jointed)<sup>4</sup>
- 12" Aggregate Subgrade Improvement<sup>5</sup>

<sup>1</sup>Designer Note 1: Use pay item **42000506, PORTLAND CEMENT CONCRETE PAVEMENT 10 ¼" (JOINTED)**, paid for in square yards.

<sup>2</sup>Designer Note 2: Use pay item **40701926, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 12 ¼"**, paid for in square yards.

<sup>7</sup>Designer Note 7: Use pay item **40701911, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 11 ½"**, paid for in square yards.

<sup>4</sup>Designer Note 4: Use pay item **42000501, PORTLAND CEMENT CONCRETE PAVEMENT 10" (JOINTED)**, paid for in square yards.

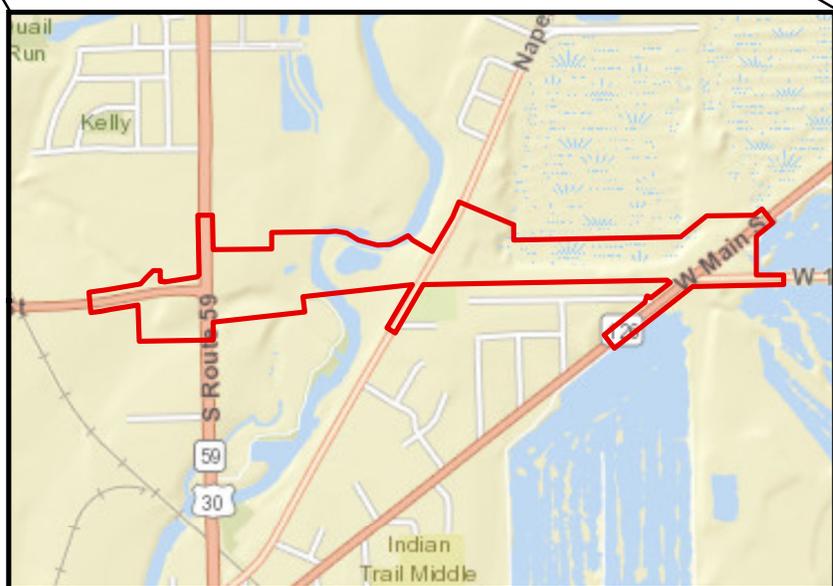
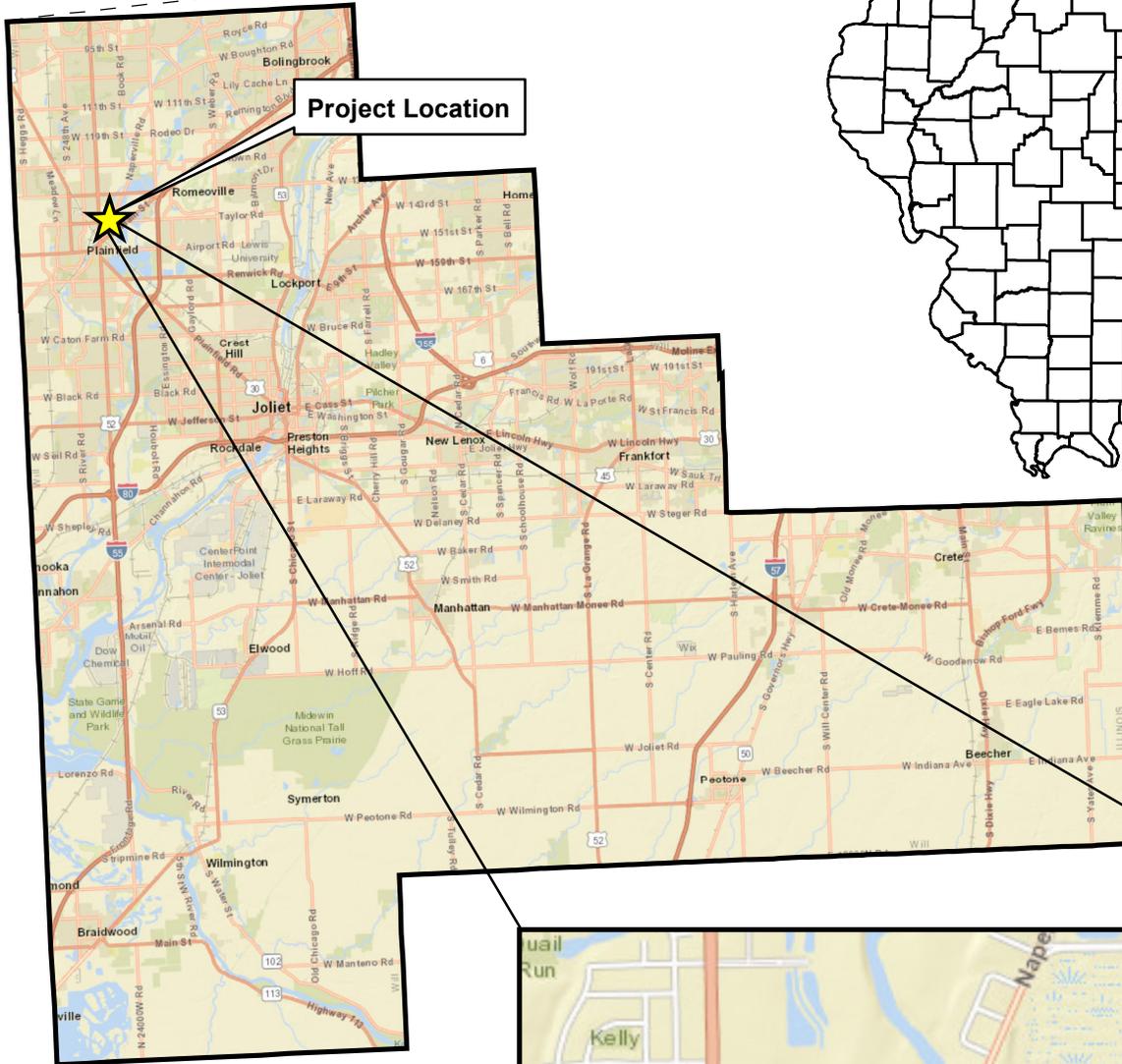
J. Elston  
May 19, 2020  
Page Three

<sup>5</sup> Designer Note 5: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12"** paid for in square yards.

<sup>6</sup> Designer Note 6: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

By:  
Jose A. Dominguez, P.E.  
Project Support Engineer



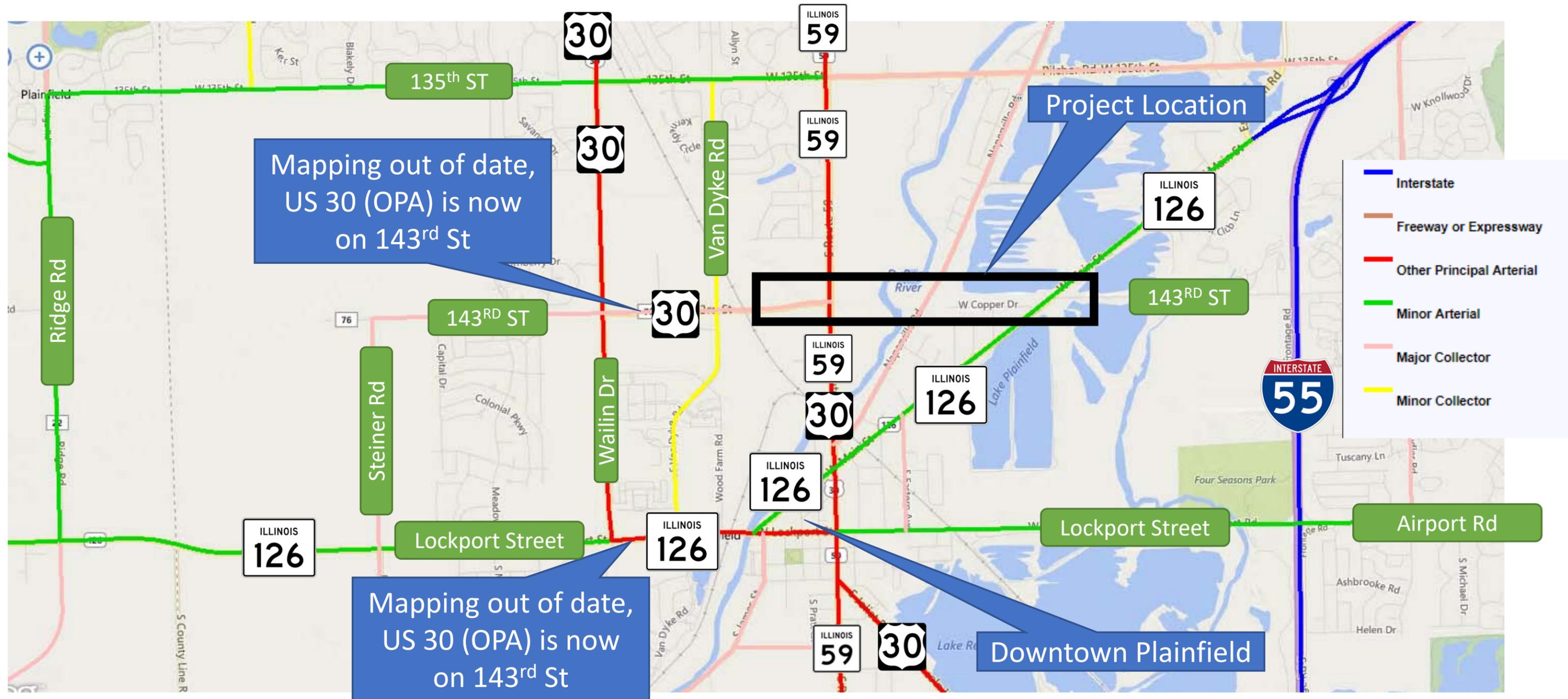
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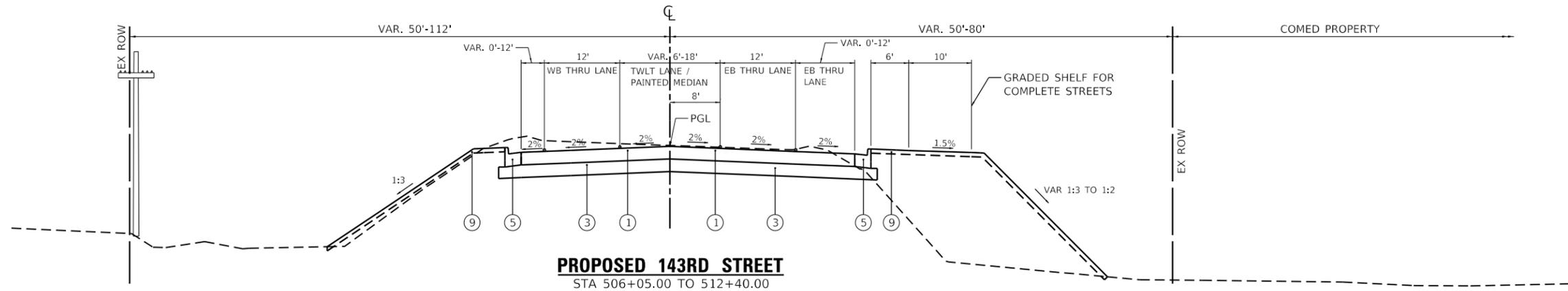
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# 143rd Street Extension Location Map - Will County, IL

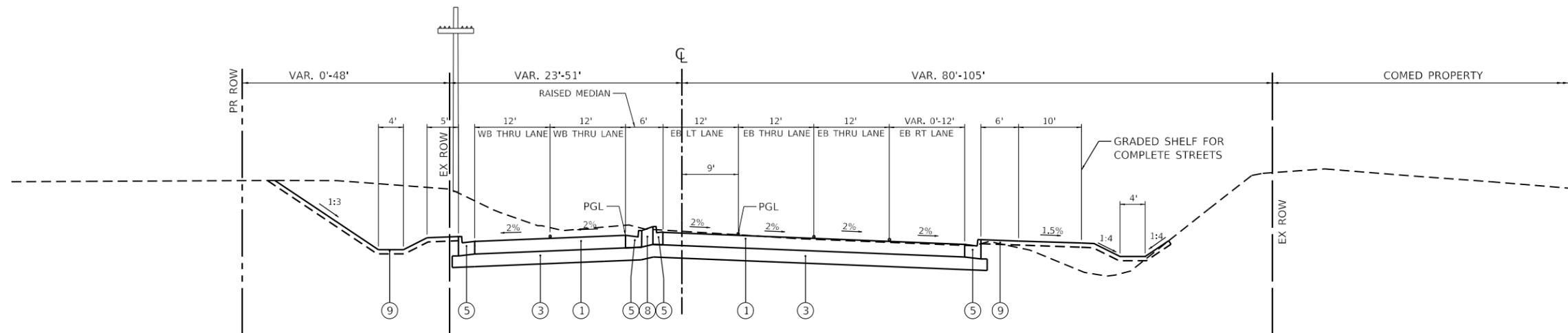


# 143<sup>rd</sup> Street Extension Project Limits

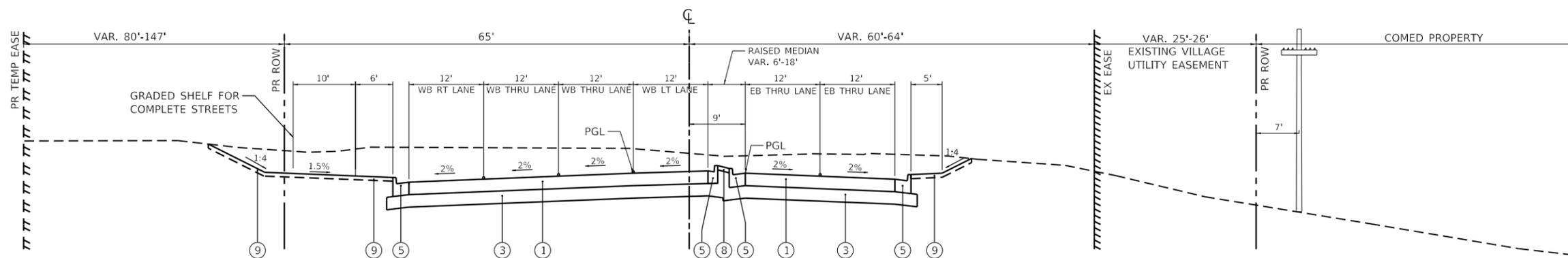




**PROPOSED 143RD STREET**  
 STA 506+05.00 TO 512+40.00



**PROPOSED 143RD STREET**  
 STA 512+44.00 TO 514+92.00



**PROPOSED 143RD STREET**  
 STA 518+00.00 TO 523+30.00

**PROPOSED LEGEND**

- ① PROPOSED PAVEMENT
- ② PAVEMENT WIDENING
- ③ AGGREGATE BASE COURSE
- ④ HMA MULTI-USE PATH
- ⑤ CONCRETE CURB AND GUTTER
- ⑥ HMA SHOULDER
- ⑦ AGGREGATE SHOULDER
- ⑧ MEDIAN
- ⑨ TOPSOIL
- ⑩ BRIDGE PARAPET
- ⑪ GUARDRAIL
- ⑫ CONCRETE BRIDGE DECK
- ⑬ NOISE WALL



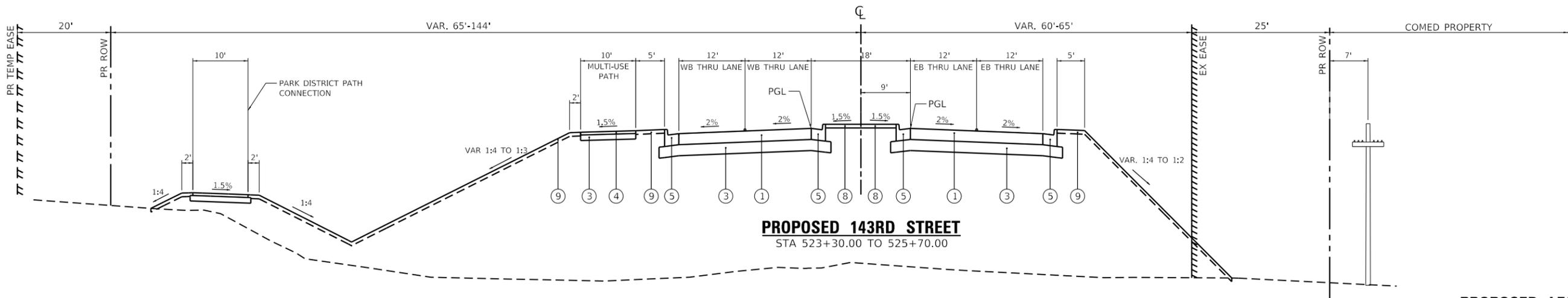
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STATE OF ILLINOIS  
 DEPARTMENT OF TRANSPORTATION

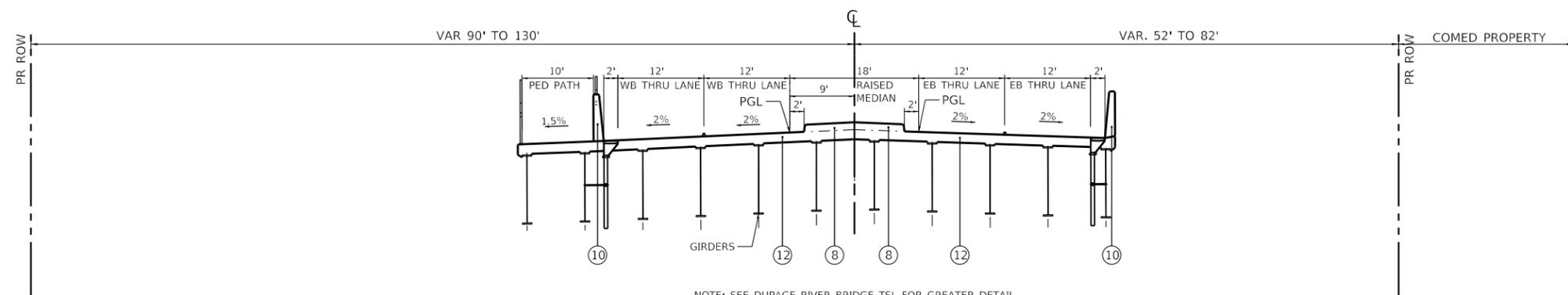
**PROPOSED TYPICAL SECTIONS**  
**143RD STREET**

SCALE: 1"=10' SHEET 1 OF 7 SHEETS STA. TO STA.

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0380	06-00040-00-FP	WILL		
				CONTRACT NO.
ILLINOIS FED. AID PROJECT				



**PROPOSED 143RD STREET**  
 STA 523+30.00 TO 525+70.00

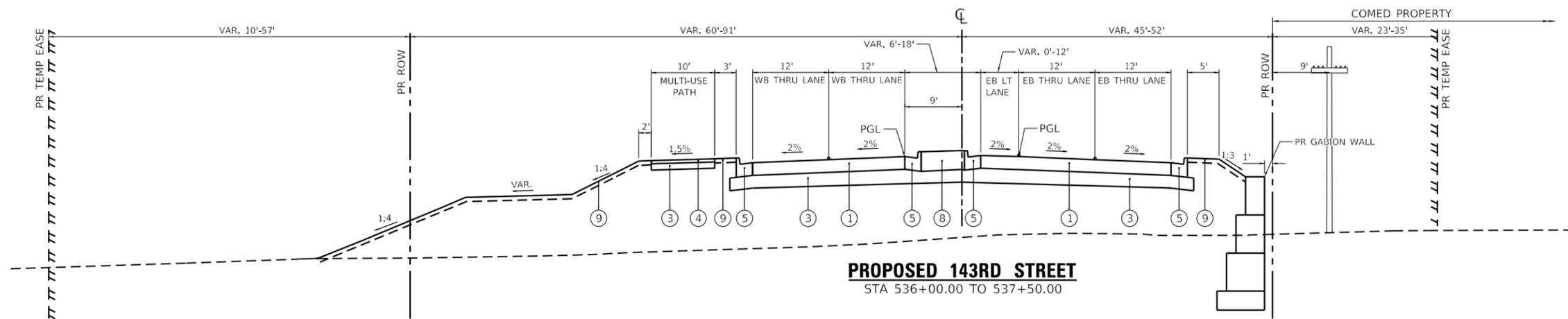


NOTE: SEE DUPAGE RIVER BRIDGE TSL FOR GREATER DETAIL

**PROPOSED 143RD STREET**  
 STA 526+09.60 TO 535+60.95

**PROPOSED LEGEND**

- ① PROPOSED PAVEMENT
- ② PAVEMENT WIDENING
- ③ AGGREGATE BASE COURSE
- ④ HMA MULTI-USE PATH
- ⑤ CONCRETE CURB AND GUTTER
- ⑥ HMA SHOULDER
- ⑦ AGGREGATE SHOULDER
- ⑧ MEDIAN
- ⑨ TOPSOIL
- ⑩ BRIDGE PARAPET
- ⑪ GUARDRAIL
- ⑫ CONCRETE BRIDGE DECK
- ⑬ NOISE WALL



**PROPOSED 143RD STREET**  
 STA 536+00.00 TO 537+50.00



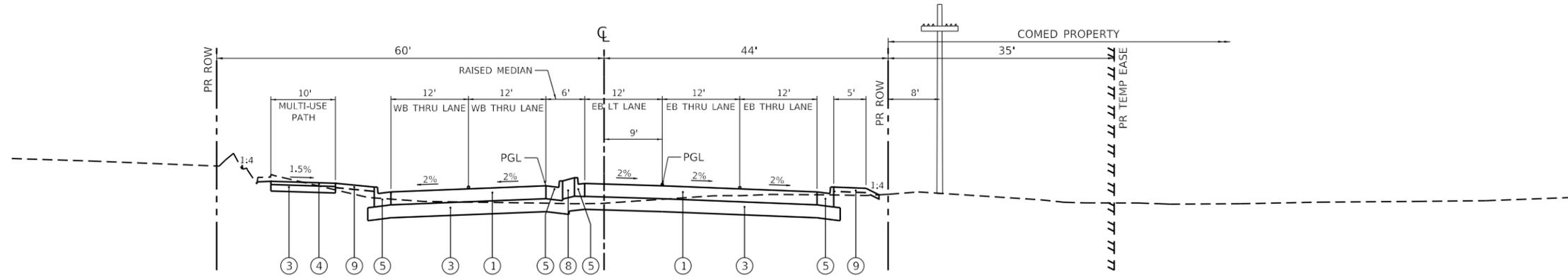
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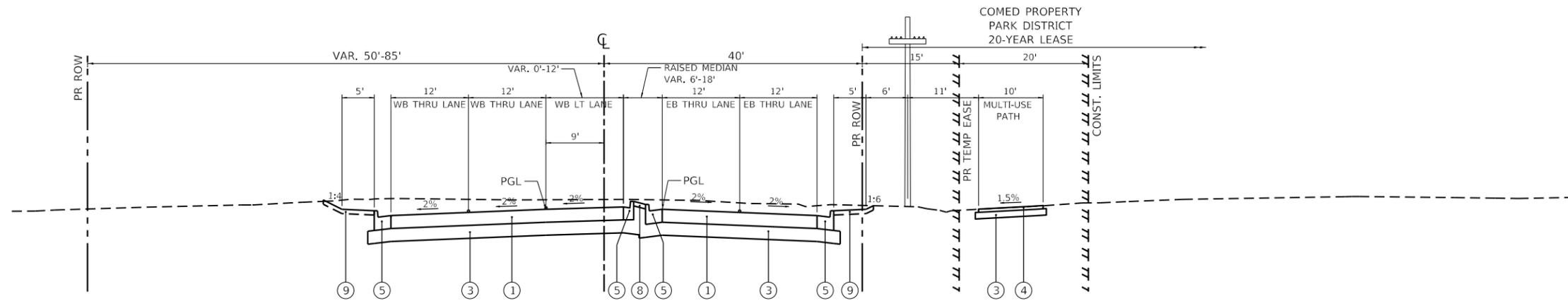
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 143RD STREET

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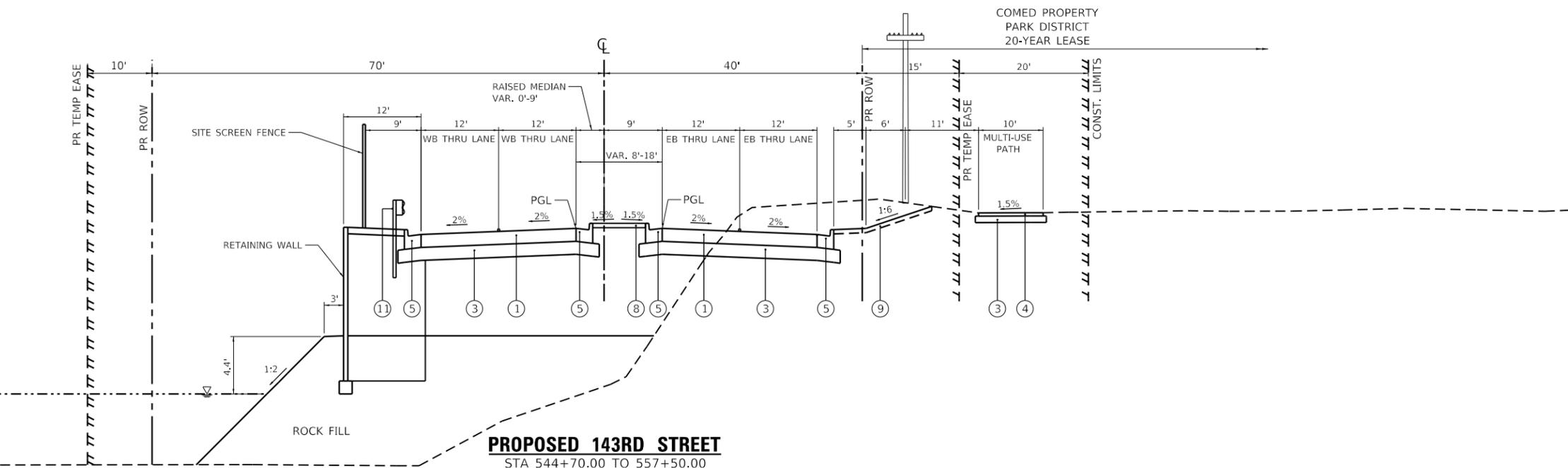
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



**PROPOSED 143RD STREET**  
 STA 537+50.00 TO 538+32.00



**PROPOSED 143RD STREET**  
 STA 542+82.00 TO 544+70.00



**PROPOSED 143RD STREET**  
 STA 544+70.00 TO 557+50.00

**PROPOSED LEGEND**

- ① PROPOSED PAVEMENT
- ② PAVEMENT WIDENING
- ③ AGGREGATE BASE COURSE
- ④ HMA MULTI-USE PATH
- ⑤ CONCRETE CURB AND GUTTER
- ⑥ HMA SHOULDER
- ⑦ AGGREGATE SHOULDER
- ⑧ MEDIAN
- ⑨ TOPSOIL
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- ⑫ CONCRETE BRIDGE DECK
- ⑬ NOISE WALL



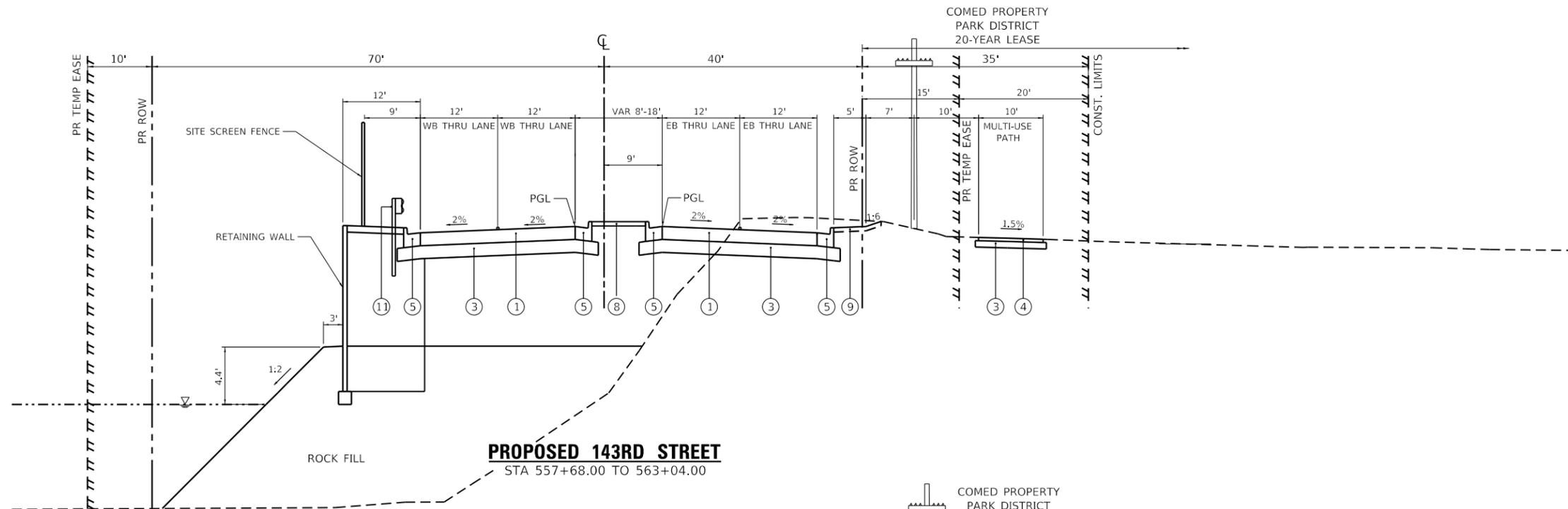
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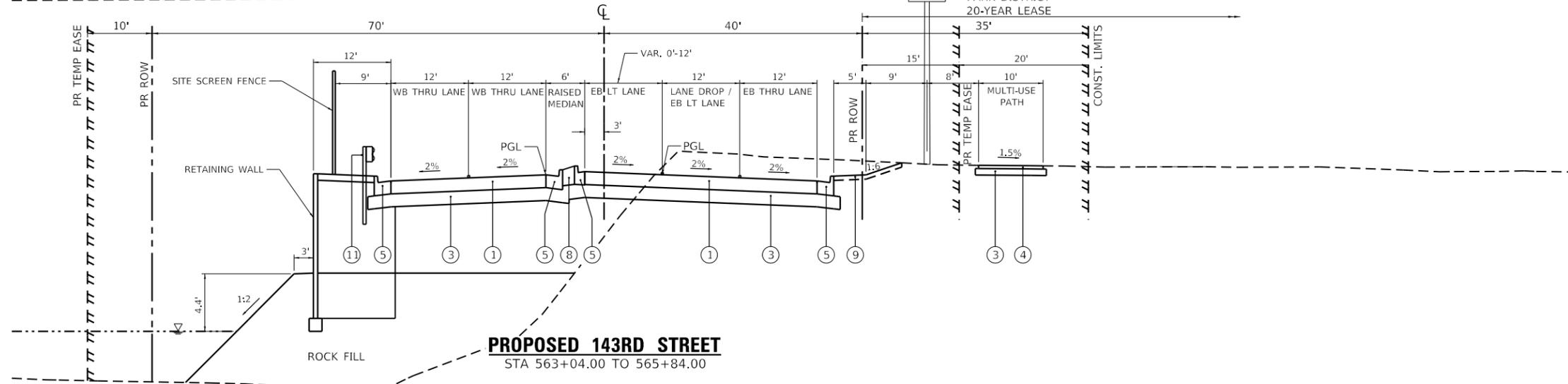
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**143RD STREET**

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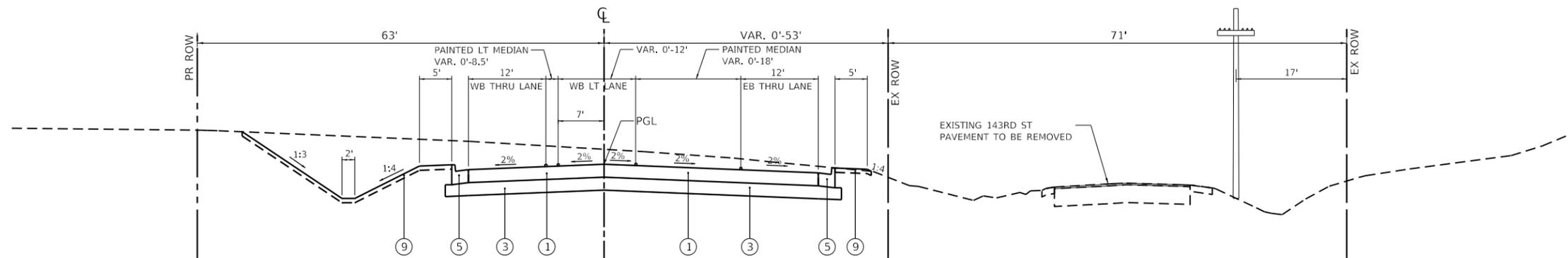
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ILLINOIS FED. AID PROJECT				



**PROPOSED 143RD STREET**  
 STA 557+68.00 TO 563+04.00



**PROPOSED 143RD STREET**  
 STA 563+04.00 TO 565+84.00



**PROPOSED 143RD STREET**  
 SRA 570+70 TO 574+86.10

**PROPOSED LEGEND**

- ① PROPOSED PAVEMENT
- ② PAVEMENT WIDENING
- ③ AGGREGATE BASE COURSE
- ④ HMA MULTI-USE PATH
- ⑤ CONCRETE CURB AND GUTTER
- ⑥ HMA SHOULDER
- ⑦ AGGREGATE SHOULDER
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- ⑪ GUARDRAIL
- ⑫ CONCRETE BRIDGE DECK
- ⑬ NOISE WALL



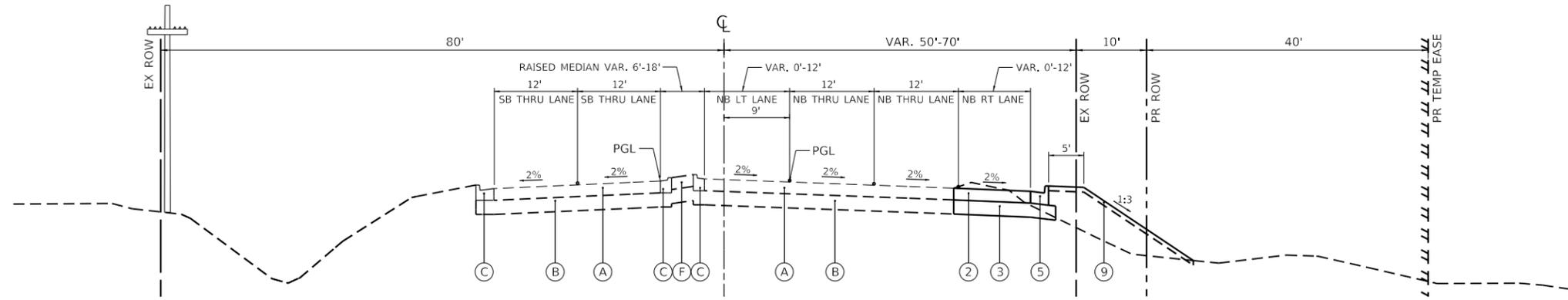
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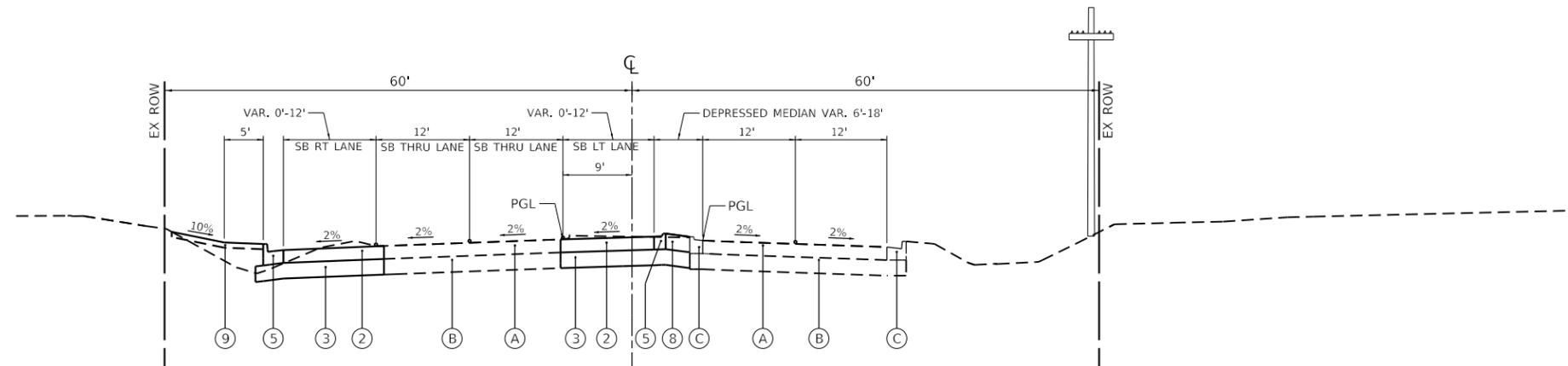
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**143RD STREET**

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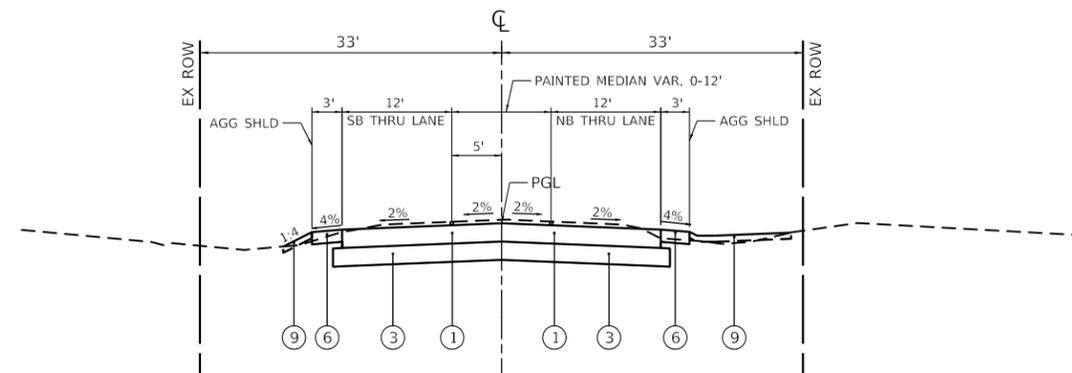
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



**ILLINOIS ROUTE 59**  
 STA 3393+00.00 TO 3397+50.00



**ILLINOIS ROUTE 59**  
 STA 3400+57.00 TO 3407+50.00



**NAPERVILLE ROAD**  
 STA 712+50.00 TO 714+68.00

**EXISTING LEGEND**

- (A) EXISTING HMA PAVEMENT
- (B) AGGREGATE BASE COURSE
- (C) CONCRETE CURB AND GUTTER
- (D) HMA SHOULDER
- (E) AGGREGATE SHOULDER
- (F) CONCRETE MEDIAN

**PROPOSED LEGEND**

- (1) PROPOSED PAVEMENT
- (2) PAVEMENT WIDENING
- (3) AGGREGATE BASE COURSE
- (4) HMA MULTI-USE PATH
- (5) CONCRETE CURB AND GUTTER
- (6) HMA SHOULDER
- (7) AGGREGATE SHOULDER
- (8) MEDIAN
- (9) TOPSOIL
- (10) BRIDGE PARAPET
- (11) GUARDRAIL
- (12) CONCRETE BRIDGE DECK
- (13) NOISE WALL

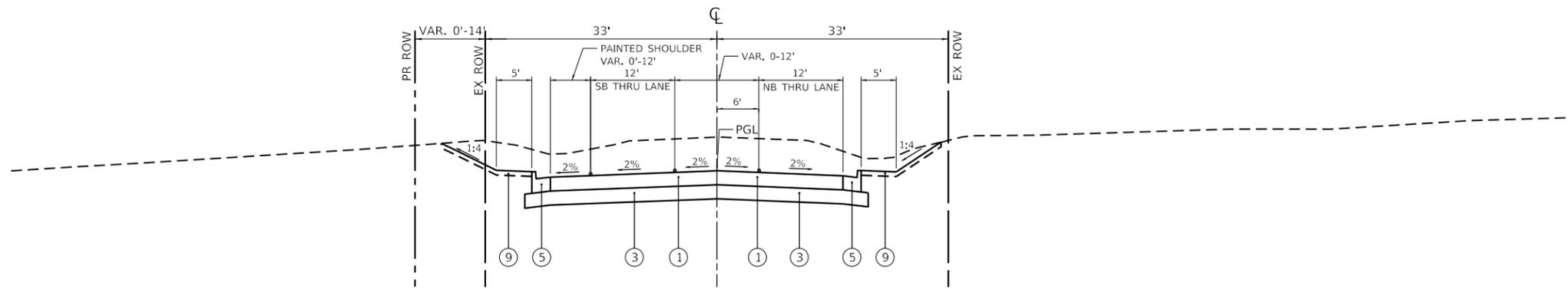


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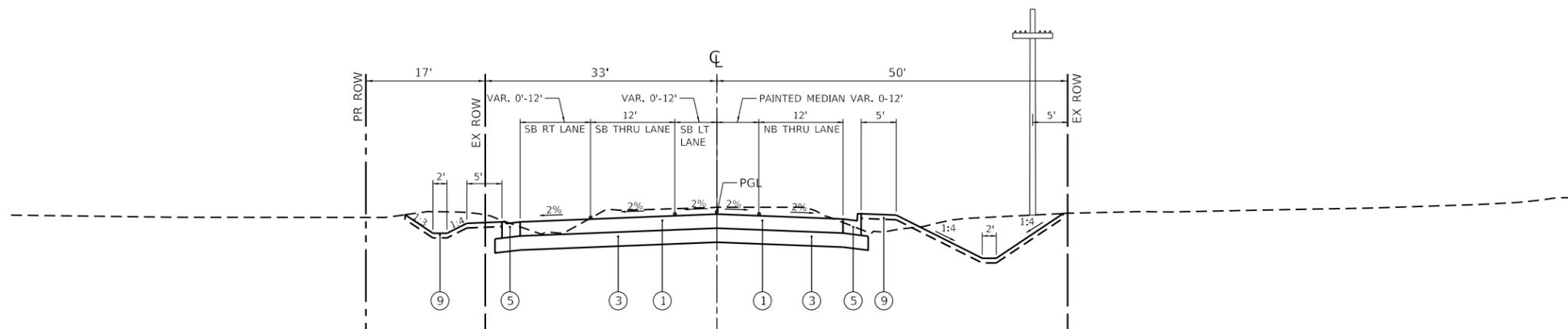
**STATE OF ILLINOIS  
 DEPARTMENT OF TRANSPORTATION**

<b>PROPOSED TYPICAL SECTIONS</b>	
<b>ILLINOIS ROUTE 59 / NAPERVILLE ROAD</b>	
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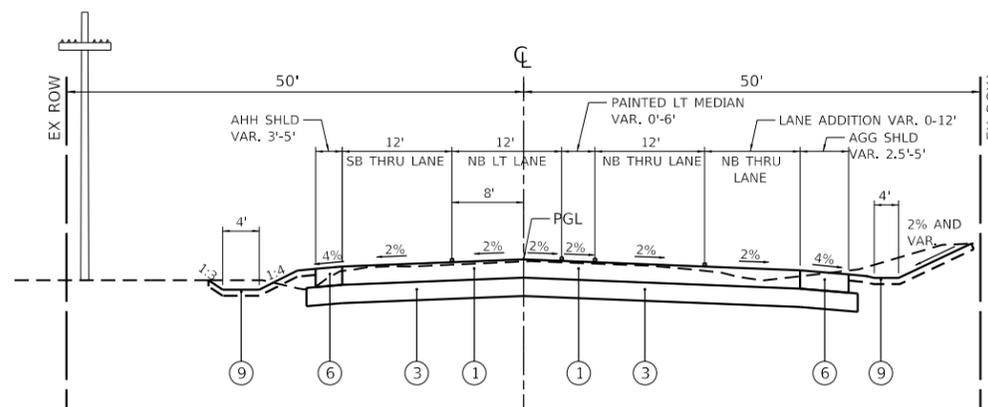
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



**NAPERVILLE ROAD**  
STA 714+68.00 TO 716+80.00



**NAPERVILLE ROAD**  
STA 714+86.00 TO 723+92.00



**ILLINOIS ROUTE 126**  
STA 25+62.00 TO 30+00.00

**PROPOSED LEGEND**

- ① PROPOSED PAVEMENT
- ② PAVEMENT WIDENING
- ③ AGGREGATE BASE COURSE
- ④ HMA MULTI-USE PATH
- ⑤ CONCRETE CURB AND GUTTER
- ⑥ HMA SHOULDER
- ⑦ AGGREGATE SHOULDER
- ⑧ MEDIAN
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- ⑪ GUARDRAIL
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- ⑬ NOISE WALL



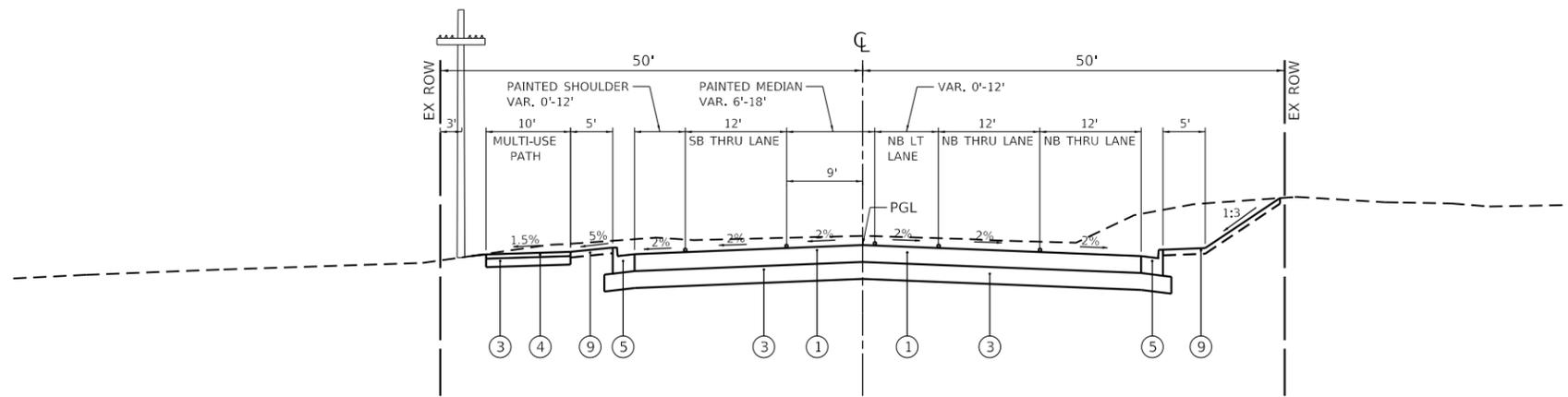
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**STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION**

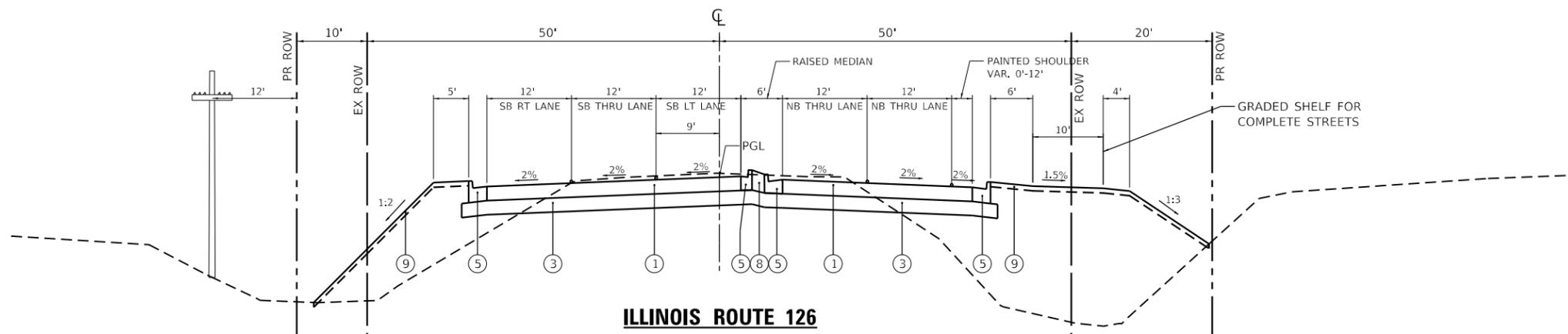
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NAPERVILLE ROAD / ILLINOIS ROUTE 126**

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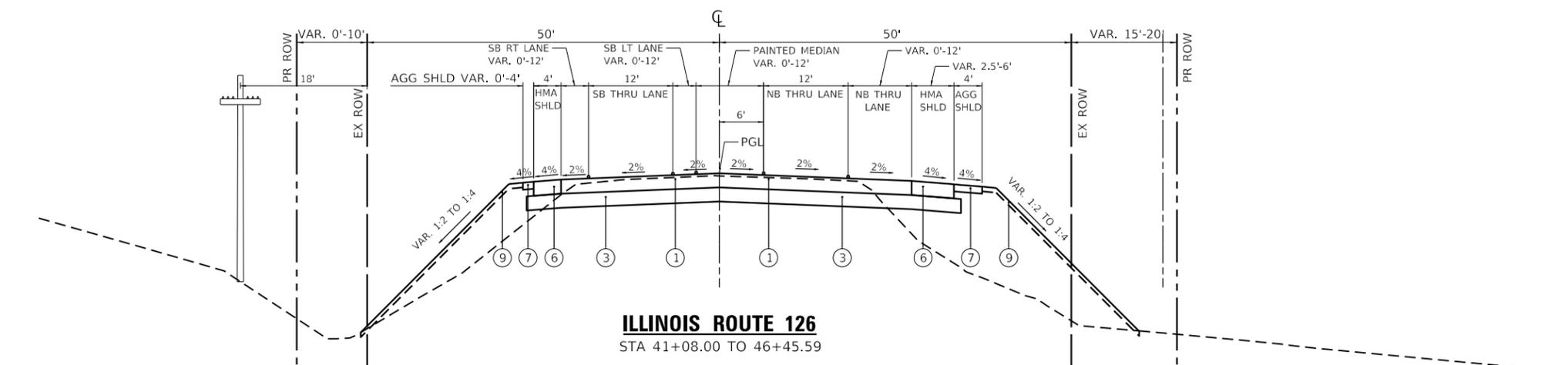
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



**ILLINOIS ROUTE 126**  
STA 31+25.00 TO 35+14.00



**ILLINOIS ROUTE 126**  
STA 39+52.00 TO 41+00.00



**ILLINOIS ROUTE 126**  
STA 41+08.00 TO 46+45.59

**PROPOSED LEGEND**

- ① PROPOSED PAVEMENT
- ② PAVEMENT WIDENING
- ③ AGGREGATE BASE COURSE
- ④ HMA MULTI-USE PATH
- ⑤ CONCRETE CURB AND GUTTER
- ⑥ HMA SHOULDER
- ⑦ AGGREGATE SHOULDER
- ⑧ MEDIAN
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STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

PROPOSED TYPICAL SECTIONS  
ILLINOIS ROUTE 126

SCALE: 1"=10' SHEET 7 OF 7 SHEETS STA. TO STA.

F.A.U. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
0380	06-00040-00-FP	WILL		
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

**PROJECT AND TRAFFIC INPUTS**

(Enter Data in Gray Shaded Cells)

Route: **143rs Street (US 30)**      Comments: **143rd Street Extension**  
 Section:      Revision based on change in scope of work and 2050 projections  
 County: **Will**      Design Date: **04/16/2020**      ONP      <-- BY  
 Location: **Plainfield, IL**      Modify Date:      <-- BY

	ADT	Year
Current:	11,134	2018
Future:	19,000	2050

Facility Type: **Other Marked State Route**  
 # of Lanes = **4**

Road Class: **I**  
 Subgrade Support Rating (SSR): **Poor**  
 Construction Year: **2021**  
 Design Period (DP) = **20** years

	Structural Design Traffic			% of ADT in Design Lane
	Minimum ADT	Actual ADT	Actual % of Total ADT	
PV =	0	10,747	75.0%	P = 32%
SU =	250	1,863	13.0%	S = 45%
MU =	750	1,720	12.0%	M = 45%
Struct. Design ADT =	14,330 (2031)			

**TRAFFIC FACTOR CALCULATION**

FLEXIBLE PAVEMENT		RIGID PAVEMENT	
Cpv =	0.15	Cpv =	0.15
Csu =	132.5	Csu =	143.81
Cmu =	482.53	Cmu =	696.42
TF flexible (Actual) =	9.70 (Actual ADT)	TF rigid (Actual) =	13.20 (Actual ADT)
TF flexible (Min) =	3.56 (Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.02 (Min ADT Fig. 54-2.C)

**NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS**

Full-Depth HMA Pavement	JPC Pavement
Use TF flexible = 9.70	Use TF rigid = 13.20
PG Grade Lower Binder Lifts = <b>PG 64-22</b> (Fig. 53-4.O)	Edge Support = <b>Tied</b> Shoulder or C&G
HMA Mixture Temp. = <b>75.5</b> deg. F (Fig. 54-5.C)	<b>Rigid Pavt Thick. = 10.25 in. (Fig. 54-4.E)</b>
Design HMA Mixture Modulus (E <sub>HMA</sub> ) = 680 ksi (Fig. 54-5.D)	
Design HMA Strain (ε <sub>HMA</sub> ) = 63 (Fig. 54-5.E)	
Full Depth HMA Design Thickness = 12.25 in. (Fig. 54-5.F)	
Limiting Strain Criterion Thickness = <b>14.75</b> in. (Fig. 54-5.I)	
<b>Use Full-Depth HMA Thickness = 12.25 inches</b>	
	<b>CRCP Pavement</b>
	Use TF rigid = 13.20
	IBR value = <b>3</b>
	<b>CRCP Thickness = 9.25 in. (Fig. 54-4.M)</b>

**TF MUST BE > 60 FOR CRCP**

**RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS**

HMA Pavement Over Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 9.70	Review 54-4.03 for limitations and special considerations.
HMA Overlay Design Thickness = 9.50 in. (Fig. 54-5.U)	
Limiting Strain Criterion Thickness = <b>10.75</b> in. (Fig. 54-5.V)	
<b>Use HMA Overlay Thickness = 9.50 inches</b>	<b>JPCP Thickness = NA inches</b>

**CONTACT RESEARCH FOR ASSISTANCE**

**DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN**

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

HMA\_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

06/02/20

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE: 143rs Street (US 30), COUNTY: Will, LOCATION: Plainfield, IL, FACILITY TYPE: NON-INTERSTATE, PROJECT LENGTH: 6800 FT, # OF CENTERLINES: 2 CL, # OF LANES: 4 LANES, # OF EDGES: 2 EP, LANE WIDTH - AVERAGE: 12 FT, SHOULDER WIDTH: 0 FT

PAVEMENT THICKNESS (FLEXIBLE): 12.25 IN, SHOULDER THICKNESS: 8.00 IN, HMA OVERLAY THICKNESS: 2.00 IN

FLEX PAVEMENT TRAFFIC FACTORS: MINIMUM 3.56, ACTUAL 9.70, USE 9.70

HMA COST PER TON: HMA SURFACE \$90.26 / TON, HMA TOP BINDER \$94.67 / TON, HMA LOWER BINDER \$88.12 / TON, HMA BINDER (IL-9.5FG or IL-4.75) \$90.26 / TON, HMA SHOULDER \$72.00 / TON

INITIAL COSTS: HMA PAVEMENT (FULL-DEPTH) \$62.14 / SQ YD, HMA SURFACE COURSE \$90.26 / TON, HMA TOP BINDER COURSE \$94.67 / TON, HMA LOWER BINDER COURSE \$88.12 / TON

HMA SHOULDER (8.00") 0 TONS \$72.00 / TON, CURB & GUTTER 13,240 LIN FT \$30.00 / LIN FT, SUBBASE GRAN MATL TY C (TONS) 166 TONS \$25.00 / TON, IMPROVED SUBGRADE: Aggregate Width = 51.0' 38,565 SQ YD \$7.00 / SQ YD

Note: \* Denotes User Supplied Quantity, FLEXIBLE CONSTRUCTION INITIAL COST \$2,924,916, FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$92,628

MAINTENANCE COSTS: ROUTINE MAINTENANCE ACTIVITY \$0.00 / LANE-MILE / YEAR, HMA OVERLAY PVMT SURF \$10.14 / SQ YD, HMA OVERLAY PVMT \$10.14 / SQ YD, HMA SURFACE MIX \$10.14 / SQ YD, HMA BINDER MIX \$0.00 / SQ YD

FLEXIBLE TOTAL LIFE-CYCLE COST \$3,775,396, FLEXIBLE TOTAL ANNUAL COST PER MILE \$119,561

FULL-DEPTH HMA PAVEMENT HMA PAVEMENT OVER RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

MAINTENANCE COSTS: YEAR 5, YEAR 10, YEAR 15, YEAR 20, YEAR 25, YEAR 30, YEAR 35, YEAR 40. Includes items like LONG SHLD JT R&S, CNTR LINE JOINT R&S, RNDM / THRM CRACK R&S, PD PVMT PATCH M&F SURF.

ROUTINE MAINTENANCE ACTIVITY 5.15 Lane Miles 0.00 \$0 \$0, MAINTENANCE LIFE-CYCLE COST \$850,480, MAINTENANCE ANNUAL COST PER MILE \$26,933

PCC PAVEMENT

JPCP

JPCP

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

06/02/20

ROUTE: 143rs Street (US 30), COUNTY: Will, LOCATION: Plainfield, IL, FACILITY TYPE: NON-INTERSTATE, PROJECT LENGTH: 6800 FT, # OF CENTERLINES: 2 CL, # OF LANES: 4 LANES, # OF EDGES: 2 EP, LANE WIDTH - AVERAGE: 12 FT, SHOULDER WIDTH: 0 FT

PAVEMENT THICKNESS (RIGID): JPCP 10.25 IN, SHOULDER THICKNESS: 10.25 IN

HMA OVERLAY THICKNESS: 2.75 IN

RIGID PAVEMENT TRAFFIC FACTORS: MINIMUM 5.02, ACTUAL 13.20, USE 13.20

INITIAL COSTS: JPC PAVEMENT \$89.62 / SQ YD, PAVEMENT REINFORCEMENT \$22.00 / SQ YD, STABILIZED SUBBASE \$19.00 / SQ YD, PCC SHOULDERS \$40.00 / SQ YD, CURB & GUTTER \$30.00 / LIN FT

Note: \* Denotes User Supplied Quantity, RIGID CONSTRUCTION INITIAL COST \$3,199,503, RIGID CONSTRUCTION ANNUAL COST PER MILE \$101,323

MAINTENANCE COSTS: ROUTINE MAINTENANCE ACTIVITY \$0.00 / LANE-MILE / YEAR, HMA OVERLAY \$13.97 / SQ YD, HMA OVERLAY PAVEMENT \$150.00 / SQ YD, HMA SURFACE MIX \$7.00 / SQ YD, HMA BINDER MIX \$6.36 / SQ YD

RIGID TOTAL LIFE-CYCLE COST \$3,759,419, RIGID TOTAL ANNUAL COST PER MILE \$119,055

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENANCE COSTS: YEAR 10, YEAR 15, YEAR 20, YEAR 25, YEAR 30, YEAR 35, YEAR 40. Includes items like PAVEMENT PATCH CLASS B, SHOULDER PATCH CLASS C, HMA OVERLAY 2.75" (PVMT), HMA OVERLAY 2.75" (SHLD).

ROUTINE MAINTENANCE ACTIVITY 5.15 Lane Miles \$0.00 \$0 \$0, MAINTENANCE LIFE-CYCLE COST \$559,916, MAINTENANCE ANNUAL COST PER MILE \$17,732

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised: 5/18/20 9:48 AM

CONSTRUCTION INITIAL COST: PRESENT WORTH \$3,199,503, ANNUAL COST PER MILE \$101,323. MAINTENANCE LIFE-CYCLE COST: PRESENT WORTH \$559,916, ANNUAL COST PER MILE \$17,732. TOTAL LIFE-CYCLE COST: PRESENT WORTH \$3,759,419, ANNUAL COST PER MILE \$119,055

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION

----->

#NAME?

#NAME?

OTHER OPTIONS (LOWEST TO HIGHEST):

TYPE / PERCENTAGE

#NAME?

#NAME?

#NAME?

#N/A

**PROJECT AND TRAFFIC INPUTS**

(Enter Data in Gray Shaded Cells)

Route: **IL 126**      Comments: **143rd Street Extension**  
 Section:              Revision based on change in scope of work  
 County: **Will**      Design Date: **04/16/2020**    ONP    <-- BY  
 Location: **Plainfield, IL**      Modify Date:                      <-- BY

	ADT	Year
Current:	17,600	2018
Future:	24,500	2050

Facility Type: **Other Marked State Route**  
 # of Lanes = **2 or 3**  
 Part of future 4 lanes or more? **No**  
 One Way Street? **No**  
 Road Class: **II**  
 Subgrade Support Rating (SSR): **Poor**  
 Construction Year: **2021**  
 Design Period (DP) = **20** years

	Structural Design Traffic			% of ADT in Design Lane
	Minimum ADT	Actual ADT	Actual % of Total ADT	
PV =	0	17,792	87.2%	P = 50%
SU =	250	1,163	5.7%	S = 50%
MU =	750	1,449	7.1%	M = 50%
Struct. Design ADT =	20,403 (2031)			

**TRAFFIC FACTOR CALCULATION**

FLEXIBLE PAVEMENT		RIGID PAVEMENT	
Cpv =	0.15	Cpv =	0.15
Csu =	112.06	Csu =	135.78
Cmu =	385.44	Cmu =	567.21
TF flexible (Actual) =	6.91 (Actual ADT)	TF rigid (Actual) =	9.82 (Actual ADT)
TF flexible (Min) =	3.17 (Min ADT Fig. 54-2.C)	TF rigid (Min) =	4.59 (Min ADT Fig. 54-2.C)

**NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS**

Full-Depth HMA Pavement		JPC Pavement	
Use TF flexible =	6.91	Use TF rigid =	9.82
PG Grade Lower Binder Lifts =	PG 64-22 (Fig. 53-4.O)	Edge Support =	Tied Shoulder or C&G
HMA Mixture Temp. =	75.5 deg. F (Fig. 54-5.C)	<b>Rigid Pavt Thick. =</b>	<b>10.00 in. (Fig. 54-4.E)</b>
Design HMA Mixture Modulus (E <sub>HMA</sub> ) =	680 ksi (Fig. 54-5.D)		
Design HMA Strain (ε <sub>HMA</sub> ) =	69 (Fig. 54-5.E)	CRC Pavement	
Full Depth HMA Design Thickness =	11.50 in. (Fig. 54-5.F)	Use TF rigid =	9.82
Limiting Strain Criterion Thickness =	14.75 in. (Fig. 54-5.I)	IBR value =	3
<b>Use Full-Depth HMA Thickness =</b>	<b>11.50 inches</b>	<b>CRCP Thickness =</b>	<b>8.75 in. (Fig. 54-4.N)</b>

**TF MUST BE > 60 FOR CRCP**

**RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS**

HMA Pavement Over Rubblized PCC		Unbonded Concrete Overlay	
Use TF flexible =	6.91	Review 54-4.03 for limitations and special considerations.	
HMA Overlay Design Thickness =	8.75 in. (Fig. 54-5.U)	<b>JPCP Thickness =</b>	<b>NA inches</b>
Limiting Strain Criterion Thickness =	10.75 in. (Fig. 54-5.V)		
<b>Use HMA Overlay Thickness =</b>	<b>8.75 inches</b>		

**CONTACT RESEARCH FOR ASSISTANCE**

**DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN**

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

HMA\_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

06/02/20

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE SECTION COUNTY LOCATION FACILITY TYPE PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH PAVEMENT THICKNESS (FLEXIBLE) SHOULDER THICKNESS HMA OVERLAY THICKNESS

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE

HMA COST PER TON UNIT PRICE HMA SURFACE HMA TOP BINDER HMA LOWER BINDER HMA BINDER HMA SHOULDER

INITIAL COSTS ITEM THICKNESS 100% QUANTITY UNIT UNIT PRICE COST

MAINTENANCE COSTS: ITEM THICKNESS MATERIAL T UNIT COST ROUTINE MAINTENANCE ACTIVITY HMA OVERLAY PVMT SURF HMA OVERLAY PVMT HMA SURFACE MIX HMA BINDER MIX HMA OVERLAY SHLD HMA OVERLAY SHLD MILLING PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL RANDOM / THERMAL CRACK ROUT & SEAL

FLEXIBLE TOTAL LIFE-CYCLE COST \$956,443 FLEXIBLE TOTAL ANNUAL COST PER MILE \$132,881

FULL-DEPTH HMA PAVEMENT HMA PAVEMENT OVER RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

MAINTENANCE COSTS: YEAR 5 YEAR 10 YEAR 15 YEAR 20 YEAR 25 YEAR 30 YEAR 35 YEAR 40

ROUTINE MAINTENANCE ACTIVITY 1.17 Lane Miles 0.00 \$0 \$0

45 YEAR LIFE CYCLE CRFn = 0.0407852 MAINTENANCE LIFE-CYCLE COST \$192,373 MAINTENANCE ANNUAL COST PER MILE \$26,727

PCC PAVEMENT

JPCP

JPCP

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

06/02/20

ROUTE SECTION COUNTY LOCATION FACILITY TYPE PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS HMA OVERLAY THICKNESS

RIGID PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE

INITIAL COSTS ITEM THICKNESS 100% QUANTITY UNIT UNIT PRICE COST

MAINTENANCE COSTS: ITEM THICKNESS MATERIAL T UNIT COST ROUTINE MAINTENANCE ACTIVITY HMA OVERLAY HMA OVERLAY PAVEMENT HMA SURFACE MIX HMA BINDER MIX HMA OVERLAY SHOULDER CLASS A PAVEMENT PATCHING CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH PVMT PATCH LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL RANDOM CRACK ROUT & SEAL

RIGID TOTAL LIFE-CYCLE COST \$1,008,996 RIGID TOTAL ANNUAL COST PER MILE \$140,183

JOINED PLAIN CONCRETE PAVEMENT UNBONDED JOINED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENANCE COSTS: YEAR 10 YEAR 15 YEAR 20 YEAR 25 YEAR 30 YEAR 35 YEAR 40

ROUTINE MAINTENANCE ACTIVITY 1.17 Lane Miles \$0.00 \$0 \$0

45 YEAR LIFE CYCLE CRFn = 0.0407852 MAINTENANCE LIFE-CYCLE COST \$126,846 MAINTENANCE ANNUAL COST PER MILE \$17,623

RECONSTRUCTION - HMA OVER RUBBLIZED PAVEMENT

RECONSTRUCTION - PCC UNBONDED OVERLAY

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised: 5/18/20 10:44 AM

CONSTRUCTION INITIAL COST PRESENT WORTH ANNUAL COST PER MILE MAINTENANCE LIFE-CYCLE COST PRESENT WORTH ANNUAL COST PER MILE

TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$1,008,996	\$956,443
		ANNUAL COST PER MILE	\$140,183	\$132,881

**LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY**

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LOWEST COST OPTION	=====>	HMA	<b>\$132,881</b>	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	<b>\$140,183</b>	5.5%

S:\GENWPDOCS\Pavement Design\ID-1\143rd Street Extension from IL 59 to IL 126\2020 Design\IL 126 - BDE 5401.xlsm\LifeCycleCost