

**DRAFT**

# **Interchange Type Study**

## **Interstate 57 and Interstate 74**

Section 10(5-1-RS-1, 14-1, 6)R  
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**Table of Contents**

- I. Executive Summary ..... 1
- II. Introduction ..... 1
  - A. Description of Project Area ..... 1
  - B. Land Use ..... 2
  - C. Project History ..... 3
- III. Purpose and Need ..... 3
  - A. Operational and Geometric Deficiencies ..... 4
  - B. Safety Deficiencies ..... 6
  - C. Capacity Deficiencies ..... 10
- IV. Interchange Type Concepts ..... 12
  - A. No-Build Concept ..... 12
  - B. Development of Proposed Interchange Type Concepts ..... 12
  - C. Selected Interchange Type Concepts ..... 14
    - 1. Alternate 1: Full Directional ..... 14
    - 2. Alternate 2: Semi-Directional with Directional Flyovers and Two Loops ..... 15
    - 3. Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops .... 15
    - 4. Alternate 4: Semi-Directional with No Loops ..... 15
    - 5. Alternate 5: Full Directional ..... 16
- V. Evaluation of Proposed Interchange Type Alternatives ..... 16
  - A. Traffic and Operational Analysis ..... 16
  - B. Highway Safety Manual Analysis ..... 20
  - C. Guide Signing ..... 20
  - D. Proposed Structures ..... 21
  - E. Maintenance of Traffic ..... 22
  - F. Environmental Impacts ..... 24
  - G. Estimated Construction Cost ..... 29
  - H. Design Exceptions ..... 29
- VI. Comparison of Interchange Alternatives ..... 31
  - A. Comparison Features ..... 31
  - B. Evaluation Matrix ..... 36
  - C. Recommended Alternate ..... 37
- VII. Conclusion ..... 37

**List of Tables**

Table 1: Weave Deficiencies ..... 5

Table 2: Total Crashes and Injuries within Project Limits (2008-2012) ..... 6

Table 3: Interstate 57 Crashes (2008-2012) ..... 7

Table 4: Interstate 74 Crashes (2008-2012) ..... 7

Table 5: Interchange Ramp Crashes (2008-2012)..... 9

Table 6: Average Daily Traffic (ADT) ..... 10

Table 7: Levels of Service – Existing Cloverleaf Interchange ..... 11

Table 8: Design Criteria ..... 30

Table 9: 2040 Peak Hour Analysis – Speed, Density, and LOS ..... 32

Table 10: Ramp Travel Times ..... 33

Table 11: CORSIM Conflict Analysis ..... 34

Table 12: Summary of Estimated Costs ..... 35

Table 13: Evaluation Matrix ..... 36

## **Exhibits**

Exhibit 1: Site Map

Exhibit 2: Existing Cloverleaf Interchange – Geometric Deficiencies

Exhibit 3: Interstate 57 Crash Diagram by Injury Type

Exhibit 4: Interstate 57 Crash Diagram by Crash Type

Exhibit 5: Interstate 74 Crash Diagram by Injury Type

Exhibit 6: Interstate 74 Crash Diagram by Crash Type

Exhibit 7: Interchange Ramp Crash Diagram by Injury Type

Exhibit 8: Interchange Ramp Crash Diagram by Crash Type

Exhibit 9: 5% Segment Diagram

Exhibit 10: Existing Cloverleaf with Aerial Image

Exhibit 11: Design and Geometric Criteria

Exhibit 12: Typical Sections: I-57

Exhibit 13: Typical Sections: I-74

Exhibit 14: Typical Sections: Ramps

Exhibit 15: Typical Sections: Mattis Avenue

Exhibit 16: Typical Sections: Bloomington Road

Exhibit 17: Alternate 1: Full Directional

Exhibit 18: Alternate 2: Semi Directional with Directional Flyovers and Two Loops

Exhibit 19: Alternate 3: Semi Directional with Semi Directional Flyovers and Two Loops

Exhibit 20: Alternate 4: Semi Directional with No Loops

Exhibit 21: Alternate 5: Full Directional

Exhibit 22: Proposed Design Traffic and LOS: No-Build Alternate

Exhibit 23: Proposed Design Traffic and LOS: Alternate 1

Exhibit 24: Proposed Design Traffic and LOS: Alternate 2

Exhibit 25: Proposed Design Traffic and LOS: Alternate 3

Exhibit 26: Proposed Design Traffic and LOS: Alternate 4

Exhibit 27: Proposed Design Traffic and LOS: Alternate 5

Exhibit 28: Preliminary Guide Signing Plan: Alternate 1

Exhibit 29: Preliminary Guide Signing Plan: Alternate 2  
Exhibit 30: Preliminary Guide Signing Plan: Alternate 3  
Exhibit 31: Preliminary Guide Signing Plan: Alternate 4  
Exhibit 32: Preliminary Guide Signing Plan: Alternate 5  
Exhibit 33: Structure Sketch: I-74, Bloomington Road, Mattis Avenue  
Exhibit 34: Structure Sketch: Ramps  
Exhibit 35: Maintenance of Traffic: Alternate 1  
Exhibit 36: Maintenance of Traffic: Alternate 2  
Exhibit 37: Maintenance of Traffic: Alternate 3  
Exhibit 38: Maintenance of Traffic: Alternate 4  
Exhibit 39: Maintenance of Traffic: Alternate 5  
Exhibit 40: Wetlands, Streams, and Other Water Bodies: Alternate 1  
Exhibit 41: Wetlands, Streams, and Other Water Bodies: Alternate 2  
Exhibit 42: Wetlands, Streams, and Other Water Bodies: Alternate 3  
Exhibit 43: Wetlands, Streams, and Other Water Bodies: Alternate 4  
Exhibit 44: Wetlands, Streams, and Other Water Bodies: Alternate 5

## I. Executive Summary

The purpose of this Interchange Type Study is to evaluate and compare different interchange types as a basis for the selection of a preferred interchange configuration to improve the existing Interstate 57 (I-57) and Interstate 74 (I-74) cloverleaf interchange in Champaign, Illinois. An interchange type study is being prepared to obtain jurisdictional agency approval of an interchange type and access alternative. The alternatives have been developed to provide improved interchange geometry and operations, enhanced safety conditions, and increased capacity for growing traffic volumes.

A recommended alternative for the interchange reconstruction will be selected by the procedures described in this type study, which included reviewing crash studies, traffic modeling, geometric planning, interstate signing, environmental impacts, estimating construction costs and additional land acquisition needs.

## II. Introduction

### A. Description of Project Area

This project is located in the Hensley and Champaign City Townships in the central portion of Champaign County and in the City of Champaign on the northwest side. The approximate project limits are the Olympian Drive to the north, North Prospect Avenue to the east, the Norfolk Southern Railroad to the south, and North Duncan Road to the west (see **Exhibit 1: Site Map**).

The existing facility was originally constructed in 1965 and is a full conventional cloverleaf interchange connecting I-57 and I-74. Each interstate consists of four lanes (two lanes in each direction) of concrete pavement with multiple overlays. Both I-57 and I-74 have open grass medians which are typically 64 feet and 40 feet in width, respectively. The adjacent section of I-74 to the east beginning between Mattis Avenue and Prospect Avenue consists of a 26 foot paved median with concrete barrier.

I-57 is a full access controlled north-south facility that serves local, regional, and interstate traffic. It originates in Southeastern Missouri and crosses numerous other interstates before terminating in Chicago in northern Illinois. I-57 serves as a vital link in the transportation network between northern and southern Illinois and is a Class I truck route carrying an average of 33,600 vehicles per day with approximately 28 percent truck volume (9,400 trucks per day average) within the project limits.

I-74 is a full access controlled east-west facility that serves local, regional, and interstate traffic. It crosses numerous other north-south and east-west interstates as it passes through Iowa, Illinois, Indiana, and Ohio. I-74 serves as a vital link in the transportation network between the Quad Cities on the Iowa-Illinois border and Cincinnati, Ohio and is a Class I truck route carrying an average of 38,400 vehicles per day with approximately 22 percent truck volume (8,500 trucks per day average) within the project limits.

Immediately adjacent interchanges include: Olympian Drive, an east-west principal arterial with a grade separation structure and diamond type interchange at I-57, approximately one mile north of I-74; Prospect Avenue, a north-south minor arterial with a grade separation structure and diamond type interchange at I-74, approximately one and a half miles east of I-57; I-72, a full access controlled east-west interstate facility with grade separation structures and a conventional cloverleaf type interchange at I-57, approximately two miles to the south; and South Prairie View Road, a north-south major collector north of I-74 and minor arterial south of I-74 with a grade separation structure and diamond type interchange with I-74, approximately five miles to the west.

Other adjacent cross roadways or grade separations within the project limits include: Mattis Avenue, a north-south minor arterial with a grade separation structure over I-57, approximately one half mile north of I-74, and a grade separation structure over I-74, approximately one half mile east of I-57; Bloomington Avenue (US 150), an east-west principal arterial with grade separation structure over I-57 approximately one quarter mile south of I-74; the Norfolk Southern Railroad, an east-west railroad with a grade separation structure over I-57, approximately one half mile south of I-74; and Duncan Road, a north-south principal arterial with grade separation structure over I-74, approximately one mile west of I-57.

## **B. Land Use**

The northeast quadrant of the I-57/I-74 interchange is primarily agricultural land use. Copper Slough passes through the center of the quadrant and there is a detention pond in the far southeast corner of the quadrant. The southeast quadrant is mostly agricultural land use with some development. Clearlake Boulevard provides access to the quadrant from Bloomington Road. There is a two story office building located in the far northeast corner of the quadrant. The southwest quadrant is also primarily agricultural land use with some development. Midwest Court provides access to the quadrant from Bloomington Road. There is a church located in the southwest corner of the quadrant and a detention pond between Midwest Court and the interchange ramp. The northwest quadrant is mainly agricultural land use with some development. There is a detention pond carrying

Copper Slough through the center of the quadrant and there is a multi-use path surrounding the detention pond.

A local stakeholder coordination meeting was held on August 20<sup>th</sup>, 2013 to discuss the proposed interchange type alternatives currently being considered. Attendees of the meeting included Senator Chapin Rose, IDOT, the City of Champaign, Champaign County, Champaign School District, local labor union representatives, and the Atkins Group, a developer that owns and brokers land in three of the four interchange quadrants. Future development adjacent to the interchange was discussed and any site plans being considered were requested for consideration during development of the proposed interchange types. The City of Champaign's Future Land Use Map indicates all four interchange quadrants have the potential for development as employment centers.

### **C. Project History**

Review of record plans for the I-57 and I-74 interchange indicate that the Interchange Design Study for the existing full conventional cloverleaf interchange was completed in 1958. Construction plans for the interchange were developed in 1963, and the interchange construction was completed in 1965. The initial construction included four lanes of pavement, two in each direction, consisting of 12 foot wide lanes constructed with 10 inches portland cement concrete pavement. The two directions of travel were separated by a 40 feet open grass median on I-74 and a 64 feet open grass median on I-57. Interchange lighting was added in 1969 to all four quadrants of the interchange. In 1990, the structures carrying I-74 over I-57 were rehabilitated, and the improvements included the complete removal and replacement of the existing superstructure. Several hot-mix asphalt overlays have been constructed on both I-57 and I-74 throughout the lifetime of the interchange.

### **III. Purpose and Need**

The purpose of the proposed interchange reconstruction improvement is to provide safer and more efficient transportation at the I-57 and I-74 interchange by eliminating deficient geometric features and reducing points of access in order to reduce crash frequency and severity, improve travel efficiency and increase the traffic capacity of the roadways by implementing policy design speed and cross sectional elements on both the mainline interstates and ramps.

The need for the proposed improvement is to address operational, geometric, safety, and capacity deficiencies as outlined below:

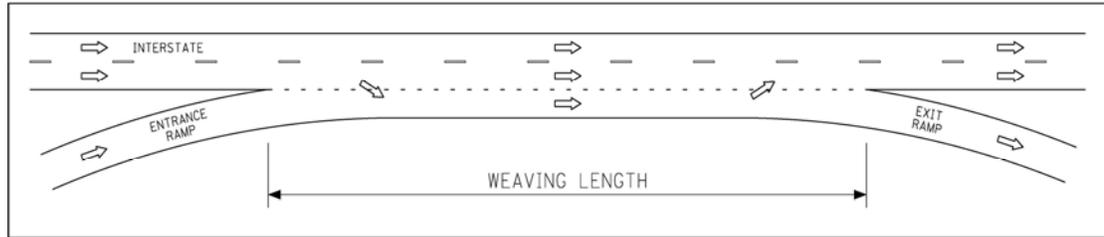
#### **A. Operational and Geometric Deficiencies**

The existing cloverleaf interchange, including the mainline interstates and all eight ramps connecting the interstates, contains several deficiencies. A deficiency is an element or characteristic of a roadway that does not meet current Federal Highway Administration (FHWA) or Illinois Department of Transportation (IDOT) policies. The existing interchange deficiencies include the ramp design speeds, ramp weaving distances, mainline interstate shoulder widths, and I-74 median width. These deficiencies lead to poor operational and safety performance of the interchange and need to be improved.

**Exhibit 2** illustrates the ramp design speeds and policy speeds, which are both determined based on the radii of the ramp curves and the cross slope of the roadway. The ramp design speed is the speed that the ramp as originally constructed currently accommodates, and the ramp policy speed is the speed that the ramps should accommodate according to current FHWA and IDOT policies. These policies set minimum speeds based on the type of facility in order to provide adequate geometry for vehicles navigating the roadways. Interstates have high policy speeds in order to move large volumes of traffic efficiently. Therefore, ramps connecting the interstates also need to have high policy speeds in order to safely accommodate travel between the high speed interstates. A deficiency occurs when the ramp design speed is less than the policy speed, because the speed of the ramp cannot safely accommodate vehicles travelling from one high speed facility to another. All of the ramp speeds for the current cloverleaf interchange configuration are deficient. As shown on **Exhibit 2**, six of the eight ramps are deficient by 10 miles per hour, and two of the eight ramps are deficient by 15 miles per hour. These deficient ramp design speeds are contributing to the crashes (see **Section III.B**) along the ramps at the existing interchange and need to be improved.

The posted speeds for I-57 and I-74 through the interchange are 65 miles per hour. A combination of different warning signs are used to alert motorists to reduce speed along the interchange ramps and approaches due to the deficiencies of each ramp. Signs include advisory exit and reduced ramp speeds, truck rollover warnings, chevrons, and large arrows. These signs add to the confusion of motorists trying to navigate from one interstate to another, and despite the implementation of these countermeasures, crashes are still occurring due to deficiencies of the ramp geometry. Ramp improvements are needed to reduce the number of crashes occurring due to the deficient ramp geometry and confusion caused by the warning signs.

A weave in an interchange is the length of roadway where an additional lane is added to allow for vehicles to increase speed to enter and reduce speed to exit the mainline interstate lanes from adjoining ramps:



The existing cloverleaf interchange has four weave locations connecting the ramps between I-57 and I-74. The actual length provided for each weave at the existing interchange is less than the IDOT policy length (see **Exhibit 2**), so all four weave lengths are deficient:

Weave location	I-57 NB	I-57 SB	I-74 EB	I-74 WB
Deficient by	104 ft	131 ft	104 ft	95 ft

These deficient weave lengths create high speed differentials between the mainline vehicles and vehicles trying to enter or exit the ramps. The speed differential and merging of vehicles onto mainline without sufficient acceleration or deceleration length contribute to the concentrated crashes (see **Section III.B**) at the weave areas for the existing interchange and need to be improved or removed.

Access points along interstates are the locations where vehicles are allowed to enter and exit the freeway. The existing cloverleaf interchange configuration has a total of 16 access points, including four along each direction of travel (northbound, southbound, eastbound, and westbound). Each access point along an interstate introduces a conflict point, where drivers are forced to make decisions with vehicles entering and exiting the mainline. At the existing access points for this interchange, the deficient weave lengths and ramp curves that motorists use to access the interstate contribute to the crashes presented in **Section III.B**. A reduction in the number of access points is needed to reduce the number of crashes at this interchange.

Paved shoulders along interstates can provide an area for vehicles that leave the mainline pavement to recover and return back to the mainline lanes prior to running

off onto the grass embankments on either side of the roadway. The existing paved shoulders for I-57 are 4 feet on the inside (or left edge of travel) and 10 feet on the outside (or right edge of travel), and I-74 shoulders are 6 feet and 10 feet, respectively. The current policy for both interstates is 12 foot shoulders on both the inside and outside. Since the existing shoulders are not as wide as the current policy, the shoulder widths are deficient. The deficient shoulder widths are a contributing factor to vehicles that strike fixed objects or overturn after running off of the pavement (see **Section III.B**) and need to be improved.

The current policy open grass median width for both interstates within the project limits is 60 feet. A 40 foot open grass median is provided for I-74 in the existing configuration, so it does not meet current policy and is deficient. This deficiency is a contributing factor to the fatality on I-74 (see **Section III.B**), where a vehicle entered the median and was not able to recover prior to entering into oncoming traffic and colliding head on with another vehicle.

**B. Safety Deficiencies**

A history of crash data and resulting injuries within the project limits were reviewed for the time period between 2008 and 2012 for I-57, I-74, and the interchange ramps. Injury types are defined as follows: Type A-Injuries are incapacitating injuries that prevent a person from walking, driving, or normally continuing activities the person was capable of performing prior to the injury; Type B-Injuries are non-incapacitating injuries that were evident to observers at the scene of the crash; Type C-Injuries are any other injuries that are reported but not evident; Crashes that do not result in injury are Property Damage Only (PDO).

Between 2008 and 2012, 22 percent of the 325 total crashes within the project limits resulted in injury. Each crash is classified by the maximum injury sustained, and some crashes involve multiple injuries:

	<b>Fatality</b>	<b>A-Injury</b>	<b>B-Injury</b>	<b>C-Injury</b>	<b>PDO</b>	<b>Total</b>
<b>Crash Type</b>	1	21	37	12	254	325
<b>Total Injuries</b>	1	27	48	15	0	91

**Interstate 57:**

A total of 85 crashes occurred between 2008 and 2012 along I-57 within the project limits. These crashes resulted in 14 injury crashes, including one Type A-Injury crash, 10 Type B-Injury crashes, and 3 Type C-Injury crashes. 71 crashes resulted in Property Damage Only (PDO). See **Exhibits 3 and 4** for diagrams of the crashes along I-57 and **Table 3** below for a summary of crashes along I-57:

Crash Type	Total	Frequency	Total Injury	Injury Type				
				Fatality	A-Injury	B-Injury	C-Injury	PDO
Animal	9	11%						9
Fixed Object	21	25%	3			2	1	18
Other Non-Collision	1	1%						1
Other Object	2	2%						2
Overtaken	11	13%	5		1	4		6
Parked Motor Vehicle	1	1%						1
Rear End	12	14%	3			3		9
Sideswipe Same Direction	28	33%	3			1	2	25
<b>Subtotal</b>	<b>85</b>	<b>100%</b>	<b>14</b>	<b>0</b>	<b>1</b>	<b>10</b>	<b>3</b>	<b>71</b>

**Interstate 74:**

A total of 168 crashes occurred between 2008 and 2012 along I-74 within the project limits. These crashes resulted in 45 injury crashes, including one fatality, 17 Type A-Injury crashes, 21 Type B-Injury crashes, and 6 Type C-Injury crashes. 123 crashes resulted in Property Damage Only (PDO). See **Exhibits 5 and 6** for diagrams of the crashes along I-74 and **Table 4** below for a summary of crashes along I-74:

Crash Type	Total	Frequency	Total Injury	Injury Type				
				Fatality	A-Injury	B-Injury	C-Injury	PDO
Angle	4	2%	2		2			2
Animal	16	10%	2		1		1	14
Fixed Object	63	38%	15		7	8		48
Head On	1	1%	1	1				
Other Non-Collision	6	4%	1			1		5
Overtaken	6	4%	6		2	4		
Parked Motor Vehicle	3	2%	2		1	1		1
Rear End	26	15%	8		3	3	2	18
Sideswipe Same Direction	38	23%	6		1	2	3	32
Turning	5	3%	2			2		3
<b>Subtotal</b>	<b>168</b>	<b>100%</b>	<b>45</b>	<b>1</b>	<b>17</b>	<b>21</b>	<b>6</b>	<b>123</b>

**Interstate I-57 and I-74 Summary:**

Fixed object and sideswipe same direction crashes account for 150 of the crashes, which is over half (58% on I-57 and 61% on I-74) of the crashes on the interstates within the project limits. The deficient weaving lengths explained in **Section III.A** are contributing to these types of crashes and need to be improved or removed. Review of the crash reports indicate that a contributing factor for these crashes is vehicles attempting to negotiate the weaving sections and ramp terminals for the deficient ramps entering and exiting I-57 and I-74. Fixed object crashes are occurring when vehicles either speed up too fast to enter the mainline, losing control and going off the roadway, or fail to slow down enough to stay on the pavement around the ramp curves, going off the roadway. Deficient shoulders along the interstates also contribute to fixed object crashes, since there is less recovery area for vehicles that begin to go off the roadway. Sideswipe crashes are occurring when vehicles are forced to enter the mainline lanes in a short distance and are unable to find an appropriate gap in traffic to pull out into the mainline lanes.

Two 5% Segments have been identified along I-74 within the project limits. 5% Segments are identified in yearly reports by the IDOT Bureau of Safety Engineering and represent the top 5% of roadway segments within the State with the highest potential for safety improvements.

The 2011 5% Segment along I-74 begins west of I-57 and extends 2000 feet to the east through the loop ramp weaving areas and I-57 outer ramp terminals (see **Exhibit 9**). A total of 72 crashes occurred between 2008 and 2012 within this 5% Segment, resulting in 15 injury crashes, including one fatality, 4 Type-A crashes, 9 Type-B crashes, and one Type-C crash. Review of the crash reports indicate that the deficient ramp design speeds and deficient weave distances discussed in **Section III.A** contribute to these crashes and improvement to these features is needed.

The 2012 5% Segment along I-74 begins 3000 feet west of Prospect Avenue and continues east through the Prospect Avenue ramp terminals to the Prospect Avenue cross roadway structure (see **Exhibit 9**). A total of 37 crashes occurred between 2008 and 2012 within this 5% Segment, resulting in 14 injury crashes, including 8 Type-A crashes, 5 Type-B crashes, and one Type-C crash. Review of the crash reports indicate that limited capacity of the interstate along this segment contributes to these crashes, so improvement is needed to provide additional capacity.

**Interchange Ramps:**

A total of 72 crashes occurred between 2008 and 2012 along the interchange ramps within the project limits. These crashes resulted in 12 injury crashes, including 3 Type A-Injury crashes, 6 Type B-Injury crashes, and 3 Type C-Injury crashes. 60 crashes resulted in Property Damage Only (PDO). **Exhibits 7 and 8** show diagrams of the crashes along the interchange ramps and illustrate the concentration of crashes along the deficient low speed ramp curves. See **Table 5** below for a summary of crashes along the ramps:

Crash Type	Total	Frequency	Total Injury	Injury Type				
				Fatality	A-Injury	B-Injury	C-Injury	PDO
Angle	1	1%						1
Fixed Object	55	76%	6		1	3	2	49
Other Non-Collision	2	3%						2
Overtuned	11	15%	6		2	3	1	5
Parked Motor Vehicle	1	1%						1
Sideswipe Same Direction	2	3%						2
<b>Subtotal</b>	<b>72</b>	<b>100%</b>	<b>12</b>	<b>0</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>60</b>

**Interchange Ramp Summary:**

The predominant crash types for the interchange ramps are fixed object (76%) and overturned (15%), which both occur when vehicles leave the ramp pavement. These crash types account for 66 of the 72 total crashes for the interchange ramps. Review of the crash reports for the interchange ramps indicates that the primary cause for these crashes is excessive speed for the ramp curves and configuration. Motorists are unable to slow their vehicles in order to negotiate the deficient ramp curves and design speeds explained in **Section III.A**. The vehicles go off the pavement and either strike fixed objects or overturn. The interchange ramps need to be improved to proper design speeds to reduce the number of crashes that are occurring due to the deficient ramp curves and design speeds.

### C. Capacity Deficiencies

The design year for this project is 2040. Traffic volumes on all roadways within the project limits are expected to increase over time. **Table 6** below illustrates the forecasted increase in traffic volumes (provided by IDOT) for the design year of 2040:

<b>Table 6: Average Daily Traffic (ADT)</b>			
	<b>2011 ADT</b>	<b>2040 ADT</b>	<b>% Increase</b>
<b>Interstate 57</b>			
South of I-74	33,600	49,900	49%
North of I-74	23,000	33,400	45%
<b>Interstate 74</b>			
West of I-57	27,800	41,800	50%
East of I-57	38,400	59,900	56%
<b>Interchange ramps</b>			
I-57 NB to I-74 EB	5,700	8,800	54%
I-74 EB to I-57 SB	3,500	4,550	30%
I-57 SB to I-74 EB	1,950	2,650	36%
I-74 EB to I-57 NB	600	1,000	67%
I-74 WB to I-57 SB	5,900	9,900	68%
I-57 NB to I-74 WB	3,600	4,950	38%
I-74 WB to I-57 NB	2,000	2,650	33%
I-57 SB to I-74 WB	700	1,200	71%

The operation of the existing I-57 and I-74 interchange has been evaluated for the increased traffic in the 2040 future conditions and several other criteria including Level of Service, speed differential, and ramp capacity.

Level of Service is a measure of the quality of traffic flow for a specific section of roadway. Levels of Service characterize the operating conditions of a roadway, which include speed, travel time, and freedom to maneuver. Levels of Service values can range from LOS A, which is the least congested or free flow, to LOS F, which is the most congested or breakdown of flow. According to The Bureau of Design and Environment Manual, Figure 44-5.A, acceptable Levels of Service for I-57 and I-74 are LOS C or better.

The Highway Capacity Manual (HCM) was used to determine the 2011 and 2040 Levels of Service for the existing I-57 and I-74 cloverleaf interchange (see **Table 7** below). These Levels of Service represent the existing geometric characteristics or “no-build” scenario and do not account for adding lanes to the freeways or reconfiguring the interchange ramps. For the design year of 2040, I-74 will have a Levels of Service D eastbound on both sides of I-57 and westbound on the east side of I-57. These Levels of Service do not meet the minimum design criteria of LOS C, so they are deficient. Improvement is needed to provide additional capacity.

<b>Table 7: Levels of Service - Existing Cloverleaf Interchange (HCM)</b>				
	<b>2011</b>		<b>2040</b>	
	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
<b>Northbound Interstate 57</b>				
South of I-74	B	B	B	B
North of I-74	A	B	A	B
<b>Southbound Interstate 57</b>				
South of I-74	B	B	B	C
North of I-74	B	B	B	B
<b>Eastbound Interstate 74</b>				
West of I-57	C	B	<b>D</b>	B
East of I-57	C	B	<b>D</b>	C
<b>Westbound Interstate 74</b>				
West of I-57	B	B	B	C
East of I-57	B	C	C	<b>D</b>

The loop ramps for the existing cloverleaf interchange have limited traffic capacity of approximately 800 vehicles per hour due to the low design speed of the ramp curves. The 2040 projected traffic volume for Ramp E (westbound I-74 to southbound I-57) is 1025 vehicles per hour, exceeding this capacity value of 800 vehicles per hour by more than 25%. If the traffic demand for a ramp exceeds the capacity, traffic will back up onto the interstate. Improvements are needed to prevent traffic from backing up onto the interstate.

#### IV. Interchange Type Concepts

##### A. No-Build Concept

The existing full conventional cloverleaf interchange consists of four loop ramps, four wrap around outer ramps, four mainline weaving segments, and sixteen points of access off of the interstates. See **Exhibit 10** for an aerial image of the existing interchange. As stated previously in **Section III**, the existing interchange without improvement has several deficiencies including operations, geometrics, safety, and capacity. All of these deficiencies could be mitigated by adding lanes to the interstates and reconstructing the interchange to meet current design criteria. Therefore, the No-Build Concept is not considered adequate to be further considered as a proposed interchange type.

##### B. Development of Proposed Interchange Type Concepts

Initial coordination of the interchange type concepts included identifying preferred components and characteristics of the proposed interchange. AASHTO's "A Policy on Geometric Design of Highways and Streets" and the Institute of Transportation Engineer's "Freeway and Interchange Geometric Design Handbook" were referenced for the various types of interchanges to be considered. The design criteria used for all roadways within the anticipate limits of reconstruction for this interchange are shown in **Exhibit 11**.

Selection variables for proposed interchange consideration included increased ramp design speeds, use of loop ramps, elimination of mainline weaves, number of access points off of the interstates, number and length of proposed structures, and impacts to the surrounding land. Standard entrance and exit terminals are utilized for all proposed interchange access points with the exception of the terminals on the north leg of I-57, which uses terminals with an auxiliary lane to the Olympian Drive interchange due to its close proximity.

All concepts include widening mainline I-57 and I-74 to three lanes in each direction and providing a closed median with barrier wall. Mainline I-57 and I-74 remain on the existing horizontal alignments, while a grade raise of approximately 3 feet is anticipated on I-74 to meet clearance requirements for the proposed structures over reconstructed I-57, which is anticipated to remain at approximately the same profile as existing. Reconstruction of adjacent cross roadways and structures along Bloomington Road and Mattis Avenue is also anticipated for each alternative as a result of the mainline widening and ramp reconstruction and to meet policy clearances. Proposed typical sections for roadway reconstruction can be seen in **Exhibits 12-16**.

A meeting was conducted at the IDOT District 5 office in November of 2012 to review the alternatives studied to date and identify which alternatives or their variations to consider for further studies. These alternatives included:

Alternate A: Semi-Directional Interchange Type with Three Loops

- Consists of four outer ramps, three loops, and one semi-directional flyover ramp.
- Four sub-alternatives were considered with loop ramp speeds varying from 30 to 45 mph.
- Includes two weaves, one along I-57 and one along I-74.
- These concepts were not selected for further studies because they did not eliminate the mainline weave.

Alternate B: Semi-Directional Interchange Type with Two Diagonal Loops

- Consists of four outer ramps, two diagonal loops, and two flyover ramps (with use of both directional and semi-directional types).
- Six sub-alternatives were considered with loop ramp speeds varying from 35 to 40 mph, variable semi-directional ramp radii, use of transposed ramps, and flyover ramps crossing over loop ramps.
- Eliminates the mainline weave.
- Two of these concepts were identified to be studied further, and they were later named Alternate 2 and Alternate 3. These were selected because they eliminated the mainline weave and had less impact on the adjacent properties compared to other alternatives.

Alternate C: Semi-Directional Interchange Type with Two Adjacent Loops

- Consists of four outer ramps, two adjacent loops, and two semi-directional flyover ramps.
- Four sub-alternatives were considered with loop ramp speeds varying from 30 to 45 mph.
- Includes one weave along I-74.
- These concepts were not selected for further studies because they did not eliminate the mainline weave.

Alternate D: Semi-Directional Interchange Type with One Loop

- Consists of four outer ramps, one loop, and three semi-directional flyover ramps.
- Four sub-alternatives were considered with loop ramp speeds varying from 30 to 45 mph.
- Eliminates the mainline weave.
- These concepts were not selected for further studies because leaving only one loop ramp was not desirable.

#### Alternate E: Full Directional Interchange Type

- Consists of four outer ramps and four directional flyover ramps.
- Three sub-alternatives were considered with varying flyover ramp geometry.
- Eliminates the mainline weave.
- Two of these concepts were identified to be studied further, and they were later named Alternate 1 and Alternate 5. These concepts were selected because they eliminated the mainline weave and all loop ramps.

#### Alternate F: Semi-Directional Interchange Type with No Loops

- Consists of four outer ramps and four semi-directional flyover ramps.
- Two sub-alternatives were considered with varying flyover ramp geometry.
- Eliminates the mainline weave.
- One of these concepts was identified to be studied further, and it was later named Alternate 4. This concept was selected because it eliminated the mainline weave and all loop ramps.

#### Alternate G: Circle Interchange

- Consists of an outer ring from which all ramp traffic merges and diverges to reach their desired direction of travel.
- Eliminates the mainline weave.
- These concepts were not selected for further studies because of the weaving movements and break over between ramps.

A full cloverleaf type interchange was discussed as an alternative for the replacement of the existing full cloverleaf interchange. Even with collector distributor roadways, this interchange type concept still has four weaves to navigate between interstates and was therefore not further considered as a desirable alternative. The full cloverleaf also has substantial right-of-way impacts due to the large loop ramps to accommodate higher design speeds in each quadrant.

After review of all alternatives, five concepts were selected for further investigation and initiation of this Interchange Type Study.

### C. Selected Interchange Type Concepts

#### 1. Alternate 1: Full Directional

This proposed full directional interchange type concept is illustrated in **Exhibit 17**. This interchange type concept does not include any inner loop ramps and eliminates the mainline weaving movements within the interchange. The proposed design consists of eight access points off of the interstates, which is half of the points for the existing cloverleaf interchange.

The use of minor convergences and divergences along the ramps reduces the number of entrance and exit terminals from four in each direction of travel to two. All ramps in the full directional interchange type are designed for a 50 mph design speed. Flyover Ramps D and E are carried over flyover Ramps C and F, which cross over I-57 and I-74.

**2. Alternate 2: Semi-Directional with Directional Flyovers and Two Loops**

This interchange type concept is a semi-directional interchange with directional flyovers and two loops as illustrated in **Exhibit 18**. The loop ramps are placed diagonally in order to eliminate any mainline weaving movements within the interchange. The proposed design consists of twelve access points off of the interstates, compared to sixteen for the existing cloverleaf interchange. The use of minor convergences and divergences in the northeast and southwest quadrants reduces the number of entrance and exit terminals from four in each direction for the existing cloverleaf to three for the proposed concept. Loop ramps are designed for a 40 mph design speed, while all other ramps are designed for a 50 mph design speed. Outer Ramps B and G cross over loop Ramps C and F; and flyover Ramps D and E are carried over I-57, I-74, and loop Ramps C and F.

**3. Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops**

The third interchange type concept is a semi-directional interchange with semi-directional flyovers and two loops as illustrated in **Exhibit 19**. Similar to Alternate 2, the loop ramps are placed diagonally in order to eliminate any mainline weaving movements within the interchange. The proposed design consists of twelve access points off of the interstates, compared to sixteen for the existing cloverleaf interchange. The use of minor convergences and divergences in the northeast and southwest quadrants reduces the number of entrance and exit terminals from four in each direction for the existing cloverleaf to three for the proposed concept. Loop ramps are designed for a 40 mph design speed, while all other ramps are designed for a 50 mph design speed. Outer Ramp B crosses over loop Ramp C; flyover Ramp D carries over outer Ramp B, I-57, and I-74; and flyover Ramp E crosses over flyover Ramp D, I-57, outer Ramp H, I-74, and loop Ramp C.

**4. Alternate 4: Semi-Directional with No Loops**

The proposed semi-directional interchange concept with no loops is illustrated in **Exhibit 20**. Similar to Alternate 1, this interchange type concept does not include any inner loop ramps and eliminates the mainline weaving movements within the interchange. The proposed design consists of eight access points off of the interstates, which is half of the points for the existing cloverleaf interchange. The use of minor convergences and divergences along the ramps reduces the number of entrance and exit terminals from

four in each direction of travel to two. All ramps in the full directional interchange type are designed for a 50 mph design speed. Flyover Ramp C crosses over outer Ramp H, I-74, and I-57; flyover Ramp D carries over outer Ramp B, I-57, flyover Ramp C, I-74, and outer Ramp G; flyover Ramp E crosses over outer Ramp G, I-57, outer Ramp H, flyover Ramp C, and I-74; and flyover Ramp F crosses over outer Ramp A, flyover Ramp C, I-74, outer Ramp G, flyover Ramp D, and I-57.

#### **5. Alternate 5: Full Directional**

The proposed full directional interchange type concept is illustrated in **Exhibit 21**. This interchange type concept does not include any inner loop ramps and eliminates the mainline weaving movements within the interchange. The proposed design consists of eight access points off of the interstates, which is half of the points for the existing cloverleaf interchange. The use of minor convergences and divergences along the ramps reduces the number of entrance and exit terminals from four in each direction of travel to two. All ramps in the full directional interchange type are designed for a 50 mph design speed. Flyover Ramp C crosses over flyover Ramps F and D, I-74, I-57, and flyover Ramp E; flyover Ramp D crosses over I-74, I-57, and flyover Ramp F; flyover Ramp E crosses over I-74 and I-57; flyover Ramp F crosses over flyover Ramp C, I-74, flyover Ramp E, and I-57.

## **V. Evaluation of Proposed Interchange Alternatives**

### **A. Traffic and Operational Analysis**

The proposed interchange type concepts were analyzed using CORridor SIMulation (CORSIM), a microscopic simulation model that represents movements of individual vehicles and includes the influence of driver behavior. CORSIM allows for a detailed comparison between alternatives in order to quantify and differentiate the traffic operations of the proposed interchange systems.

CORSIM is also used to compare the safety differences between the interchange alternatives by quantifying the number of conflicts within each simulation, where a conflict is defined as a moment when the time-to-collision between two simulated vehicles is less than or equal to 2.0 seconds. The number of conflicts is not an estimation of the number of collisions that are likely to occur, but rather a surrogate for the potential exposure to conflicts.

The 2040 Design Hourly Volumes (DHV's) for the I-57 and I-74 interchange were provided by IDOT. Trucks account for approximately 28% of the volume on I-57, 22% on I-74, and 21% on the ramps. The existing peak hour directional splits for I-57

and I-74 were determined from IDOT's Traffic Count Database System (<http://www.ms2soft.com/tcds/tsearch.asp?loc=Idot&mod=>). Determining the directional distribution for the interstate included averaging on both sides of the interchange to achieve balanced volumes. See **Exhibit 22** for the 2040 DHV's for the existing cloverleaf interchange.

Adjacent interchange ramp volumes at Prospect Avenue, Prairie View Road, Olympian Drive, and I-72 were calculated from the 2011 ADT's from IDOT's Traffic Counts (<http://www.gettingaroundillinois.com>). The 2040 ADT for each ramp was projected from the 2011 ADT's and based on the average growth rate of the mainline provided by IDOT. The 2040 ramp DHV was then estimated based on the percentage of mainline DHV versus ADT.

In addition to the following traffic and operational analysis provided for each alternative below, see **Table 9**: 2040 Peak Hour Analysis, **Table 10**: Ramp Travel Times, and **Table 11**: CORSIM Conflict Analysis in **Section IV.A**.

#### ***Existing Cloverleaf***

The existing cloverleaf interchange was analyzed for the projected 2040 design hourly traffic. See **Exhibit 22** for the projected traffic volumes and Levels of Service for the different components of the interchange. Without construction of a third thru lane on I-74, eastbound traffic between the I-57 ramps and Prospect Avenue operates at a LOS D. This does not meet the minimum design criteria of LOS C for an urban interstate. In addition, the projected 2040 DHV is 3,153 for I-74 eastbound and 2,958 for I-74 westbound, and the design criteria warrants a third thru lane for DHV's exceeding 2,800.

#### ***Alternate 1: Full Directional***

The full directional interchange type concept was analyzed for the projected 2040 design hourly traffic. **Exhibit 23** illustrates the projected traffic volumes and Levels of Service for the different components of the interchange. With the lane additions on I-57 and I-74 and increased ramp design speed of 50 mph resulting from larger ramp radii and elimination of the loop ramps, the full directional alternative offers increased capacity over the existing cloverleaf.

The overall travel time through the full directional interchange is less than the existing cloverleaf and the shortest of any of the proposed alternatives. All of the proposed ramps are directional with a design speed of 50 mph and the total of all the ramp lengths is approximately 10.5 miles. The total travel time through all of the ramps in the interchange from a common point on the interstate compared to other alternatives is estimated to be 11 minutes and 56 seconds.

Due to the reduction of access points off the interstate and elimination of the short weaving sections, the full directional interchange has fewer potential conflicts than the existing cloverleaf interchange. The conflict analysis for the full directional interchange predicts a 56% reduction in the total number of conflicts from the no-build alternative.

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

The projected 2040 design hourly traffic was used to analyze the semi-directional interchange type concept with directional flyovers and two loops. **Exhibit 24** illustrates the projected traffic volumes and Levels of Service for the different components of the interchange. With the lane additions on I-57 and I-74 and increased design speed of 40 mph for the loop ramps and 50 mph for all other ramps, this alternative offers increased capacity over the existing cloverleaf.

The overall travel time through the semi-directional interchange concept with directional flyovers and two loops is less than the existing cloverleaf and the third shortest of any of the proposed alternatives. All of the proposed ramps have design speeds higher than the existing cloverleaf, and the total of all the ramp lengths is approximately 11.8 miles. The total travel time through all of the ramps in the interchange from a common point on the interstate compared to other alternatives is estimated to be 13 minutes and 1 second.

Due to the reduction of access points off the interstate and elimination of the short weaving sections, the semi-directional interchange concept with directional flyovers and two loops has fewer potential conflicts than the existing cloverleaf interchange. The conflict analysis for this interchange concept predicts a 46% reduction in the total number of conflicts from the no-build alternative.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

The semi-directional interchange type concept with semi-directional flyovers and two loops was analyzed for the projected 2040 design hourly traffic. **Exhibit 25** illustrates the projected traffic volumes and Levels of Service for the different components of the interchange. With the lane additions on I-57 and I-74 and increased design speed of 40 mph for the loop ramps and 50 mph for all other ramps, this alternative offers increased capacity over the existing cloverleaf.

The overall travel time through the semi-directional interchange concept with semi-directional flyovers and two loops is less than the existing cloverleaf and the longest of any of the proposed alternatives. All of the proposed ramps have design speeds higher than the existing cloverleaf, and the total of all the ramp lengths is approximately 12.5 miles. The total travel time through all of the ramps in the interchange from a common point on the interstate compared to other alternatives is estimated to be 14 minutes and 3 seconds.

Due to the reduction of access points off the interstate and elimination of the short weaving sections, the semi-directional interchange concept with semi-directional flyovers and two loops has fewer potential conflicts than the existing cloverleaf interchange. The conflict analysis for this interchange concept predicts a 52% reduction in the total number of conflicts from the no-build alternative.

***Alternate 4: Semi-Directional with No Loops***

The projected 2040 design hourly traffic was used to analyze the semi-directional interchange type concept with no loops. **Exhibit 26** illustrates the projected traffic volumes and Levels of Service for the different components of the interchange. With the lane additions on I-57 and I-74 and increased ramp design speed of 50 mph resulting from larger ramp radii and elimination of the loop ramps, the semi-directional alternative with no loops offers increased capacity over the existing cloverleaf.

The overall travel time through the semi-directional interchange with no loops is less than the existing cloverleaf and the second longest of any of the proposed alternatives. All of the proposed ramps have a design speed of 50 mph and the total of all the ramp lengths is approximately 11.9 miles. The total travel time through all of the ramps in the interchange from a common point on the interstate compared to other alternatives is estimated to be 13 minutes and 36 seconds.

Due to the reduction of access points off the interstate and elimination of the short weaving sections, the semi-directional interchange with no loops has fewer potential conflicts than the existing cloverleaf interchange. The conflict analysis for this interchange concept predicts a 33% reduction in the total number of conflicts from the no-build alternative.

***Alternate 5: Full Directional***

The full directional interchange type concept was analyzed for the projected 2040 design hourly traffic. **Exhibit 27** illustrates the projected traffic volumes and Levels of Service for the different components of the interchange. With the lane additions on I-57 and I-74 and increased ramp design speed of 50 mph resulting from larger ramp radii and elimination of the loop ramps, the full directional alternative offers increased capacity over the existing cloverleaf.

The overall travel time through the full directional interchange is less than the existing cloverleaf and the second shortest of any of the proposed alternatives. All of the proposed ramps are directional with a design speed of 50 mph and the total of all the ramp lengths is approximately 10.5 miles. The total travel time through all of the ramps in the interchange from a common point on the interstate compared to other alternatives is estimated to be 12 minutes and 16 seconds.

Due to the reduction of access points off the interstate and elimination of the short weaving sections, the full directional interchange has fewer potential conflicts than the existing cloverleaf interchange. The conflict analysis for the full directional interchange predicts a 41% reduction in the total number of conflicts from the no-build alternative.

## **B. Highway Safety Manual Analysis**

A Highway Safety Manual Analysis utilizing the Enhanced Interchange Safety Analysis Tool (ISATe) will be included for future submittals in order to predict the safety performance of the proposed interchange alternatives.

## **C. Guide Signing**

### ***Alternate 1: Full Directional***

A preliminary layout of the proposed interstate guide signing along I-57 and I-74 for Alternate 1 (Full Directional Interchange Type) is illustrated on **Exhibit 28**. With the elimination of the loop ramps and reduction in access points off of the interstates, the proposed guide signs change significantly from the existing cloverleaf. The two “A” and “B” exits for each leg are no longer required, and only one exit sign off the interstate needs to be provided for each leg. Once vehicles exit the interstate, additional directional information is provided along the ramp for the divergence of traffic to the two directions. Advance guide signs are also revised to display the new configuration without the use of “A” and “B” exits. Additional information including the route shield and cardinal direction has been added to the supplemental guide signs to indicate the direction of travel after the single exit. “Exit Only” signs have also been added for I-57 northbound and southbound between I-57 and Olympian Drive, and I-74 eastbound between I-57 and Prospect Avenue. In the proposed configuration, these lanes are considered auxiliary lanes and drop off at the adjacent ramp terminals. As a result of eliminating the loop ramps and reducing the number of mainline access points, the guide signing plan for Alternate 1 is simplified compared to existing, and the total number of exit signs along the interstate is reduced.

### ***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

A preliminary layout of the proposed interstate guide signing along I-57 and I-74 for Alternate 2 (Semi-Directional Interchange Type with Loops) is illustrated on **Exhibit 29**. This signing concept is similar to Alternate 1, except that the “A” and “B” exit signing is still required along I-57 due to the use of the loop ramps.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

A preliminary layout of the proposed interstate guide signing along I-57 and I-74 for Alternate 3 (Semi Directional Interchange Type with Loops) is illustrated on **Exhibit 30**. This signing concept is similar to Alternate 2, except that in order to keep the geometry of this interchange type alternative compressed and minimize right-of-way impacts, the directional split on the I-74 eastbound ramp after the exit terminal is transposed. Vehicles that want to ultimately go right (south) choose the left split in the ramp and vehicles that want to go left (north) choose the right split in the ramp.

***Alternate 4: Semi-Directional with No Loops***

A preliminary layout of the proposed interstate guide signing along I-57 and I-74 for Alternate 4 (Semi Directional Interchange Type) is illustrated on **Exhibit 31**. This signing concept is similar to Alternate 1, except that in order to keep the geometry of this interchange type alternative compressed and minimize right-of-way impacts, each of the directional splits on the ramps after the exit terminal is transposed. Vehicles that want to ultimately go right choose the left split in the ramp and vehicles that want to go left choose the right split in the ramp.

***Alternate 5: Full Directional***

A preliminary layout of the proposed interstate guide signing along I-57 and I-74 for Alternate 5 (Full Directional Interchange Type) is illustrated on **Exhibit 32**. This signing concept is similar to Alternate 1.

**D. Proposed Structures**

It is anticipated that all interchange type concepts will require the removal and replacement of the structures carrying I-74 over I-57, Bloomington Road over I-57, Mattis Avenue over I-74, and Mattis Avenue over I-57. This reconstruction is anticipated in order to accommodate the proposed roadway typical sections on the bridge deck, provide the clear opening underneath the structure for the proposed under passing roadway and ramp terminals, and to provide the design vertical clearance of 17'-1".

Proposed ramp structures are also anticipated at new locations for each interchange type concept where the ramps cross over the interstates or other ramps. Variable widths for the inside shoulder on the ramp structures are anticipated in order to meet sight distance along the inside of curves where the 42" parapet wall could restrict visibility.

The proposed structure lengths and number of spans vary based on the interchange type concept. The construction of these structures has been considered in the cost estimate for each alternative. Proposed typical sections for these structures can be

seen on **Exhibits 33-34** and the structure limits are depicted in plan view on **Exhibits 17-21**.

## **E. Maintenance of Traffic**

The maintenance of traffic during staged construction of the I-57 and I-74 interchange and associated improvements is a critical component of the proposed project. Construction will need to be completed while maintaining traffic at all times on I-57 and I-74 regardless of the recommended alternative. Use of temporary pavement will be minimized, although required for some temporary ramp connections and tie-ins. Short-term duration closures could be considered for completion of portions of ramp construction items in lieu of temporary pavement or detour routes.

Each alternative generally follows the same sequencing for staging of construction to maintain traffic. See **Exhibits 35-39** for preliminary construction staging and maintenance of traffic concepts for each of the proposed alternatives. The cross roadways are constructed first in order to provide the necessary opening below for the proposed interstate reconstruction and any associated ramp terminals. Outer ramps or portions thereof that do not interfere with the existing ramp configuration are constructed next. After traffic is placed onto the proposed outer ramps, the proposed flyover and loop ramps can be constructed. Proposed ramp geometry, location of proposed substructure units, and staging of individual ramps will be evaluated in order to maintain traffic on the existing loops with minimal disturbance and limited use of temporary pavement. Upon completion of the proposed ramp construction, placement of traffic on the proposed ramps, and closure of the existing loop ramps, the mainline I-57 and I-74 pavement and I-74 structure can be constructed. Proposed interstate staging will allow for two lanes of travel in each direction, which will require temporary widening of one existing structure to maintain traffic during construction of the first proposed structure. Temporary connections to the proposed ramps will also be provided during the mainline construction. Specific staging requirements unique to each individual interchange type alternate are described below.

### ***Alternate 1: Full Directional***

After completing construction of the cross roadways and structures, all of outer ramps G and H, portions of outer ramps A and B, and portions of all flyover ramps are constructed. Next, temporary connections for outer ramps A and B will be constructed. Traffic will remain in the existing configuration until completion of this construction, upon which the proposed outer ramps will be opened to traffic while maintaining traffic on the existing loop ramps. Flyover ramps C, D, E, and F are completed next, allowing for closure of the existing loop ramps, placement of traffic

on all proposed ramps, and construction of the proposed mainline pavement and I-74 structure.

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

Temporary connections for existing outer ramp B and loop ramp G are constructed along with the cross roadways and structures. Traffic is shifted to the temporary ramp B and G configuration, allowing for construction of all of outer ramps B and G and portions of flyover ramps D and E. Loop ramps C and F are then constructed after shifting traffic to the proposed outer ramps B and G. After the existing loop ramps C and F are closed and traffic is placed onto the two proposed loop ramps, flyover ramps D and E can be constructed. Traffic can then be shifted to the proposed flyover ramps D and E, allowing for closure of the existing loops ramps D and E and construction of the mainline pavement, I-74 structure, and outer ramps A and H.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

All of outer ramps B and G and flyover ramps D and E are constructed after completion of the cross roadways and structures and while traffic is maintained in the existing configuration. After placement of traffic on the proposed ramps previously constructed and closure of the existing outer ramps B and G and existing loop ramps D and E, the proposed outer ramps A and H and loop ramps C and F can be constructed. After traffic is placed on the proposed loop ramps and all existing loop ramps are closed, the mainline roadways and I-74 structure can be constructed.

***Alternate 4: Semi-Directional with No Loops***

While maintaining traffic in the existing configuration, all of outer ramps B and H, portions of outer ramps A and G, and a temporary connection for ramp A are all constructed after completion of the cross roadways and structures. Traffic is shifted to the proposed outer ramps A, B, and C, and the flyover ramps D, E, and F are constructed along with the completion of proposed permanent ramp A. After opening flyover ramps D, E, and F to traffic, the existing loops D, E, and F can be closed and flyover ramp C can be constructed. Traffic is then placed onto the proposed flyover ramp C, and a temporary connection for the existing ramp G is constructed to allow for completion of the proposed ramp G. After all existing loop ramps are closed to traffic, construction can be completed on the mainline roadways and I-74 structure.

***Alternate 5: Full Directional***

After completing construction of the cross roadways and structures, all of outer ramps A, G, and H, portions of outer ramp B, and portions of all flyover ramps are constructed. Next, a temporary connection for outer ramp B will be constructed. Traffic will remain in the existing configuration until completion of this construction, upon which the proposed outer ramps will be opened to traffic while maintaining

traffic on the existing loop ramps. Flyover ramps C, D, E, and F are completed next, allowing for closure of the existing loop ramps, placement of traffic on all proposed ramps, and construction of the proposed mainline pavement and I-74 structure.

## **F. Environmental Impacts**

### **Wetlands**

A wetland survey was conducted by the Wetland Science Program of the Illinois Natural History Survey on June 13-14, 2013. All potential wetlands within the specified project area were examined. Sixteen sites met the three criteria of a wetland established in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* [U.S. Army Corps of Engineers (USACE) 2010] and were, therefore, determined to be wetlands.

The following is a summary of the potential wetland impacts for each of the five alternates. The estimated impact areas were calculated based on the preliminary right-of-way limits for each alternate. Exhibits depicting the wetland areas in proximity to each of the project alternates are included in **Exhibits 40-44**. The estimated wetland impacts are assumed to be a conservative estimate since the impact areas are based only on the preliminary right-of-way limits. Measures to avoid and minimize potential impacts will be taken into consideration in accordance with IDOT BDE Manual Section 26-8. Therefore, the actual wetland impact areas could be less and would be determined during the design phase of the project once further details, including grading limits, have been identified.

#### ***Alternate 1: Full Directional***

Based on the limits of the proposed right-of-way for this alternate, six (6) wetlands would likely be impacted, one of which would only be partially impacted. The estimated total area of wetland impacts would be approximately 3.7 acres.

#### ***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

Based on the limits of the proposed right-of-way for this alternate, six (6) wetlands would likely be impacted, one of which would only be partially impacted. The estimated total area of wetland impacts would be approximately 3.5 acres.

#### ***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

Based on the limits of the proposed right-of-way for this alternate, six (6) wetlands would likely be impacted, one of which would only be partially impacted. The estimated total area of wetland impacts would be approximately 4.2 acres.

***Alternate 4: Semi-Directional with No Loops***

Based on the limits of the proposed right-of-way for this alternate, eight (8) wetlands would likely be impacted, one of which would only be partially impacted. The estimated total area of wetland impacts would be approximately 6.7 acres.

***Alternate 5: Full Directional***

Based on the limits of the proposed right-of-way for this alternate, seven (7) wetlands would likely be impacted, one of which would only be partially impacted. The estimated total area of wetland impacts would be approximately 5.4 acres.

**Streams and Other Water Bodies**

Copper Slough is a southeast flowing creek located within the project limits. The slough enters the project limits in the northwest quadrant and crosses under I-57. It then bisects the northeast quadrant before flowing into a detention pond in the far southeast corner of the northeast quadrant. The slough crosses under I-74 and continues south away from the project area. The slough is not a permanent water body. According to the Illinois Water Quality Report (2012), this stretch of Copper Slough has been assessed as “not supporting” for aquatic life, likely caused by channelization and contaminated sediments. According to the wetland report, the slough is now essentially a grassed waterway with no discernible bed or bank.

There are two detention ponds located within the project area: a detention pond in the southeast corner of the northeast quadrant carrying Copper Slough; and a detention pond in the northeast corner of the southeast quadrant, near the two story office building.

The following is a summary of the potential impacts to streams and other water bodies for each of the five alternates. Similar to the wetlands, the estimated impact areas were calculated based on the preliminary estimated right-of-way limits for each alternate. Exhibits depicting the streams and other water bodies for each of the project alternates are included in **Exhibits 40-44**.

***Alternate 1: Full Directional***

Based on the limits of the proposed right-of-way for this alternate, 1.47 acres one (1) pond would likely be impacted, and 1,970 feet of Copper Slough would be likely be impacted.

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

Based on the limits of the proposed right-of-way for this alternate, 0.67 acres one (1) pond would likely be impacted, and 814 feet of Copper Slough would be likely be impacted.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

Based on the limits of the proposed right-of-way for this alternate, 1.47 acres one (1) pond would likely be impacted, and 2,082 feet of Copper Slough would be likely be impacted.

***Alternate 4: Semi-Directional with No Loops***

Based on the limits of the proposed right-of-way for this alternate, 1.35 acres one (1) pond would likely be impacted, and 2,013 feet of Copper Slough would be likely be impacted.

***Alternate 5: Full Directional***

Based on the limits of the proposed right-of-way for this alternate, 1.54 acres two (2) ponds would likely be impacted, and 707 feet of Copper Slough would be likely be impacted.

**Floodplains**

Regulatory floodplains are those with a designated 100-year floodplain that are mapped on National Flood Insurance Rate Maps by the Federal Emergency Management Agency (FEMA). The 100-year floodplain limits in the project area are delineated on the effective FIRM Nos. 17019C0293D and 17019C0294D, dated October 2, 2013. The floodplain located in the project area is associated with the Copper Slough. As such, all five alternates would impact this floodplain.

**Threatened/Endangered Species and Natural Communities of Special Interest**

No species listed as threatened or endangered federally or in Illinois were found during the wetland survey within the project corridor. Also, no natural communities of special interest were noted.

**Hazardous Materials**

A Preliminary Environmental Site Assessment (PESA) - Final Report, dated March 13, 2013, was prepared by the Illinois State Geological Survey (ISGS). Subsequently, an addendum was prepared to include additional areas not previously assessed. The addendum is dated September 5, 2013. Several sites with recognized environmental conditions (RECs) were located in the proposed project area. For purposes of the reports, RECs are conditions that may be indicative of releases or potential releases of hazardous substances on, at, in, or to the site.

***Alternate 1: Full Directional***

Five (5) sites are indicated in the reports for which RECs are located within the anticipated proposed construction limits for this concept. These sites include the existing IDOT right-of-way, Copper Slough, and three (3) additional adjacent properties with buildings/structures that could likely be avoided.

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

Four (4) sites are indicated in the reports for which RECs are located within the anticipated proposed construction limits for this concept. These sites include the existing IDOT right-of-way, Copper Slough, and two (2) additional adjacent properties with buildings/structures that could likely be avoided.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

Four (4) sites are indicated in the reports for which RECs are located within the anticipated proposed construction limits for this concept. These sites include the existing IDOT right-of-way, Copper Slough, and two (2) additional adjacent properties with buildings/structures that could likely be avoided.

***Alternate 4: Semi-Directional with No Loops***

Six (6) sites are indicated in the reports for which RECs are located within the anticipated proposed construction limits for this concept. These sites include the existing IDOT right-of-way, Copper Slough, an existing municipal well, and three (3) additional adjacent properties with buildings/structures that could likely be avoided.

***Alternate 5: Full Directional***

Eight (8) sites are indicated in the reports for which RECs are located within the anticipated proposed construction limits for this concept. These sites include the existing IDOT right-of-way, Copper Slough, an existing municipal well, a construction company, and four (4) additional adjacent properties with buildings/structures that could likely be avoided.

**Historical, Architectural, Archaeological, and Cultural Resources**

IDOT is in the process of conducting a survey of potential cultural/archaeological resources, which includes further investigation of a potential archaeological site within the project limits. Additional information will be provided for potential impacted resources once these surveys have been completed.

***Alternate 1: Full Directional***

The potential archaeological site could be impacted by this alternate.

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

Based on the preliminary site investigation, it appears that the potential archaeological site could be avoided by this alternate.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

The potential archaeological site could be impacted by this alternate.

***Alternate 4: Semi-Directional with No Loops***

The potential archaeological site could be impacted by this alternate.

***Alternate 5: Full Directional***

The potential archaeological site could be impacted by this alternate.

**Social Impacts**

There are two buildings with parking lots located close to the interchange that could be impacted by the anticipated proposed construction limits for the various concepts. A church, the Kingdom Hall of Jehovah's Witnesses, is located in the southwest quadrant. It is located just south of Midwest Court and access is provided off Bloomington Road. A two-story office building is located in the southeast quadrant. It is located just south of I-74 and access is provided from Clearlake Boulevard off of Bloomington Road.

***Alternate 1: Full Directional***

A portion of the office building parking lot in the southeast quadrant could be impacted by this alternate.

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

No impacts are anticipated to either building or parking lot for this concept.

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

A portion of the church parking lot in the southwest quadrant and a portion of the office building parking lot in the southeast quadrant could be impacted by this alternate.

***Alternate 4: Semi-Directional with No Loops***

A portion of the church parking lot in the southwest quadrant and a portion of the office building parking lot in the southeast quadrant could be impacted by this alternate.

***Alternate 5: Full Directional***

The two-story office building and parking lot located in the southeast quadrant would likely be impacted by this alternate.

## G. Estimated Construction Cost

Construction costs were estimated for all four proposed interchange alternatives. The estimates include: mainline I-57 and I-74 reconstruction and widening; reconstruction of the structure carrying I-74 over I-57; proposed ramp pavement, embankment, and structures; cross roadway reconstruction and structure replacement for Bloomington Road over I-57, Mattis Avenue over I-74, and Mattis Avenue over I-57; and other items associated with the construction of these facilities.

***Alternate 1: Full Directional***

\$97,490,000

***Alternate 2: Semi-Directional with Directional Flyovers and Two Loops***

\$97,210,000

***Alternate 3: Semi-Directional with Semi-Directional Flyovers and Two Loops***

\$86,965,000

***Alternate 4: Semi-Directional with No Loops***

\$115,740,000

***Alternate 5: Full Directional***

\$113,310,000

## H. Design Exceptions

The alternatives were reviewed for their adherence to IDOT's interchange design criteria. The design criteria used for all roadways within the anticipate limits of reconstruction for this interchange are shown in **Exhibit 11**. The following table was developed from the Level Two Design Criteria checklist for interchanges. The initial designs of all alternatives were prepared to avoid any proposed design exceptions. As the alternative development continues and constraints are identified, potential design exceptions could be coordinated with IDOT and FHWA and justifications discussed at bi-monthly coordination meetings.

**Table 8: Design Criteria**

INTERCHANGE DESIGN CRITERIA		Do the Alternatives comply with the Design Criteria?				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
a. Exit Terminal	Standard Type	YES	YES	YES	YES	YES
	Design speed of first curve	YES	YES	YES	YES	YES
	Are any exit terminals located on mainline horizontal curve?	YES	YES	YES	YES	YES
b. Entrance Terminal	Standard Type	YES	YES	YES	YES	YES
	Length of tangent after the entering curve	YES	YES	YES	YES	YES
	Design speed of entering curve	YES	YES	YES	YES	YES
c.	Design speed of ramp proper: 50 mph (40 mph loops)	YES	YES	YES	YES	YES
d.	Design speed of crossroad: 70 mph	YES	YES	YES	YES	YES
e. Maximum ramp grades	Exit ramp: +4% to -6%	YES	YES	YES	YES	YES
	Entrance ramp: +4% to -6%	YES	YES	YES	YES	YES
f.	Ramp pavement width = 16ft	YES	YES	YES	YES	YES
g. Ramp shoulder widths	Left = 4 ft paved	YES	YES	YES	YES	YES
	Right = 6 ft paved	YES	YES	YES	YES	YES
h.	Horizontal ramp curvature in conjunction with selected design speeds	YES	YES	YES	YES	YES
i. Superelevation development on ramps	Superelevation Rate	YES	YES	YES	YES	YES
	Transition Length	YES	YES	YES	YES	YES
	Distribution Between Tangent & Curve	YES	YES	YES	YES	YES
j.	Vertical curvature compliance with selected design speed on ramp?	YES	YES	YES	YES	YES
k.	Length of access control at crossroad	YES	YES	YES	YES	YES
l. Type of traffic control at crossroad	Stop signs	N/A	N/A	N/A	N/A	N/A
	Traffic Signals	N/A	N/A	N/A	N/A	N/A
	Free Flow	YES	YES	YES	YES	YES
m.	Is length of crest vertical curve used on crossroad > or = that required by the selected design speed of crossroad?	YES	YES	YES	YES	YES
n.	Are crossroad approach grades through ramp terminal intersections < or = 2%	YES	YES	YES	YES	YES
o.	Are ramp terminal intersections located on a tangent section of crossroad alignment?	N/A	N/A	N/A	N/A	N/A

p.	Is decision sight distance available in advance of exit gore?	YES	YES	YES	YES	YES		
q.	Is clear recovery area available beyond gore nose?	YES	YES	YES	YES	YES		
r.	Level of Service "C" or better	Exit terminal	YES	YES	YES	YES	YES	
		Entrance terminal	YES	YES	YES	YES	YES	
		Ramp proper	YES	YES	YES	YES	YES	
		Weaving area	YES	YES	YES	YES	YES	
		Ramp/crossroad intersection	YES	YES	YES	YES	YES	
s.	Freeway lane drops	Location	Upgrade	YES	YES	YES	YES	YES
			Downgrade	YES	YES	YES	YES	YES
			Inside Lane	YES	YES	YES	YES	YES
			Outside Lane	YES	YES	YES	YES	YES
			At Exit Terminal	YES	YES	YES	YES	YES
			Beyond Exit Terminal	YES	YES	YES	YES	YES
	Taper Length	YES	YES	YES	YES	YES		

## VI. Comparison of Interchange Alternatives

### A. Comparison Features

Evaluation of the I-57/I-74 interchange alternates was based on the following primary objectives:

- Accommodation of future peak hour traffic volume
- Efficiency of the Interchange (Ramp Travel Times)
- Safety of vehicles entering and exiting the interstates
- Impacts to environmental resources
- Construction cost
- Design Exceptions

Additional interchange features studied for the alternates are included in the evaluation matrix table (**Table 13**), which is presented later in this section of the report.

#### ***Accommodation of Future Peak Hour Traffic Volume***

Accommodation of future traffic volumes for each alternative can be evaluated by reviewing the Level of Service (LOS) at different locations within the project. The LOS for the five interchange alternates and the No-Build alternate are shown in the following table.

**Table 9: 2040 Peak Hour Analysis – Speed, Density, and LOS**

Road Segment			Alternate 1		Alternate 2		Alternate 3		Alternate 4		Alternate 5		No-Build	
			AM	PM										
I-57 Mainline Between I-57/I-74 Ramps and I-57/I-72 Interchange	NB	Speed Density LOS	65.5 10.3 A	65.5 12.0 B	65.9 9.9 A	65.6 12.1 B	66.0 9.9 A	65.8 11.5 B	65.4 10.4 A	65.7 11.2 B	65.4 10.2 A	65.5 12.0 B	65.9 11.3 B	65.8 13.4 B
	SB	Speed Density LOS	65.6 12.2 B	64.2 15.2 B	65.4 12.3 B	63.8 15.3 B	65.2 12.5 B	63.5 15.2 B	64.7 12.6 B	63.6 14.7 B	65.5 12.2 B	64.1 15.5 B	64.6 14.3 B	63.5 17.6 B
I-57 Mainline Between Interchange Ramps	NB	Speed Density LOS	69.2 1.3 A	68.7 3.6 A	65.0 3.2 A	65.8 6.1 A	65.0 3.2 A	65.9 5.8 A	68.7 1.3 A	68.9 3.5 A	69.1 1.4 A	68.8 3.6 A	54.7 4.8 A	62.9 6.5 A
	SB	Speed Density LOS	68.9 4.7 A	69.0 4.7 A	67.4 6.0 A	67.5 5.7 A	67.7 6.0 A	67.6 5.8 A	68.6 4.8 A	68.8 4.4 A	68.8 4.6 A	68.9 4.7 A	51.0 11.6 B	46.6 15.8 B
I-57 Mainline Between Olympian Dr. and I-57/I-74 Ramps	NB	Speed Density LOS	63.7 2.3 A	65.4 4.1 A	63.1 2.4 A	65.4 4.2 A	62.9 2.3 A	65.1 4.1 A	63.4 2.3 A	65.4 3.9 A	63.4 2.3 A	65.3 4.0 A	64.8 4.2 A	65.4 7.4 A
	SB	Speed Density LOS	66.5 4.8 A	66.0 5.1 A	67.6 4.7 A	67.5 5.0 A	67.6 4.7 A	67.1 5.0 A	65.1 5.0 A	65.0 4.8 A	65.4 4.9 A	65.1 5.2 A	65.6 8.9 A	65.3 9.5 A
I-74 Mainline Between Prairie View Rd. and I-57/I-74 Ramps (3 lane section only)	EB	Speed Density LOS	64.4 14.2 B	65.6 8.5 A	63.8 14.4 B	65.9 8.4 A	63.9 14.0 B	65.6 8.5 A	63.5 14.4 B	65.8 8.0 A	64.0 14.3 B	65.7 8.5 A	64.3 21.4 C	66.2 12.7 B
	WB	Speed Density LOS	66.4 7.0 A	64.2 12.1 B	67.1 8.2 A	64.6 14.2 B	67.2 8.4 A	63.8 14.7 B	66.1 7.9 A	64.3 12.4 B	66.6 8.3 A	64.2 14.2 B	66.2 11.0 A	64.7 18.4 C
I-74 Mainline Between Interchange Ramps	EB	Speed Density LOS	67.1 11.2 B	68.1 6.3 A	65.5 11.6 B	66.4 6.8 A	65.3 11.4 B	66.0 7.0 A	66.8 11.2 B	68.0 6.0 A	66.9 11.3 B	68.1 6.1 A	62.3 19.8 C	65.0 11.3 B
	WB	Speed Density LOS	69.0 5.3 A	67.9 9.5 A	65.9 6.8 A	65.5 11.0 B	66.0 7.0 A	65.1 11.4 B	68.8 5.4 A	67.9 8.8 A	68.8 5.3 A	68.0 9.5 A	56.0 12.1 B	53.7 20.9 C
I-74 Mainline Between I-57/I-74 Ramps and Prospect Ave.	EB	Speed Density LOS	61.2 17.8 B	64.7 10.4 A	62.1 17.5 B	65.3 10.6 A	62.3 17.2 B	65.1 10.5 A	59.0 18.5 C	63.3 10.3 A	58.8 18.4 C	63.3 10.7 A	53.1 30.0 D	62.0 16.2 B
	WB	Speed Density LOS	66.5 9.3 A	64.8 16.6 B	66.4 9.4 A	64.7 16.7 B	66.7 9.4 A	65.1 16.7 B	66.6 9.2 A	65.5 15.1 B	66.4 9.3 A	65.0 16.5 B	66.0 13.6 B	63.0 24.7 C

The No-Build option does not provide acceptable LOS on I-74 EB between the interchange ramps and Prospect Avenue, and since one of the main objectives of the proposed interchange reconstruction is to provide increased capacity for future traffic, it should not be given further consideration. Each of the proposed interchange alternatives provides improved LOS compared to the existing cloverleaf interchange, although there are not many differences between the five build alternatives and the LOS provided. Alternates 1, 4, and 5 provide LOS A for the 2040 PM peak hour for I-74 mainline between the interchange ramps, whereas Alternates 2 and 3 provide LOS B. Alternates 1, 2, and 3 provide LOS B for the 2040 AM peak hour for I-74 mainline between the interchange ramps and Prospect Avenue, while Alternate 4 and 5 provide LOS C. At all other locations, the level of service is the same for each of the five build alternatives.

**Ramp Travel Times**

Each interchange alternate was evaluated for its travel efficiency, which is measured as the free-flow travel times through the interchange. Travel efficiency usually decreases with the addition of access points. Providing free flow conditions is preferred in order to maximize travel efficiency. Each of the alternates has different design speeds due to the loop ramps and varying ramp lengths. The calculation of travel time encompasses both of these factors into a single comparable value. The ramp travel times were calculated from common beginning and ending points along the interstates for the four interchange alternatives and are shown in **Table 10** below.

**Table 10: Ramp Travel Time**

Ramp Movement	Ramp Free-Flow Travel Time (minutes)					
	Alternate 1	Alternate 2	Alternate 3	Alternate 4	Alternate 5	No-Build
Ramp A	1.44	1.35	1.35	1.38	1.39	1.66
Ramp B	1.43	1.43	1.41	1.42	1.45	1.84
Ramp C	1.56	2.19	2.19	1.70	1.78	2.08
Ramp D	1.57	1.56	2.18	1.96	1.53	1.78
Ramp E	1.68	1.66	2.13	2.36	1.61	1.90
Ramp F	1.60	2.21	2.21	2.09	1.88	1.87
Ramp G	1.35	1.37	1.31	1.37	1.36	1.73
Ramp H	1.30	1.24	1.27	1.31	1.28	1.67
<b>TOTAL TIME</b>	<b>11.93</b>	<b>13.01</b>	<b>14.05</b>	<b>13.59</b>	<b>12.27</b>	<b>14.53</b>

Each of the proposed interchange alternatives provide a total ramp travel time savings to the users of the interchange compared to the no-build option. Alternate 1 has the most efficient ramp configuration of the interchanges studied with a total ramp travel time of more than one minute less than Alternates 2, 3, and 4, and 20 seconds less than Alternate 5. Alternative 5 is the second most efficient alternative,

followed by Alternatives 2, 4, and 3. The No-Build cloverleaf has the highest travel time of all interchange types.

***Safety of Vehicles Entering and Exiting the Interstates***

A study comparing projected vehicle-to-vehicle conflicts of the five proposed interchange alternatives and the No-Build alternate was performed using CORSIM. The purpose of this inquiry was to provide comparative data of the alternatives, not to correlate data with historic crash rates. The estimated number of conflicts for the four interchange alternatives and the No-Build alternate are shown in **Table 11** below.

**Table 11: CORSIM Conflict Analysis**

	Estimated number of conflicts					
	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4	Alternate 5
<b>2040 AM</b>	534	219	220	238	348	309
<b>2040 PM</b>	96	60	119	66	74	61
<b>TOTAL</b>	630	279	339	304	422	370
<b>Difference from No-Build</b>	<b>N/A</b>	<b>-56%</b>	<b>-46%</b>	<b>-52%</b>	<b>-33%</b>	<b>-41%</b>

Each of the build alternatives has significantly fewer potential conflicts than the existing interchange geometry as a result of eliminating conflict points associated with the number of access locations off of the interstates and eliminating the mainline weaving movements. Alternate 1 has the fewest number of projected conflicts of all four proposed alternatives. Alternate 3 has the second fewest project conflicts, followed by Alternates 2, 5, and 4.

***Impacts to Environmental Resources***

The environmental impacts and disturbance to adjacent properties for each proposed interchange alternative are also considered when selecting a preferred concept. Wetlands, detention ponds, streams, hazardous materials, archaeological resources, and social resources have all been identified as having potential impacts associated with the construction of the proposed interchange alternatives. Alternate 2 has the least number of potential impacts to the environmental resources. Alternates 1 and 3 have the second least impacts, followed by Alternate 4 and 5.

**Construction Cost**

The total estimated cost for each alternative, shown in **Table 12**, includes the construction cost and additional costs associated with land acquisition.

**Table 12: Summary of Estimated Costs**

	<b>Alternate 1</b>	<b>Alternate 2</b>	<b>Alternate 3</b>	<b>Alternate 4</b>	<b>Alternate 5</b>
<b>Construction Cost</b>	\$97,490,000	\$97,210,000	\$86,965,000	\$115,740,000	\$113,310,000
<b>R.O.W. / Land Acquisition</b>	\$4,200,000	\$ 2,500,000	\$5,700,000	\$6,400,000	\$5,300,000
<b>Total</b>	<b>\$101,690,000</b>	<b>\$99,710,000</b>	<b>\$92,665,000</b>	<b>\$122,140,000</b>	<b>\$118,610,000</b>

**Design Exceptions**

Compliance with design criteria and potential proposed design exceptions are also a factor in selecting the recommended interchange alternative. At this time no proposed design exceptions have been identified, but as the alternative development continues and constraints are identified, potential design exceptions could be considered to select a preferred alternate.

## B. Evaluation Matrix

The following evaluation matrix table was developed to present a side-by-side comparison of the five interchange alternatives:

**Table 13: Evaluation Matrix**

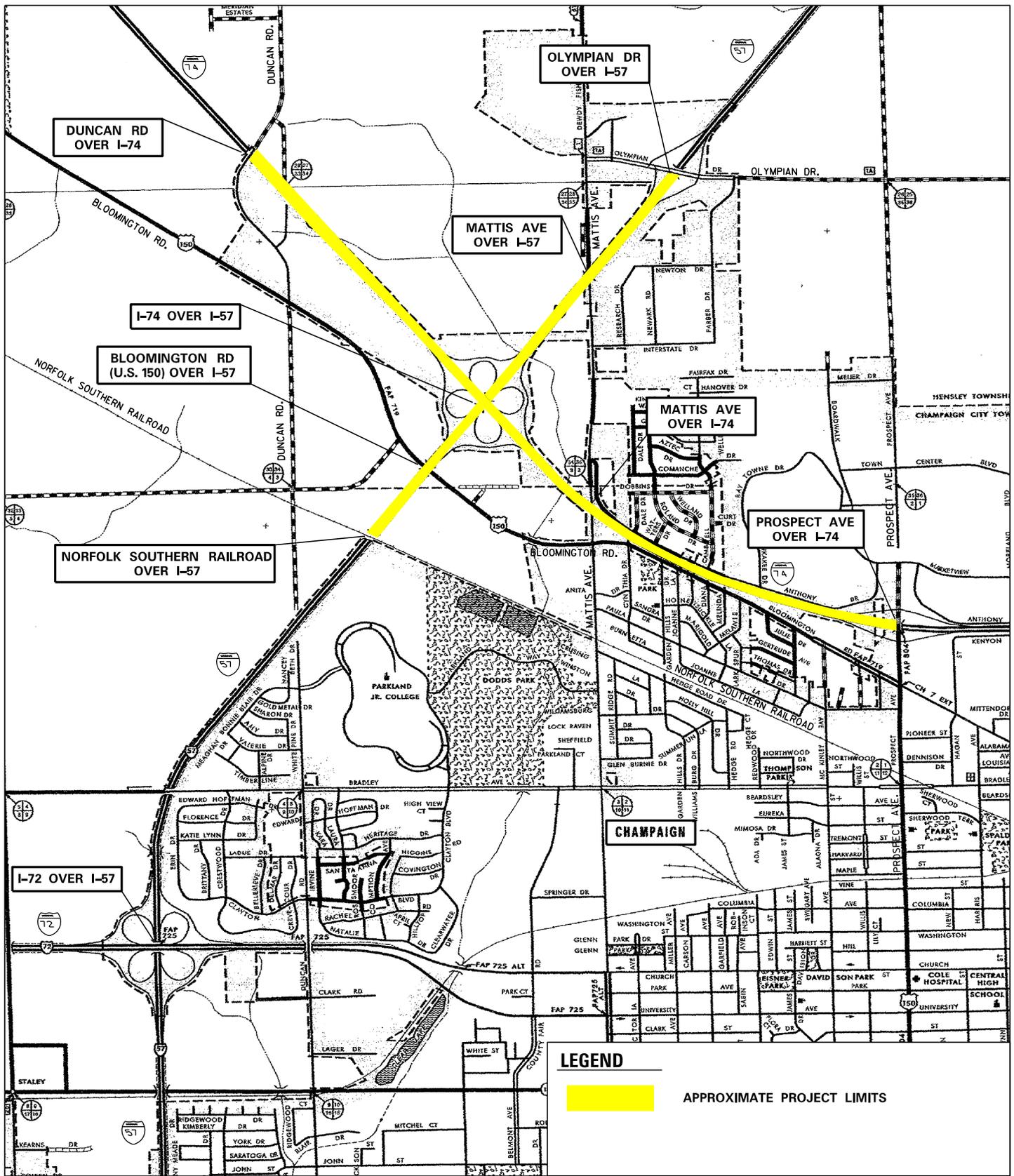
Comparison Features	Alternate 1	Alternate 2	Alternate 3	Alternate 4	Alternate 5
Number of Loop Ramps	0	2	2	0	0
Number of Mainline Access Points	8	12	12	8	8
Number of Transposed Ramps	0	0	1	4	0
Number of Ramp Structures	4	6	7	8	6
Fully Directional	YES	NO	NO	NO	YES
Number of Design Exceptions	0	0	0	0	0
Capacity - Level of Service					
I-57 NB	B	B	B	B	B
I-57 SB	B	B	B	B	B
I-74 EB	B	B	B	C	C
I-74 WB	B	B	B	B	B
CORSIM Conflict Analysis (potential conflicts in peak hour)	279	339	304	422	370
Total Ramp Travel Time (minutes)	11.93	13.01	14.05	13.59	12.27
Potential Environmental Impacts					
Wetlands	6	6	6	8	7
Detention Ponds	1	1	1	1	1
Streams	1	1	1	1	1
Hazardous Materials	5	4	4	6	8
Archaeological Resources	1	0	1	1	1
Social Resources	1	0	2	2	1
Right-of-Way Acquisition (acres)	66	37	89	106	78
Construction Cost (millions)	\$97	\$97	\$87	\$116	\$113

### **C. Recommended Alternate**

A recommended interchange alternative will be coordinated with IDOT and FHWA after review of this draft Interchange Type Study and after consideration from public involvement activities and stakeholder coordination.

## **VII. Conclusion**

Final evaluation of this report and the interchange alternatives studied will be coordinated with IDOT and FHWA after review of this draft Interchange Type Study and after consideration from public involvement activities and stakeholder coordination.



DUNCAN RD  
OVER I-74

OLYMPIAN DR  
OVER I-57

I-74 OVER I-57

BLOOMINGTON RD  
(U.S. 150) OVER I-57

MATTIS AVE  
OVER I-57

MATTIS AVE  
OVER I-74

NORFOLK SOUTHERN RAILROAD  
OVER I-57

PROSPECT AVE  
OVER I-74

I-72 OVER I-57

**LEGEND**



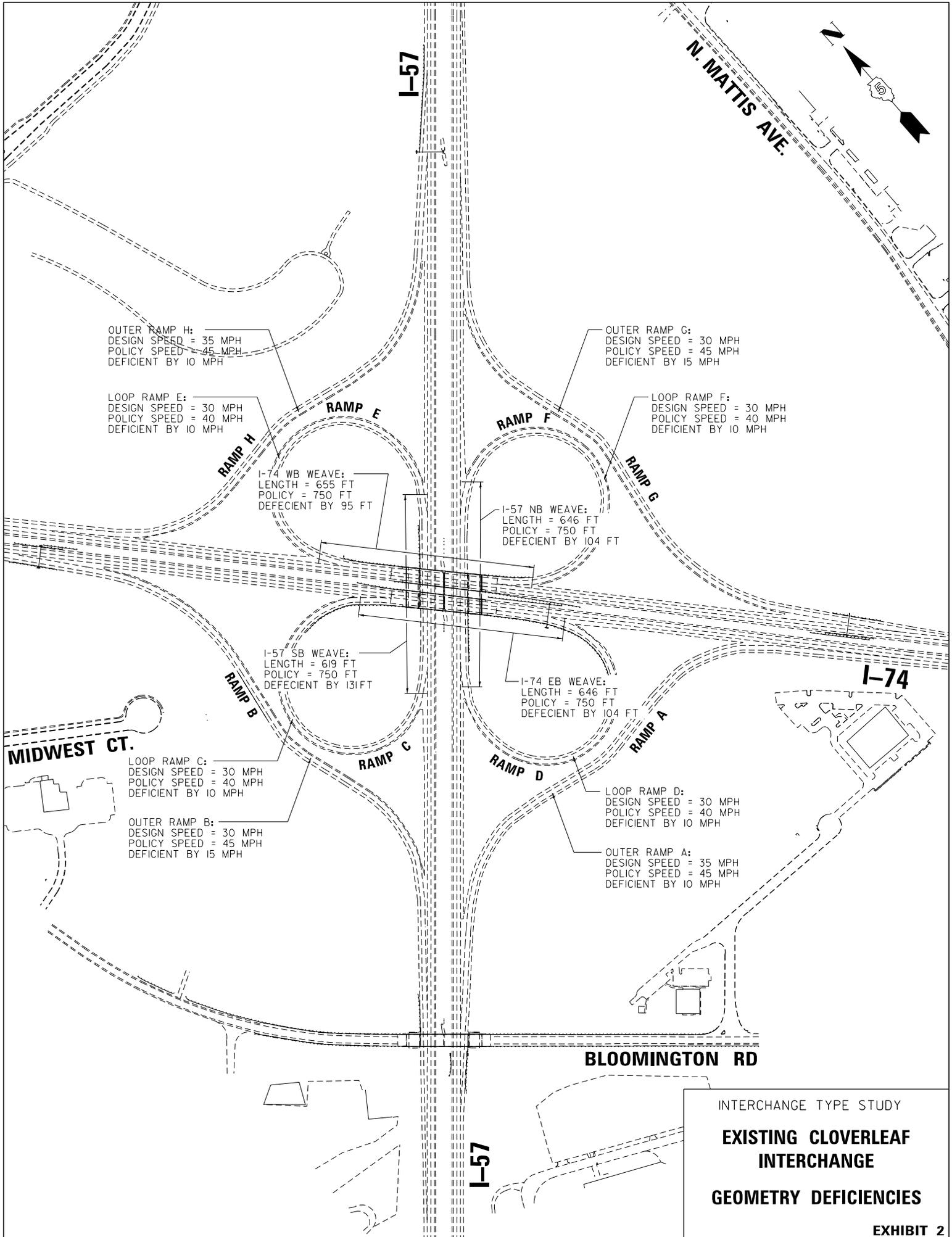
APPROXIMATE PROJECT LIMITS

**SITE MAP**

I-57 & I-74 INTERCHANGE  
IDOT - DISTRICT 5  
CHAMPAIGN COUNTY  
CHAMPAIGN, IL



SCALE: 1" = 2,400'



OUTER RAMP H:  
 DESIGN SPEED = 35 MPH  
 POLICY SPEED = 45 MPH  
 DEFICIENT BY 10 MPH

LOOP RAMP E:  
 DESIGN SPEED = 30 MPH  
 POLICY SPEED = 40 MPH  
 DEFICIENT BY 10 MPH

I-74 WB WEAVE:  
 LENGTH = 655 FT  
 POLICY = 750 FT  
 DEFICIENT BY 95 FT

I-57 NB WEAVE:  
 LENGTH = 646 FT  
 POLICY = 750 FT  
 DEFICIENT BY 104 FT

OUTER RAMP G:  
 DESIGN SPEED = 30 MPH  
 POLICY SPEED = 45 MPH  
 DEFICIENT BY 15 MPH

LOOP RAMP F:  
 DESIGN SPEED = 30 MPH  
 POLICY SPEED = 40 MPH  
 DEFICIENT BY 10 MPH

I-57 SB WEAVE:  
 LENGTH = 619 FT  
 POLICY = 750 FT  
 DEFICIENT BY 131 FT

I-74 EB WEAVE:  
 LENGTH = 646 FT  
 POLICY = 750 FT  
 DEFICIENT BY 104 FT

LOOP RAMP C:  
 DESIGN SPEED = 30 MPH  
 POLICY SPEED = 40 MPH  
 DEFICIENT BY 10 MPH

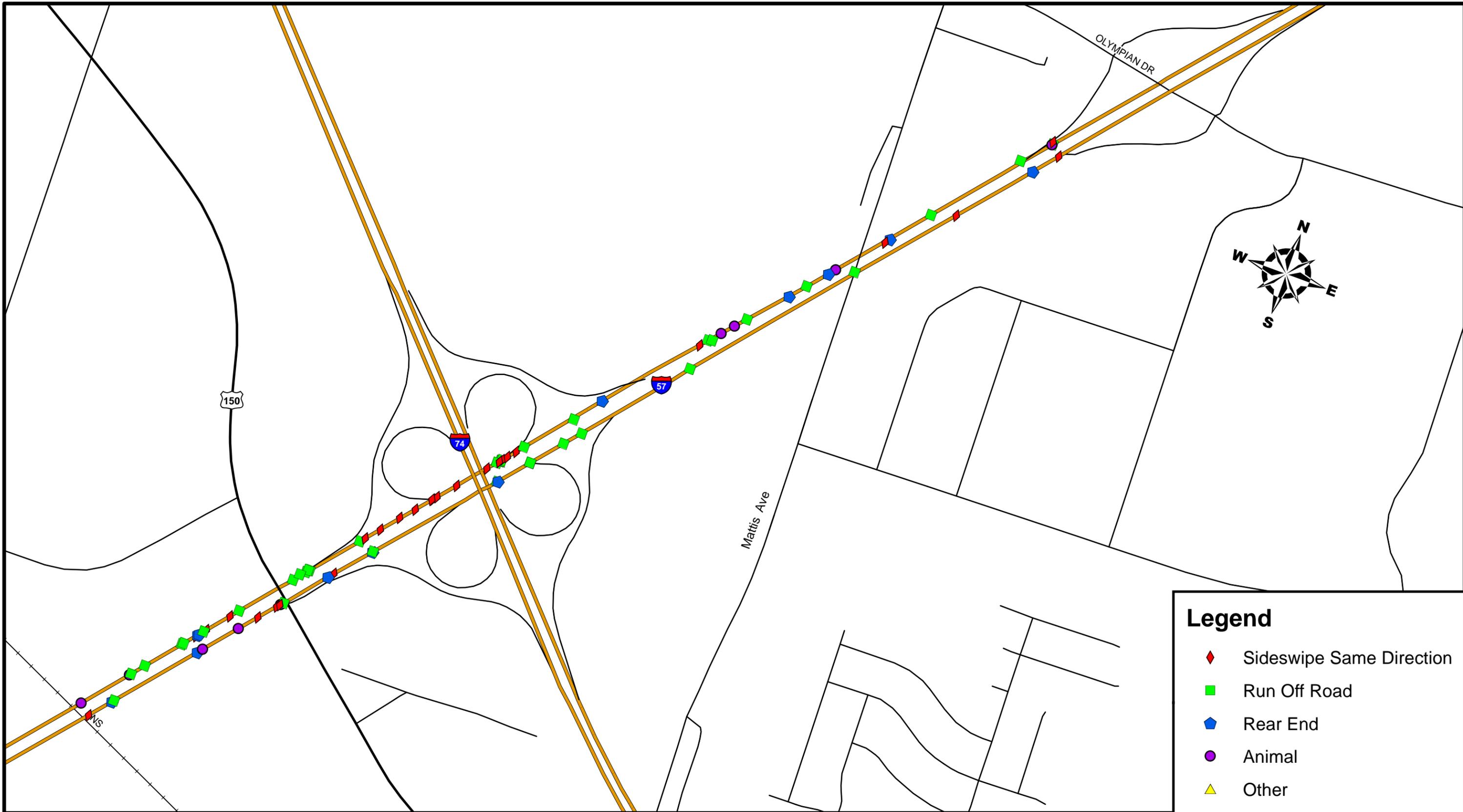
OUTER RAMP B:  
 DESIGN SPEED = 30 MPH  
 POLICY SPEED = 45 MPH  
 DEFICIENT BY 15 MPH

LOOP RAMP D:  
 DESIGN SPEED = 30 MPH  
 POLICY SPEED = 40 MPH  
 DEFICIENT BY 10 MPH

OUTER RAMP A:  
 DESIGN SPEED = 35 MPH  
 POLICY SPEED = 45 MPH  
 DEFICIENT BY 10 MPH

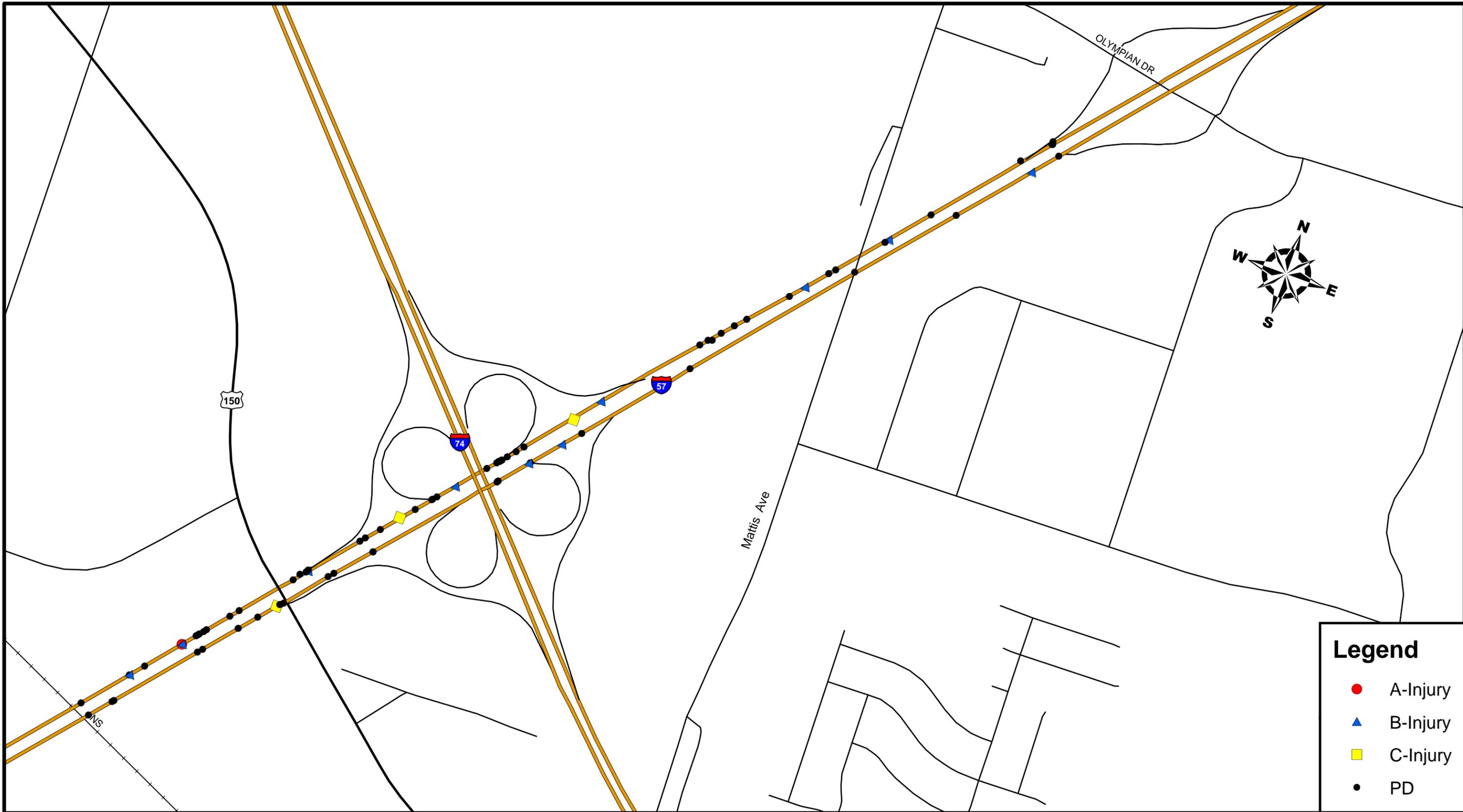
INTERCHANGE TYPE STUDY  
**EXISTING CLOVERLEAF INTERCHANGE**  
**GEOMETRY DEFICIENCIES**

# Interchange Reconstruction Project I-57 Crashes from 2008 to 2012

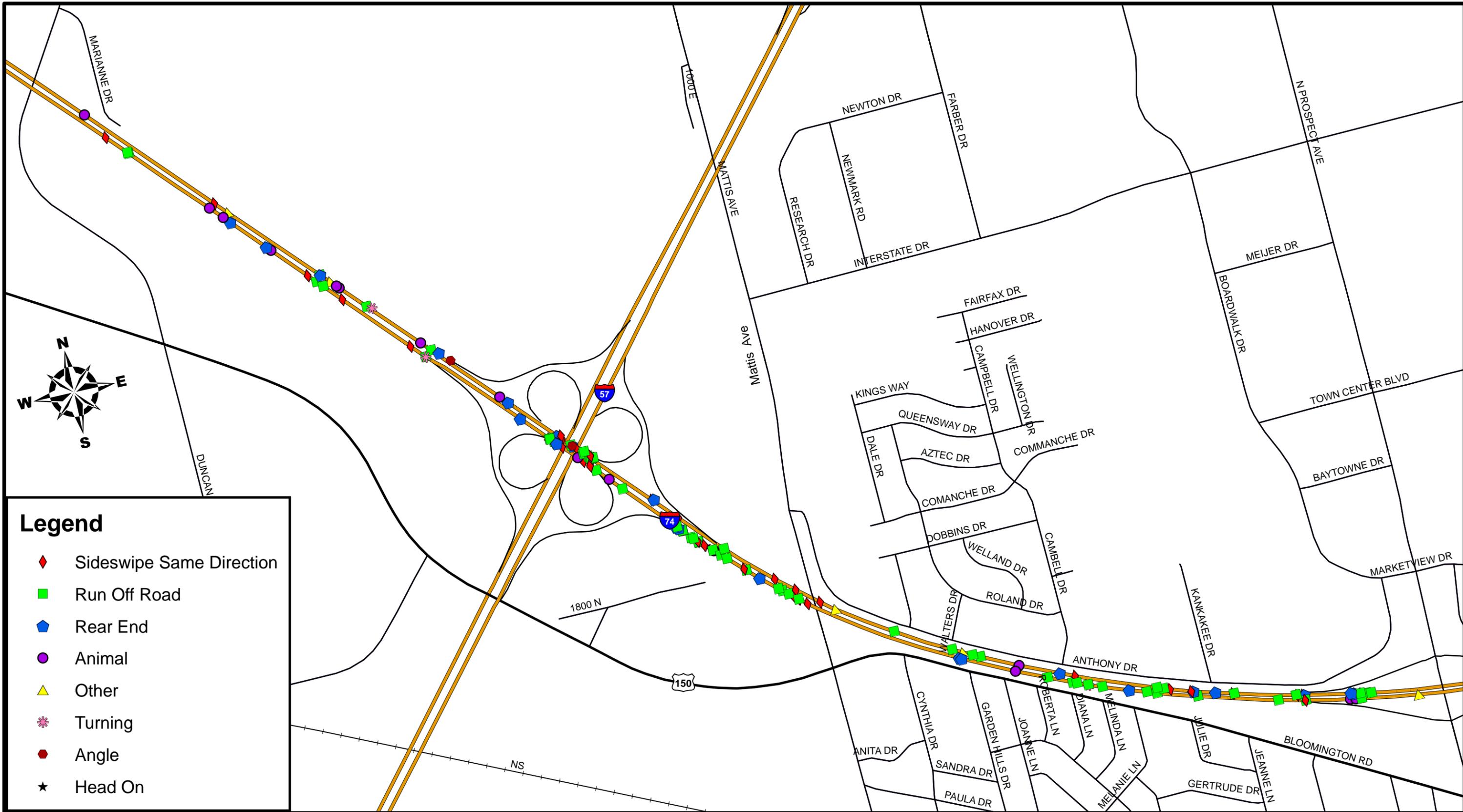


Note: Run Off Road crashes include fixed object, other object, overturned, and parked motor vehicle crashes

# Interchange Reconstruction Project I-57 Crashes from 2008 to 2012

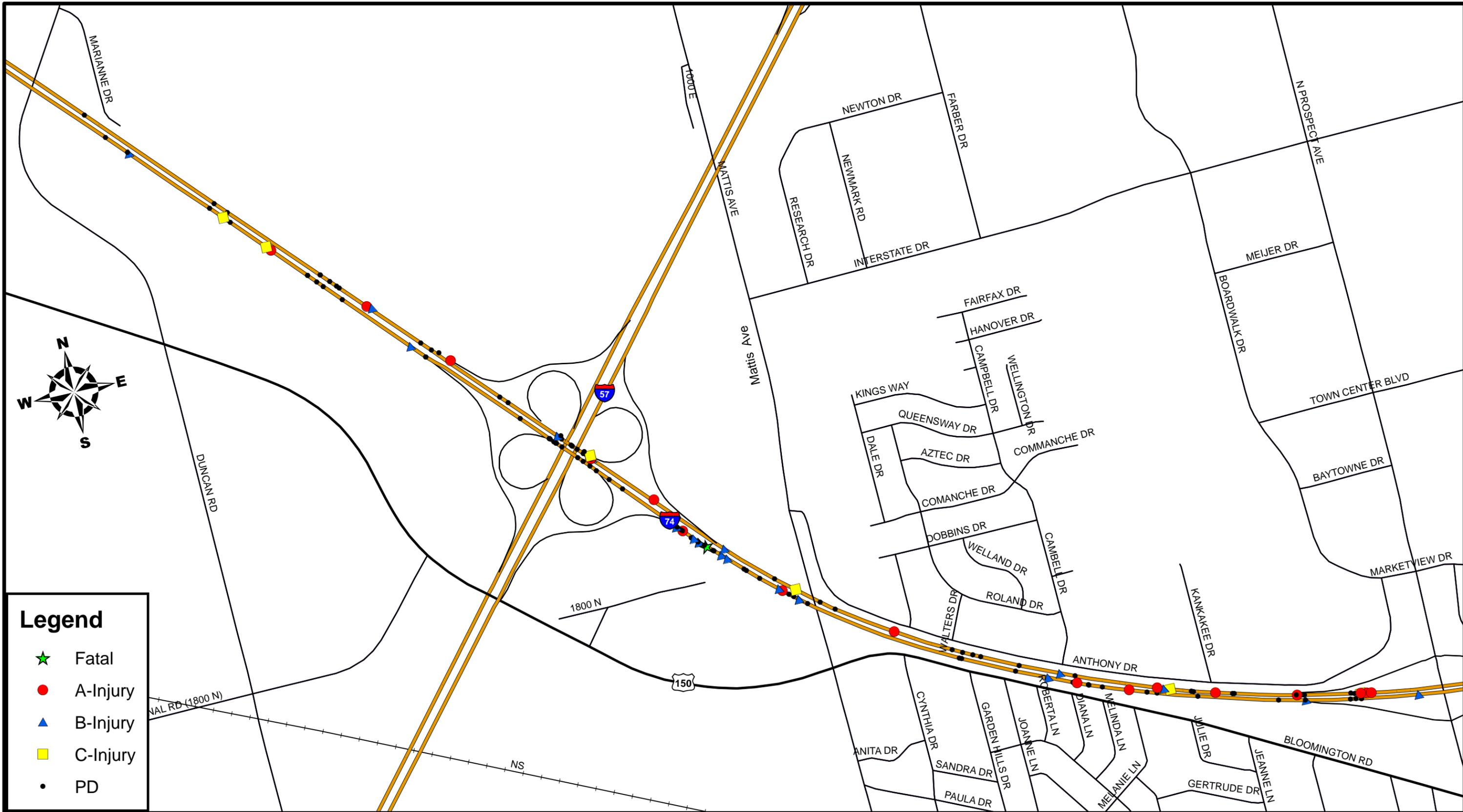


# Interchange Reconstruction Project I-74 Crashes from 2008 to 2012

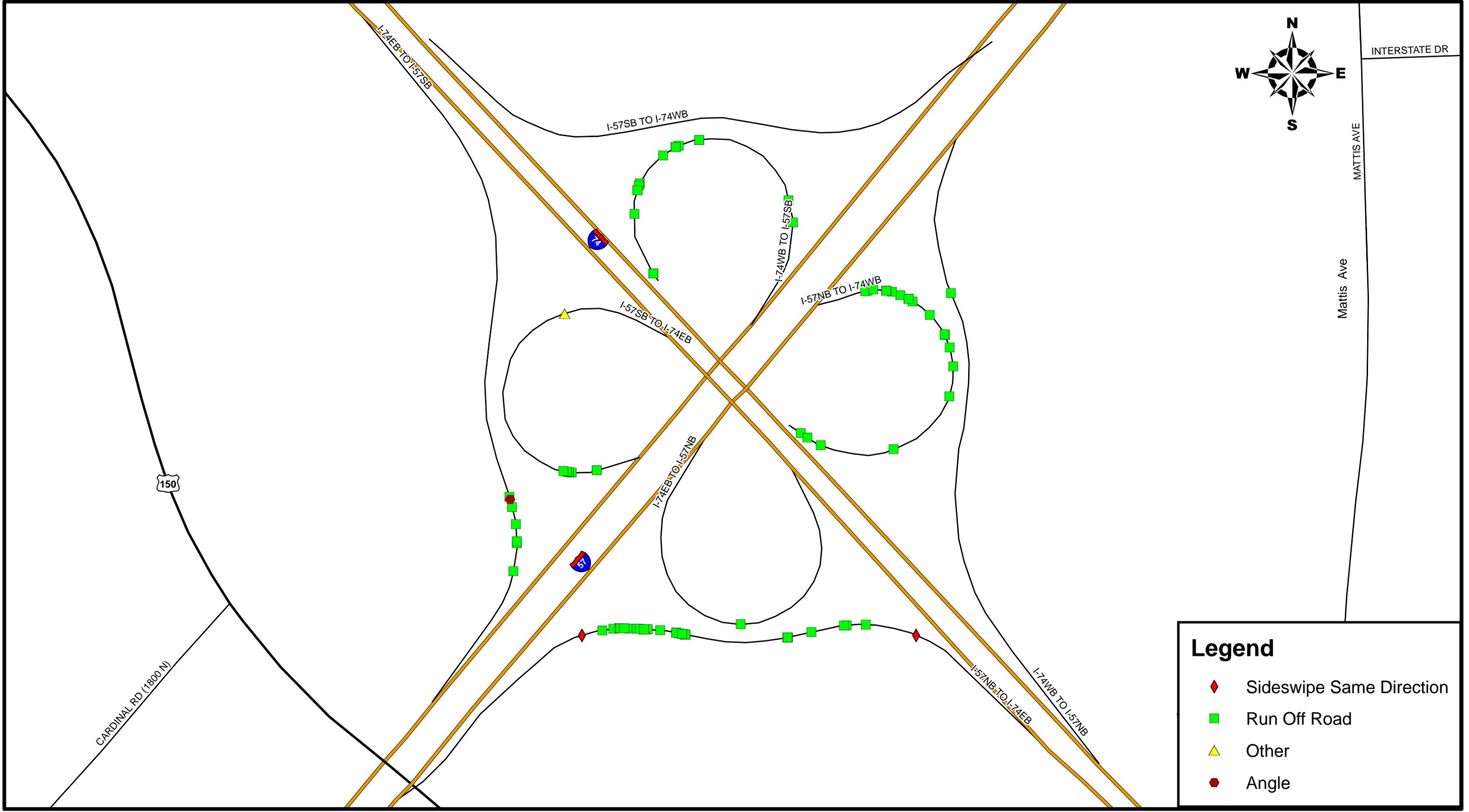


Note: Run Off Road crashes include fixed object, other object, overturned, and parked motor vehicle crashes

# Interchange Reconstruction Project I-74 Crashes from 2008 to 2012



# Interchange Reconstruction Project Ramp Crashes from 2008 to 2012

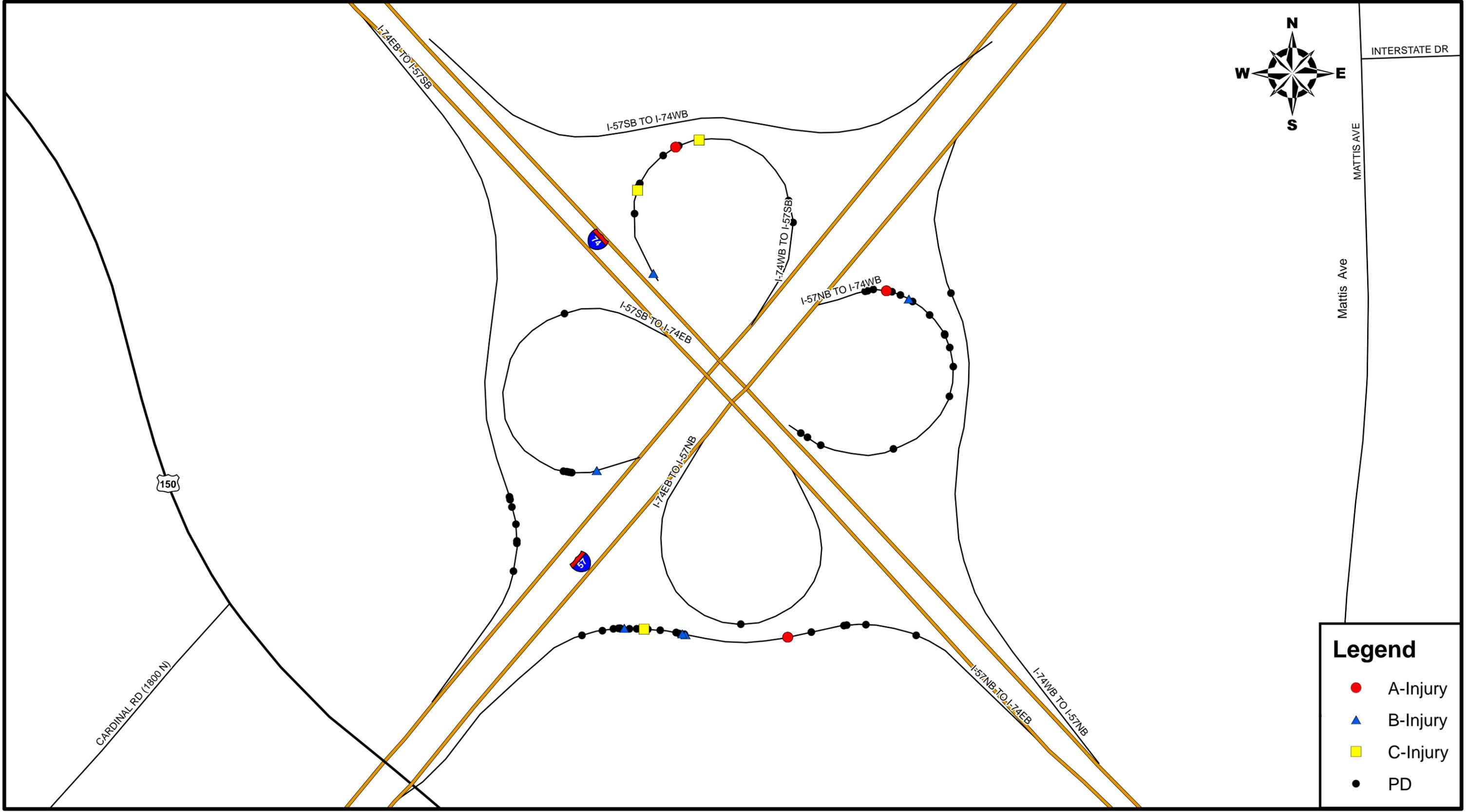


**Legend**

- ◆ Sideswipe Same Direction
- Run Off Road
- ▲ Other
- Angle

Note: Run Off Road crashes include fixed object, other object, overturned, and parked motor vehicle crashes

# Interchange Reconstruction Project Ramp Crashes from 2008 to 2012





PLOT DATE = 12/6/2013  
FILE NAME = I:\DOT\118682\Draw\Exhibits\ITS Exhibit 10 Existing Cloverleaf Aerial.dgn  
PLOT SCALE = 600,0000 / in.  
USER NAME = HB Springfield



INTERCHANGE TYPE STUDY

**EXISTING CLOVERLEAF  
INTERCHANGE WITH  
AERIAL IMAGE**

**EXHIBIT 10**

BDE-9908

# **Design and Geometric Criteria**

## **Interstate 57 and Interstate 74**

Section 10(5-1-RS-1, 14-1, 6)R  
Job No. P-95-030-11

Champaign, IL  
Champaign County

**F.A.I. 57 (I-57) – Urban Principal Arterial (Interstate)**  
**F.A.I. 74 (I-74) – Urban Principal Arterial (Interstate)**

<u>Topic</u>	<u>Criteria</u>	<u>Source</u>
<b>Design Speed</b>	60 mph	BDE, Figure 44-5A
<b>Level of Service</b>	LOS C	BDE, Figure 44-5A
<b>Horizontal Alignment</b>		
Superelevation Rate ( $e_{max}$ )	6 %	BDE, Figure 44-5D
Minimum Radius Curve	1330 ft	BDE, Figure 44-5D
Minimum Curve Length Design Vehicle	Varies with deflection angle WB-65	BDE, Section 32-2.05 BDE, Figure 36-1R
<b>Vertical Alignment</b>		
Maximum Grade		
Level	3%	BDE, Figure 44-5D
Minimum Grade		
Desirable	0.5%	BDE, Figure 44-5D
With Curb and Gutter	0.3%	BDE, Figure 44-5D
Rate of Vertical Curvature, K (Stopping Sight Dist.)		
Crest Vertical Curve		
Passenger Cars – Level Grade	151	BDE, Figure 33-4A
Sag Vertical Curve		
Passenger Cars – Level Grade	136	BDE, Figure 33-4E
Minimum Length of Curve	5 x Design Speed	
Crest	300 ft	BDE, Sec. 33-4.01(a)
Sag	300 ft	BDE, Sec. 33-4.02(a)
<b>Sight Distance</b>		
Stopping Sight Distance (Passenger Car)		
Minimum	570 ft	BDE, Figure 31-3A, Figure 44-5D
<b>Bridges</b>		
Vertical Clearance (Freeway Under)		
New and Replaced Overpassing Bridges	17'-1"	BDE, Figure 44-5A
Overhead Signs/Pedestrian Bridges	17'-3" (New)	BDE, Figure 44-5A

**F.A.I. 57 (I-57) – Rural Principal Arterial (Interstate)**  
**F.A.I. 74 (I-74) – Rural Principal Arterial (Interstate)**  
**(Continued)**

<u>Topic</u>	<u>Criteria</u>	<u>Source</u>
<b>Cross Section Elements</b>		
Median Width (Depressed)	60 ft	BDE, Figure 44-5A
Median Width (Flush – Concrete Barrier)	23 ft	BDE, Figure 44-5A
Traveled Way Width	2 @ 36 ft	BDE, Figure 44-5A
Shoulder Width		
Left	10 ft	BDE, Figure 44-5A
Right	10 ft	BDE, Figure 44-5A
Paved Shoulder Width		
Left	10 ft	BDE, Figure 44-5A
Right	10 ft	BDE, Figure 44-5A
Auxiliary Lanes		
Lane Width	12 ft	BDE, Figure 44-5A
Left Shoulder	8 ft (minimum)	BDE, Figure 44-5A
Right Shoulder	10 ft	BDE, Figure 44-5A
Cross Section Slopes		
Travel Lanes	1.5%	BDE, Figure 44-5A
Auxiliary Lanes	2%	BDE, Sec. 34-2.03
Shoulders	4%	BDE, Figure 44-5A
Maximum Shoulder Rollover	8%	BDE, Sec. 32-3.04
Clear Zone, from E.O.P.	30 ft (1:6 Foreslope)	BDE, Figure 38-3A
Earth Slopes		
Fill		
Foreslope		
Behind Guardrail	1:2 Max.	BDE, Figure 44-5A
Without Guardrail		
Within Clear Zone	1:6	BDE, Figure 44-5A
Beyond Clear Zone	1:3 Max.	BDE, Figure 44-5A
Cut		
Foreslope		
Within Clear Zone	1:6	BDE, Figure 44-5A
Beyond Clear Zone	1:3 Max.	BDE, Figure 44-5A
Backslope		
Within Clear Zone	1:3	BDE, Figure 44-5A
Beyond Clear Zone	1:3	BDE, Figure 44-5A
Median Slopes	1:6	BDE, Figure 44-5A
Ditch Bottom Width	4 ft	BDE, Figure 44-5A

**Interchange Ramps -  
 Outer Connector, Directional, Semi-Directional**

<u>Topic</u>	<u>Criteria</u>	<u>Source</u>
<b>Design Speed</b>	50 mph	BDE, Sec. 37-4.04
<b>Stopping Sight Distance</b> Stopping Sight Distance (Passenger Car) Minimum	425 ft (360 ft)	BDE, Figure 37-4F
<b>Horizontal Alignment</b> Minimum Radius Curve 50 mph (45 mph min) Maximum Superelevation Rate	760 ft (590 ft) 8%	BDE, Figure 37-4F BDE, Sec. 37-4.07(b) #2, Figure 37-4F
Minimum Curve Length	Varies with deflection angle	BDE, Section 32-2.05
<b>Vertical Alignment</b> Maximum Upgrade	+4%	BDE, Section 37-4.08(a), Figure 37-4F
Maximum Downgrade	-6%	BDE, Section 37-4.08(a), Figure 37-4F
Rate of Vertical Curvature, k Crest Vertical Curve Minimum Sag Vertical Curve Minimum	84 96	BDE, Figure 37-4F BDE, Figure 37-4F
<b>Cross Section Elements</b> Clear Zone	24-28 ft Ramp A 20-26 ft Ramp B 20-26 ft Ramp G 16-20 ft Ramp H	BDE, Figure 38-3A
<b>Cross Section Widths</b> 1-Lane Ramp Traveled Way Width Shoulder Width Left Right Paved Shoulder Width Left Right	16 ft 6 ft 8 ft 4 ft 6 ft	BDE, Section 37-4.06 BDE, Section 37-4.06 BDE, Section 37-4.06 BDE, Section 37-4.06 BDE, Section 37-4.06
<b>Cross Section Slopes</b> Travel Lane Shoulders Sideslopes	1.5% Min. (Toward Rt. Shoulder) 4% 1:4 (Maximum)	BDE, Section 37-4.06 BDE, Section 37-4.06 BDE, Section 37-4.06
<b>Entrance and Exit Ramp Terminals</b> Minimum Acceleration/Deceleration Lengths		See BDE, Sec. 37-6 and IDOT Highway Standards 406001 & 406101

### Interchange Ramps - Loop

<u>Topic</u>	<u>Criteria</u>	<u>Source</u>
<b>Design Speed</b>	40 mph	BDE, Sec. 37-4.04
<b>Stopping Sight Distance</b> Stopping Sight Distance (Passenger Car) Minimum	305 ft	BDE, Figure 37-4F
<b>Horizontal Alignment</b> Minimum Radius Curve 40 mph	445 ft	BDE, Figure 37-4F
Maximum Superelevation Rate	8%	BDE, Sec. 37-4.07(b) #2, Figure 37-4F
Minimum Curve Length	Varies with deflection angle	BDE, Section 32-2.05
<b>Vertical Alignment</b> Maximum Upgrade	+4%	BDE, Section 37-4.08(a), Figure 37-4F
Maximum Downgrade	-6%	BDE, Section 37-4.08(a), Figure 37-4F
Rate of Vertical Curvature, k Crest Vertical Curve Minimum	44	BDE, Figure 37-4F
Sag Vertical Curve Minimum	64	BDE, Figure 37-4F
<b>Cross Section Elements</b> Clear Zone	14-16 ft Ramp C 12-14 ft Ramp D 16-18 ft Ramp E 14-16 ft Ramp F	BDE, Figure 38-3A
<b>Cross Section Widths</b> 1-Lane Ramp Traveled Way Width	16 ft	BDE, Section 37-4.06
Shoulder Width Left	6 ft	BDE, Section 37-4.06
Right	8 ft	BDE, Section 37-4.06
Paved Shoulder Width Left	4 ft	BDE, Section 37-4.06
Right	6 ft	BDE, Section 37-4.06
<b>Cross Section Slopes</b> Travel Lane	1.5% Min. (Toward Rt. Shoulder)	BDE, Section 37-4.06
Shoulders	4%	BDE, Section 37-4.06
Sideslopes	1:4 (Maximum)	BDE, Section 37-4.06
<b>Entrance and Exit Ramp Terminals</b> Minimum Acceleration/Deceleration Lengths		See BDE, Sec. 37-6 and IDOT Highway Standards 406001 & 406101

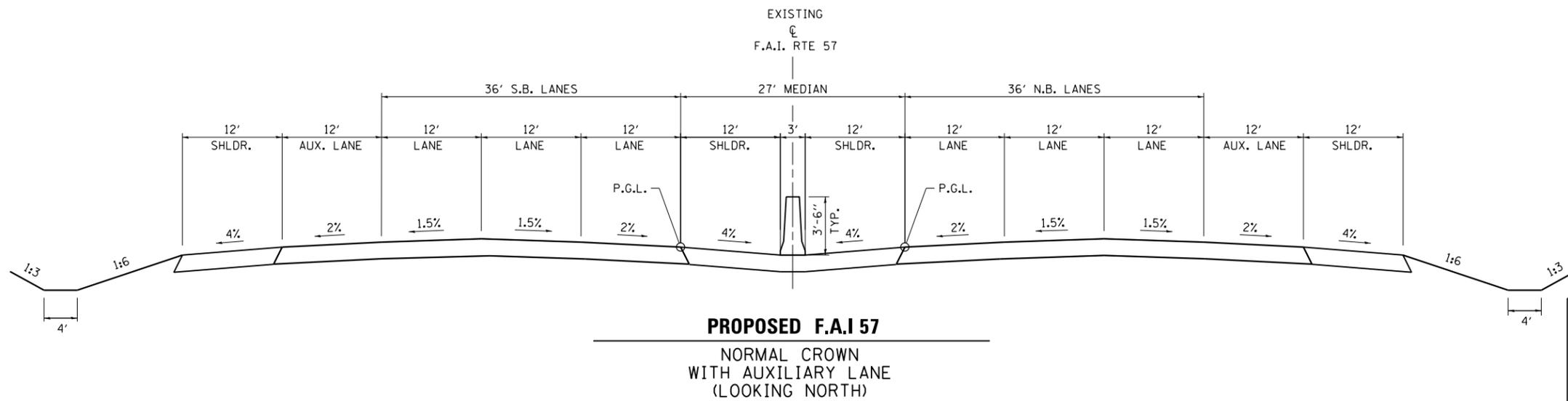
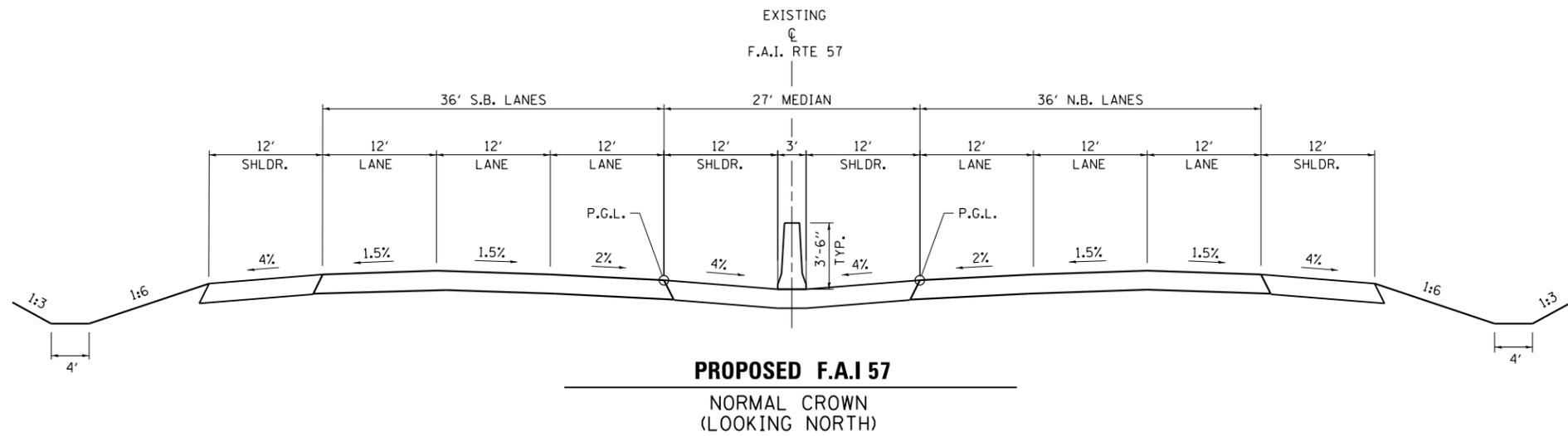
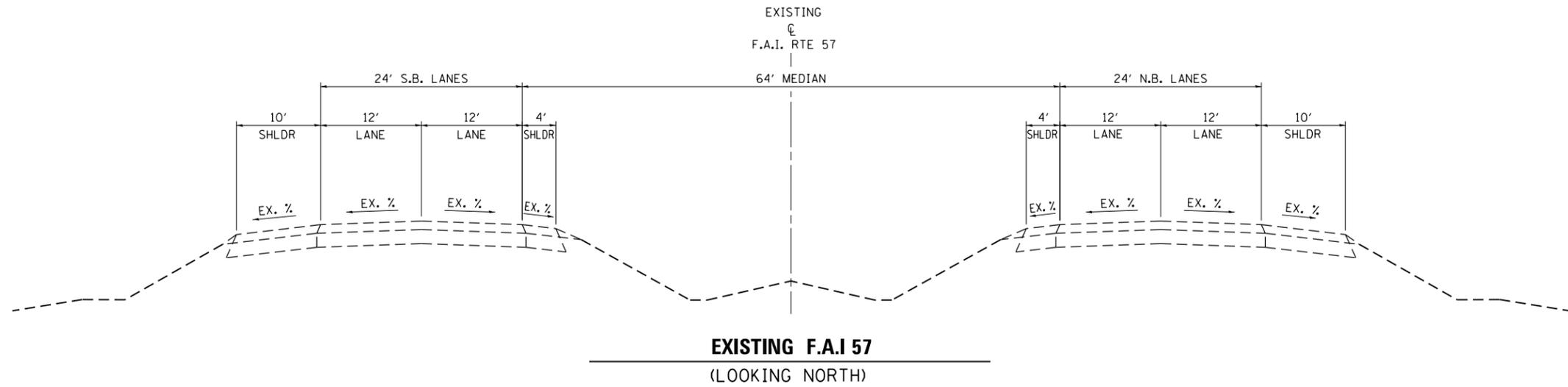
**F.A.P. 719 (Bloomington Rd./IL 150) – Urban Principal Arterial (Other)**

<u>Topic</u>	<u>Criteria</u>	<u>Source</u>
<b>Design Speed</b>	40 mph (30-40 mph)	BDE, Figure 48-6A
<b>Level of Service</b>	LOS C	BDE, Figure 48-6A
<b>Horizontal Alignment</b>		
Superelevation Rate ( $e_{max}$ )	4 %	BDE, Figure 48-6C
Minimum Radius Curve (Low Speed Urban Street)	533 ft	BDE, Figure 32-2F Figure 48-6C
Minimum Curve Length Design Vehicle	Varies with deflection angle WB-65	BDE, Section 32-2.05 BDE, Figure 36-1R
<b>Vertical Alignment</b>		
Maximum Grade Level	7%	BDE, Figure 48-6C
Minimum Grade Desirable	0.5%	BDE, Figure 48-6C
With Curb & Gutter	0.3%	BDE, Figure 48-6C
Rate of Vertical Curvature, K (Stopping Sight Dist.)		
Crest Vertical Curve Minimum	44	BDE, Figure 48-6C
Sag Vertical Curve Minimum	64	BDE, Figure 48-6C
Minimum Length of Curve (3 x Design Speed)		
Crest	120 ft	BDE, Sec. 33-4.01(a)
Sag	120 ft	BDE, Sec. 33-4.02(a)
<b>Sight Distance</b>		
Stopping Sight Distance (Passenger Car) Minimum	305 ft	BDE, Figure 31-3A, Figure 48-6C
<b>Cross Section Elements</b>		
Median Width (Raised Curb)	n/a	BDE, Figure 48-6A
Traveled Way Width (Without Parking)	30 ft f-f	BDE, Figure 48-6A
Auxiliary Lanes Lane	Single Left or Right 12 ft Dual Lefts 24 ft, Min: 22 ft	BDE, Figure 48-6A BDE, Figure 48-6A
Cross Section Slopes Travel Lanes	2.0% for Lanes Adjacent to Crown	BDE, Figure 48-6A
Maximum Shoulder Rollover	8%	BDE, Sec. 32-3.04

### N. Mattis Ave/CR 1000E – Urban Minor Arterial

<u>Topic</u>	<u>Criteria</u>	<u>Source</u>
<b>Design Speed</b>	40 mph (30-40 mph)	BLR, Figure 32-2D
<b>Level of Service</b>	LOS C	BLR, Figure 32-2D
<b>Horizontal Alignment</b>		
Superelevation Rate ( $e_{max}$ )	4 %	BLR, Sec. 29-4.03(b)
Minimum Radius Curve (Low Speed Urban Street)	490 ft	BLR, Figure 29-4A
Minimum Curve Length	Varies with deflection angle	BLR, Section 29-2.06
<b>Vertical Alignment</b>		
Maximum Grade		
Level	7%	BLR, Figure 32-3B
Minimum Grade		
Desirable	0.5%	BLR, Figure 32-3B
With Curb & Gutter	0.3%	BLR, Figure 32-3B
Rate of Vertical Curvature, K (Stopping Sight Dist.)		
Crest Vertical Curve		
Minimum	44	BLR, Figure 32-3B
Sag Vertical Curve		
Minimum	64	BLR, Figure 32-3B
Minimum Length of Curve (3 x Design Speed)		
Crest	120 ft	BLR, Figure 30-2A
Sag	120 ft	BLR, Figure 30-2D
<b>Sight Distance</b>		
Stopping Sight Distance (Passenger Car)		
Minimum	305 ft	BLR, Figure 32-3B
<b>Cross Section Elements</b>		
Median Width (Raised Curb)	18 ft	BLR, Figure 32-2D
Surface Width	4 lanes @ 12 ft	BLR, Figure 32-2D
Auxiliary Lanes		
Lane	Single Left or Right 12 ft Dual Lefts 24 ft, Min: 22 ft	BLR, Figure 32-2D BLR, Figure 32-2D
<b>Cross Section Slopes</b>		
Travel Lanes	1.5%-2%	BLR, Figure 32-2D
Auxiliary Lanes	2%	BLR, Figure 32-2D

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USER NAME = Brad Downen



INTERCHANGE TYPE STUDY

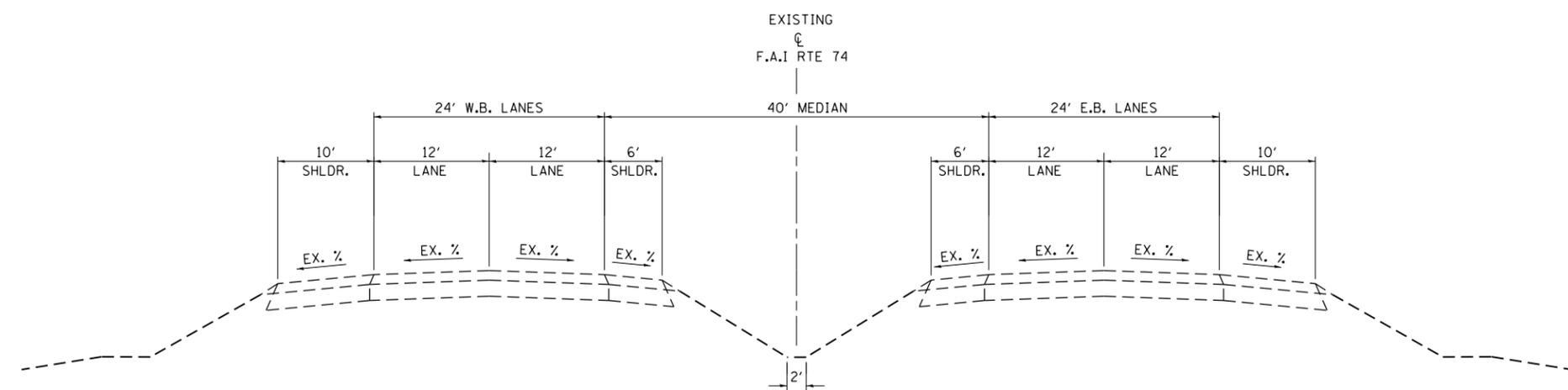
EXISTING & PROPOSED  
TYPICAL SECTIONS

INTERSTATE 57

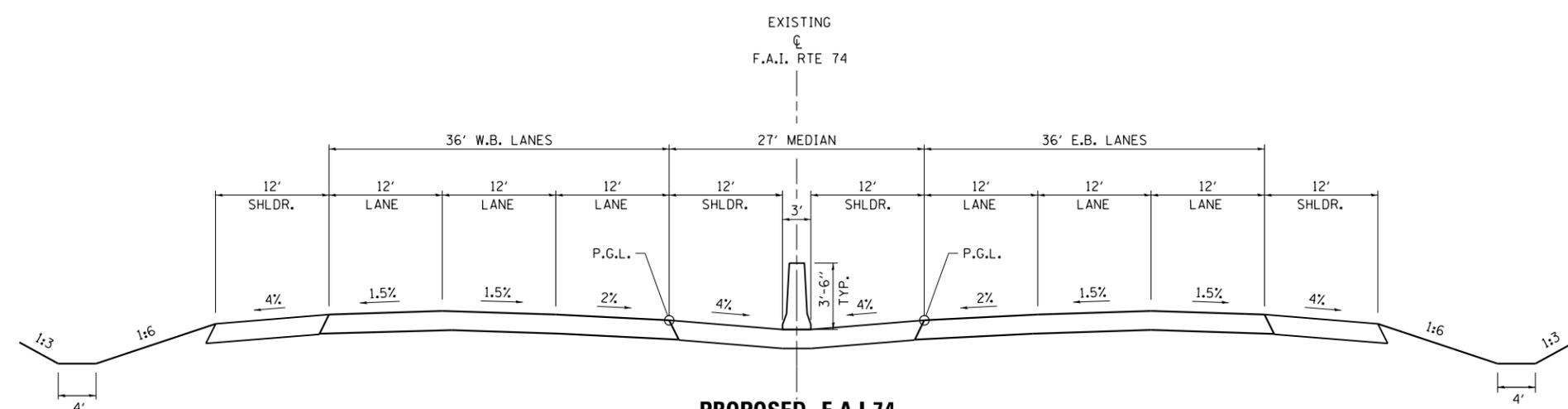
EXHIBIT 12

BDE-9908

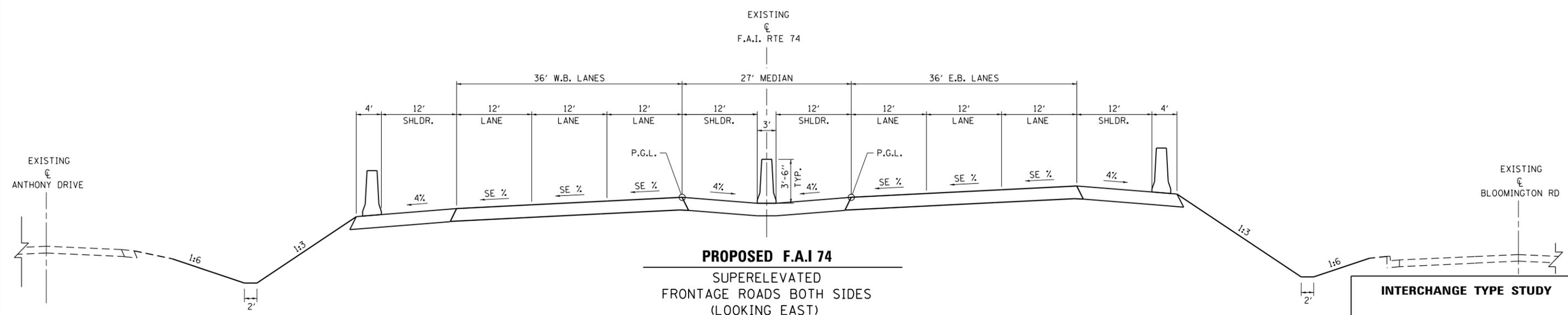
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 USER NAME = Brad Downen



**EXISTING F.A.I 74**  
 (LOOKING EAST)



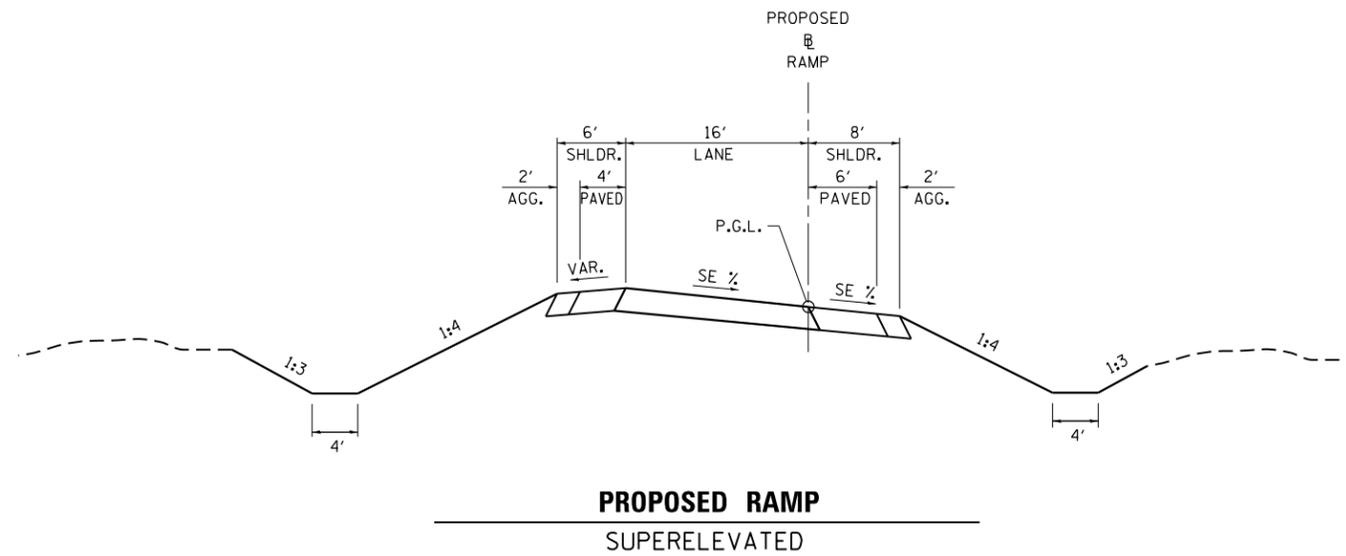
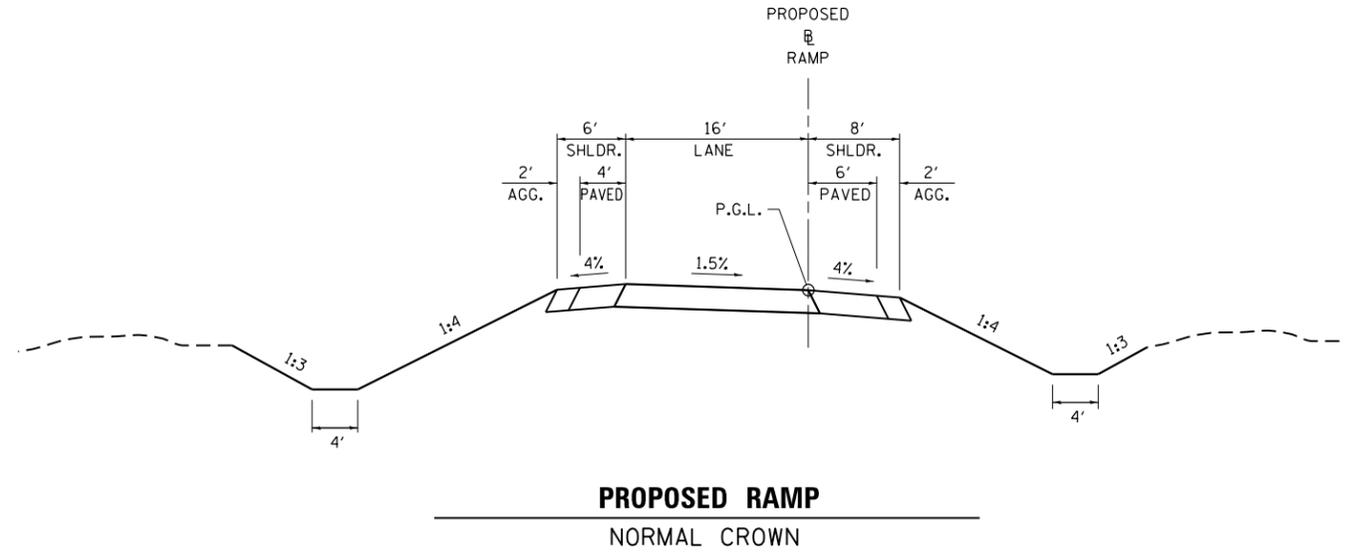
**PROPOSED F.A.I 74**  
 NORMAL CROWN  
 (LOOKING EAST)



**PROPOSED F.A.I 74**  
 SUPERELEVATED  
 FRONTAGE ROADS BOTH SIDES  
 (LOOKING EAST)

**INTERCHANGE TYPE STUDY**  
**EXISTING & PROPOSED**  
**TYPICAL SECTIONS**  
  
**INTERSTATE 74**  
**EXHIBIT 13**

PLOT DATE = 12/16/2013  
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USER NAME = Brad Downen



INTERCHANGE TYPE STUDY

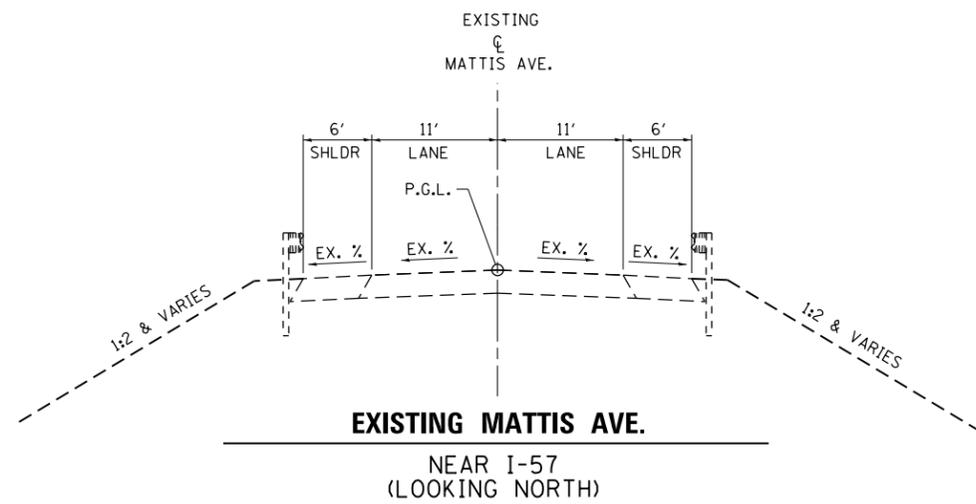
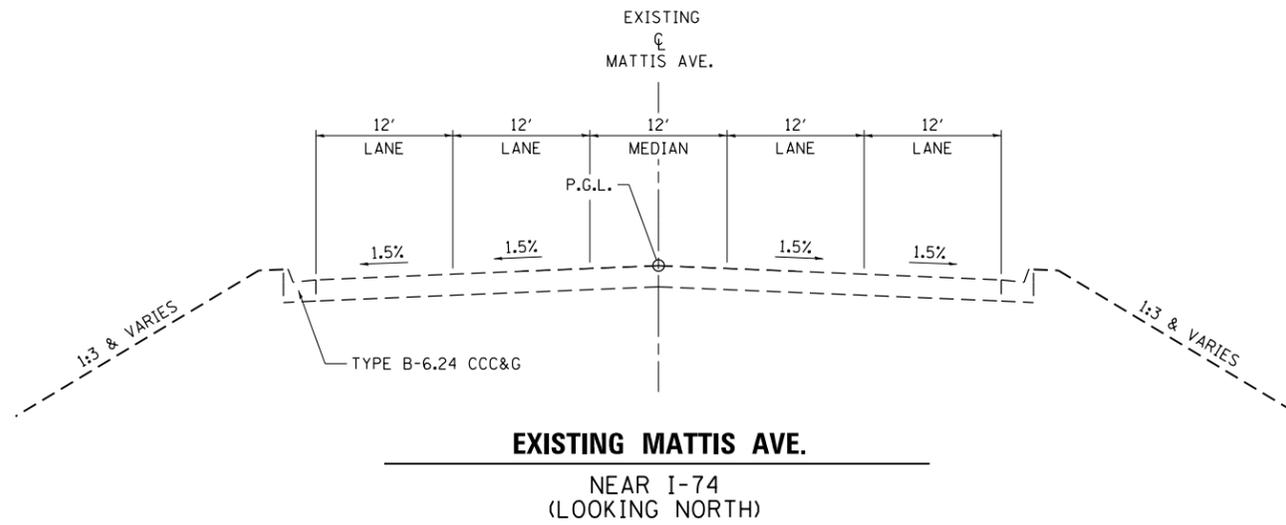
EXISTING & PROPOSED  
TYPICAL SECTIONS

RAMPS

EXHIBIT 14

BDE-9908

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USER NAME = Brad Downen

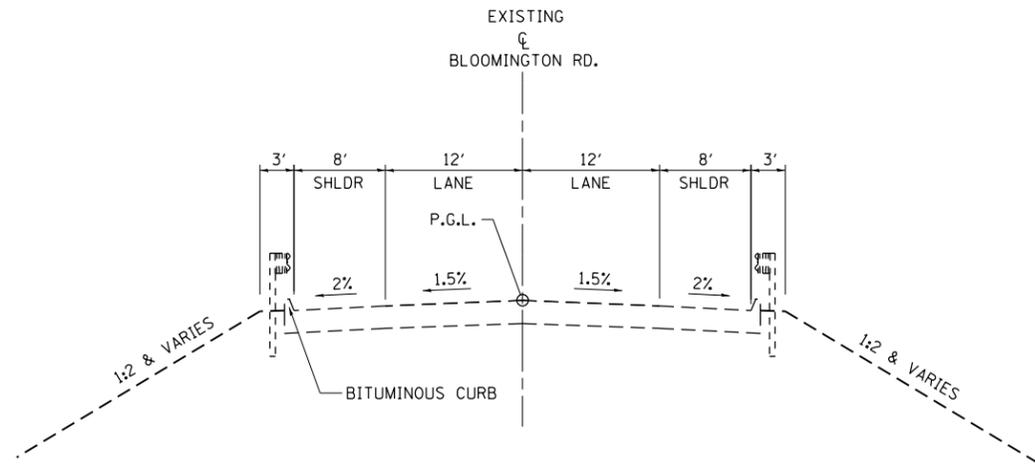


COORDINATION TO BE COMPLETED WITH THE CITY OF CHAMPAIGN

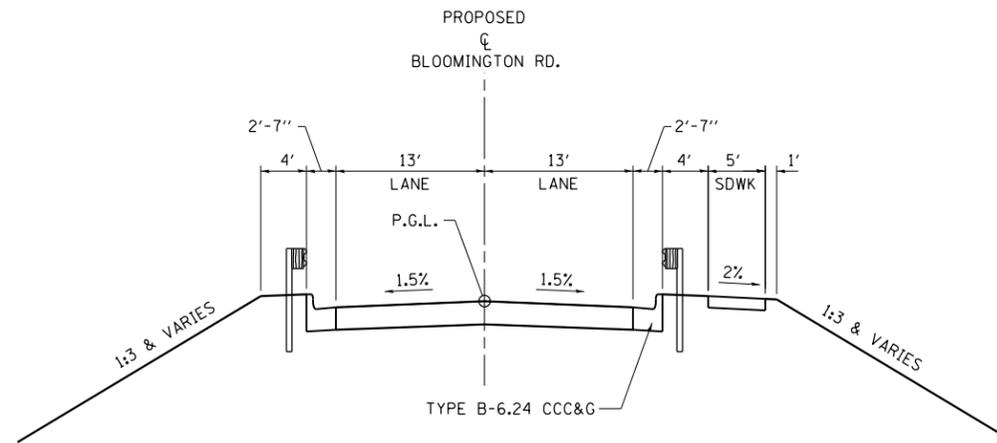
**PROPOSED MATTIS AVE.**  
(LOOKING NORTH)

**INTERCHANGE TYPE STUDY**  
**EXISTING & PROPOSED**  
**TYPICAL SECTIONS**  
**MATTIS AVENUE**  
**EXHIBIT 15**

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USER NAME = Brad Downen



**EXISTING BLOOMINGTON ROAD**  
(LOOKING EAST)



**PROPOSED BLOOMINGTON ROAD**  
(LOOKING EAST)

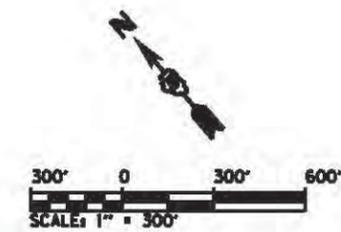
**INTERCHANGE TYPE STUDY**

**EXISTING & PROPOSED  
TYPICAL SECTIONS**

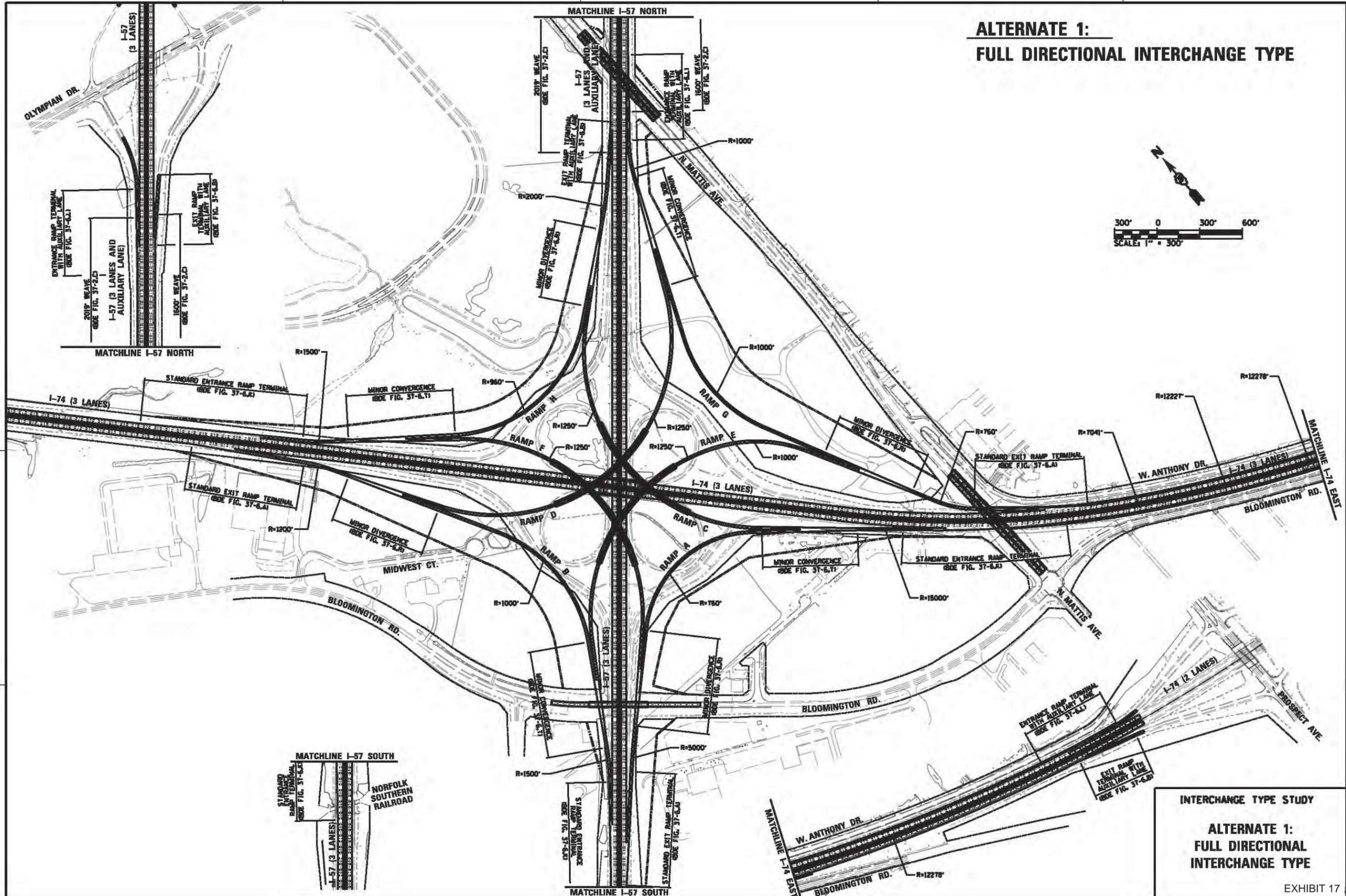
**BLOOMINGTON ROAD**

**EXHIBIT 16**

**ALTERNATE 1:  
FULL DIRECTIONAL INTERCHANGE TYPE**

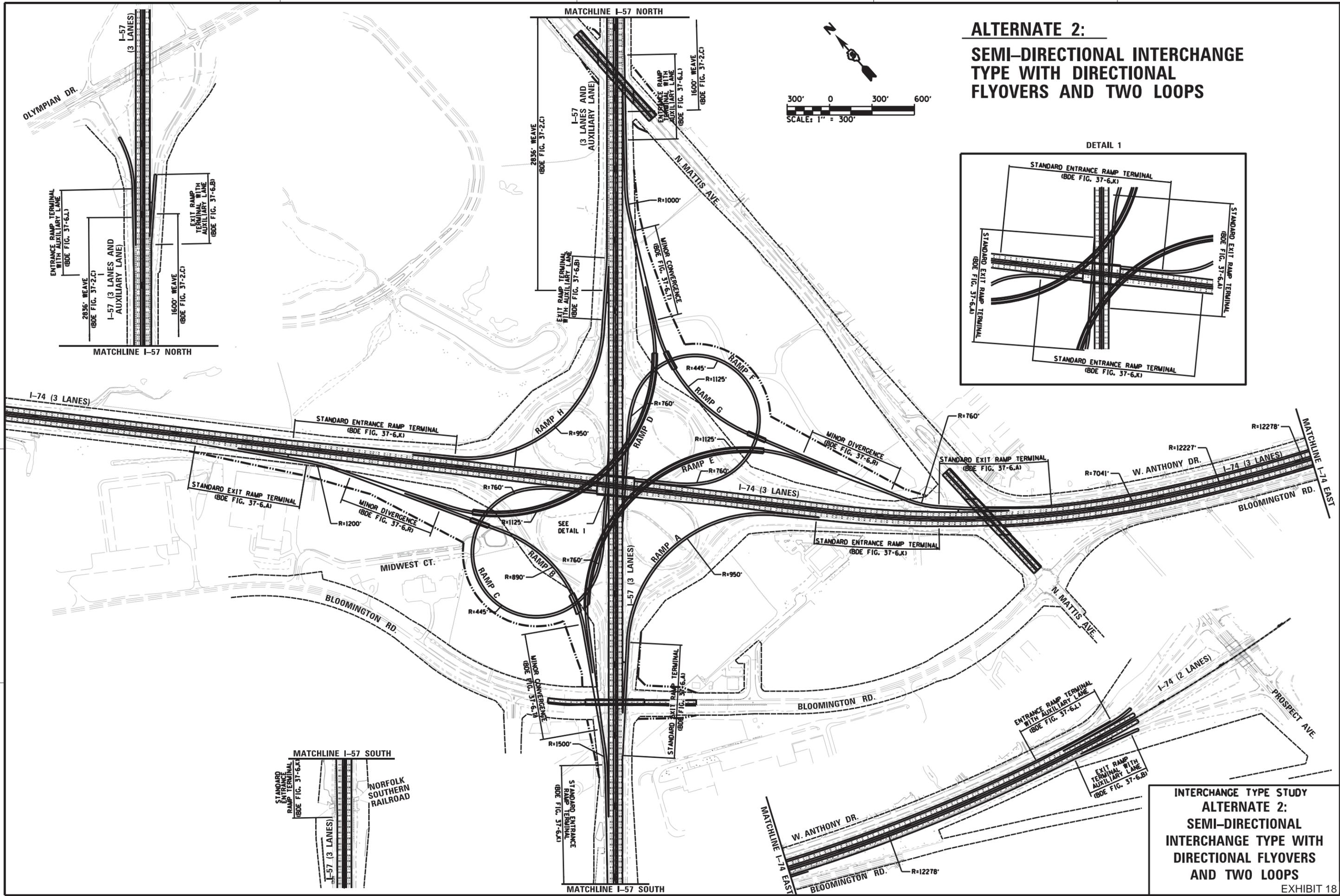


DATE: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 SCALE: \_\_\_\_\_  
 SHEET NO.: \_\_\_\_\_

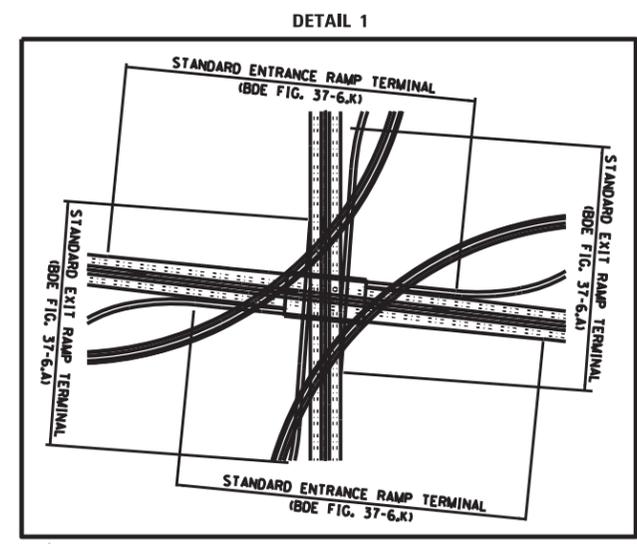
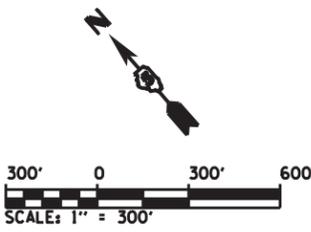


**INTERCHANGE TYPE STUDY**  
  
**ALTERNATE 1:  
FULL DIRECTIONAL  
INTERCHANGE TYPE**  
  
 EXHIBIT 17

PLOT DATE : BOATES  
FILE NAME : FILES  
PLOT SCALE : SCALES  
USER NAME : USERS

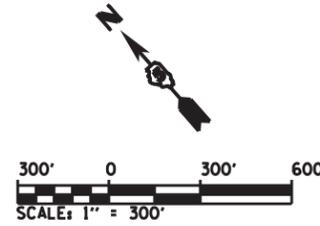


### ALTERNATE 2: SEMI-DIRECTIONAL INTERCHANGE TYPE WITH DIRECTIONAL FLYOVERS AND TWO LOOPS

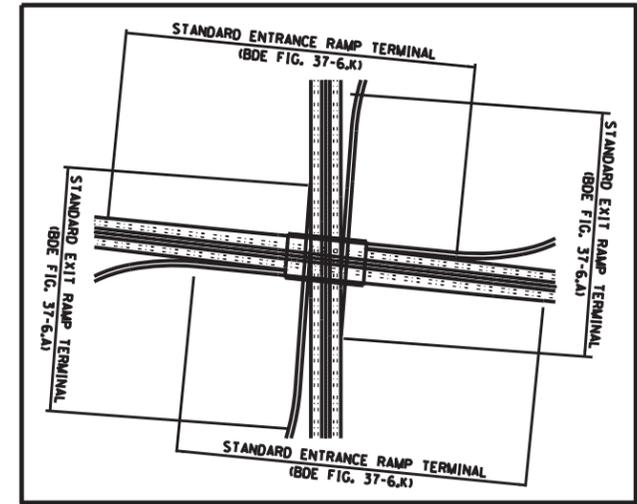


INTERCHANGE TYPE STUDY  
ALTERNATE 2:  
SEMI-DIRECTIONAL  
INTERCHANGE TYPE WITH  
DIRECTIONAL FLYOVERS  
AND TWO LOOPS

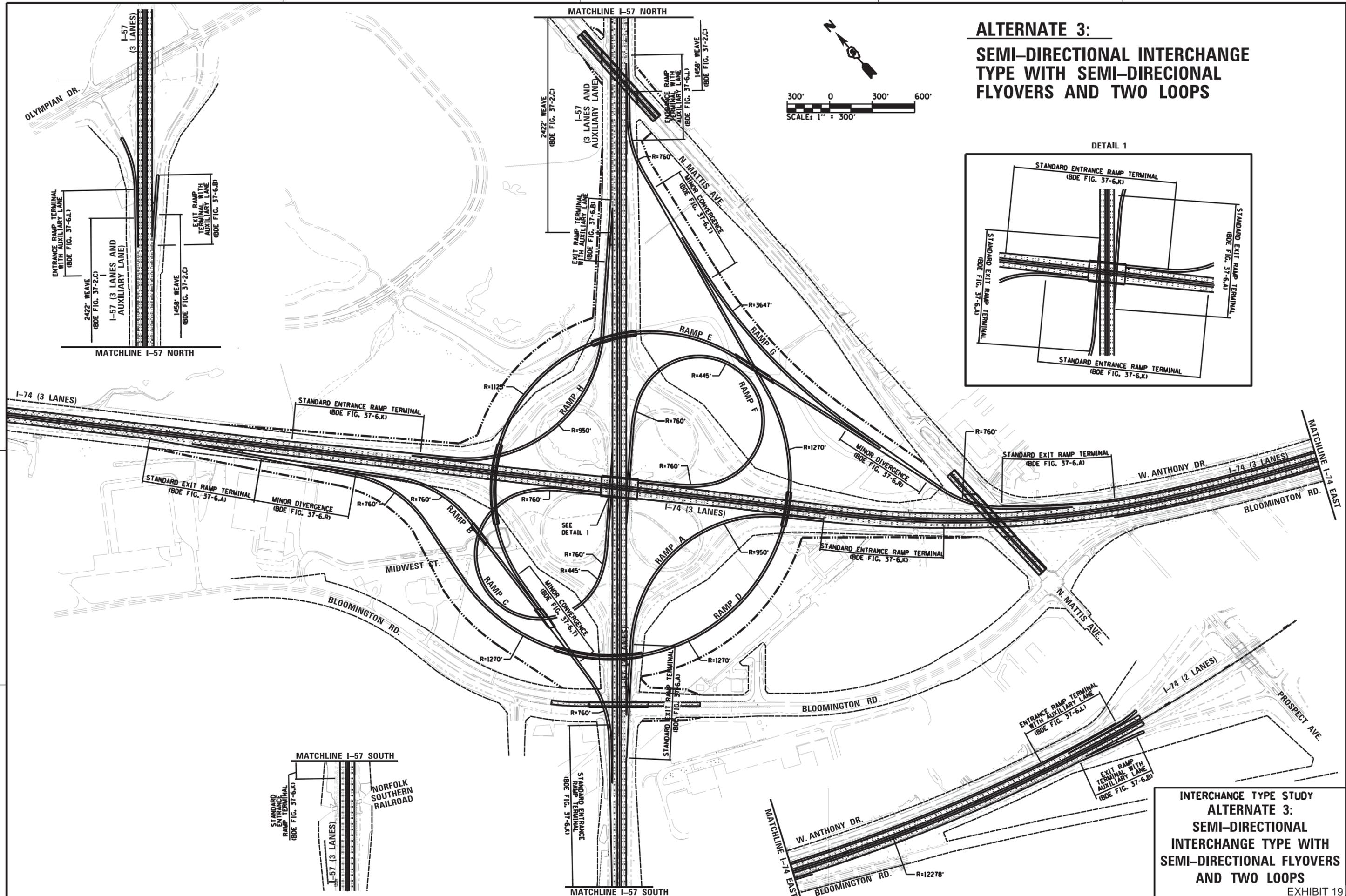
**ALTERNATE 3:  
SEMI-DIRECTIONAL INTERCHANGE  
TYPE WITH SEMI-DIRECTIONAL  
FLYOVERS AND TWO LOOPS**



**DETAIL 1**

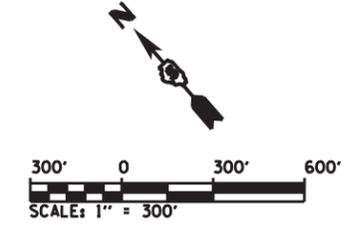


PLOT DATE : 04/25/11  
 FILE NAME : 37-6.A1  
 PLOT SCALE : 1" = 300'  
 USER NAME : J. WILSON

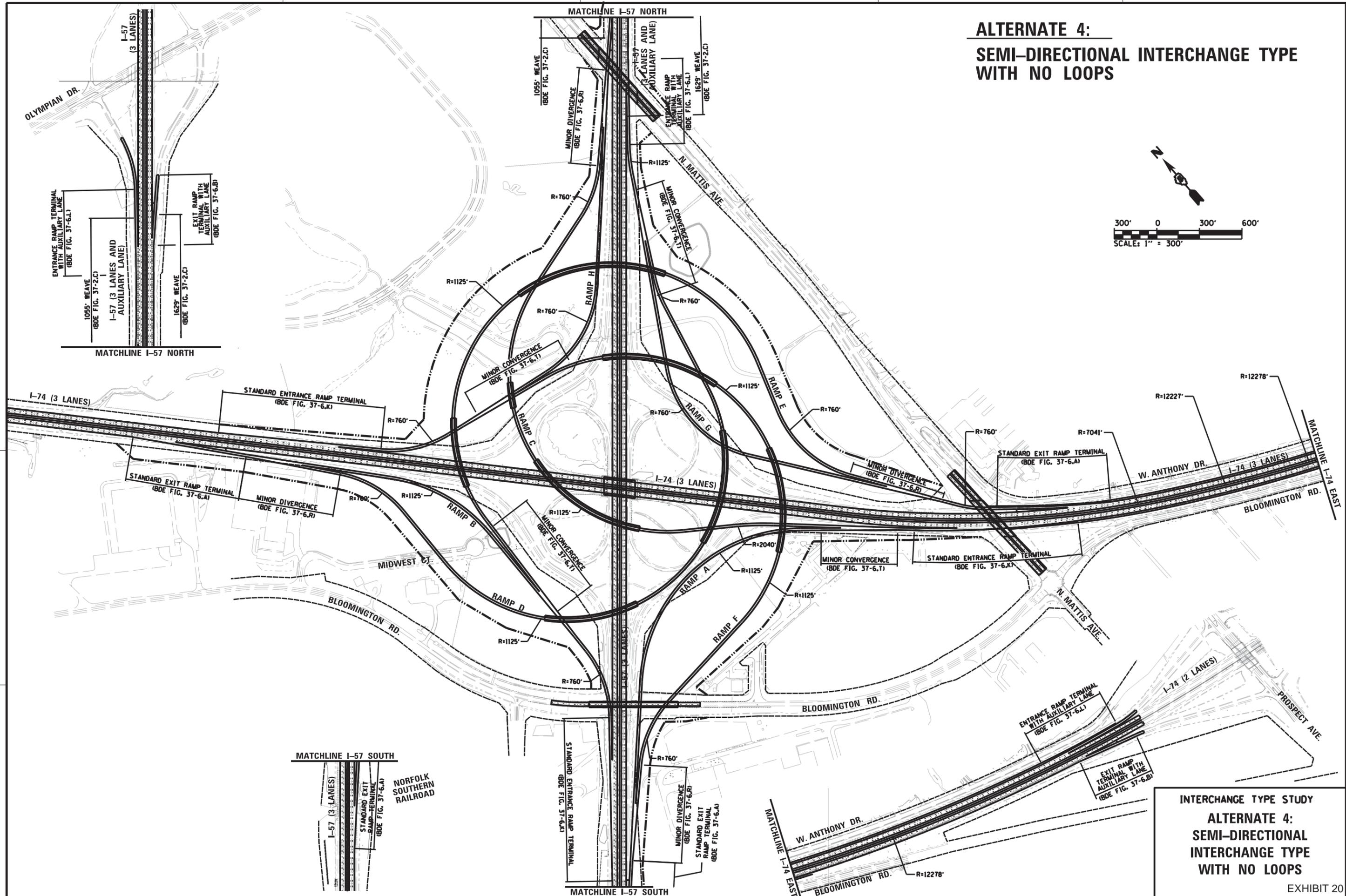


**INTERCHANGE TYPE STUDY  
ALTERNATE 3:  
SEMI-DIRECTIONAL  
INTERCHANGE TYPE WITH  
SEMI-DIRECTIONAL FLYOVERS  
AND TWO LOOPS**  
 EXHIBIT 19

**ALTERNATE 4:  
SEMI-DIRECTIONAL INTERCHANGE TYPE  
WITH NO LOOPS**



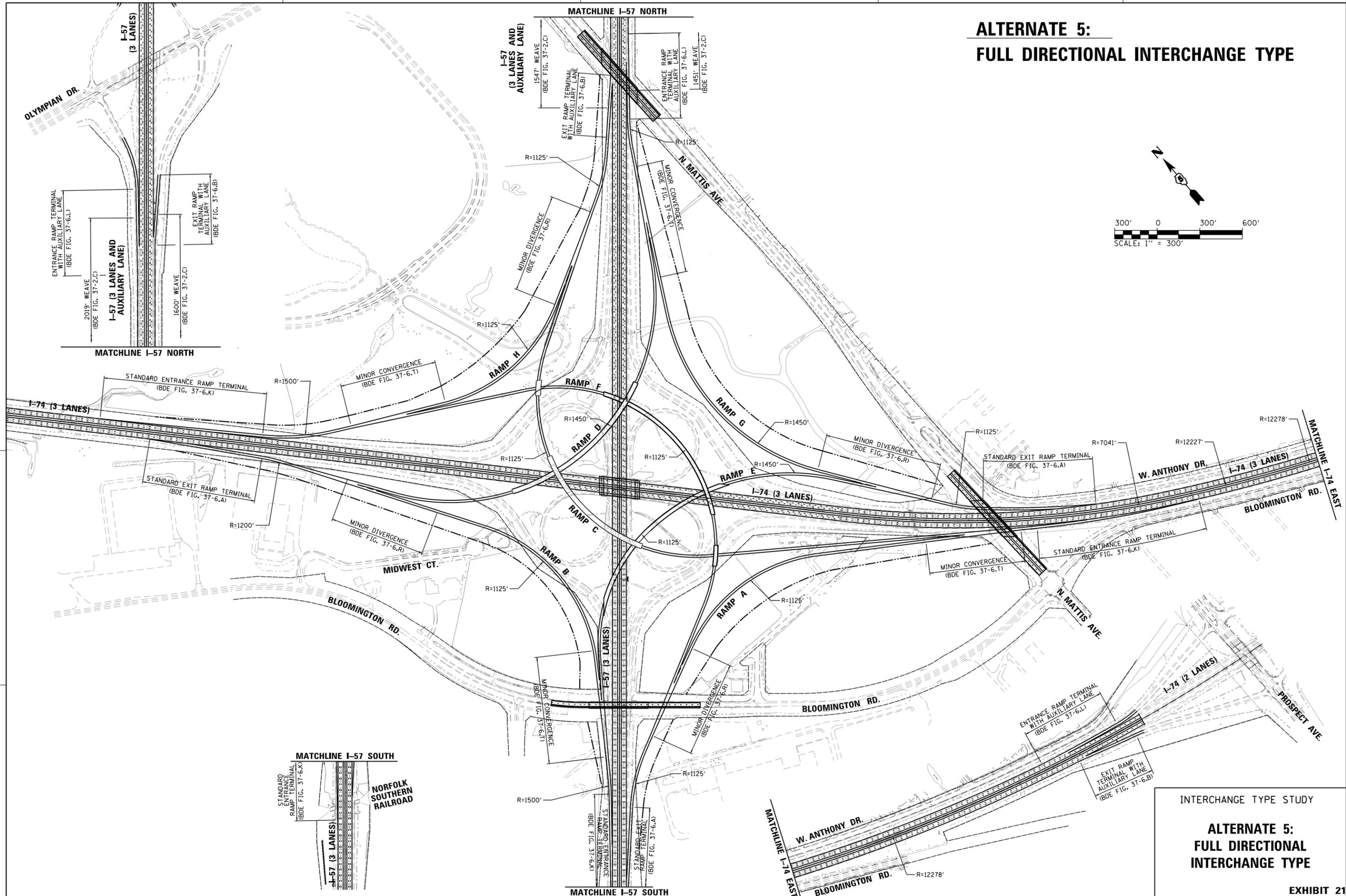
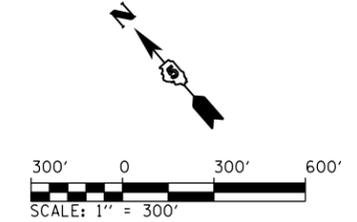
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 FILE NAME :  
 PLOT SCALE :  
 USER NAME :



**INTERCHANGE TYPE STUDY**  
**ALTERNATE 4:**  
**SEMI-DIRECTIONAL**  
**INTERCHANGE TYPE**  
**WITH NO LOOPS**  
 EXHIBIT 20

PLOT DATE = 12/16/2013  
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PLOT SCALE = 600,0000 / in.  
USER NAME = Brad Downen

# ALTERNATE 5: FULL DIRECTIONAL INTERCHANGE TYPE



INTERCHANGE TYPE STUDY

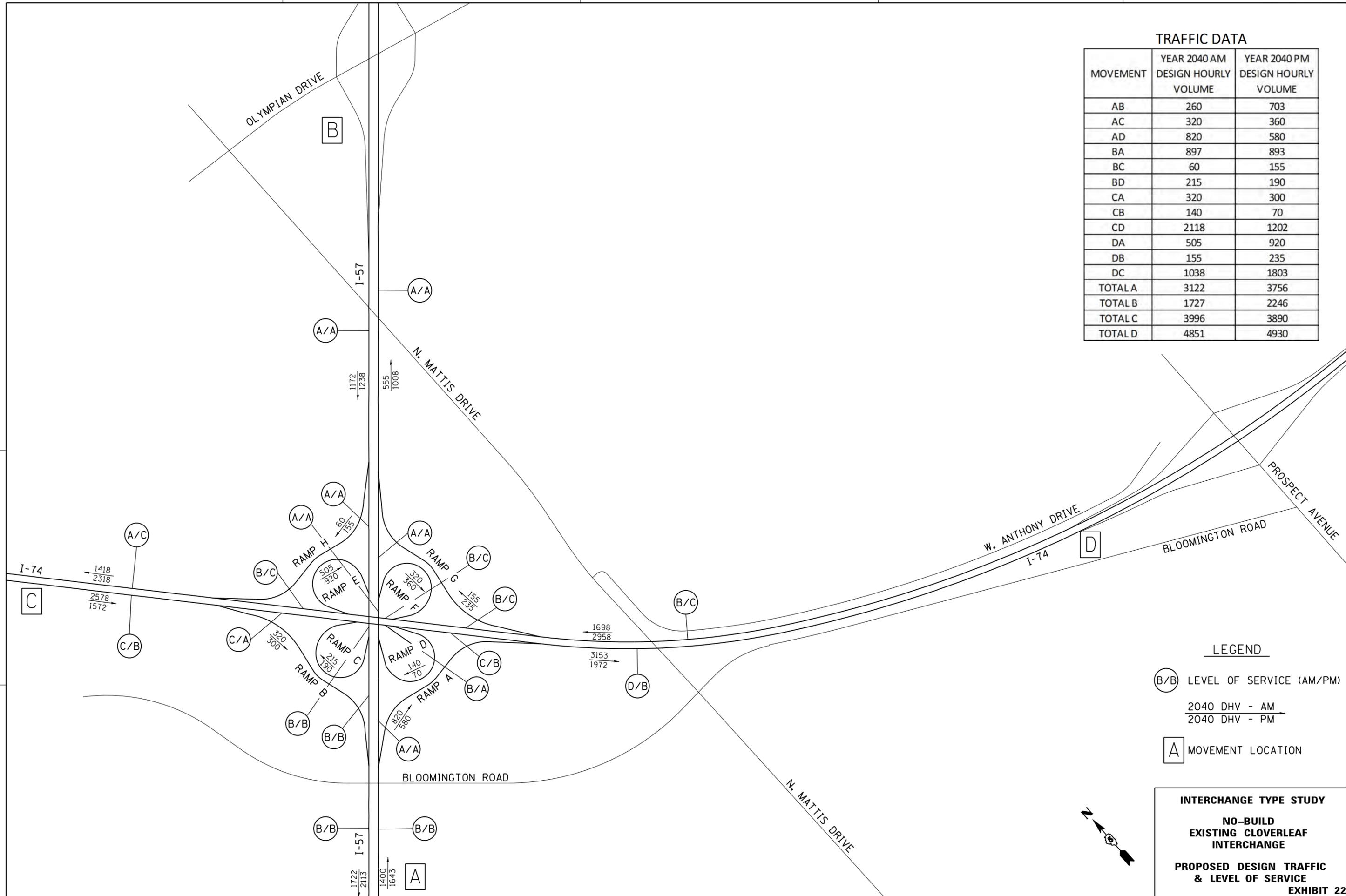
**ALTERNATE 5:  
FULL DIRECTIONAL  
INTERCHANGE TYPE**

EXHIBIT 21

PLOT DATE = 12/16/2013  
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 PLOT SCALE = 800,0000 / in.  
 USER NAME = Brad Downen

TRAFFIC DATA

MOVEMENT	YEAR 2040 AM DESIGN HOURLY VOLUME	YEAR 2040 PM DESIGN HOURLY VOLUME
AB	260	703
AC	320	360
AD	820	580
BA	897	893
BC	60	155
BD	215	190
CA	320	300
CB	140	70
CD	2118	1202
DA	505	920
DB	155	235
DC	1038	1803
TOTAL A	3122	3756
TOTAL B	1727	2246
TOTAL C	3996	3890
TOTAL D	4851	4930



LEGEND

- (B/B) LEVEL OF SERVICE (AM/PM)  
 $\frac{2040\ DHV - AM}{2040\ DHV - PM}$
- [A] MOVEMENT LOCATION

**INTERCHANGE TYPE STUDY**

**NO-BUILD  
 EXISTING CLOVERLEAF  
 INTERCHANGE**

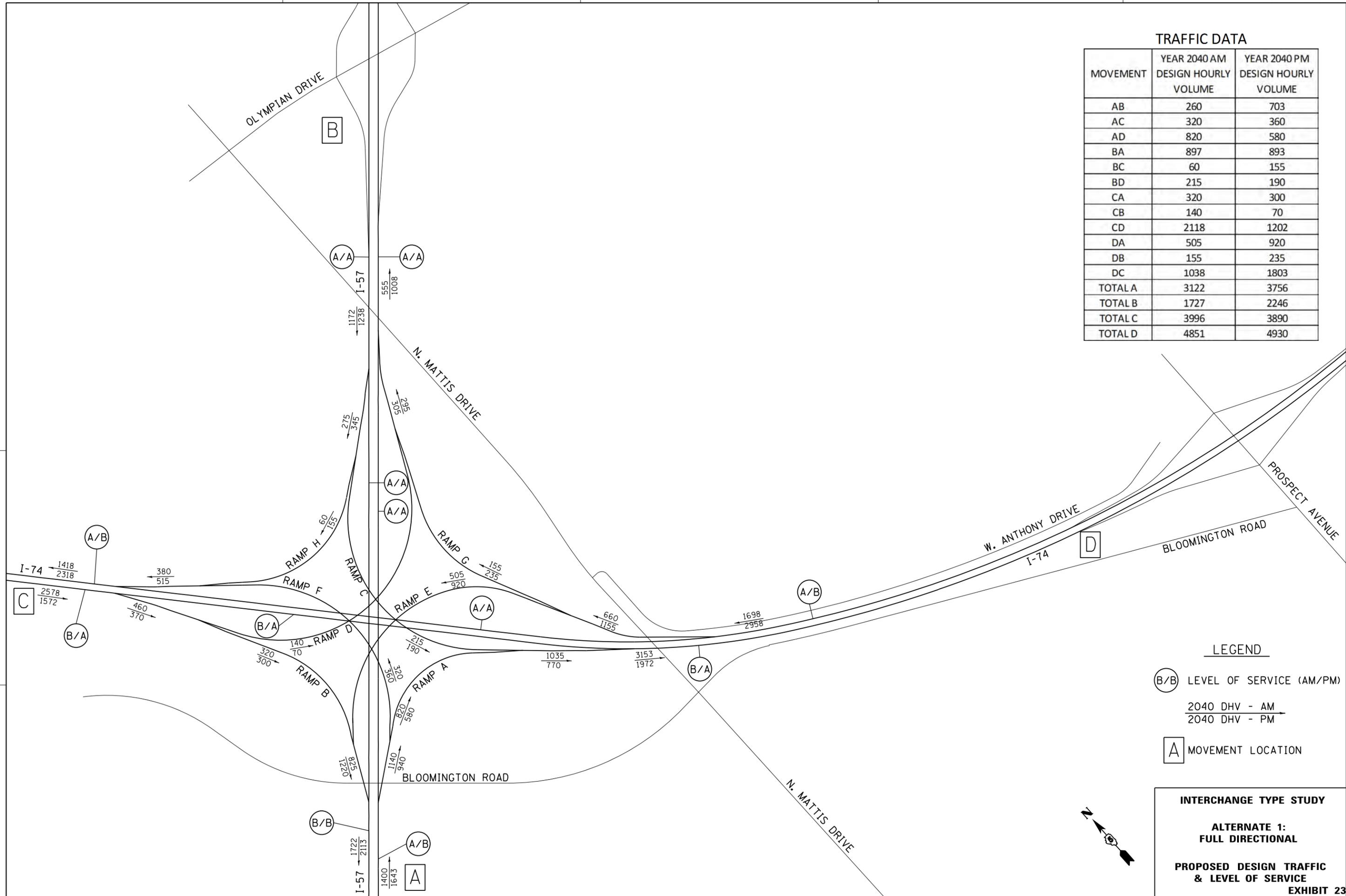
**PROPOSED DESIGN TRAFFIC  
 & LEVEL OF SERVICE**

**EXHIBIT 22**

PLOT DATE = 12/16/2013  
 FILE NAME = I:\PROJECTS\1106682\Draw\Exhibits\ITS Exhibit 23 Alternate 1 E-1 Traffic.dgn  
 PLOT SCALE = 800,0000 / in.  
 USER NAME = Brad Downen

**TRAFFIC DATA**

MOVEMENT	YEAR 2040 AM DESIGN HOURLY VOLUME	YEAR 2040 PM DESIGN HOURLY VOLUME
AB	260	703
AC	320	360
AD	820	580
BA	897	893
BC	60	155
BD	215	190
CA	320	300
CB	140	70
CD	2118	1202
DA	505	920
DB	155	235
DC	1038	1803
TOTAL A	3122	3756
TOTAL B	1727	2246
TOTAL C	3996	3890
TOTAL D	4851	4930



**LEGEND**

- (B/B) LEVEL OF SERVICE (AM/PM)
- 2040 DHV - AM  
2040 DHV - PM
- [A] MOVEMENT LOCATION

**INTERCHANGE TYPE STUDY**

**ALTERNATE 1:  
FULL DIRECTIONAL**

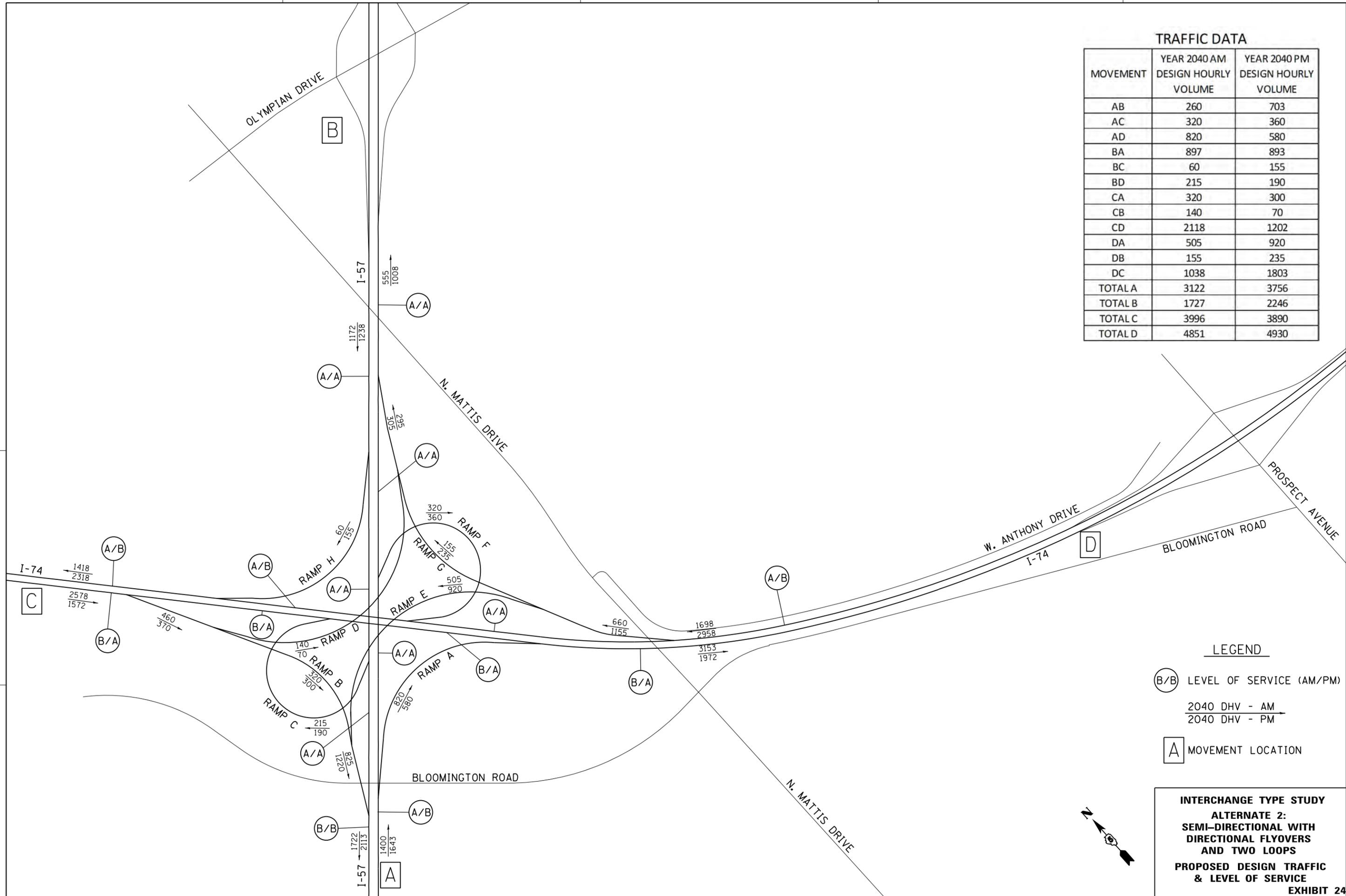
**PROPOSED DESIGN TRAFFIC  
& LEVEL OF SERVICE**

**EXHIBIT 23**

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 USER NAME = Brad Downen

**TRAFFIC DATA**

MOVEMENT	YEAR 2040 AM DESIGN HOURLY VOLUME	YEAR 2040 PM DESIGN HOURLY VOLUME
AB	260	703
AC	320	360
AD	820	580
BA	897	893
BC	60	155
BD	215	190
CA	320	300
CB	140	70
CD	2118	1202
DA	505	920
DB	155	235
DC	1038	1803
TOTAL A	3122	3756
TOTAL B	1727	2246
TOTAL C	3996	3890
TOTAL D	4851	4930



**LEGEND**

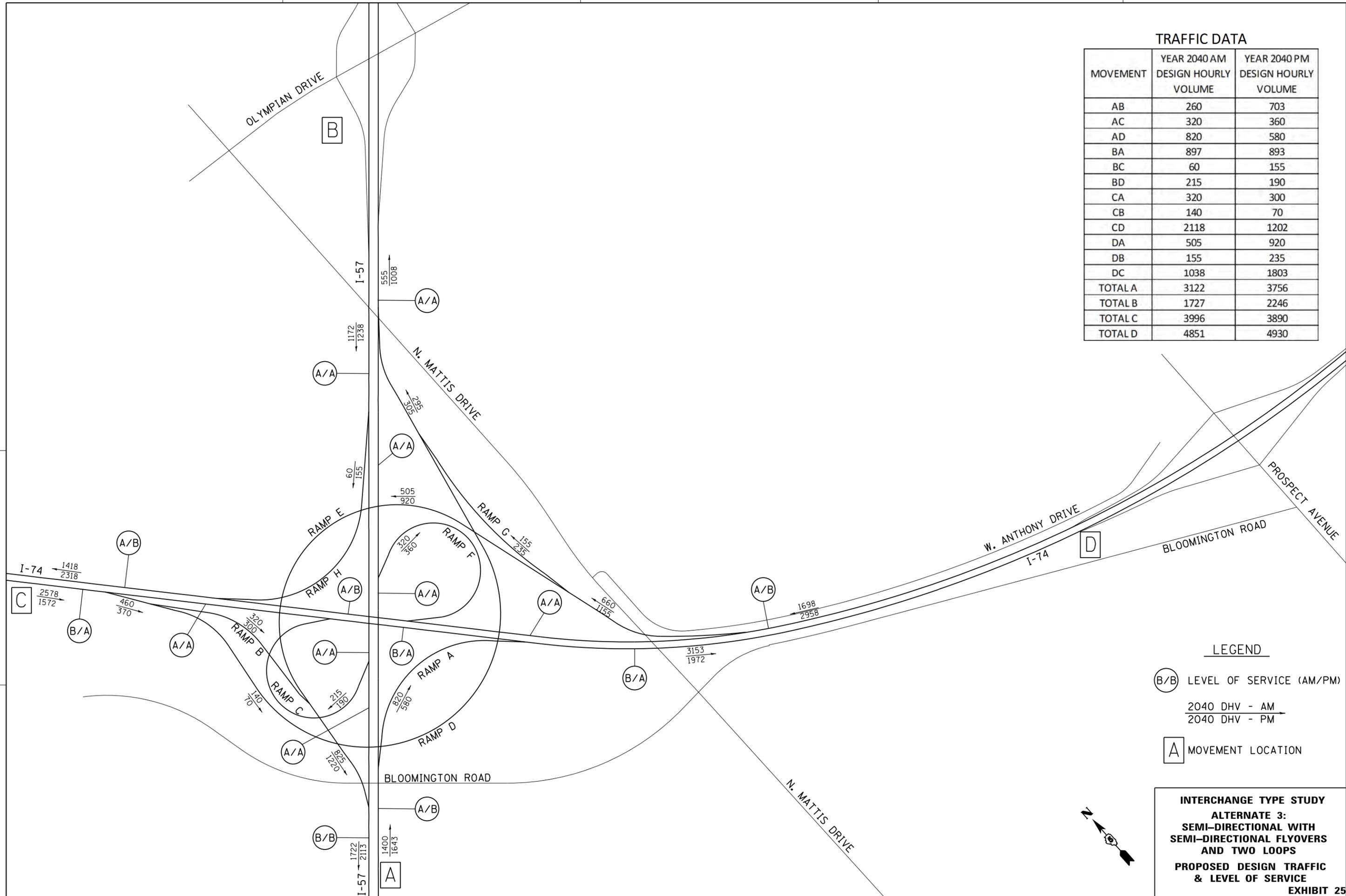
- (B/B) LEVEL OF SERVICE (AM/PM)
- 2040 DHV - AM  
2040 DHV - PM
- (A) MOVEMENT LOCATION

**INTERCHANGE TYPE STUDY  
 ALTERNATE 2:  
 SEMI-DIRECTIONAL WITH  
 DIRECTIONAL FLYOVERS  
 AND TWO LOOPS  
 PROPOSED DESIGN TRAFFIC  
 & LEVEL OF SERVICE**

PLOT DATE = 12/16/2013  
 FILE NAME = I:\PROJECTS\1106682\Draw\Exhibits\ITS Exhibit 25 Alternate 3 B-2 Traffic.dgn  
 PLOT SCALE = 800,0000 / in.  
 USER NAME = Brad Downen

TRAFFIC DATA

MOVEMENT	YEAR 2040 AM DESIGN HOURLY VOLUME	YEAR 2040 PM DESIGN HOURLY VOLUME
AB	260	703
AC	320	360
AD	820	580
BA	897	893
BC	60	155
BD	215	190
CA	320	300
CB	140	70
CD	2118	1202
DA	505	920
DB	155	235
DC	1038	1803
TOTAL A	3122	3756
TOTAL B	1727	2246
TOTAL C	3996	3890
TOTAL D	4851	4930



LEGEND

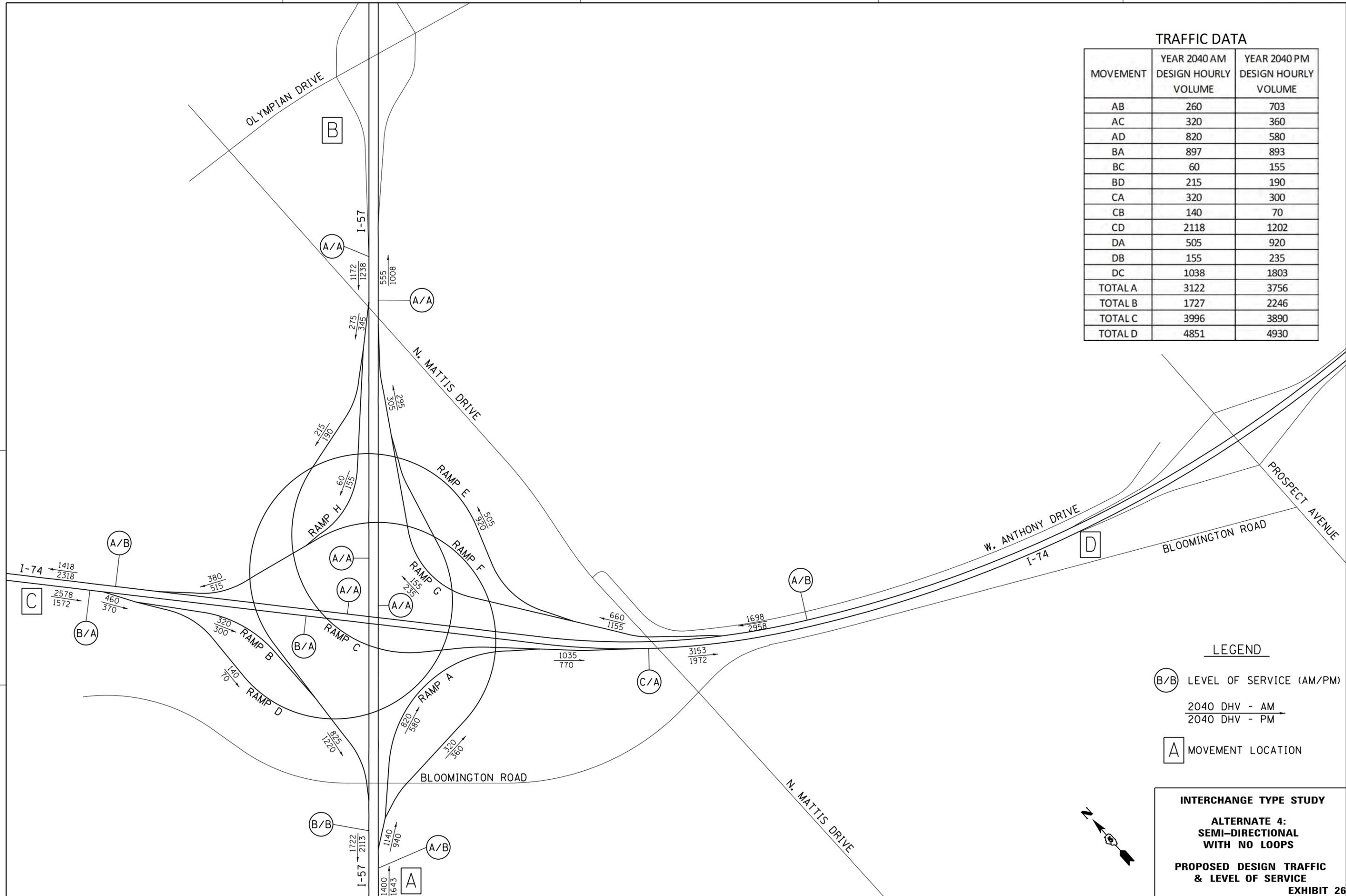
- (B/B) LEVEL OF SERVICE (AM/PM)
- 2040 DHV - AM  
2040 DHV - PM
- [A] MOVEMENT LOCATION

**INTERCHANGE TYPE STUDY  
 ALTERNATE 3:  
 SEMI-DIRECTIONAL WITH  
 SEMI-DIRECTIONAL FLYOVERS  
 AND TWO LOOPS  
 PROPOSED DESIGN TRAFFIC  
 & LEVEL OF SERVICE**

PLOT DATE = 12/16/2013  
 FILE NAME = I:\DOT\1106682\Draw\Exhibits\ITS Exhibit 26 Alternate 4 E-2 Traffic.dgn  
 PLOT SCALE = 800,0000 / in.  
 USER NAME = Brad Downen

**TRAFFIC DATA**

MOVEMENT	YEAR 2040 AM DESIGN HOURLY VOLUME	YEAR 2040 PM DESIGN HOURLY VOLUME
AB	260	703
AC	320	360
AD	820	580
BA	897	893
BC	60	155
BD	215	190
CA	320	300
CB	140	70
CD	2118	1202
DA	505	920
DB	155	235
DC	1038	1803
TOTAL A	3122	3756
TOTAL B	1727	2246
TOTAL C	3996	3890
TOTAL D	4851	4930



**LEGEND**

(B/B) LEVEL OF SERVICE (AM/PM)

2040 DHV - AM  
 2040 DHV - PM

[A] MOVEMENT LOCATION

**INTERCHANGE TYPE STUDY**

**ALTERNATE 4:  
 SEMI-DIRECTIONAL  
 WITH NO LOOPS**

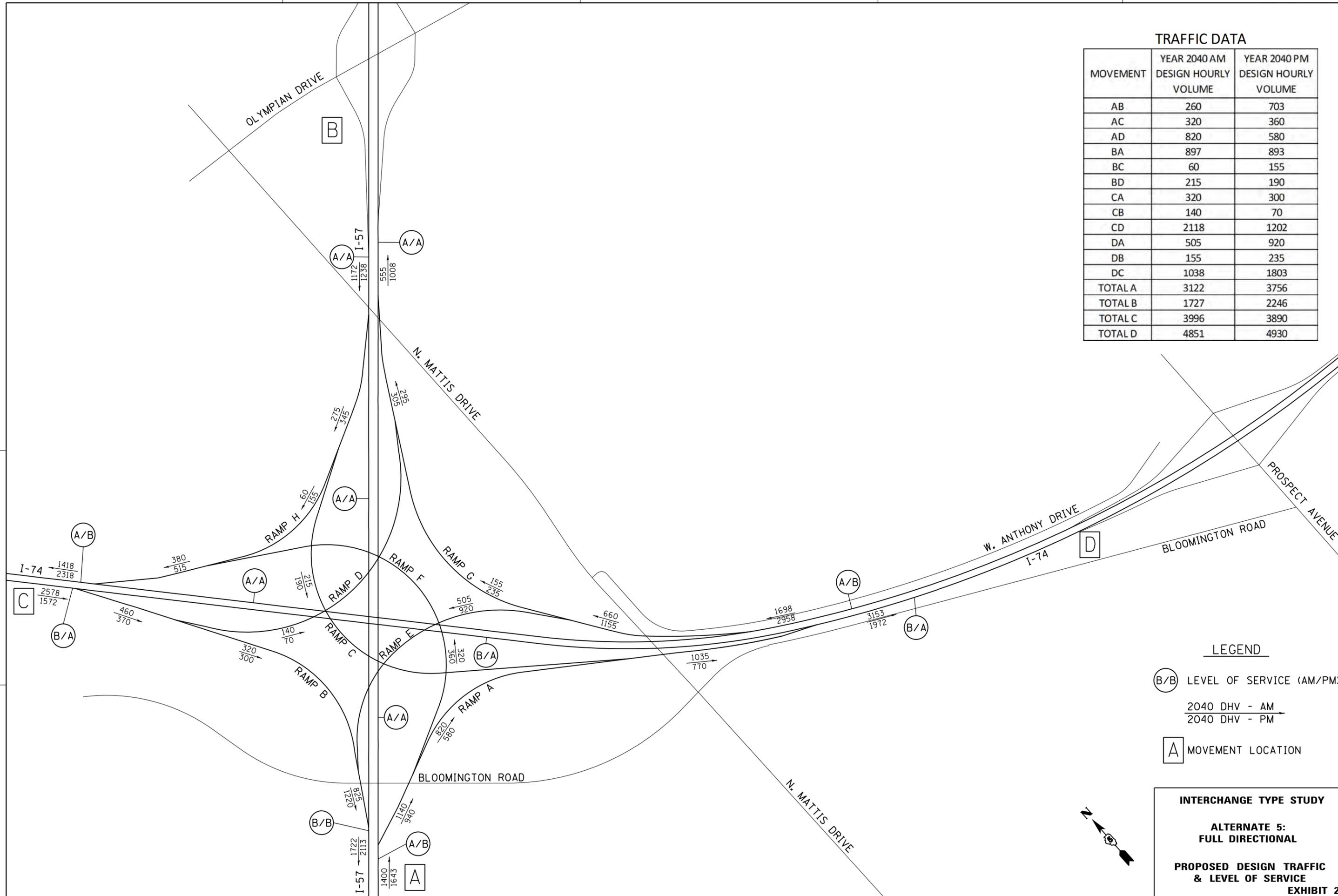
**PROPOSED DESIGN TRAFFIC  
 & LEVEL OF SERVICE**

**EXHIBIT 26**

PLOT DATE = 12/16/2013  
 FILE NAME = I:\PROJECTS\1106682\Draw\Exhibits\ITS Exhibit 27 Alternate 5 Traffic.dwg  
 PLOT SCALE = 800,0000 / in.  
 USER NAME = Brad Downen

TRAFFIC DATA

MOVEMENT	YEAR 2040 AM DESIGN HOURLY VOLUME	YEAR 2040 PM DESIGN HOURLY VOLUME
AB	260	703
AC	320	360
AD	820	580
BA	897	893
BC	60	155
BD	215	190
CA	320	300
CB	140	70
CD	2118	1202
DA	505	920
DB	155	235
DC	1038	1803
TOTAL A	3122	3756
TOTAL B	1727	2246
TOTAL C	3996	3890
TOTAL D	4851	4930



LEGEND

(B/B) LEVEL OF SERVICE (AM/PM)

2040 DHV - AM  
 2040 DHV - PM

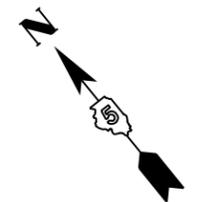
(A) MOVEMENT LOCATION

INTERCHANGE TYPE STUDY

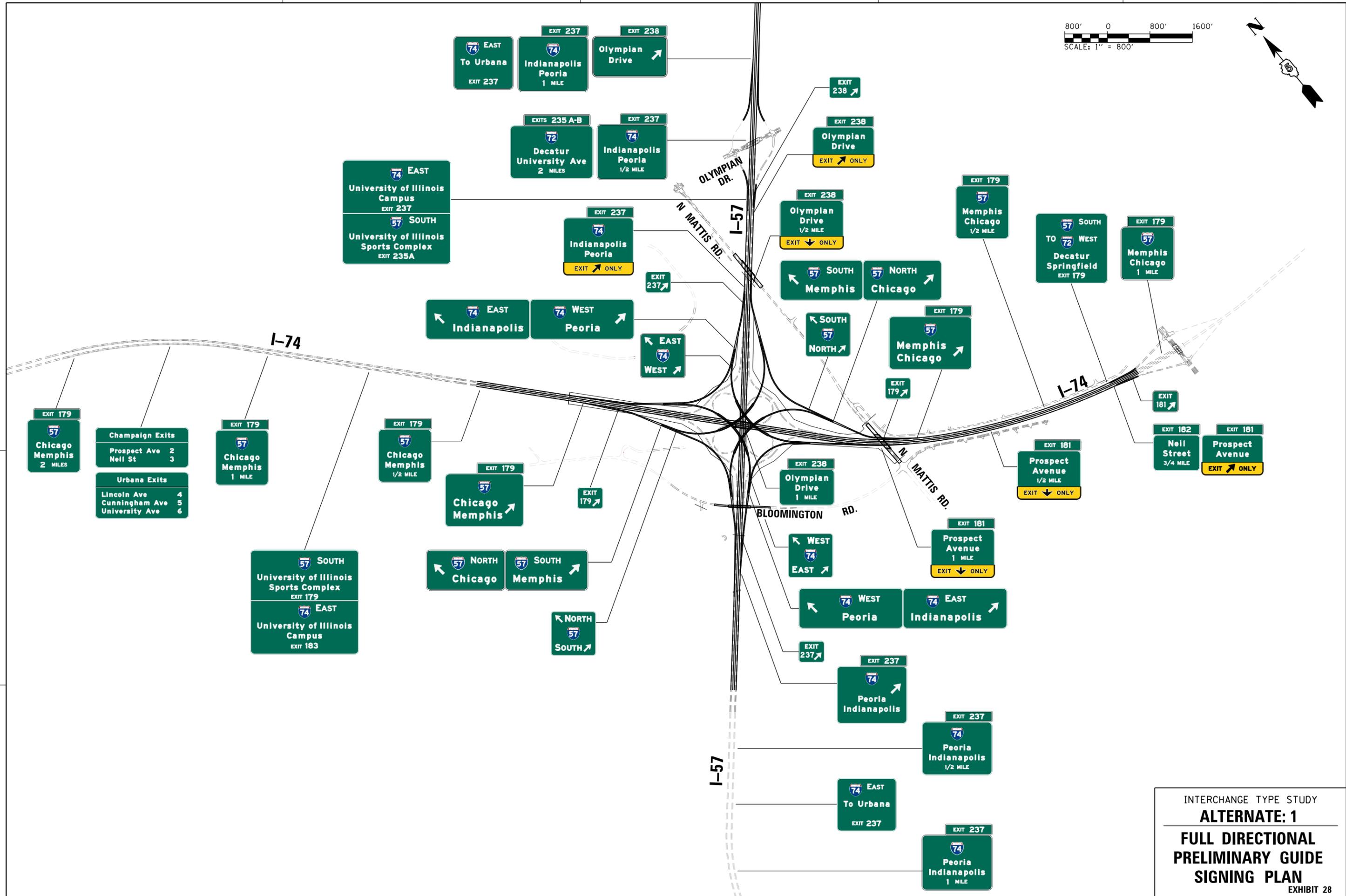
ALTERNATE 5:  
 FULL DIRECTIONAL

PROPOSED DESIGN TRAFFIC  
 & LEVEL OF SERVICE

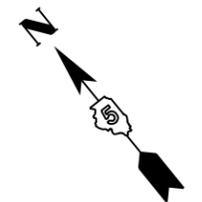
EXHIBIT 27



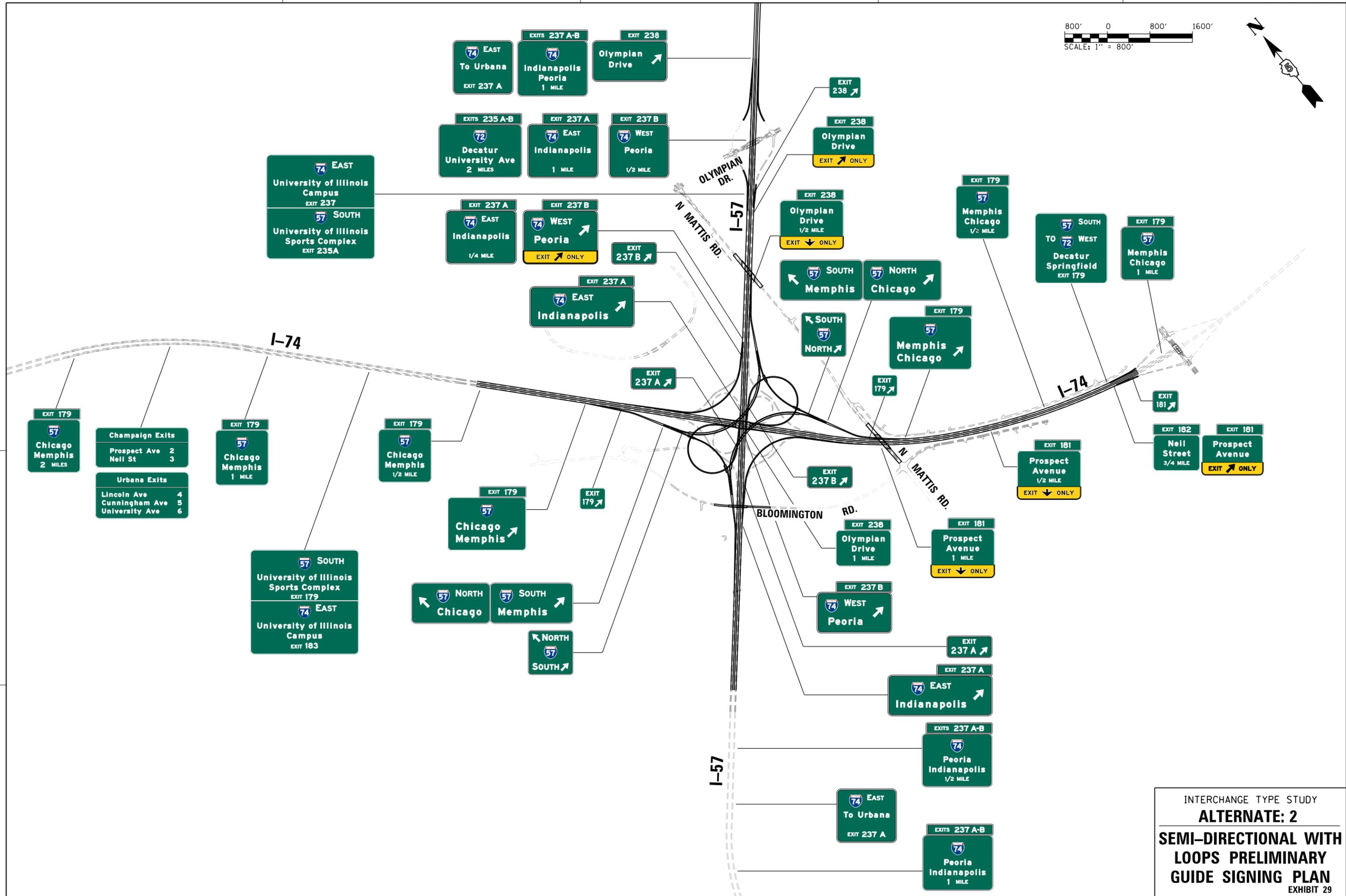
PLOT DATE = 12/16/2013  
 FILE NAME = I:\DOT\116692\Drawn\Exhibits\ITS Exhibit 28 Sign Exhibit E1B.dgn  
 PLOT SCALE = 1600/8000 / in.  
 USER NAME = Brad Downen



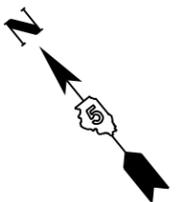
INTERCHANGE TYPE STUDY  
**ALTERNATE: 1**  
**FULL DIRECTIONAL**  
**PRELIMINARY GUIDE**  
**SIGNING PLAN**  
 EXHIBIT 28



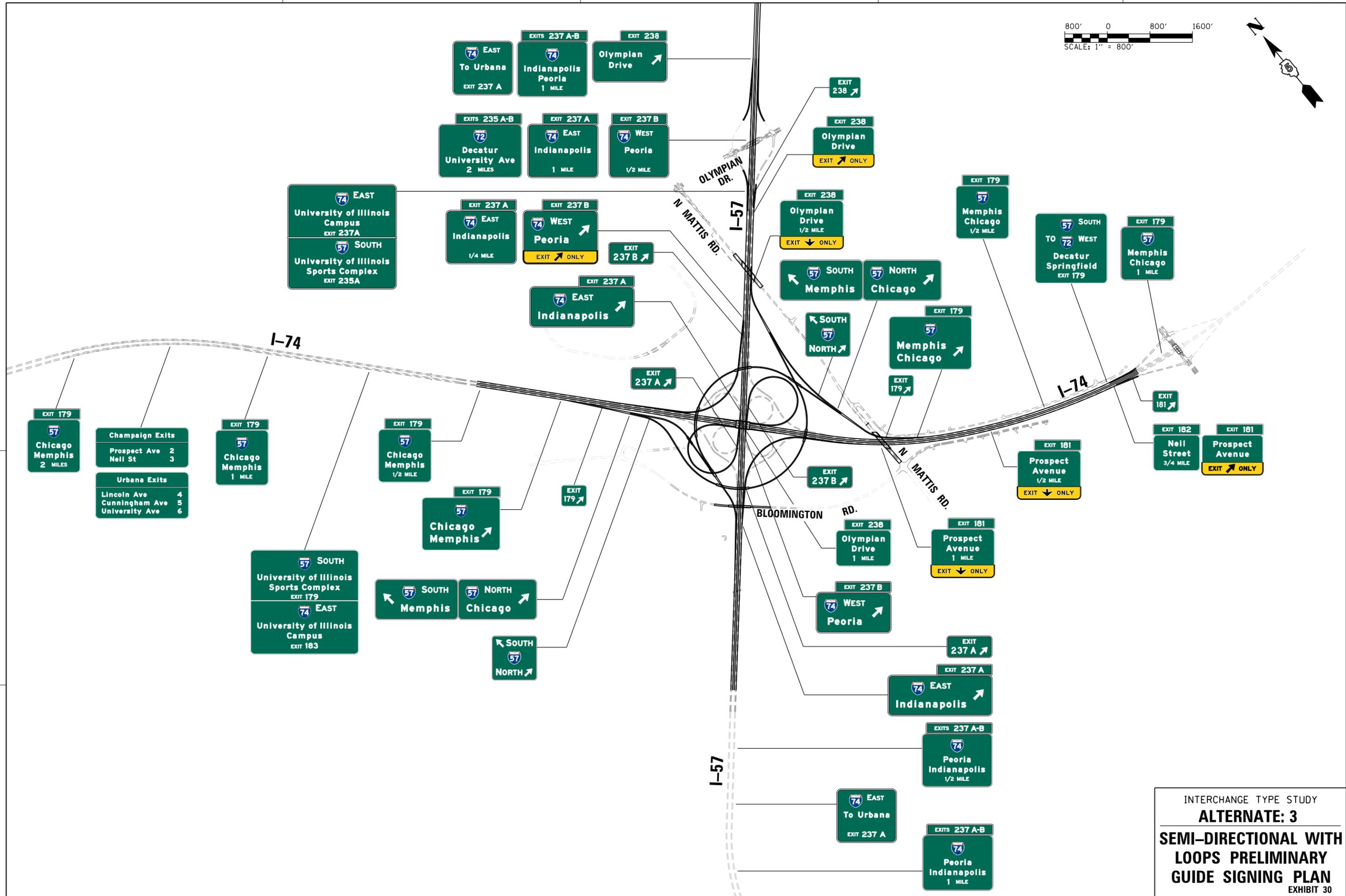
PLOT DATE = 12/16/2013  
 FILE NAME = I:\DOT\116692\Draw\Exhibits\ITS Exhibit 29 Sign Exhibit B3.dgn  
 PLOT SCALE = 1600/800 = 2 in.  
 USER NAME = Brad Downen



INTERCHANGE TYPE STUDY  
**ALTERNATE: 2**  
**SEMI-DIRECTIONAL WITH**  
**LOOPS PRELIMINARY**  
**GUIDE SIGNING PLAN**  
 EXHIBIT 29

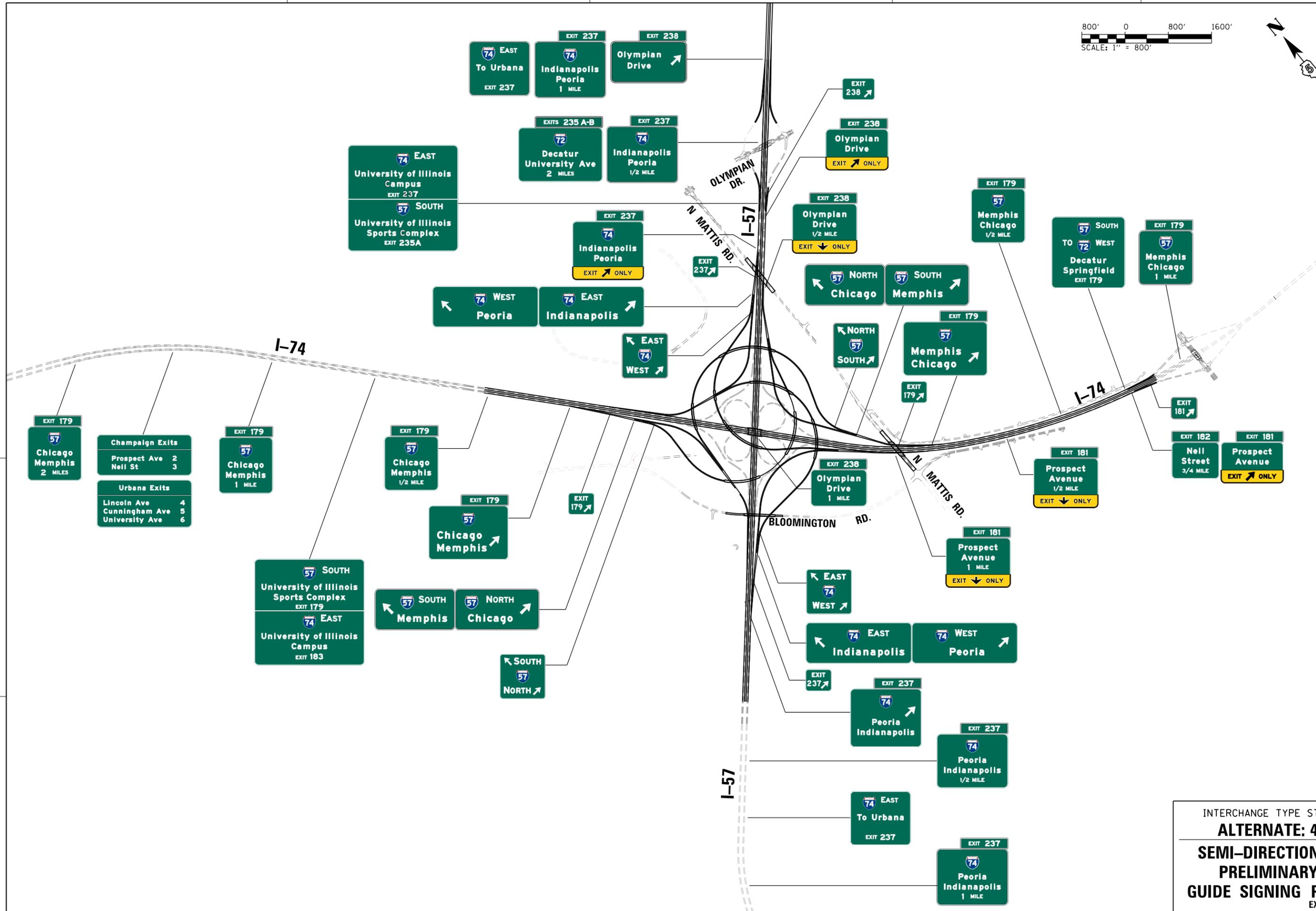
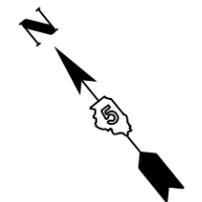


PLOT DATE = 12/16/2013  
 FILE NAME = I:\DOT\116692\Draw\Exhibits\ITS Exhibit 30 Sign Exhibit B2.dgn  
 PLOT SCALE = 1600/800 / in.  
 USER NAME = Brad Downen



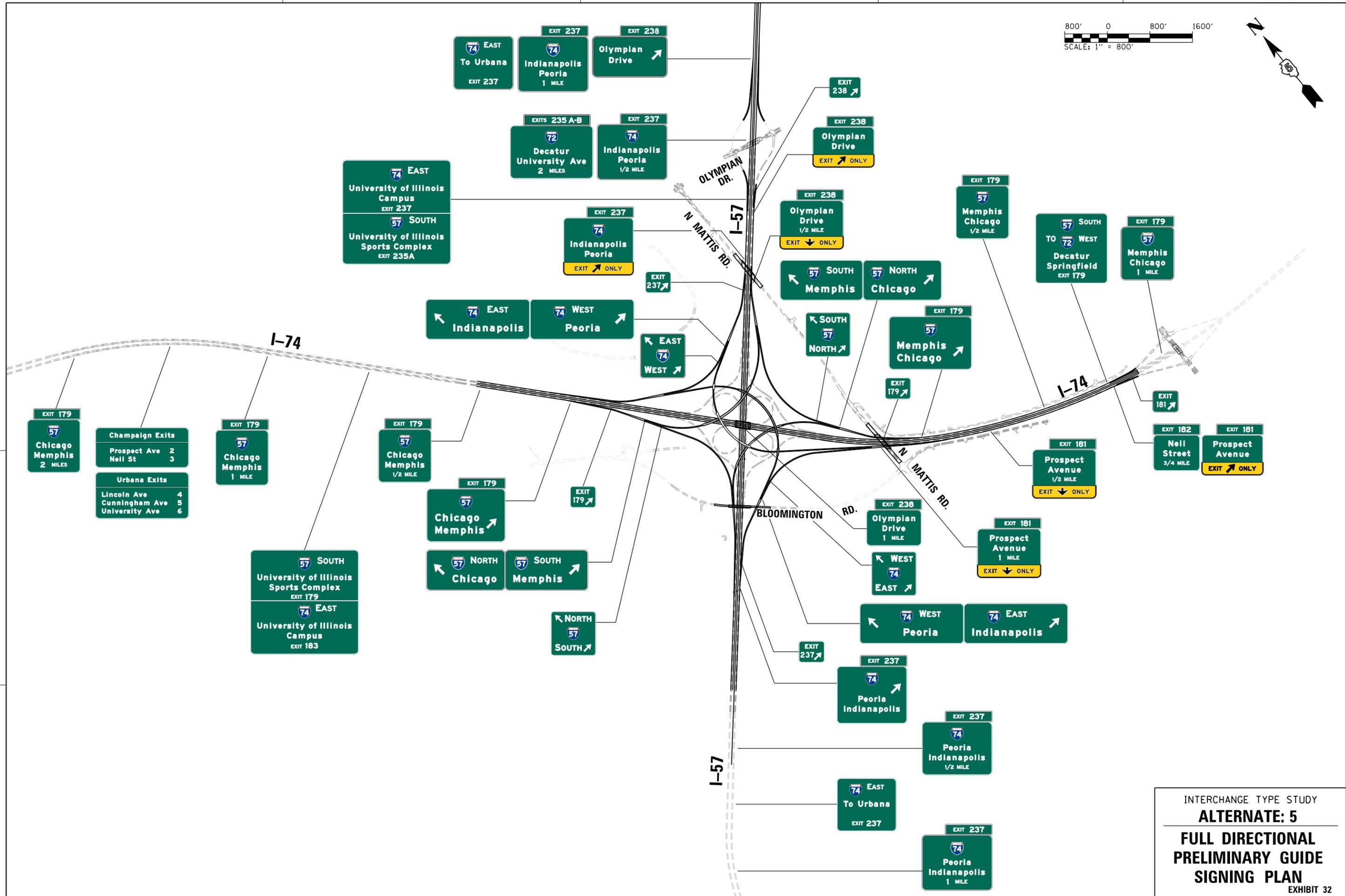
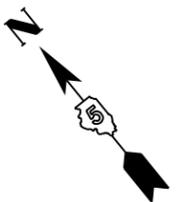
INTERCHANGE TYPE STUDY  
**ALTERNATE: 3**  
**SEMI-DIRECTIONAL WITH**  
**LOOPS PRELIMINARY**  
**GUIDE SIGNING PLAN**  
 EXHIBIT 30

PLOT DATE = 12/16/2013  
FILE NAME = I:\PROJECTS\116692\Drawn\Exhibits\ITS Exhibit 31 Sign Exhibit E2.dgn  
PLOT SCALE = 1600.0000 / 1 in.  
USER NAME = Brad Downen



INTERCHANGE TYPE STUDY  
**ALTERNATE: 4**  
**SEMI-DIRECTIONAL**  
**PRELIMINARY**  
**GUIDE SIGNING PLAN**  
EXHIBIT 31

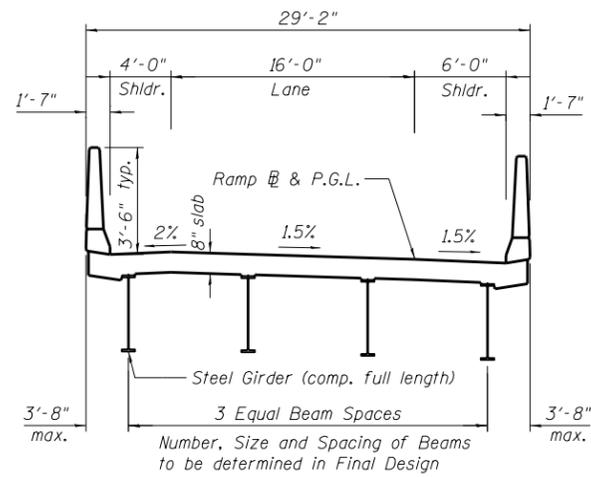
PLOT DATE = 12/16/2013  
FILE NAME = I:\DOT\116692\Draw\Exhibits\ITS Exhibit 32 Sign Exhibit Flgdr  
PLOT SCALE = 1600/8000 / in.  
USER NAME = Brad Downen



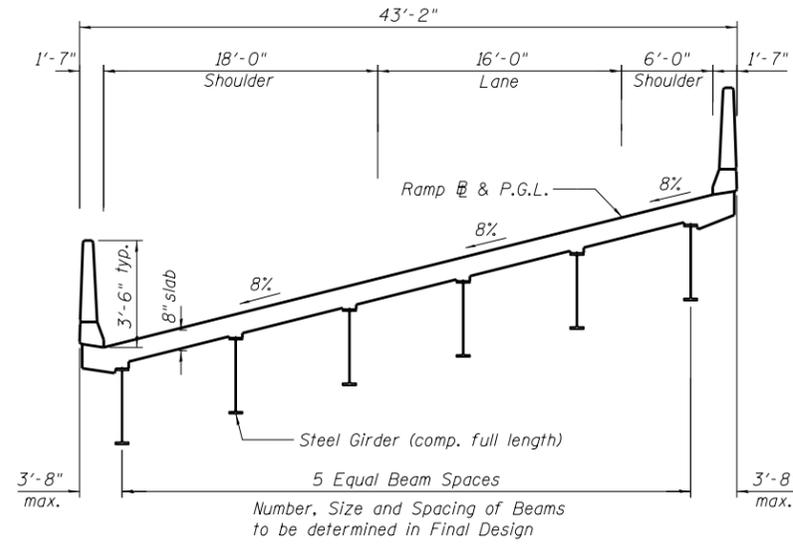
INTERCHANGE TYPE STUDY  
**ALTERNATE: 5**  
**FULL DIRECTIONAL  
PRELIMINARY GUIDE  
SIGNING PLAN**  
EXHIBIT 32



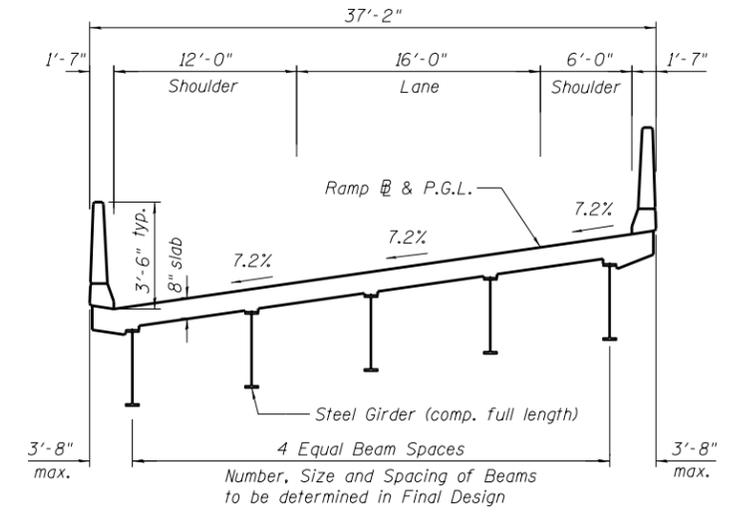
PLOT DATE = 12/16/2013  
 FILE NAME = I:\PROJECTS\1166802\Draws\Exhibits\ITS Exhibit 34\_Typical Structures.dgn  
 PLOT SCALE = 1/8" = 1'-0"  
 USER NAME = Brad Downen



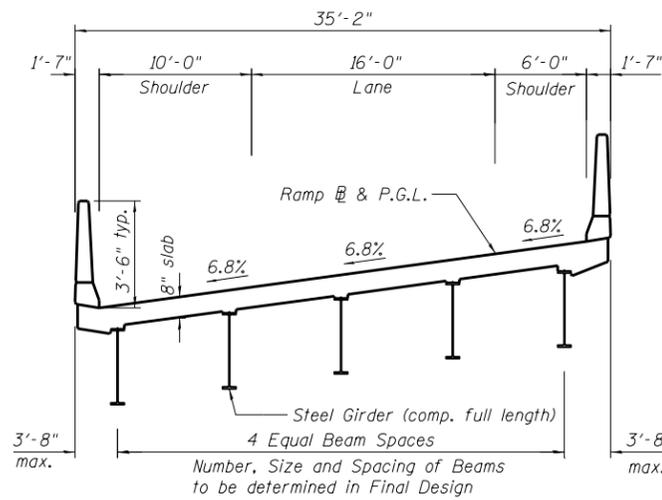
**TYPICAL RAMP BRIDGE (ON TANGENT)**  
 (Looking Upstation)



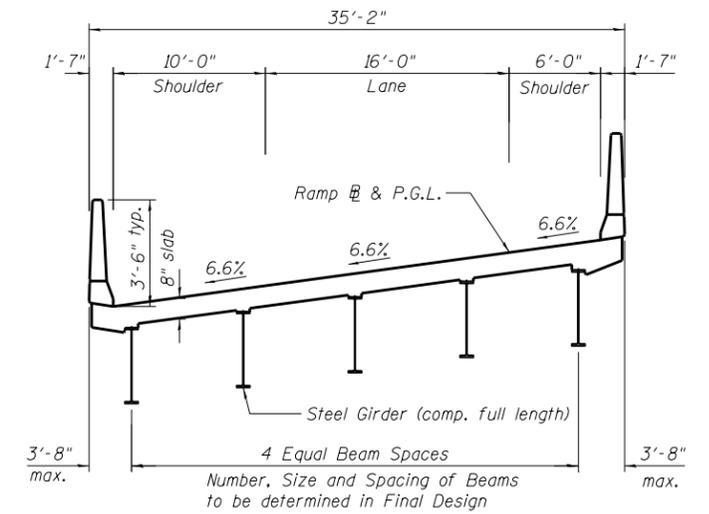
**TYPICAL RAMP BRIDGE (890' RADIUS)**  
 (Looking Upstation)



**TYPICAL RAMP BRIDGE (1125' RADIUS)**  
 (Looking Upstation)



**TYPICAL RAMP BRIDGE (1250' RADIUS)**  
 (Looking Upstation)



**TYPICAL RAMP BRIDGE (1270' RADIUS)**  
 (Looking Upstation)

INTERCHANGE TYPE STUDY

STRUCTURE  
 TYPICAL SECTIONS

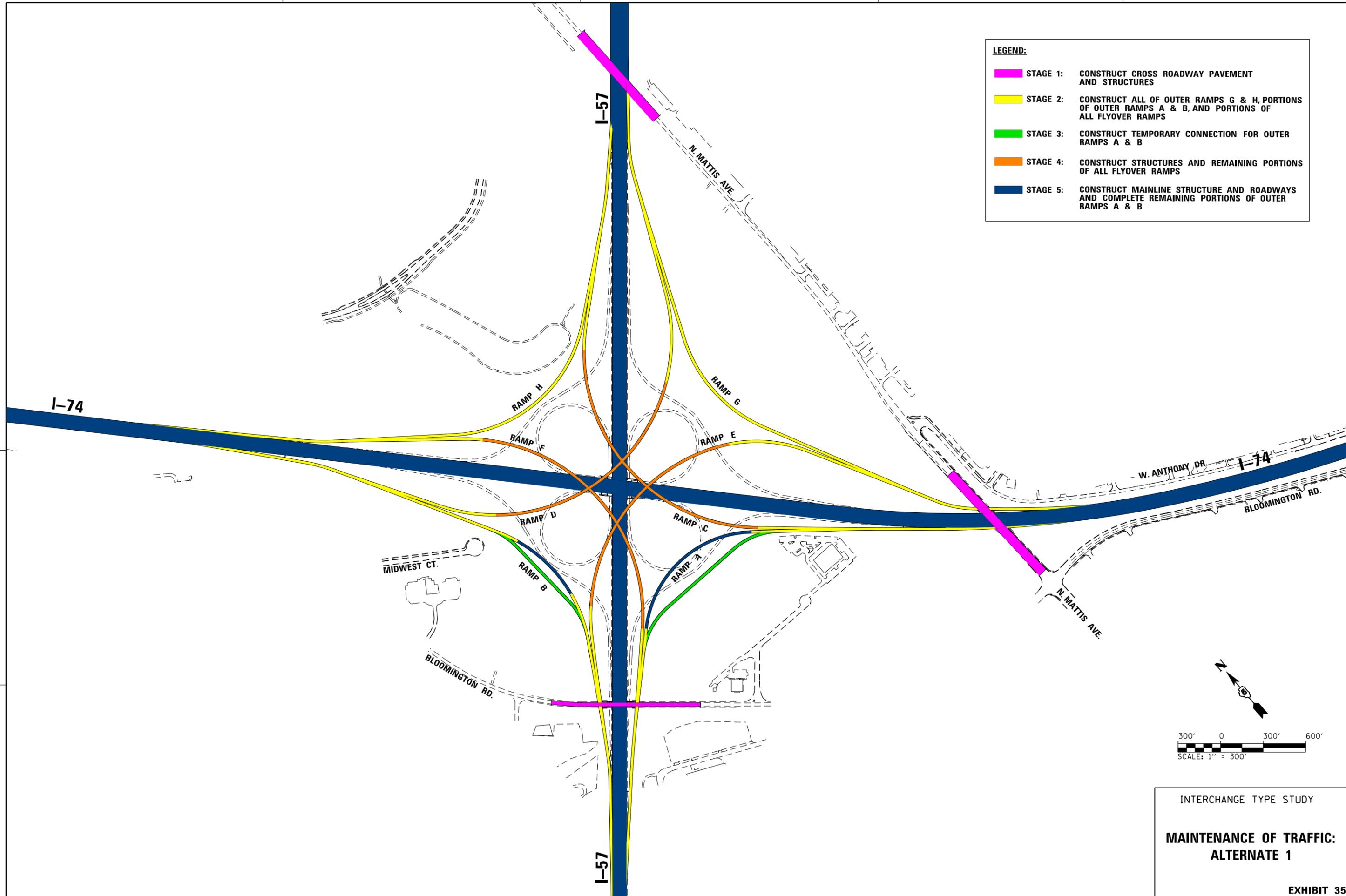
RAMPS

EXHIBIT 34

BDE-9908

PLOT DATE = 12/19/2013  
FILE NAME = I:\PROJECTS\1186602\Drawn\Exhibits\ITS Exhibit 35 Alt 1.MOT.dgn  
PLOT SCALE = 600.0000 / in.  
USER NAME = bbsvmen

LEGEND:	
	STAGE 1: CONSTRUCT CROSS ROADWAY PAVEMENT AND STRUCTURES
	STAGE 2: CONSTRUCT ALL OF OUTER RAMPS G & H, PORTIONS OF OUTER RAMPS A & B, AND PORTIONS OF ALL FLYOVER RAMPS
	STAGE 3: CONSTRUCT TEMPORARY CONNECTION FOR OUTER RAMPS A & B
	STAGE 4: CONSTRUCT STRUCTURES AND REMAINING PORTIONS OF ALL FLYOVER RAMPS
	STAGE 5: CONSTRUCT MAINLINE STRUCTURE AND ROADWAYS AND COMPLETE REMAINING PORTIONS OF OUTER RAMPS A & B

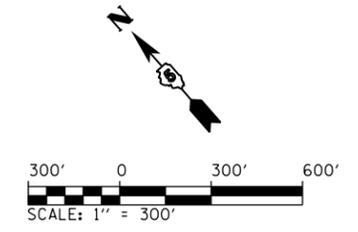
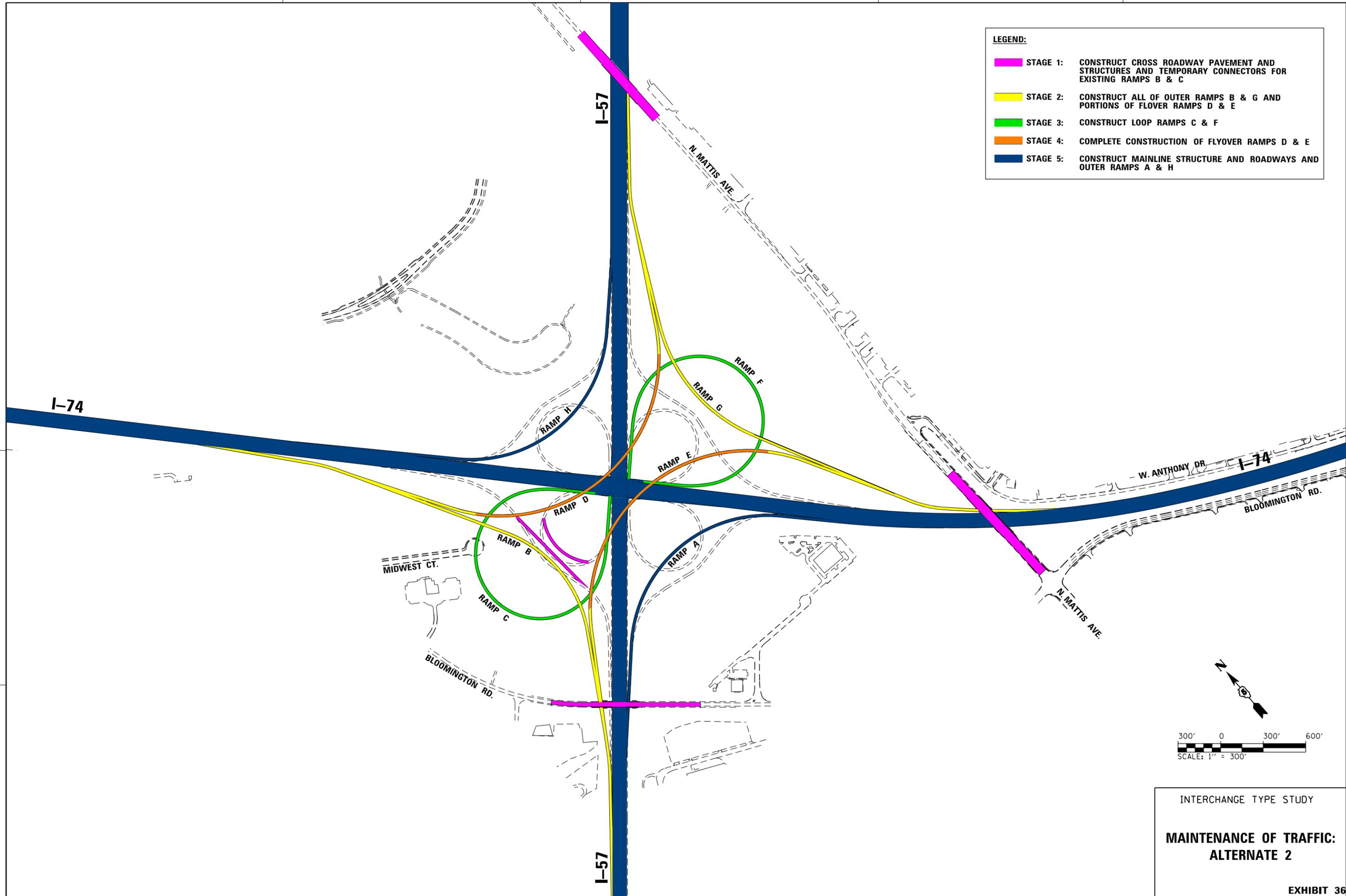


INTERCHANGE TYPE STUDY  
**MAINTENANCE OF TRAFFIC:  
ALTERNATE 1**

PLOT DATE = 12/19/2013  
FILE NAME = I:\PROJECTS\1186602\Draw\Exhibits\ITS Exhibit 36 Alt 2 MOT.dgn  
PLOT SCALE = 600.0000 / in.  
USER NAME = bbsm

**LEGEND:**

	STAGE 1: CONSTRUCT CROSS ROADWAY PAVEMENT AND STRUCTURES AND TEMPORARY CONNECTORS FOR EXISTING RAMPS B & C
	STAGE 2: CONSTRUCT ALL OF OUTER RAMPS B & G AND PORTIONS OF FLYOVER RAMPS D & E
	STAGE 3: CONSTRUCT LOOP RAMPS C & F
	STAGE 4: COMPLETE CONSTRUCTION OF FLYOVER RAMPS D & E
	STAGE 5: CONSTRUCT MAINLINE STRUCTURE AND ROADWAYS AND OUTER RAMPS A & H

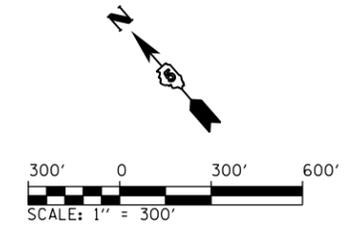
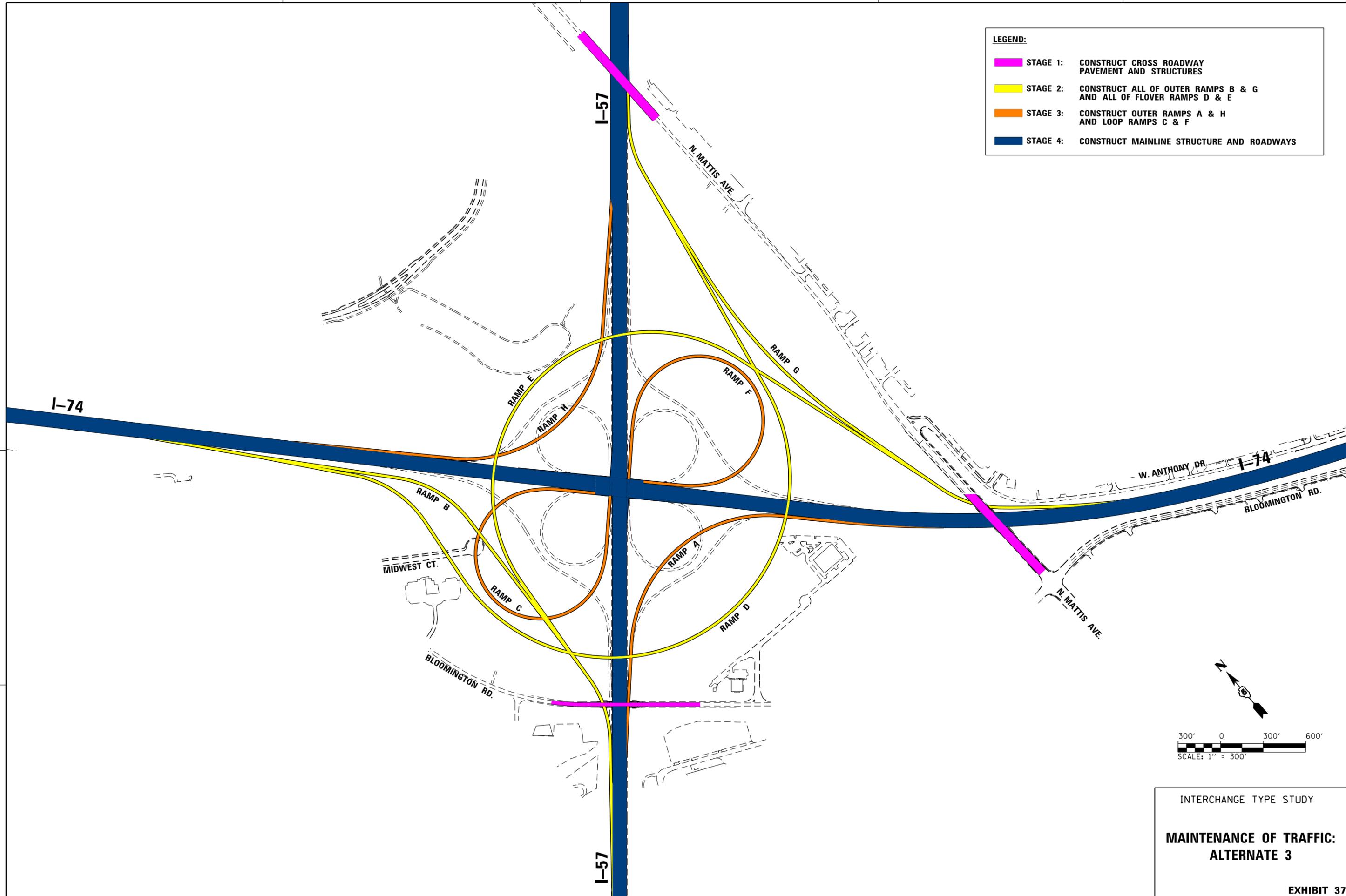


INTERCHANGE TYPE STUDY

**MAINTENANCE OF TRAFFIC:  
ALTERNATE 2**

PLOT DATE = 12/19/2013  
FILE NAME = I:\PROJECTS\1186602\Drawings\Exhibits\ITS Exhibit 37 Alt 3 MDT.dgn  
PLOT SCALE = 600.0000 / in.  
USER NAME = bbsm

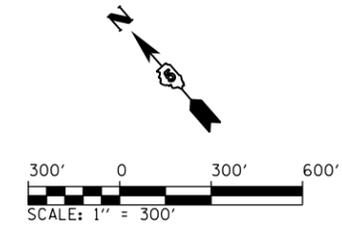
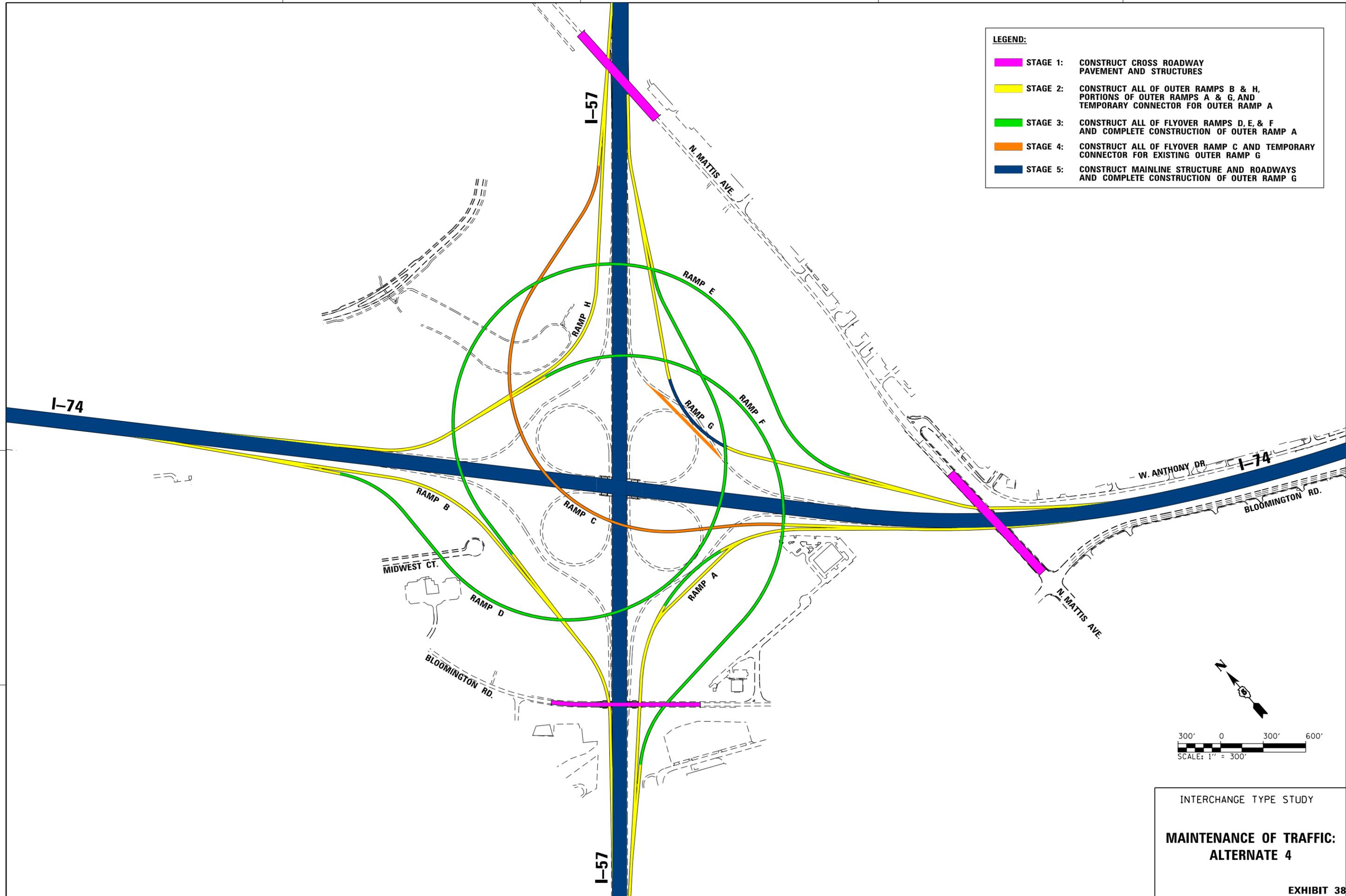
LEGEND:	
	STAGE 1: CONSTRUCT CROSS ROADWAY PAVEMENT AND STRUCTURES
	STAGE 2: CONSTRUCT ALL OF OUTER RAMPS B & G AND ALL OF FLOVER RAMPS D & E
	STAGE 3: CONSTRUCT OUTER RAMPS A & H AND LOOP RAMPS C & F
	STAGE 4: CONSTRUCT MAINLINE STRUCTURE AND ROADWAYS



INTERCHANGE TYPE STUDY  
**MAINTENANCE OF TRAFFIC:  
ALTERNATE 3**

PLOT DATE = 12/19/2013  
FILE NAME = I:\PROJECTS\1186602\Draw\Exhibits\ITS Exhibit 38 Alt 4 MDT.dgn  
PLOT SCALE = 600,0000 / in.  
USER NAME = Brad Downen

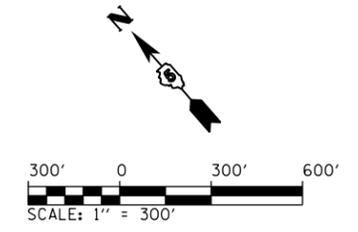
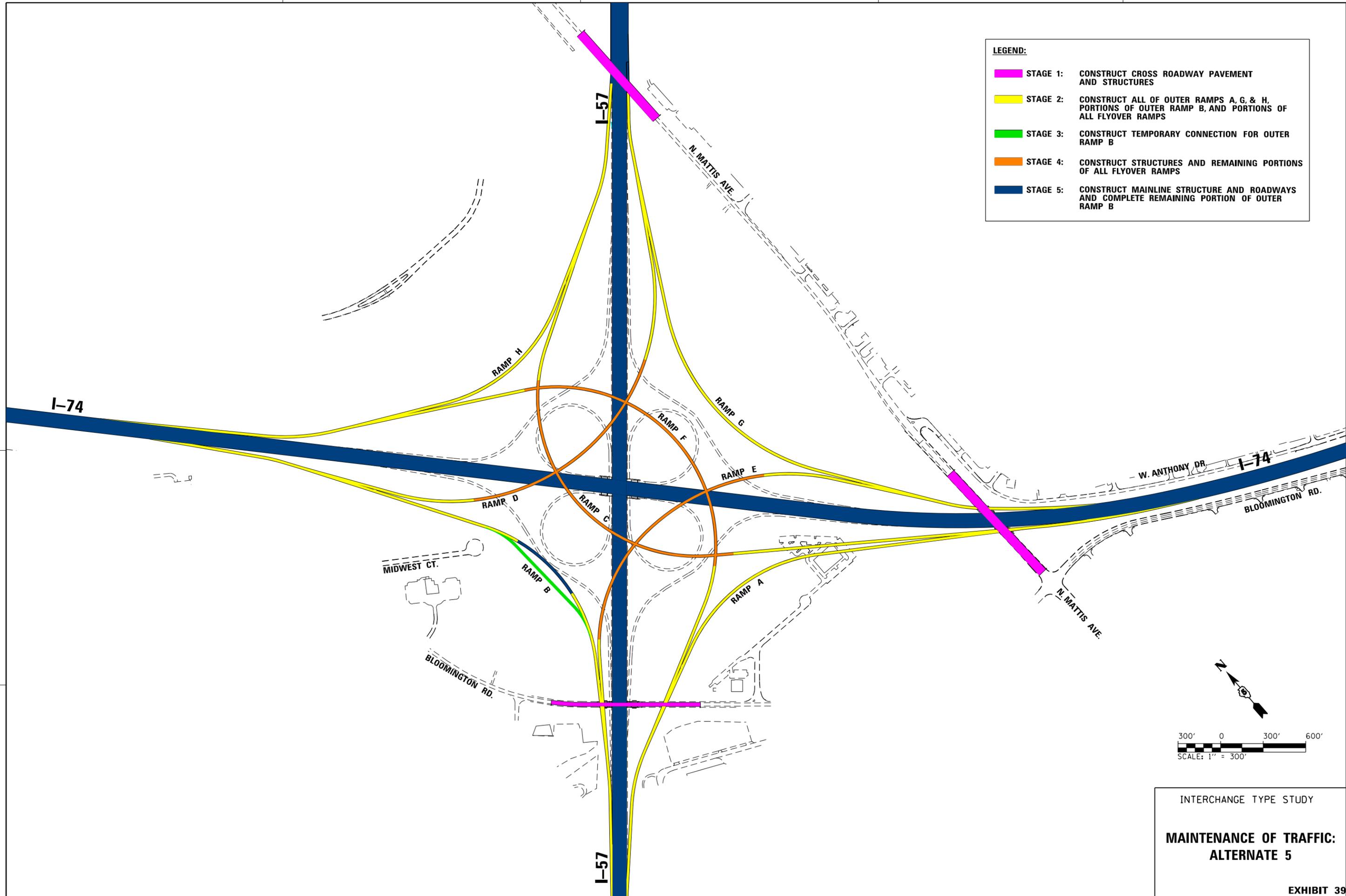
LEGEND:	
	STAGE 1: CONSTRUCT CROSS ROADWAY PAVEMENT AND STRUCTURES
	STAGE 2: CONSTRUCT ALL OF OUTER RAMPS B & H, PORTIONS OF OUTER RAMPS A & G, AND TEMPORARY CONNECTOR FOR OUTER RAMP A
	STAGE 3: CONSTRUCT ALL OF FLYOVER RAMPS D, E, & F AND COMPLETE CONSTRUCTION OF OUTER RAMP A
	STAGE 4: CONSTRUCT ALL OF FLYOVER RAMP C AND TEMPORARY CONNECTOR FOR EXISTING OUTER RAMP G
	STAGE 5: CONSTRUCT MAINLINE STRUCTURE AND ROADWAYS AND COMPLETE CONSTRUCTION OF OUTER RAMP G



INTERCHANGE TYPE STUDY  
**MAINTENANCE OF TRAFFIC:  
ALTERNATE 4**

PLOT DATE = 12/19/2013  
FILE NAME = I:\PROJECTS\1186602\Draws\Exhibits\ITS Exhibit 39 Alt 5 MDT.dgn  
PLOT SCALE = 600,0000 / in.  
USER NAME = Brad Downen

LEGEND:	
	STAGE 1: CONSTRUCT CROSS ROADWAY PAVEMENT AND STRUCTURES
	STAGE 2: CONSTRUCT ALL OF OUTER RAMPS A, G, & H, PORTIONS OF OUTER RAMP B, AND PORTIONS OF ALL FLYOVER RAMPS
	STAGE 3: CONSTRUCT TEMPORARY CONNECTION FOR OUTER RAMP B
	STAGE 4: CONSTRUCT STRUCTURES AND REMAINING PORTIONS OF ALL FLYOVER RAMPS
	STAGE 5: CONSTRUCT MAINLINE STRUCTURE AND ROADWAYS AND COMPLETE REMAINING PORTION OF OUTER RAMP B

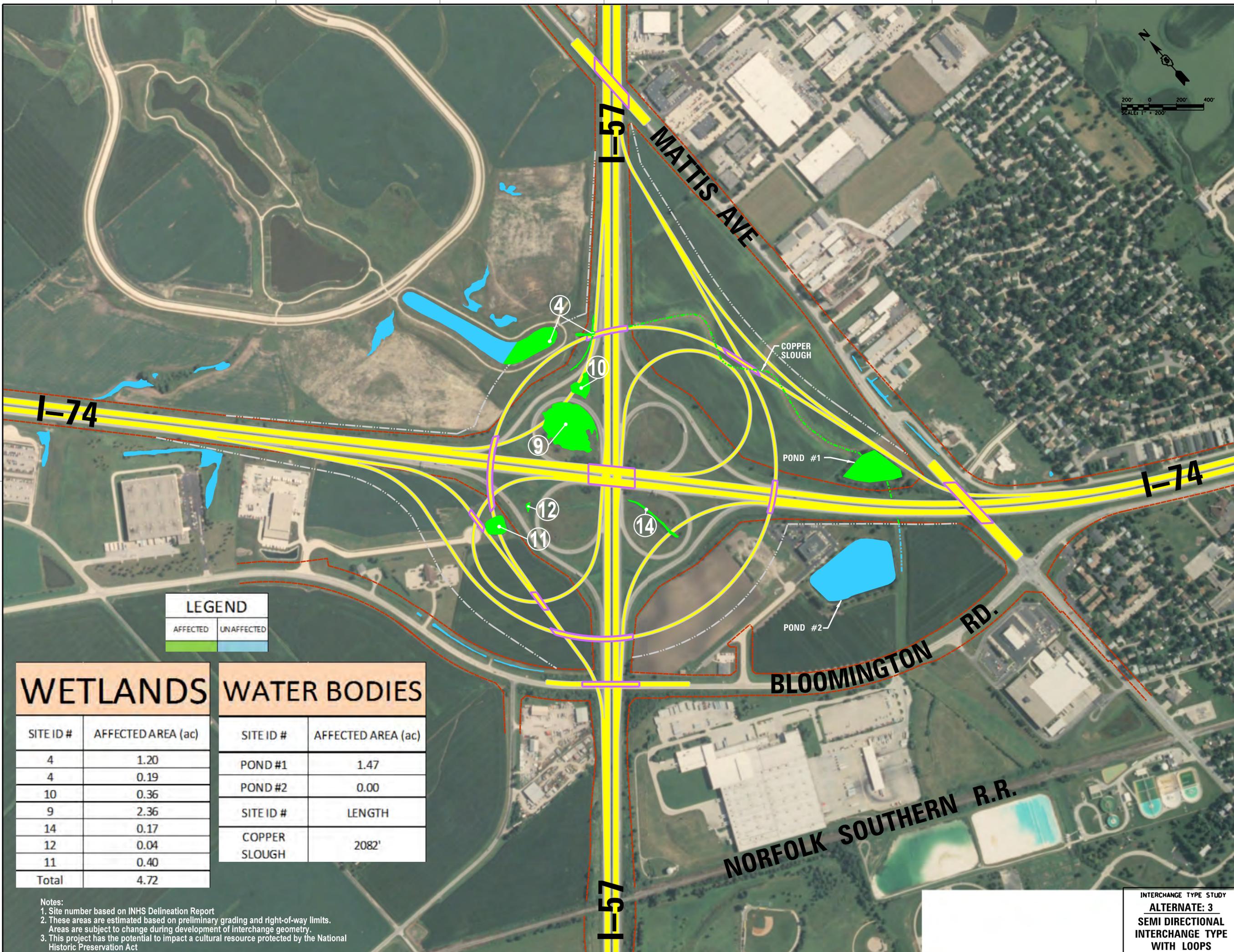
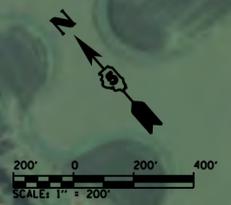


INTERCHANGE TYPE STUDY  
**MAINTENANCE OF TRAFFIC:  
ALTERNATE 5**





PROJECT: I-74 Interchange Study  
 DATE: 10/20/2011  
 SCALE: 1" = 200'  
 SHEET: 11 OF 11



LEGEND	
AFFECTED	UNAFFECTED
<span style="background-color: #00FF00; width: 15px; height: 10px; display: inline-block;"></span>	<span style="background-color: #ADD8E6; width: 15px; height: 10px; display: inline-block;"></span>

### WETLANDS

SITE ID #	AFFECTED AREA (ac)
4	1.20
4	0.19
10	0.36
9	2.36
14	0.17
12	0.04
11	0.40
<b>Total</b>	<b>4.72</b>

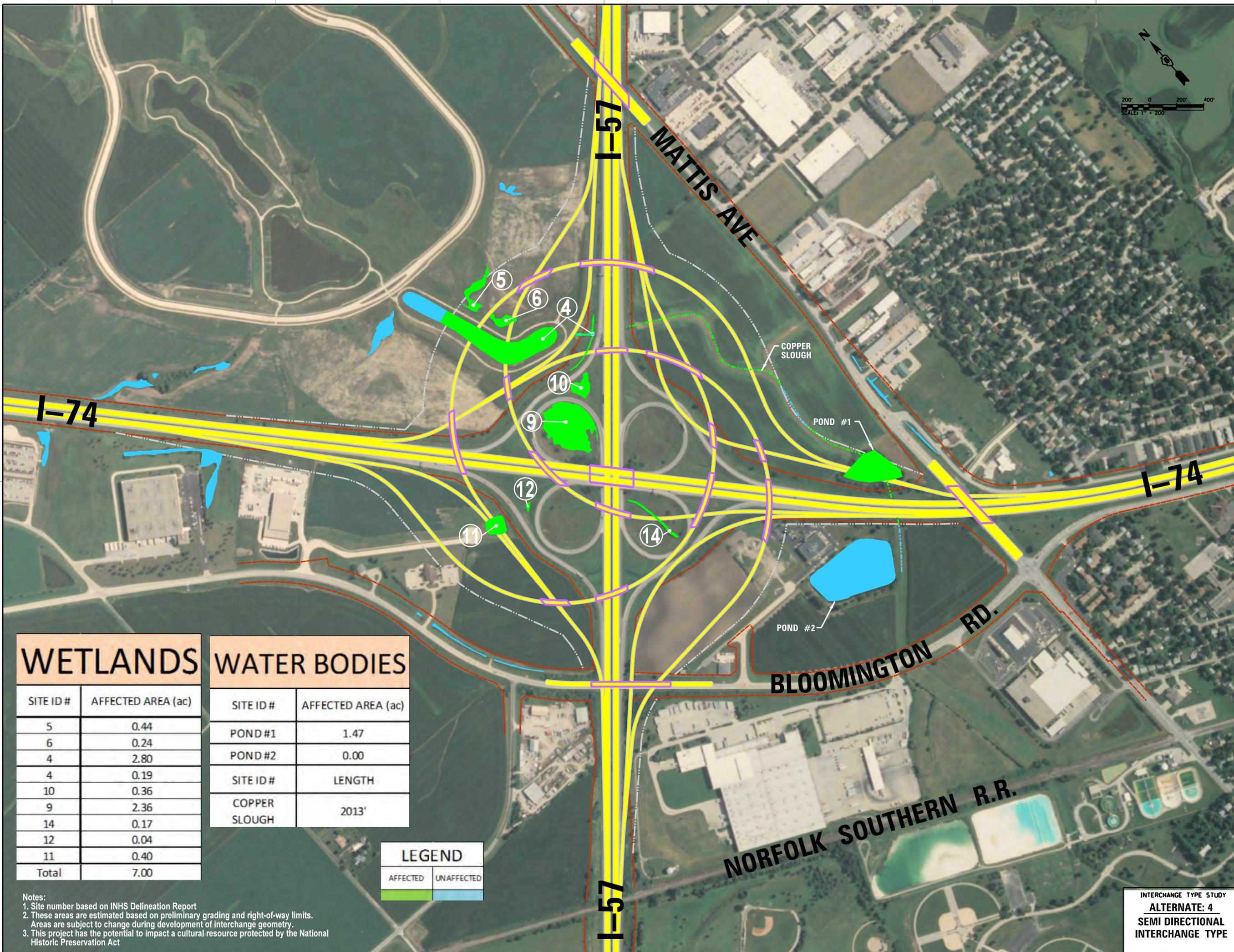
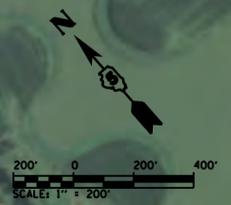
### WATER BODIES

SITE ID #	AFFECTED AREA (ac)
POND #1	1.47
POND #2	0.00
SITE ID #	LENGTH
COPPER SLOUGH	2082'

**Notes:**  
 1. Site number based on INHS Delineation Report  
 2. These areas are estimated based on preliminary grading and right-of-way limits. Areas are subject to change during development of interchange geometry.  
 3. This project has the potential to impact a cultural resource protected by the National Historic Preservation Act

INTERCHANGE TYPE STUDY  
**ALTERNATE: 3**  
 SEMI DIRECTIONAL  
 INTERCHANGE TYPE  
 WITH LOOPS

PROJECT DATE: 2/14/2018  
 PROJECT NAME: I-74 Interchange Upgrade  
 PROJECT LOCATION: I-74 Interchange Upgrade  
 PROJECT SCALE: 1" = 400'  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]



### WETLANDS

SITE ID #	AFFECTED AREA (ac)
5	0.44
6	0.24
4	2.80
4	0.19
10	0.36
9	2.36
14	0.17
12	0.04
11	0.40
<b>Total</b>	<b>7.00</b>

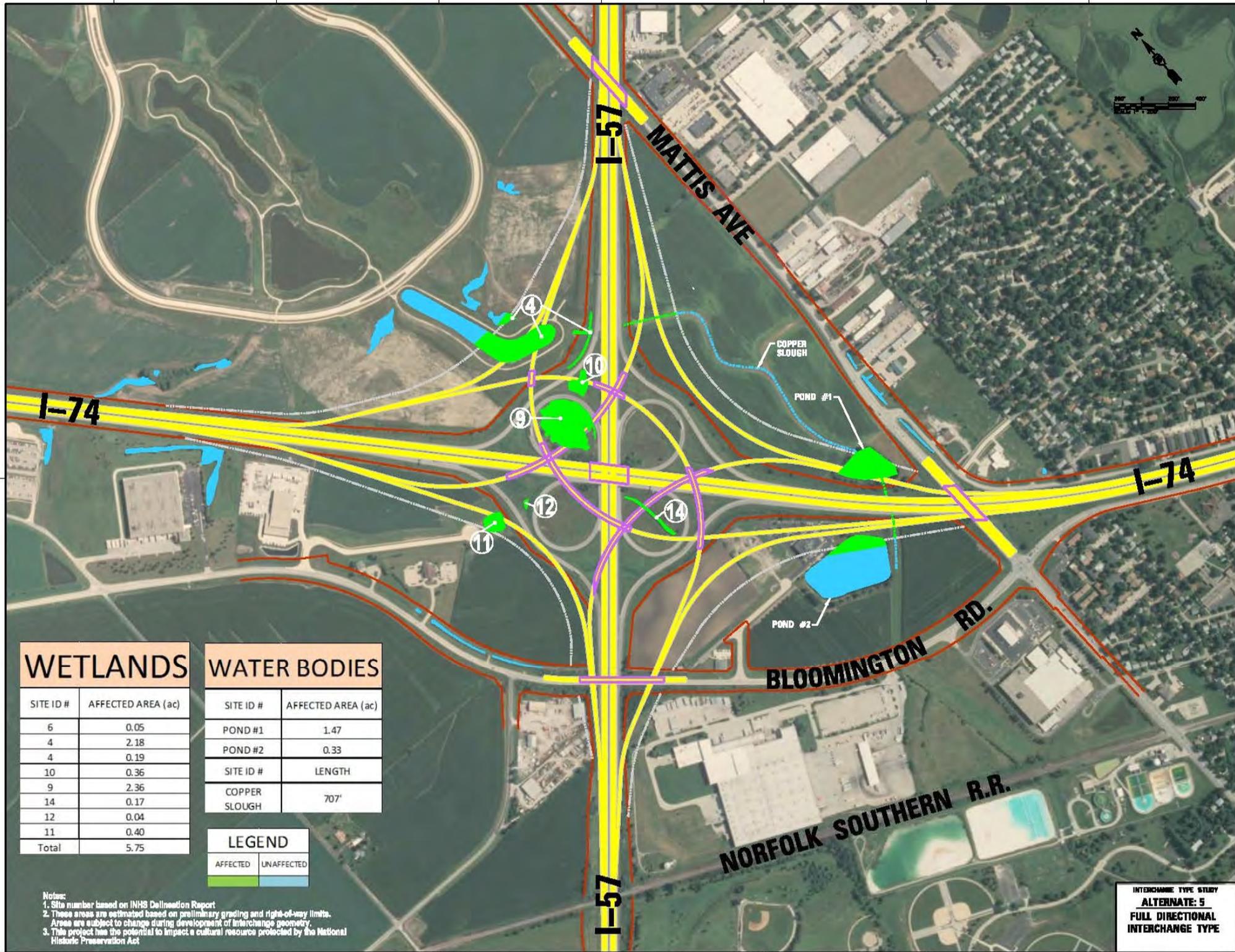
### WATER BODIES

SITE ID #	AFFECTED AREA (ac)
POND #1	1.47
POND #2	0.00
SITE ID #	LENGTH
COPPER SLOUGH	2013'



**Notes:**  
 1. Site number based on INHS Delineation Report  
 2. These areas are estimated based on preliminary grading and right-of-way limits. Areas are subject to change during development of interchange geometry.  
 3. This project has the potential to impact a cultural resource protected by the National Historic Preservation Act

INTERCHANGE TYPE STUDY  
**ALTERNATE: 4**  
 SEMI DIRECTIONAL  
 INTERCHANGE TYPE



### WETLANDS

SITE ID #	AFFECTED AREA (ac)
6	0.05
4	2.18
4	0.19
10	0.36
9	2.36
14	0.17
12	0.04
11	0.40
<b>Total</b>	<b>5.75</b>

### WATER BODIES

SITE ID #	AFFECTED AREA (ac)
POND #1	1.47
POND #2	0.33
SITE ID #	LENGTH
COPPER SLOUGH	707'

### LEGEND

<span style="background-color: #90EE90; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> AFFECTED	<span style="background-color: #ADD8E6; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> UNAFFECTED
--------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------

Notes:  
 1. Site number based on INHS Delineation Report  
 2. These areas are estimated based on preliminary grading and right-of-way limits. Areas are subject to change during development of interchange geometry.  
 3. This project has the potential to impact a cultural resource protected by the National Historic Preservation Act

INTERCHANGE TYPE STUDY  
**ALTERNATE: 5**  
**FULL DIRECTIONAL**  
**INTERCHANGE TYPE**