Exhibit 4E: Tribal Coordination

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Outlook

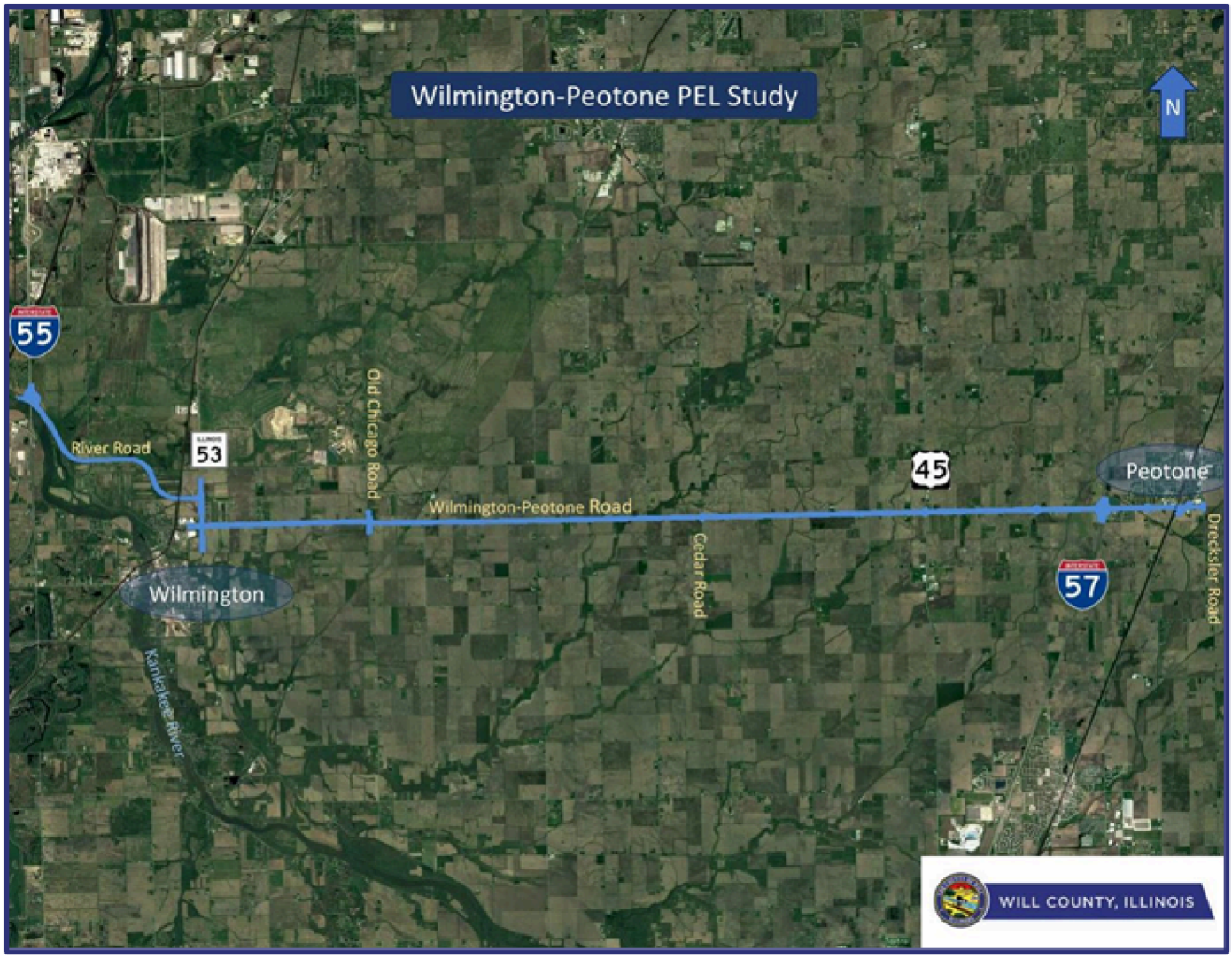
Wilmington-Peotone Planning Environmental Linkages (PEL) Study: Ho-Chunk Nation Invitation for Section 106 Consulting Party Status

From Leska, Katherine (Katie) <kleska@burnsmcd.com>
Date Thu 1/16/2025 1:20 PM
To Bill.Quackenbush@Ho-Chunk.com <Bill.Quackenbush@Ho-Chunk.com>
Cc Christina Kupkowski <ckupkowski@willcountyillinois.com>; James, Desiree L <djames2@burnsmcd.com>

1 attachment (3 MB)
23-00116-15-ES_TribalCorresp_Letter_Ho-Chunk Nation.pdf;

Dear William Quackenbush:

My name is Katie Leska, the consultant project manager, and I am reaching out on behalf of the Will County Division of Transportation regarding the Wilmington-Peotone PEL Study requesting your input on the project. As a first step in engaging in this process, we are providing for your review the project's Purpose and Need statement and Alternatives to be Carried Forward. The study area spans from Wilmington to Peotone in the southwest part of the county. Additional PEL study materials are readily available on the project website, www.wilmingtonpeotonestudy.com. The study area covers 4 miles of River Road from I-55 to IL Route 53, 0.6 miles of IL Route 53 from River Road to Wilmington-Peotone Road, and 17.4 miles of Wilmington-Peotone Road from IL Route 53 to Drecksler Road for a total of approximately 22 miles.



Additional information regarding the project and this request can be found in the attached letter and the links below. Please let me know if paper copies are preferred and we will get this information to you as soon as possible.

Purpose and Need Statment

Concept Evaluation

We appreciate your input and interest in this project.

Sincerely,
Katie Leska

Katie Leska, PE | BURNS McDONNELL
Project Manager
O 847-466-4522
C 847-370-3367
kleska@burnsmcd.com
Pronouns: She/her/hers

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WILL COUNTY ILLINOIS
DIVISION OF TRANSPORTATION

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WILL COUNTY EXECUTIVE

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Division of Transportation
16841 W. Laraway Road
Joliet, IL 60433

January 16, 2025

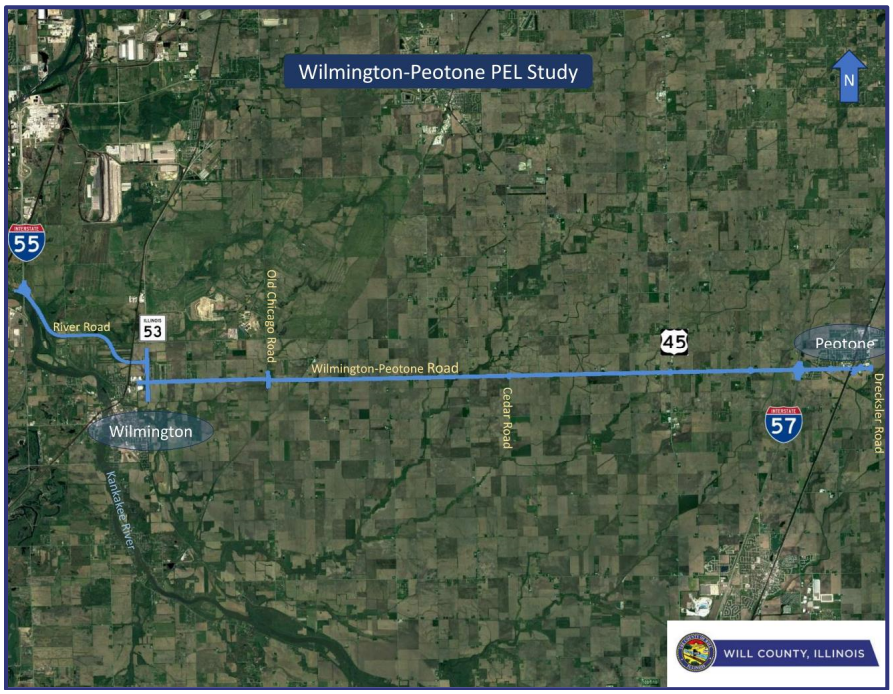
[CONTACT NAME]
Tribal Historic Preservation Officer
[TRIBE NAME]
[MAILING ADDRESS]

Subject: Wilmington-Peotone Planning Environmental Linkages (PEL) Study: Invitation for Section 106 Consulting Party Status

Dear [CONTACT NAME] :

This letter is to request [TRIBE NAME] Tribal participation in the Will County Division of Transportation's (WCDOT) Wilmington-Peotone Planning and Environmental Linkages Study (PEL). WCDOT, in cooperation with the Federal Highway Administration (FHWA) and Illinois Department of Transportation (IDOT), is leading the study and it is our intent that your Tribe is given the opportunity to coordinate with the project.

As a first step in engaging in this process, we are providing for your review the project's Purpose and Need statement and Alternatives to be Carried Forward. The study area spans from Wilmington to Peotone in the southwest part of the county. Additional PEL study materials are readily available on the project website, www.wilmingtonpeotonestudy.com. The study area covers 4 miles of River Road from I-55 to IL Route 53, 0.6 miles of IL Route 53 from River Road to Wilmington-Peotone Road, and 17.4 miles of Wilmington-Peotone Road from IL Route 53 to Drecksler Road for a total of approximately 22 miles. The area contains a variety of environmentally sensitive resources, including the Kankakee River and Midewin National Prairie Tall Grassland, and wetlands.



What is a PEL?

PEL studies are a collaborative and integrated approach to transportation decision-making that 1) considers environmental, community, and economic goals early in the transportation planning process, and 2) uses the information, analysis, and products developed during planning to inform the environmental review process. Upon conclusion of the study, WCDOT intends to carry forward the decisions made into the National Environmental Policy Act (NEPA) decision-making process. Additional coordination with your Tribe will occur throughout the NEPA process.

Study Information

The Wilmington-Peotone corridor has seen an increased rate of crashes compared to the state and county averages. Commercial and industrial development growth is occurring rapidly across Will County as evidenced by new freight clusters along the Wilmington-Peotone corridor that are challenging the roadway infrastructure. Multimodal accommodations are minimal with recreational trails present but no safe connections directly along the Wilmington-Peotone corridor. For roadway users, the number of east-west connectors throughout the County are limited and the increase in distribution and logistics centers throughout the area has only increased the need for access between I-55 and I-57. The study was initiated to examine the existing conditions, determine the cause for the safety and traffic concerns, and develop concepts to address them.

The PEL study includes an evaluation of transportation system needs across the entire study area, using transportation demand models, traffic studies, analysis of crash reports, structural assessments, and field studies to assess drainage and environmental concerns. To this point, the project team has completed its data collection work and created a Purpose and Need Statement. The project team has used its understanding of

existing conditions and needs, as vetted by stakeholders and the public, to develop potential geometric improvement concepts intended to address the needs of the corridor.

Response Request

Your input is an important part of our coordination effort for the PEL study. Included in the links below for your review and comment is the purpose and need and geometric improvement concepts under consideration for this project.

Purpose and Need Statement

Concept Evaluation

If you have any questions or would like to discuss in more detail the study or our agencies' respective roles and responsibilities during the preparation of this study, please contact Christina Kupkowski, WCDOT Project Manager, at ckupkowski@willcountyillinois.com or at 815-727-8476.

Thank you for your cooperation and interest in this project.

Sincerely,

Jeff Ronaldson, PE
Director of Transportation/County Engineer

Christina Kupkowski

By:
Christina Kupkowski, PE
Phase I Project Manager/Transportation Planner

-Enclosure

Tribe Name	Primary POC	Title	Phone	E-Mail	Street Address	City, State Zip
Ho-Chunk Nation	William Quackenbush	THPO	715-896-2795	Bill.Quackenbush@Ho-Chunk.com	PO Box 667	Black River Falls, WI 54615
Iowa Tribe of Kansas and Nebraska	Lance Foster	THPO	785-595-3258, EXT 104	lfoster@Iowas.org	3345-B Thrasher Road	White Cloud, KS 66094
Kickapoo Tribe in Kansas	Craig Wahwahsuck	Environmental Department	785-484-2785	craigwahwahsuck@gmail.com	824 111th Drive	Horton, KS 66439
Miami Tribe of Oklahoma	Logan York	THPO	918-541-7885	THPO@miamination.com	3410 P St. NW	Miami, OK 74354
Peoria Tribe of Indians of Oklahoma	Burgundy Fletcher	Tribal Historic Preservation Specialist	918-540-2535	bfletcher@peoriatribe.com	118 S. Eight Tribes Trails	Miami, OK 74355
Potawatomi - Forest County Potawatomi Community	Luke Heider	THPO	715-478-7354	luke.heider@fcp-nsn.gov	5320 Wensaut Lane	Crandon, WI 54520
Potawatomi - Match-E-Be-Nash-She-Wish (Gun Lake) Band of Pottawatomi Indians	Lakota Hobia (formerly Pochedley)	THPO	269-397-1780, EXT 1255	lakota.pochedley@glt-nsn.gov	2872 Mission Drive	Shelbyville, MI 49344
Potawatomi - Pokagon Band of Potawatomi	Matthew Bussler	THPO	269-462-4316	matthew.bussler@pokagonband-nsn.gov	58620 Sink Road	Dowagiac, MI 49047
Potawatomi - Prairie Band Potawatomi Nation	Raphael J. Wahwassuck	THPO	785-966-4037	raphaelwahwassuck@pbpnation.org	16281 Q. Road	Mayetta, KS 66509
Sac and Fox Nation of Oklahoma	Chris Boyd	THPO/NAGPRA Director	918-968-3526, EXT 1070	tribaladminstrator@sacandfoxnation-nsn.gov	Route 2 Box 246	Stroud, OK 74079
Winnebago Tribe of Nebraska	Sunshine Thomas-Bear	THPO/NAGPRA	402-878-3103	sunshine.bear@winnebagotribe.com	PO Box 687	Winnebago, NE 68071

Exhibit 5: Technical Memoranda

A. Existing Traffic Analysis

B. Crash Analysis

C. Design Criteria and Assumptions

D. Drainage Design Criteria

E. Geometric Review of Existing Alignment

F. Existing Drainage Plan

G. Bridge inspection Reports

H. Passing Lane Location

I. Future Traffic Analysis

J. Safety Analysis

K. Concept Evaluation

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Exhibit 5A: Existing Traffic Analysis

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Wilmington-Peotone Planning and Environmental Linkage (PEL) Study

EXISTING TRAFFIC ANALYSIS

Travel Demand Model Base Year Validation Technical Memorandum

Wilmington-Peotone Road

From I-55 to Drecksler Road

Section 23-00116-15-ES

Will County Division of Transportation

March 2024

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

Kimley-Horn, as a subconsultant to Burns & McDonnell, is conducting a Planning Environmental Linkage (PEL) Study on behalf of the Will County Division of Transportation (WCDOT) for proposed improvements to the Wilmington-Peotone Corridor from I-55 to Drecksler Road. The purpose of this project is to improve safety, enhance mobility through providing an efficient east-west connection, and support current and future travel demand throughout the corridor.

To analyze travel demand throughout the corridor, Kimley-Horn used Chicago Metropolitan Agency for Planning (CMAP)'s regional Travel Demand Model (TDM) as the primary tool to forecast automobile and truck traffic along the project corridor for the interim year 2035 and horizon year 2050. Several data sources were used to validate the base year 2019 travel model including: Traffic counts collected by the project team from August 2023 along with counts available from Illinois Department of Transportation (IDOT), Origin and destination (OD) data from Streetlight, and OD trip tables from the Illinois Statewide Travel Demand Model (Statewide Model). The travel model will then be used to forecast build year and design year traffic.

The purpose of this memorandum is to document the data collection and model recalibration process, and to present the validation results of the base year 2019 model.

2. PROJECT CORRIDOR, INFLUENCE AREA, AND PLANNING DISTRICTS

A. Project Corridor

The Wilmington-Peotone project limits begin to the west at the interchange of I-55 and River Road. The project follows River Road 4 miles to the intersection with IL Route 53, follows IL Route 53 from River Road to Wilmington-Peotone Road, and continues along Wilmington-Peotone Road until it ends at Drecksler Road. The limits extend roughly 22 miles and will be referred to as the Wilmington-Peotone Corridor. The Location Map is included in Figure 1.

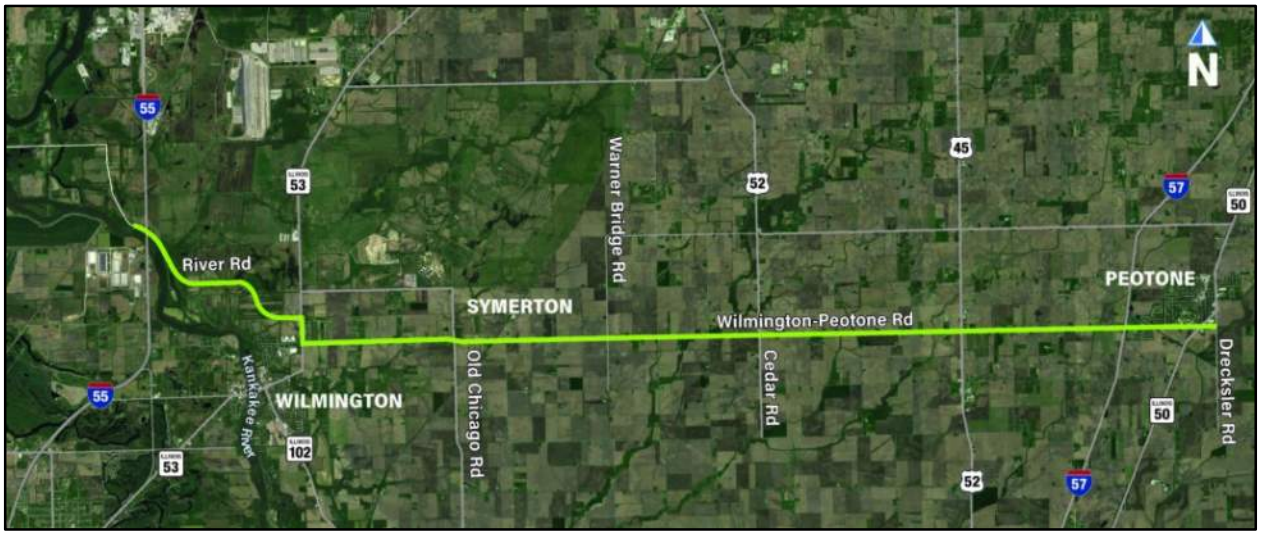


Figure 1: *Wilmington-Peotone Corridor Location Map*

B. Project Influence Area

For traffic analysis purposes, a project influence area is defined to include the area within the local highway network that is potentially most impacted by the proposed project. The project influence area is defined to be large enough to capture traffic diversion due to route choice opportunities for all trips that could benefit from an improved Wilmington-Peotone corridor. Figure 2 shows the project influence area. The project influence area is used as the subarea boundary for validating the CMAP TDM's performance compared with traffic counts, Streetlight data, and the Statewide Model.

C. Planning Districts

For purposes of model validation and understanding local travel patterns, two sets of planning districts were developed. The first district structure includes six internal districts and six external districts. The six internal districts subdivide the study area into south (district 1), east (district 2), northeast (district 3), central (district 4), southwest (district 5), and northwest (district 6) based on the general location relative to the study corridor. The six external districts represent the direction of traffic external to the study area entering/exiting the study area around the six internal district boundaries, respectively. Figure 3 shows the planning district boundaries for 12 planning districts.

The second district structure merges all external districts (11 through 16) into adjacent internal districts (1 through 6). Aggregating the external districts with the entering/exiting internal districts is to reduce the total number of districts to simplify the analysis. Figure 4 shows the planning district boundaries for 6 planning districts with merged external zones.

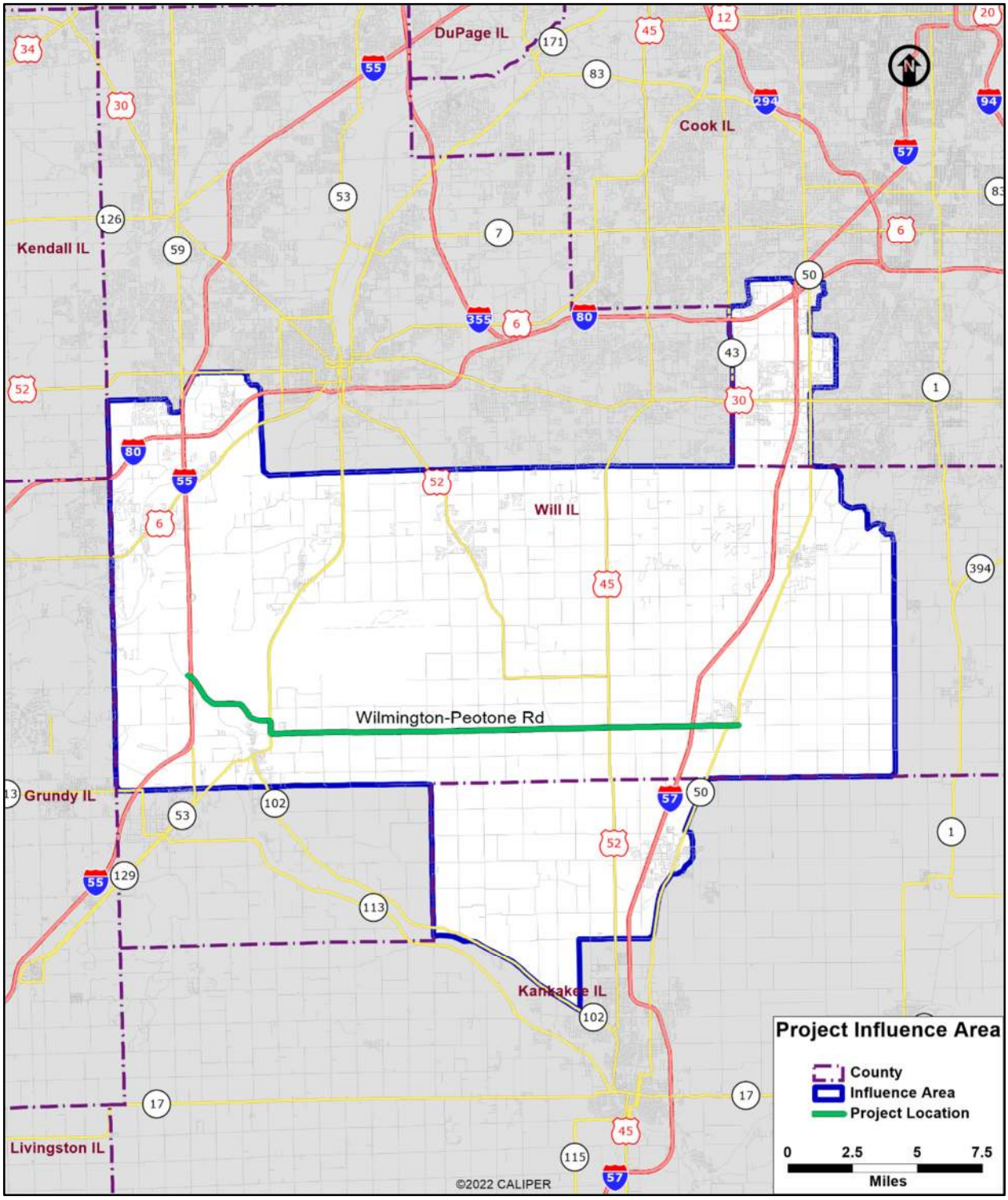


***Figure 2**: Project Influence Area (Subarea Boundary)*

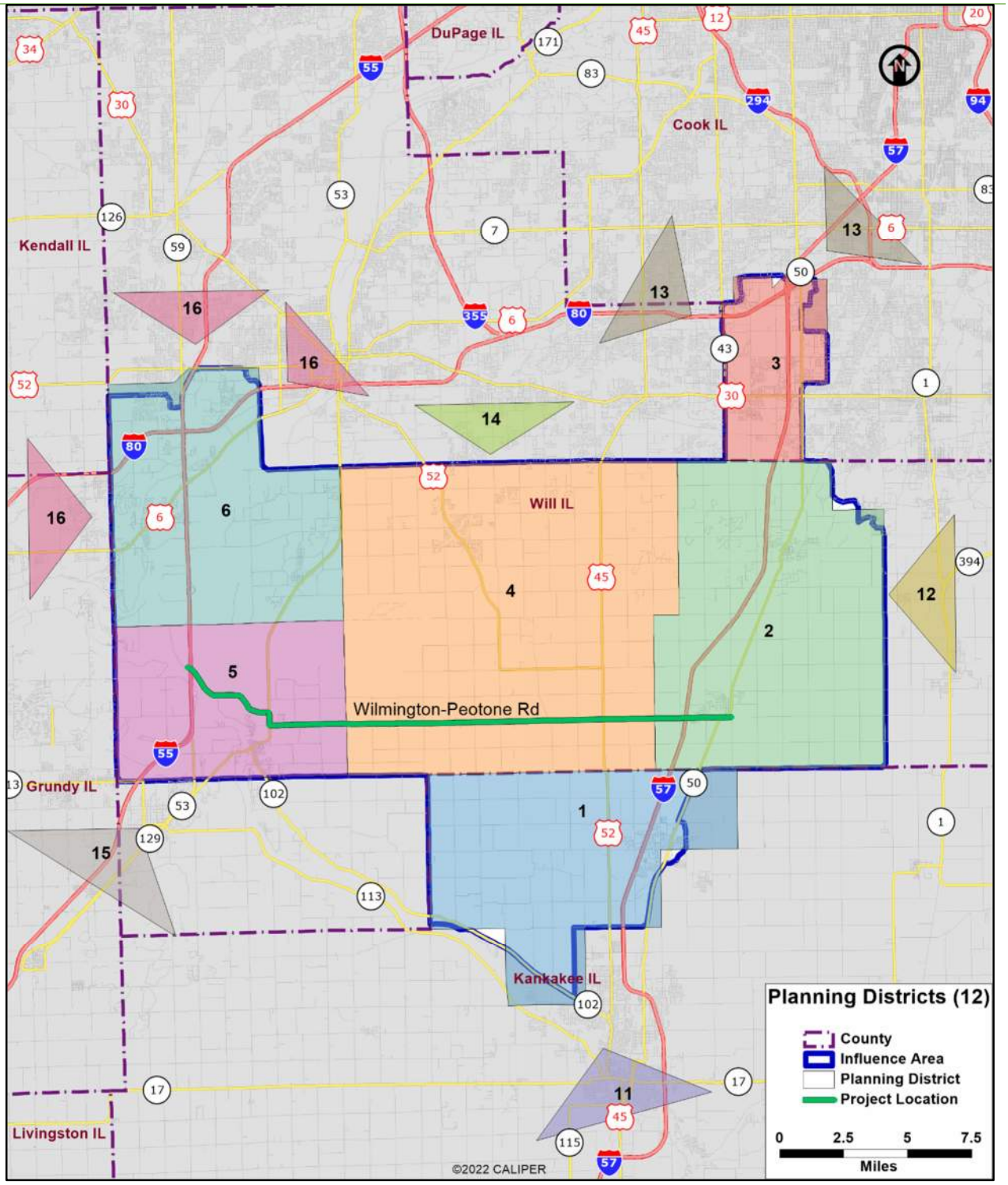


***Figure 3**: Internal and External Planning Districts (12)*

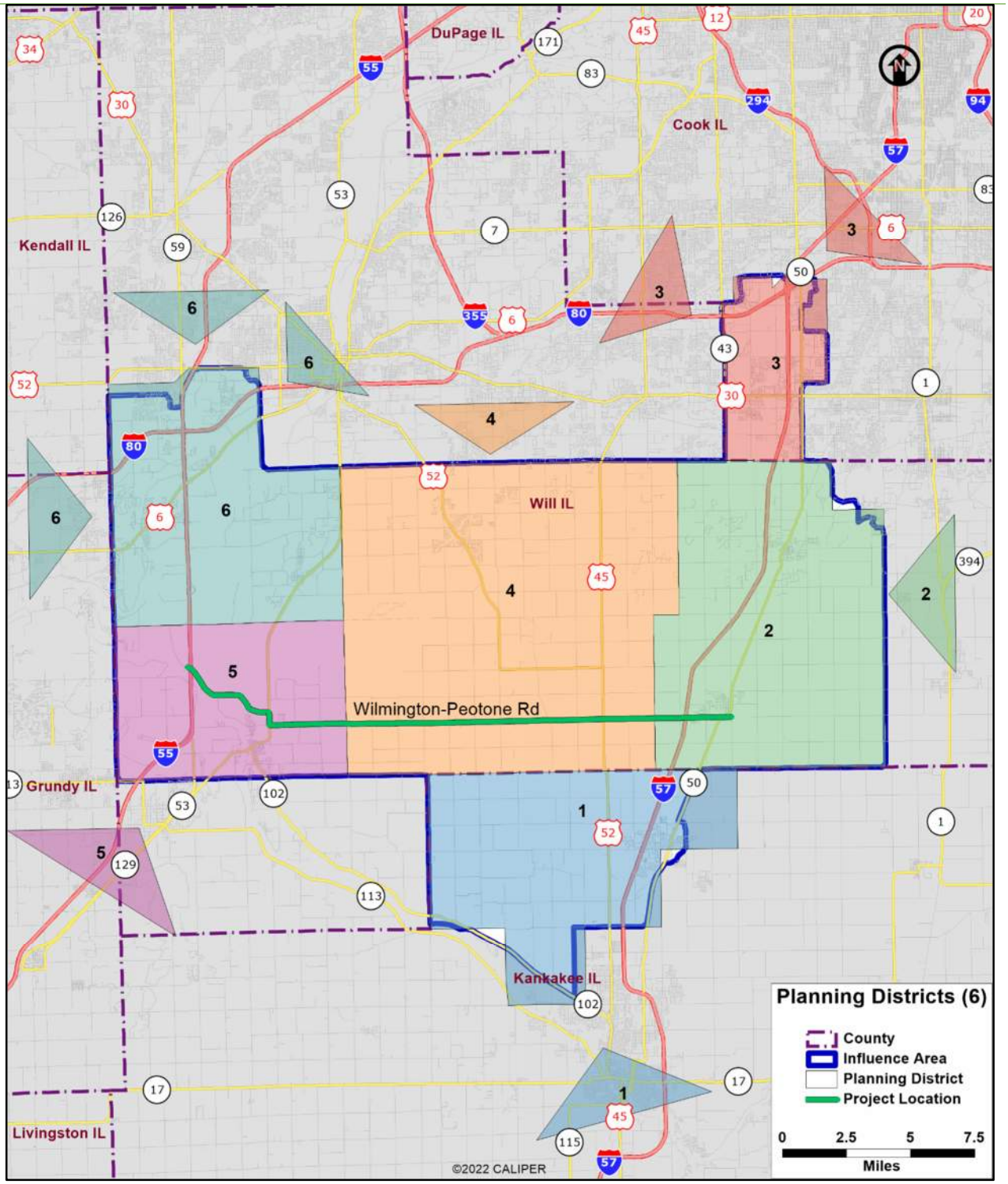


***Figure 4**: Planning Districts (6)*

Trip tables from the probe data, the Statewide Model, and the MPO model were aggregated to the planning district level for the convenience of analysis.

3. DATA COLLECTION AND EXISTING TRAFFIC CONDITIONS

A. Traffic Counts

The project team collected 24-hour turning movement counts in August 2023 at eleven intersections within the corridor. The counts were classified by vehicle types and further aggregated into Auto, Single Unit (SU) trucks, and Combination Unit (CU) trucks. These counts were used to develop existing Average Daily Traffic (ADT) volumes along each segment of the project corridor, as shown in **Table 1** below. Count location IDs are shown in **Figure 5**.

Table 1: *Existing (Year 2023) Traffic on Project Corridor Segments*

ID	Location Description	ADT	SU Trucks	SU Truck %	CU Trucks	CU Truck %	All Trucks (SU+CU)	All Truck %
1	River Rd (West of I-55)	609	12	2.0%	5	0.8%	17	2.8%
2	River Rd (East of I-55)	9,716	436	4.5%	2,056	21.2%	2,492	25.6%
3	River Rd (West of Hwy 53)	7,350	380	5.2%	2,109	28.7%	2,489	33.9%
4	Hwy 53	11,895	387	3.3%	1,880	15.8%	2,267	19.1%
5	W Peotone Rd (East of Hwy 53)	8,816	268	3.0%	1,500	17.0%	1,768	20.1%
6	W Peotone Rd (East of Indian Trail	8,201	315	3.8%	1,453	17.7%	1,768	21.6%
7	W Peotone Rd (East of Old Chicago Rd)	6,992	294	4.2%	1,670	23.9%	1,964	28.1%
8	W Peotone Rd (West of Warner Bridge Rd)	6,828	336	4.9%	1,597	23.4%	1,933	28.3%
9	W Wilmington-Peotone Rd (East of Warner Bridge Rd)	6,807	333	4.9%	1,596	23.4%	1,929	28.3%
10	W Wilmington-Peotone Rd (West of Cedar Rd)	7,662	305	4.0%	1,654	21.6%	1,959	25.6%
11	W Wilmington-Peotone Rd (East of Cedar Rd)	6,821	280	4.1%	1,731	25.4%	2,011	29.5%
12	W Wilmington-Peotone Rd (West of Hwy 45)	6,685	280	4.2%	1,726	25.8%	2,006	30.0%
13	W Wilmington-Peotone Rd (East of Hwy 45)	5,344	227	4.2%	1,437	26.9%	1,664	31.1%
14	W Wilmington-Peotone Rd (West of I-57)	7,189	290	4.0%	1,576	21.9%	1,866	26.0%
15	W Wilmington-Peotone Rd (East of I-57)	8,804	263	3.0%	1,043	11.8%	1,306	14.8%
16	W Wilmington-Peotone Rd (West of Governors Hwy)	6,486	242	3.7%	980	15.1%	1,222	18.8%
17	Tucker Rd (East of Governors Hwy)	1,232	39	3.2%	425	34.5%	464	37.7%

In addition, 24-hour coverage counts and limited heavy vehicle percentage data within the study area were collected from IDOT's Illinois Roadway Analysis Database System (IROADS) and were used in the base year travel demand model calibration and validation effort.

***Figure 5**: Corridor Count Location*

B. StreetLight Data

To understand the existing travel patterns around the study area, a StreetLight dataset was purchased for the project study area. StreetLight data uses two main data sources to develop its volume metrics: location-based services (LBS) and navigation-GPS data. StreetLight Origin-Destination (OD) volumes were determined by first developing a total volume for each zone, then calculating the total amount of measured LBS and GPS trips between origins and destinations, and finally scaling the LBS and GPS trips to the total zone volume.

A total of 40 external bi-directional pass-through zones and 9 internal non-pass-through zones were used to extract the OD data. The OD matrix that was extracted from Streetlight for this study was from an average weekday (Tuesday, Wednesday, and Thursday) in 2023 and included all vehicles. The raw OD matrix is aggregated to 12 districts as shown in **Figure 3**. **Table 2** shows the aggregated OD trip table by 12 districts.

***Table 2:** StreetLight OD Matrix by 12 Planning Districts*

ID	1	2	3	4	5	6	11	12	13	14	15	16
1	0	989	92	246	132	82	7,810	314	1,618	548	112	183
2	941	1,615	1,554	1,122	120	254	3,076	2,401	9,615	934	189	703
3	104	1,729	0	185	26	221	605	220	30,557	198	80	851
4	244	1,153	171	483	288	807	565	253	1,960	10,212	274	1,319
5	124	121	26	300	0	1,419	861	76	858	1,375	4,899	3,024
6	88	241	213	812	1,492	4,564	547	159	7,269	8,676	2,961	43,874
11	7,797	2,846	476	554	857	494	4,544	696	11,444	1,890	580	853
12	317	2,368	186	252	78	175	701	233	722	362	112	160
13	1,516	9,515	30,734	1,881	913	7,234	11,203	810	127,787	4,315	3,014	34,233
14	574	917	196	10,030	1,440	8,336	2,061	370	4,453	1,902	1,067	4,294
15	89	172	79	242	4,416	2,674	530	100	3,018	997	5,357	12,836
16	171	681	856	1,290	2,935	42,860	918	185	33,835	4,144	13,435	75,144

Figure 6 is a travel desire line map illustrating the flows between six internal districts within the study area. There are approximately 15,300 local trips (mostly within Will County) that are crossing planning district boundaries. 31% of these trips are east-west demand. These trips would benefit from an improved Wilmington-Peotone Road corridor.

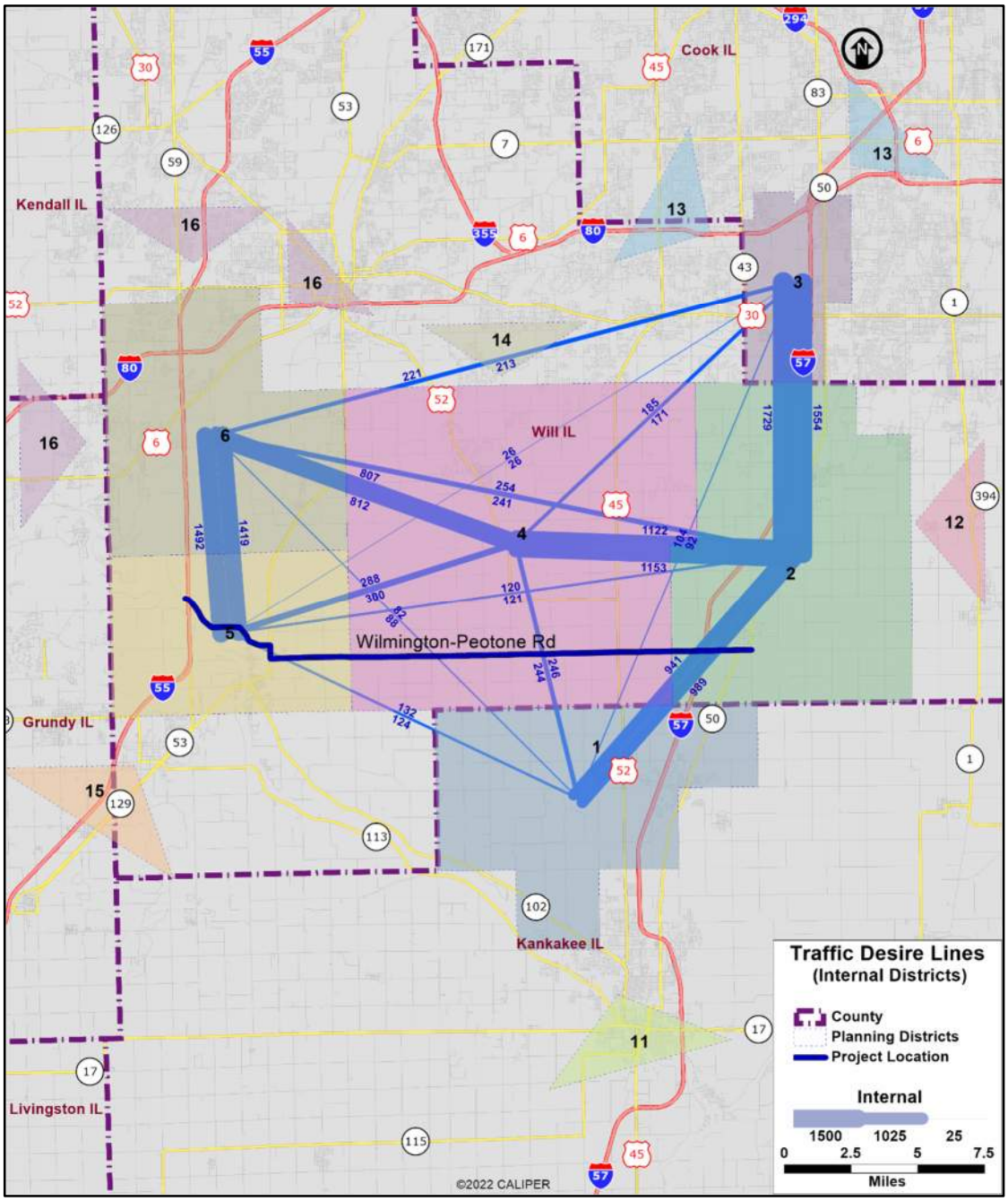


***Figure 6**: Desire Lines (Local Traffic Internal to Study Area)*

Figure 7 shows the desire line flows between the six external zone groups and the six internal districts. Among approximately 295,300 external-internal trips entering the study area, 11% are crossing the study area east-west or diagonally. The volumes along the corridor are currently relatively low showing that it is not being used as a thoroughfare. With improvements to the corridor, all of the diagonal trips would have the opportunity to use Wilmington-Peotone Road as an alternative.

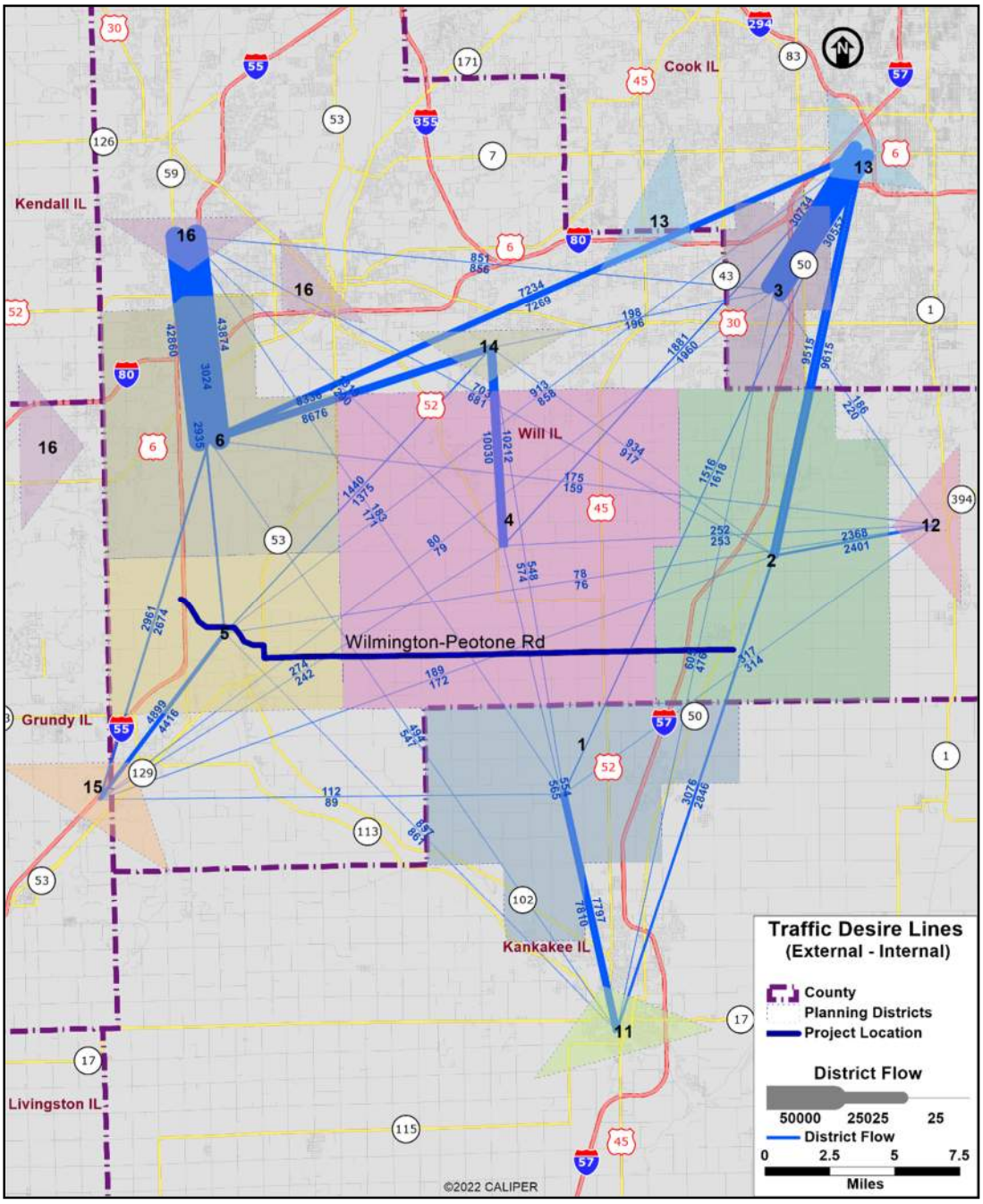


Figure 7: Desire Lines (External Traffic Entering the Study Area)

Figure 8 shows the desire line flows that are passing through traffic between the six external zone groups only. There are a total of 153,300 trips passing through the study area, and about 59% of them crossing the area diagonally or east-west, potentially benefit from an improved Wilmington-Peotone Road corridor.

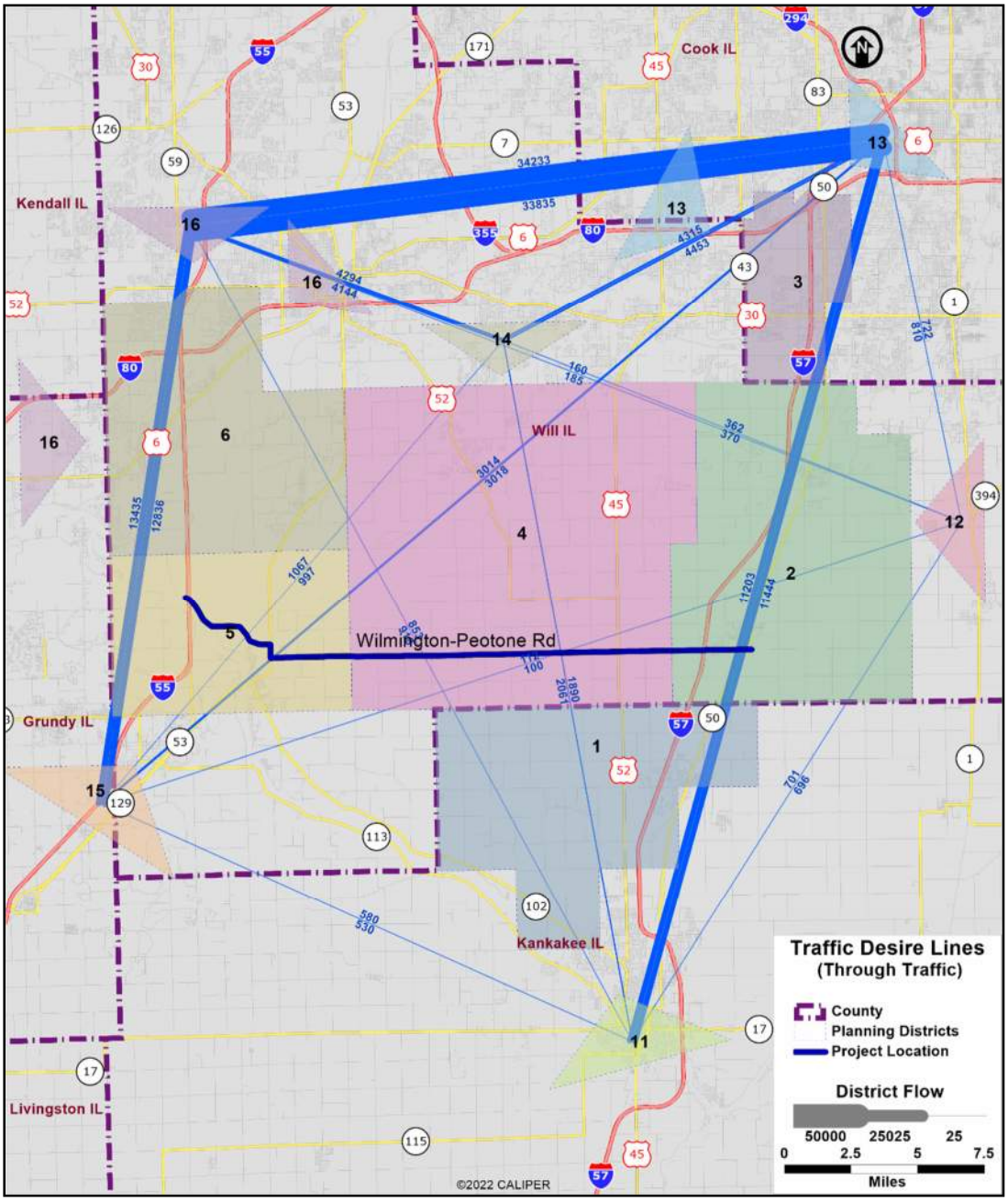


***Figure 8**: Desire Lines (External Traffic Passing Through the Study Area)*

C. Illinois Statewide Travel Demand Model (Statewide Model)

The Illinois Statewide Model was provided by IDOT. Using the base year 2017 model, Kimley-Horn conducted a subarea analysis to obtain subarea OD matrices for auto and truck trips. These OD matrices were aggregated into planning districts described in Section 2 and were used to compare travel patterns from the CMAP regional model and Streetlight data in **Section 4 - TRAVEL DEMAND MODEL CALIBRATION AND VALIDATION**.

D. Chicago Metropolitan Agency for Planning (CMAP)'s Regional Travel Demand Model

CMAP's regional TDM is the primary tool to forecast automobile and truck traffic along the project corridor. The CMAP regional TDM included 21 counties grouped into four sub-regions: the 7-county CMAP region, external Illinois modeling areas, external Indiana modeling areas, and external Wisconsin modeling areas. In Illinois, 12 full counties (Boone, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, McHenry, Will, and Winnebago) and three partial counties (LaSalle, Lee, and Ogle) were included in CAMP model boundary.

Figure 9 is a flow chart showing the general steps used by the CMAP trip-based TDM modeling process. Mode detailed description of the modeling process is documented in the Travel Demand Model Appendix of the CMAP ON TO 2050 Plan Update.

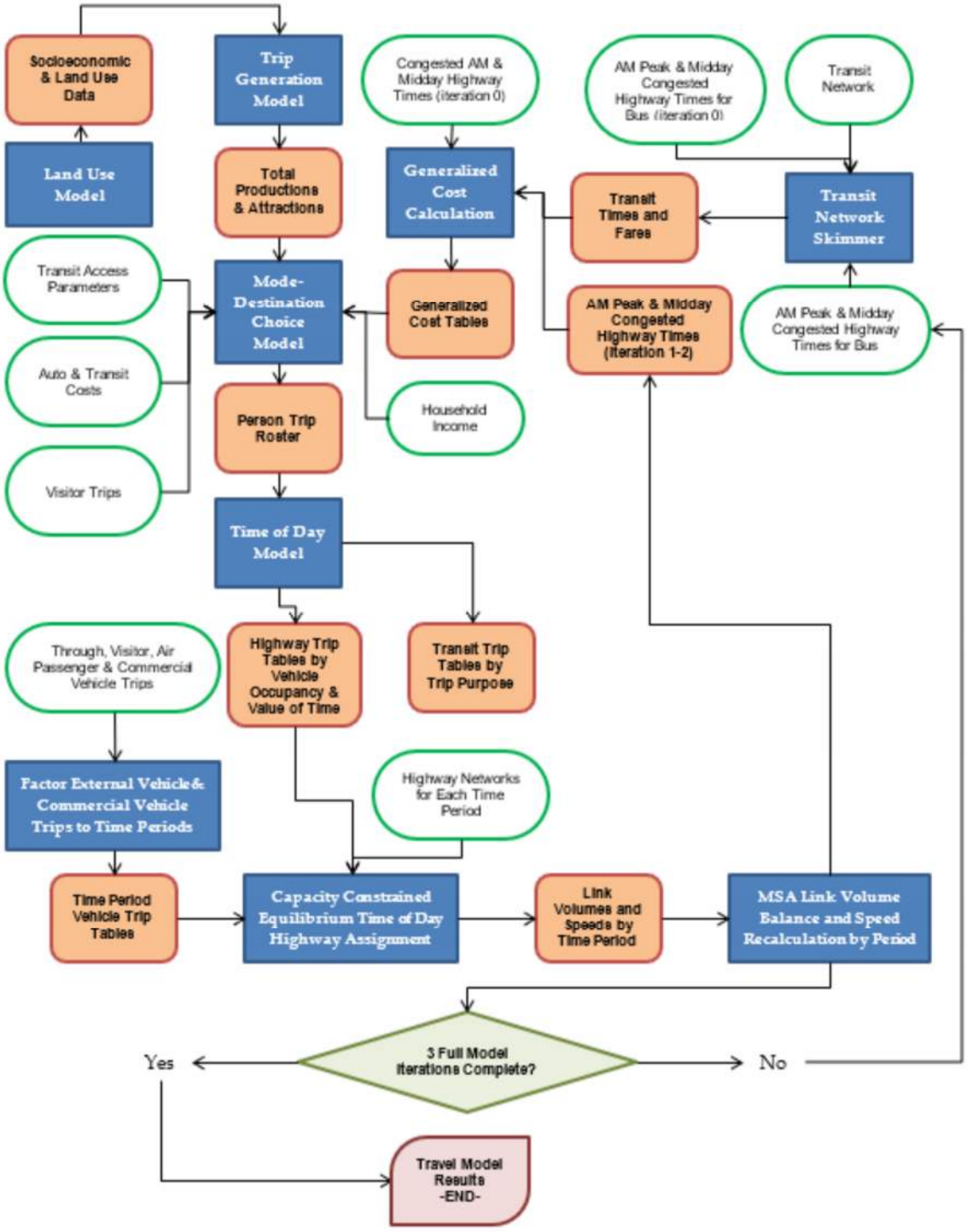


***Figure 9**: CMAP Trip-based TDM – Modeling Process (Source: CMAP Model Documentation)*

A total of 3,649 Traffic Analysis Zones (TAZs) are included in the CMAP regional model. Trip generation models were processed in a smaller subzone level with 17,418 sub zones. There are 85 TAZs and 1,624 sub zones within the study area, as shown in **Figure 10**.

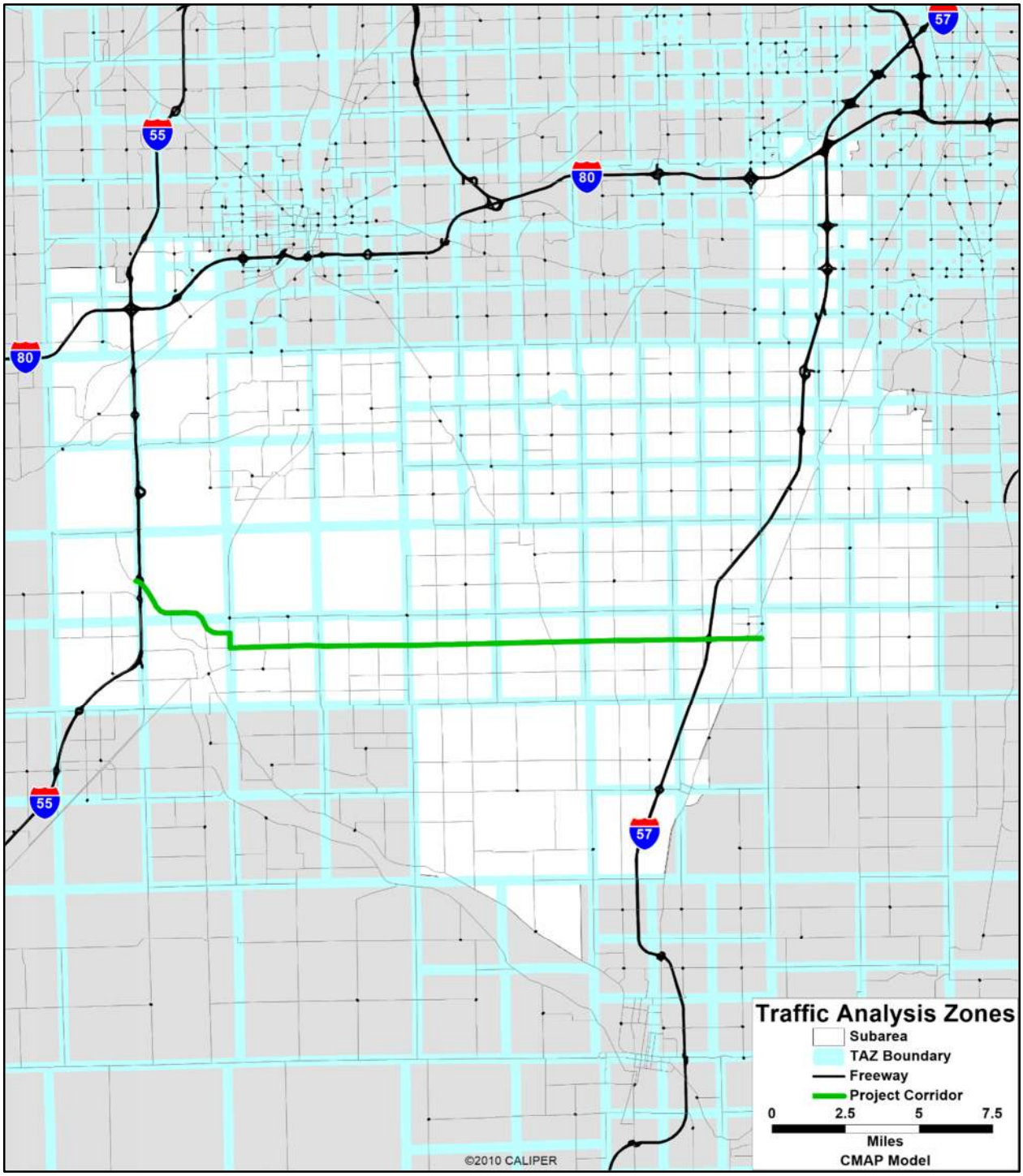


***Figure 10**: Traffic Analysis Zone Boundary (CMAP Model)*

Figure 11 shows the highway network in the CMAP model within the subarea boundary by functional classification. Within the project corridor, River Road west of I-55 is classified as major collector. Remaining segments of the project corridor are classified as principal arterial.

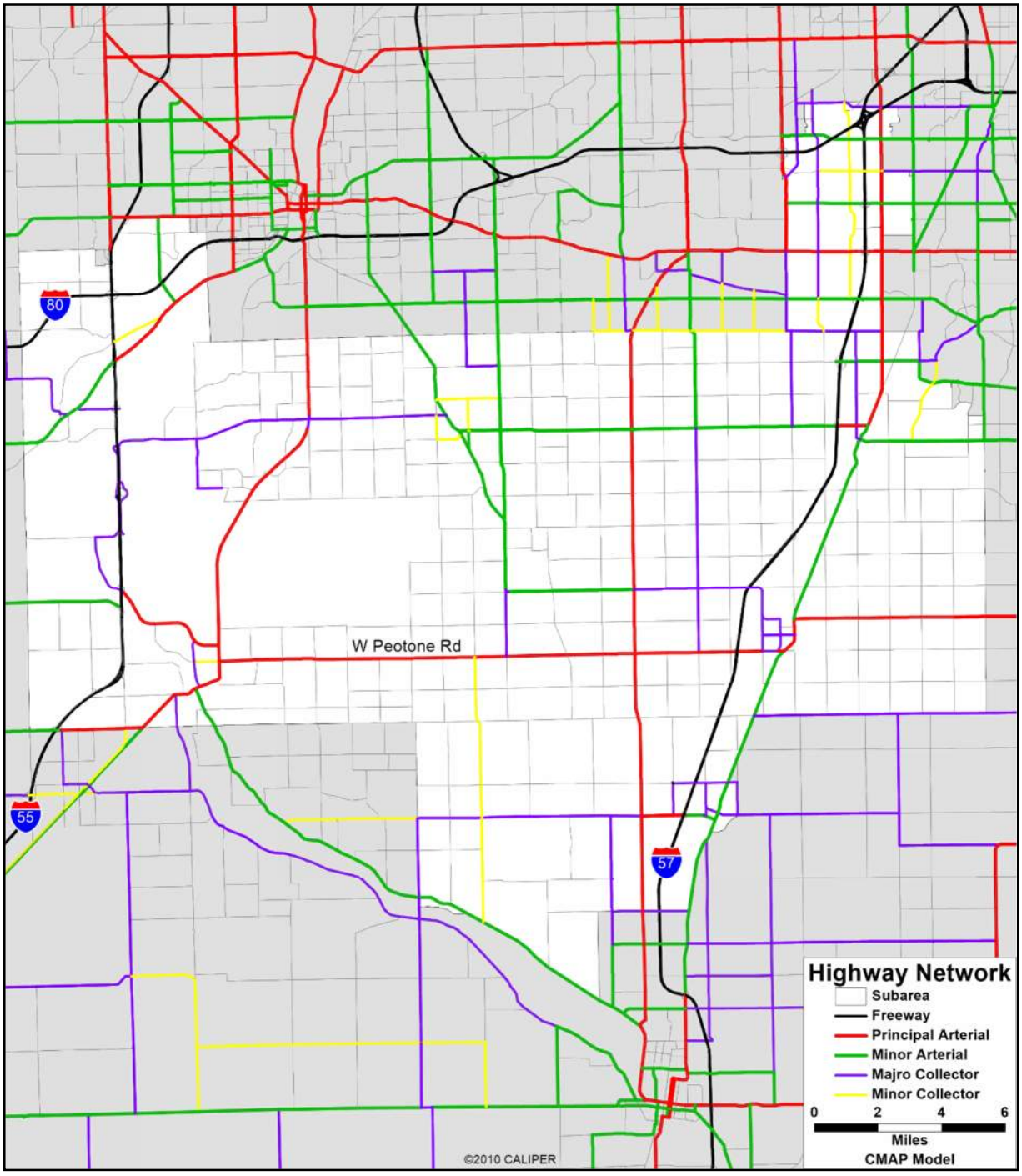


***Figure 11**: Highway Network Links by Functional Classification (CMAP Model)*

4. TRAVEL DEMAND MODEL CALIBRATION AND VALIDATION

The model validation process followed the "Travel Model Validation and Reasonableness Checking Manual - Second Edition, 2010, Federal Highway Administration". For reference, this document is abbreviated as "FHWA Guidelines".

Using traffic counts collected by the project team and available through the IROADs website, the project team conducted a model calibration and validation process to make sure that the model predicted traffic volumes match the observed counts within the FHWA guideline range at daily level. Six cut lines around the study area were developed to gauge how well the model replicates traffic entering, exiting, and crossing the study area. Following adjustments were made to the model during the calibration process:

- Reviewed centroid connector locations and attributes of model network links.
- Applied travel time penalties for roadway segments with significant over-assigned traffic volumes.
- Increased free flow speed for roadway segments with significant under-assigned traffic volumes.
- Adjusted free flow speeds between parallel facilities based on traffic counts for better load balancing.
- Compared district level travel patterns with Streetlight data and Statewide Model data.

The following describes the final highway assignment validation results achieved after the model calibration and validation. The highway assignment results were validated at varying levels of aggregation, based on the requirements from the FWHA Guidelines. Travel patterns from the model trip tables were validated at the six planning district level (as shown in **Figure 4**) compared with Streetlight data and the Statewide Model.

A. Daily Traffic Volume Compared to Counts within the Study Area

The coefficient of determination (R^2) is a useful measure to compare system-wide observed traffic counts with estimated volumes. The FHWA Guidelines suggest that the R^2 value be greater than 0.88 at the system level. The base year model has an R^2 value of 0.93, which adheres to the FHWA guidelines. The model's root mean square error (%RMSE) is 29.1%. This is below the acceptable RMSE value of 45% suggested by the FHWA Guidelines.

Table 3 compares the daily volumes with targets by functional classification. The results show that the model effectively estimates model volumes by functional classification.

***Table 3**: Volume-to-Count Percent Difference by Functional Classification*

Roadway Functional Classification	Volume Per Day		Number of Traffic Count Locations	% Difference	
	Observed (Traffic Counts)	Model Estimated		Model Compared to Observed	FHWA Guidelines (+/-)
Freeways	1,230,452	1,296,383	40	5.4%	7%
Principal Arterials	1,107,004	1,128,406	130	1.9%	15%
Minor Arterials	211,063	227,472	46	7.8%	15%
Collectors	108,179	97,894	28	-9.5%	25%
Total	**2,656,698**	**2,750,155**	**244**	**3.5%**	**5%**

Table 4 shows the %RMSE values by functional classification. The RMSE error for all functional classification groups are below the FHWA Guidelines for %RMSE except the principal arterial group. The principal arterial group is 2% above target. Given the limited number of traffic count locations within the subarea compared with the 12-county CMAP region, the Consultant believe this is acceptable without over-calibrate the model.

Table 4: *Root Mean Square Error (RMSE) by Functional Classification*

Roadway Functional Classification	Number of Traffic Count Locations	% RMSE	
		Model Compared to Observed	FHWA Guidelines (Large Region)
Freeways	40	14.5%	20%
Principal Arterials	130	37.0%	35%
Minor Arterials	46	47.7%	50%
Collectors	28	57.5%	90%
Total	**244**	**29.1%**	**45%**

Table 5 presents the model volumes and validation targets by volume groups. The results show that the model effectively estimates model volumes by volume group as all volume groups are below the FHWA Guideline targets.

Table 5: *Percent Difference Volume Targets by Daily Volume Groupings*

Volume Group	Volume Per Day		Number of Traffic Count Locations	% Difference	
	Observed (Traffic Counts)	Model Estimated		Model Compared to Observed	FHWA Guidelines (+/-)
<1,000	8,019	18,484	18	130.5%	200%
1,000-2,500	60,487	87,524	35	44.7%	100%
2,500-5,000	137,339	134,105	40	-2.4%	50%
5,000-10,000	515,241	520,023	71	0.9%	25%
10,000-25,000	805,412	842,810	49	4.6%	20%
25,000-50,000	806,300	823,119	25	2.1%	15%
>50,000	323,900	324,089	6	0.1%	10%

Table 6 shows the %RMSE values by volume groups. All volume group measures are at or below the target values provided by FHWA Guidelines.

Table 6: *Root Mean Square Error (RMSE) by Volume Group*

Volume Group	Number of Traffic Count Locations	% RMSE	
		Model Compared to Observed	FHWA Guidelines (+/-)
< 5000	93	84.2%	100%
5000 - 10000	71	37.3%	45%
10000 - 15000	16	35.4%	35%
15000 - 20000	25	17.2%	30%
20000 - 30000	19	21.9%	27%
30000 - 50000	14	15.5%	25%
50000 - 60000	6	4.9%	20%
> 60000	0	0.0%	19%
Total	244	29.1%	45%

B. Cut Line Volumes

As a part of the model calibration and validation process, six cut lines were developed in the Subarea, as shown in **Figure 12**. Cut lines 1 through 4 are developed to measure the total traffic entering/exiting the study area from the south, east, north, and west respectively. Cut line 5 is used to measure traffic crossing the study area east and west. Cut line 6 is used to measure traffic crossing the study area north and south.to gauge how well the model replicates traffic between different areas within the Subarea Model boundary. **Figure 12** shows the cut line locations.

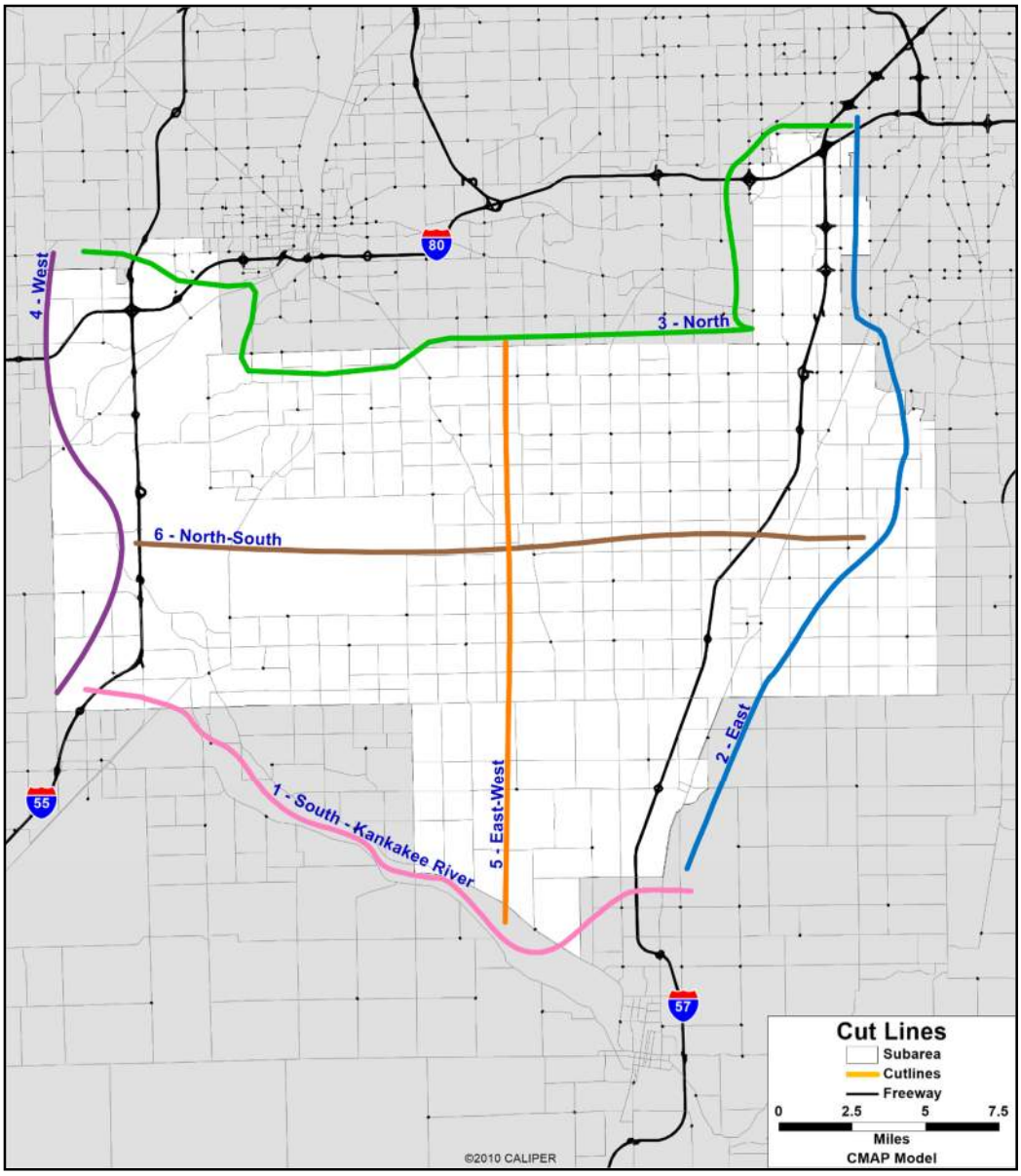


Figure 12: Cut Line Locations

Table 7 shows the percent errors at cut lines. All cut lines fell within the desired targets.

Table 7: *Volume-to-Count Percent Difference at Cut Lines*

Screen Line Name	Volume (VPD)		Number of Traffic Count Locations	% Difference	
	Observed (Traffic Counts)	Model Estimated		Model Compared to Observed	FHWA Guidelines (+/-)
South - Kankakee River	106,500	114,105	11	7.1%	15%
East	215,925	187,540	15	-13.1%	15%
North	573,150	590,638	37	3.1%	15%
West	74,309	80,201	5	7.9%	15%
East-West	16,621	18,487	5	11.2%	15%
North-South	98,650	111,798	9	13.3%	15%

C. Traffic Volume Along the Project Corridor

Table 8 shows the percent errors along all segments of the project corridor. Overall differences along the entire corridor is approximately 6%. Out of 17 segments, 5 segments are within a 10% difference, 9 are within a 20% difference, and 14 are within a 30% difference. Segment 1 (River Road west of I-55) and Segment 17 (Tucker Road) are low volume collector or local roads that are not accurately loaded with local traffic due to TDM's limitation on centroid connector placement.

Table 8: *Volume-to-Count Percent Difference at Segments of Project Corridor*

ID	Location Description	Observed (Traffic Counts)	Model Estimated Volume	% Difference
1	River Rd (West of I-55)	609	0	-100.0%
2	River Rd (East of I-55)	9,716	12,486	28.5%
3	River Rd (West of Hwy 53)	7,350	5,069	-31.0%
4	Hwy 53	11,860	8,820	-25.6%
5	W Peotone Rd (East of Hwy 53)	8,816	10,463	18.7%
6	W Peotone Rd (East of Indian Trail)	8,201	9,658	17.8%
7	W Peotone Rd (East of Old Chicago Rd)	6,992	7,926	13.4%
8	W Peotone Rd (West of Warner Bridge Rd)	6,828	7,741	13.4%
9	W Wilmington-Peotone Rd (East of Warner Bridge Rd)	6,807	8,314	22.1%
10	W Wilmington-Peotone Rd (West of Cedar Rd)	7,662	7,472	-2.5%
11	W Wilmington-Peotone Rd (East of Cedar Rd)	6,821	8,263	21.1%
12	W Wilmington-Peotone Rd (West of Hwy 45)	6,685	7,323	9.5%
13	W Wilmington-Peotone Rd (East of Hwy 45)	5,344	6,850	28.2%
14	W Wilmington-Peotone Rd (West of I-57)	7,189	6,726	-6.4%
15	W Wilmington-Peotone Rd (East of I-57)	8,804	9,070	3.0%
16	W Wilmington-Peotone Rd (West of Governors Hwy)	6,482	5,801	-10.5%
17	Tucker Rd (East of Governors Hwy)	1,232	2,233	81.3%
Total		**117,398**	**124,215**	**5.8%**

D. Truck Traffic Comparison

Tables 9, 10, and 11 compare the model and observed Single Unit (SU), Combination Unit (CU), and all truck volumes respectively by functional classification. These measures were calculated using only the count locations where vehicle classification information is available. Within the study area, total trucks are approximately within 30% of the margin of error. Although large variances are observed by facility type, the results are based on a small number of vehicle classification counts within a relatively small subarea compared with the size of the CMAP TDM modeling area.

Table 9: *Volume-to-Count Percent Difference by Functional Classification for SU Trucks*

Roadway Functional Classification	Truck Volume (VPD)		Number of Traffic Count Locations	Difference	
	Observed (Traffic Counts)	Model Estimated		Value	%
Freeways	21,370	22,474	22	1,104	5%
Principal Arterials	11,950	7,731	31	-4,219	-35%
Minor Arterials	1,033	1,200	4	167	16%
Collectors	312	215	2	-97	-31%
Total	**34,665**	**31,620**	**59**	-3,045	**-9%**

Table 10: *Volume-to-Count Percent Difference by Functional Classification for CU Trucks*

Roadway Functional Classification	Truck Volume (VPD)		Number of Traffic Count Locations	Difference	
	Observed (Traffic Counts)	Model Estimated		Value	%
Freeways	114,322	158,191	22	43,869	38%
Principal Arterials	28,067	38,347	31	10,280	37%
Minor Arterials	5,557	7,260	4	1,703	31%
Collectors	354	504	2	150	42%
Total	**148,300**	**204,302**	**59**	56,002	**38%**

Table 11: *Volume-to-Count Percent Difference by Functional Classification for All Trucks*

Roadway Functional Classification	Truck Volume (VPD)		Number of Traffic Count Locations	Difference	
	Observed (Traffic Counts)	Model Estimated		Value	%
Freeways	135,692	180,665	22	44,973	33%
Principal Arterials	40,017	46,078	31	6,061	15%
Minor Arterials	6,590	8,460	4	1,870	28%
Collectors	666	719	2	53	8%
Total	**182,965**	**235,922**	**59**	52,957	**29%**

Table 12 shows the differences between model estimated truck volumes and traffic counts along all segments of the project corridor. Overall differences along the entire corridor is approximately 21%.

Table 12: *Truck Volume-to-Count Percent Difference at Segments of Project Corridor*

ID	Location Description	Model Estimated Volume (VPD)	Observed (Traffic Counts)	% Difference
1	River Rd (West of I-55)	17	0	-100.0%
2	River Rd (East of I-55)	2,492	2,956	18.6%
3	River Rd (West of Hwy 53)	2,489	2,956	18.8%
4	Hwy 53	2,267	2,573	13.5%
5	W Peotone Rd (East of Hwy 53)	1,768	3,014	70.5%
6	W Peotone Rd (East of Indian Trail	1,768	2,963	67.6%
7	W Peotone Rd (East of Old Chicago Rd)	1,964	2,317	18.0%
8	W Peotone Rd (West of Warner Bridge Rd)	1,933	2,302	19.1%
9	W Wilmington-Peotone Rd (East of Warner Bridge Rd)	1,929	2,337	21.2%
10	W Wilmington-Peotone Rd (West of Cedar Rd)	1,959	2,168	10.7%
11	W Wilmington-Peotone Rd (East of Cedar Rd)	2,011	2,268	12.8%
12	W Wilmington-Peotone Rd (West of Hwy 45)	2,006	1,711	-14.7%
13	W Wilmington-Peotone Rd (East of Hwy 45)	1,664	1,637	-1.6%
14	W Wilmington-Peotone Rd (West of I-57)	1,866	1,515	-18.8%
15	W Wilmington-Peotone Rd (East of I-57)	1,306	1,913	46.5%
16	W Wilmington-Peotone Rd (West of Governors Hwy)	1,222	1,645	34.6%
17	Tucker Rd (East of Governors Hwy)	464	975	110.1%
Total		**29,125**	**35,250**	**21.0%**

E. District Level Travel Patterns

Travel patterns between planning districts were compared by aggregating the subarea OD matrices into the six planning districts as shown in **Figure 4**. The same aggregation was done for Streetlight and the Statewide Model OD data.

Table 13 shows the traffic demand between the six planning districts (as shown in **Figure 4**) from CMAP model compared with StreetLight and Statewide Model data, normalized to 100%. **Figure 13** illustrates the same data side by side in a bar chart.

Table 13: *Trip Demand Between Districts*

District Pair	StreetLight	CMAP Model	Statewide Model
1-2	5.4%	2.5%	6.9%
1-3	14.9%	16.5%	17.0%
1-4	3.7%	3.2%	12.9%
1-5	1.8%	1.1%	0.0%
1-6	1.8%	1.1%	0.2%
2-3	13.4%	24.2%	13.4%
2-4	3.0%	2.3%	6.7%
2-5	0.5%	0.9%	1.1%
2-6	1.4%	0.7%	1.1%
3-4	7.4%	1.2%	0.8%
3-5	4.4%	0.3%	1.1%
4-5	3.3%	1.6%	2.5%
4-6	16.4%	22.2%	11.5%
5-6	22.5%	22.2%	24.8%
Total	100%	100%	100%

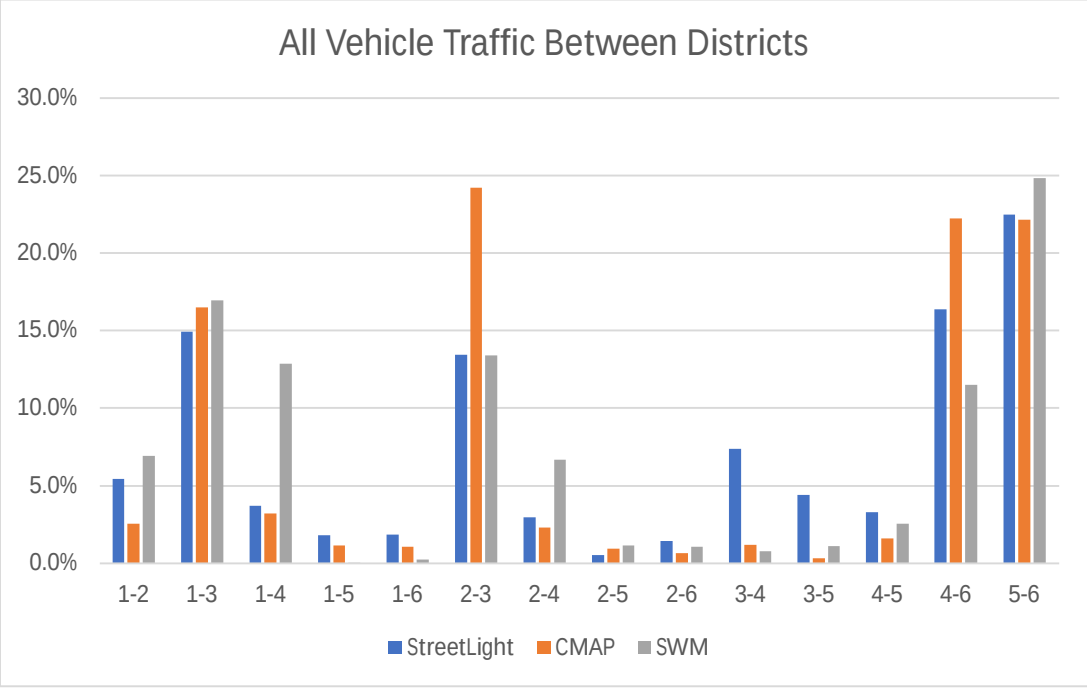


Figure 13*: Crossing District Travel Demand Compared*

In **Table 13**, the correlation coefficient between the StreetLight data and the CMAP Model is 0.92. The correlation coefficient between the CMAP Model and the Statewide Model is 0.86. A correlation

coefficient that is greater than 0.7 is considered highly correlated. These results show a reasonable match compared with the CMAP model with the StreetLight and Statewide Model data.

Travel patterns for truck trips were compared with the Statewide Model. **Table 14** shows the truck travel demand between the six planning districts (as shown in **Figure 4**) from CMAP model compared with the Statewide Model data, normalized to 100%. **Figure 14** illustrates the same data side by side in a bar chart.

Table 14: *Truck Demand Between Districts*

District Pair	CMAP Model	Statewide Model
1-2	0.4%	4.5%
1-3	16.6%	18.0%
1-4	0.7%	8.4%
1-5	0.3%	0.0%
1-6	0.6%	0.6%
2-3	19.3%	13.6%
2-4	0.7%	3.8%
2-5	0.7%	0.8%
2-6	0.9%	3.0%
3-4	0.4%	0.1%
3-5	0.2%	1.4%
4-5	0.4%	0.9%
4-6	37.3%	20.5%
5-6	21.4%	24.5%
Total	100%	100%

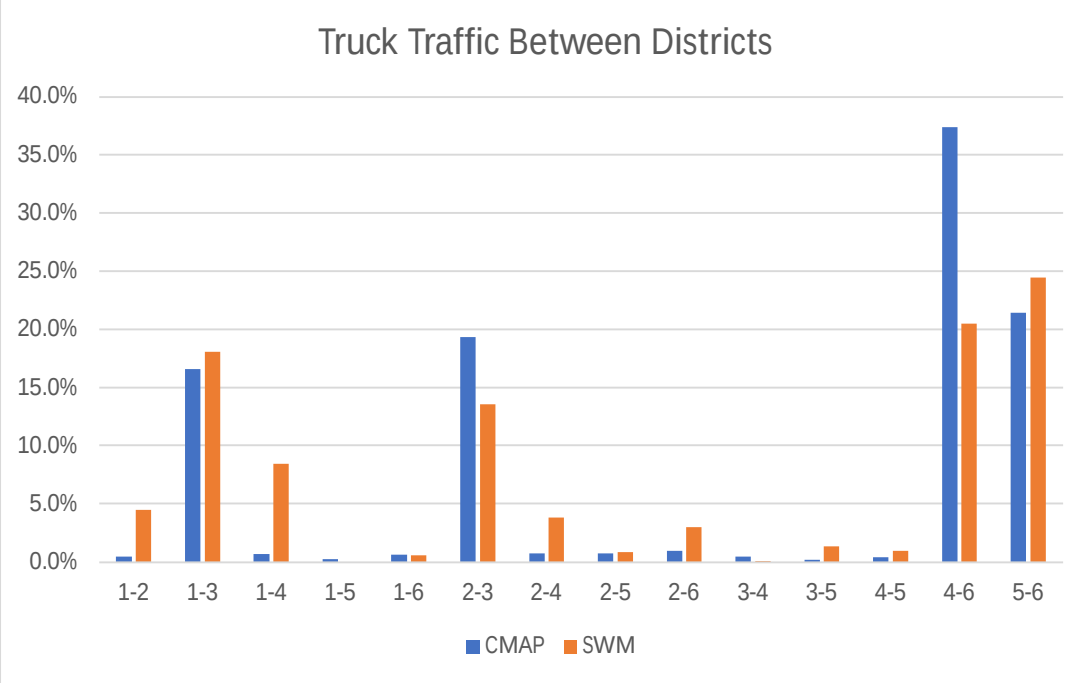


Figure 14*: Crossing District Truck Travel Demand Compared*

The correlation coefficient between the CMAP Model and the Statewide Model in **Table 19** is 0.89. These results show a reasonable match on truck travel patterns comparing the CMAP model with the Statewide Model data.

5. CONCULSION AND NEXT STEPS

The project team conducted a subarea analysis using the CMAP regional travel demand model as the base. Model network within the subarea was adjusted based on comparison between the model assigned volume and traffic counts. Final model validation results are presented in **Section 4**. The validation results showed that the base year model assigned volumes match the traffic counts reasonably well using targets outlined in FHWA's travel model validation guidelines.

With a validated base year model, the project team will gather input from the client and other project stakeholders on approved or anticipated development projects, as well as future year land use and socio-economic growth assumptions within the study area. Based on the input gathered from the client, we will check the future year demographic and employment input data and make adjustment, as necessary. The project team will use the future year socio-economic growth scenario and the calibrated CMAP model to estimate future year traffic on the project corridor for no-build and build alternatives. Future year traffic along the project corridor will be estimated based on methodologies outlined in *NCHRP 765 – Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. Future year traffic forecasts will incorporate growth rates and travel pattern changes predicted by the model, as well as proper adjustment procedure to account for base year model errors at individual link and turn level.

Exhibit 5B: Crash Analysis

BURNS McDONNELL

Memorandum

October 26, 2023

Date: October 26, 2023

To: Will County Division of Transportation
Christina Kupkowski, PE

From: Burns & McDonnell
Cheryl Kelley, PE

Subject: Wilmington-Peotone Road Crash Memorandum
Wilmington, Will County, Illinois

Burns & McDonnell has performed crash analysis as part of the Wilmington-Peotone PEL Study for the Will County Division of Transportation (WCDOT). Rapid growth has been occurring across Will County, altering the traffic dynamic, and challenging the roadway infrastructure. This project will evaluate the existing and future travel demand as well as the characteristics of the existing corridor to determine their impact on mobility throughout the area. A key element of this PEL study is to assess the safety and the crash history of the corridor.

The purpose of this Memorandum is to summarize crash data along the corridor and identify patterns and potential causes which can be used to develop concepts which might lead to a reduction in crash frequencies. Crash data was received from the year 2018 through 2022.

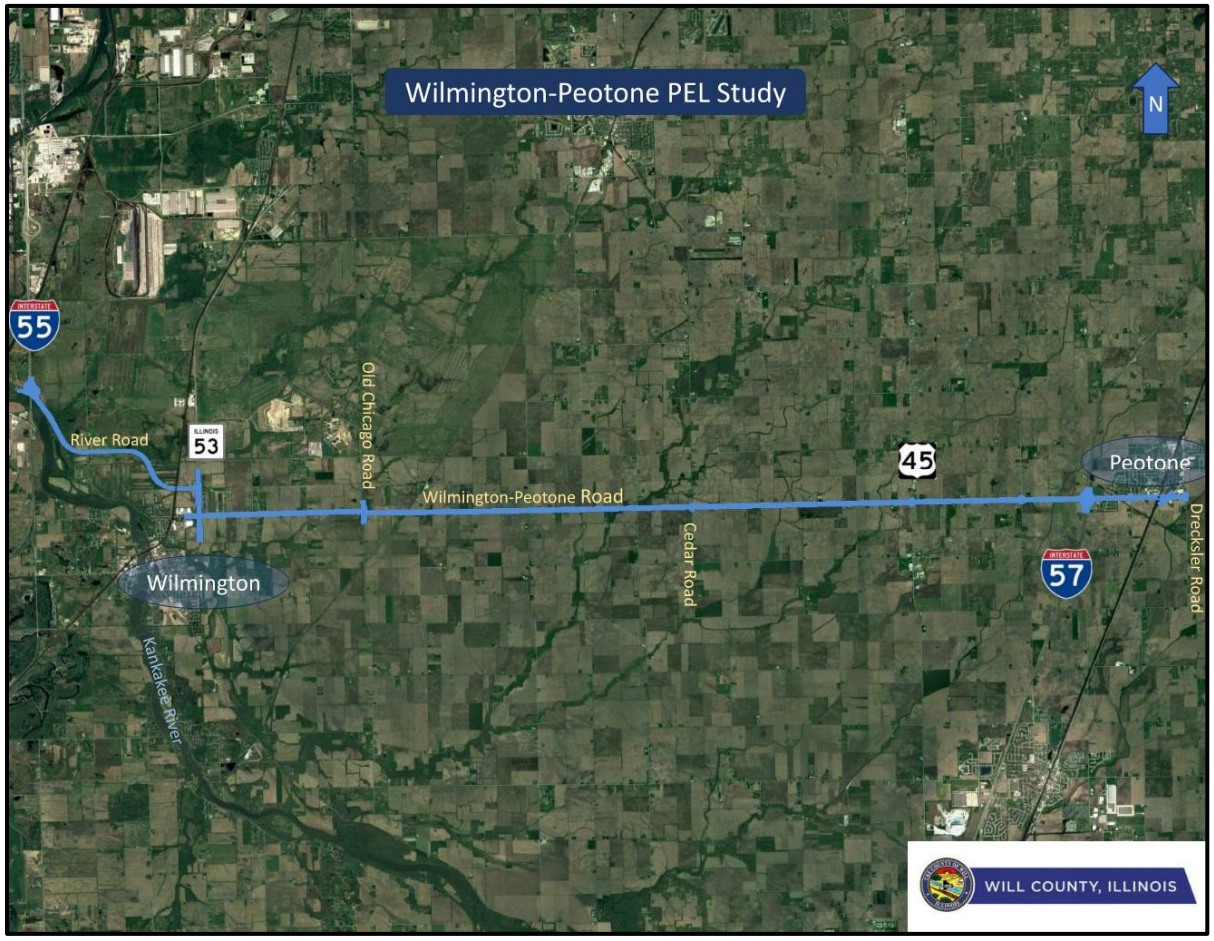
CRASH ANALYSIS OVERVIEW

PROJECT LOCATION

The Wilmington-Peotone Corridor project includes River Road from I-55 to IL 53, IL 53 from River Road to Wilmington-Peotone Road, and Wilmington-Peotone Road from IL 53 to Drecksler Road. The Wilmington-Peotone Corridor is 22 miles long within the project limits. Land use varies throughout the area but is largely agricultural. The project limits includes 2 interchanges, 2 signalized intersections, and 29 unsignalized intersections. There are 2 at-grade railroad crossings and a crossing with the Wauponsee Trail.

The project location is displayed in **Figure 1**.

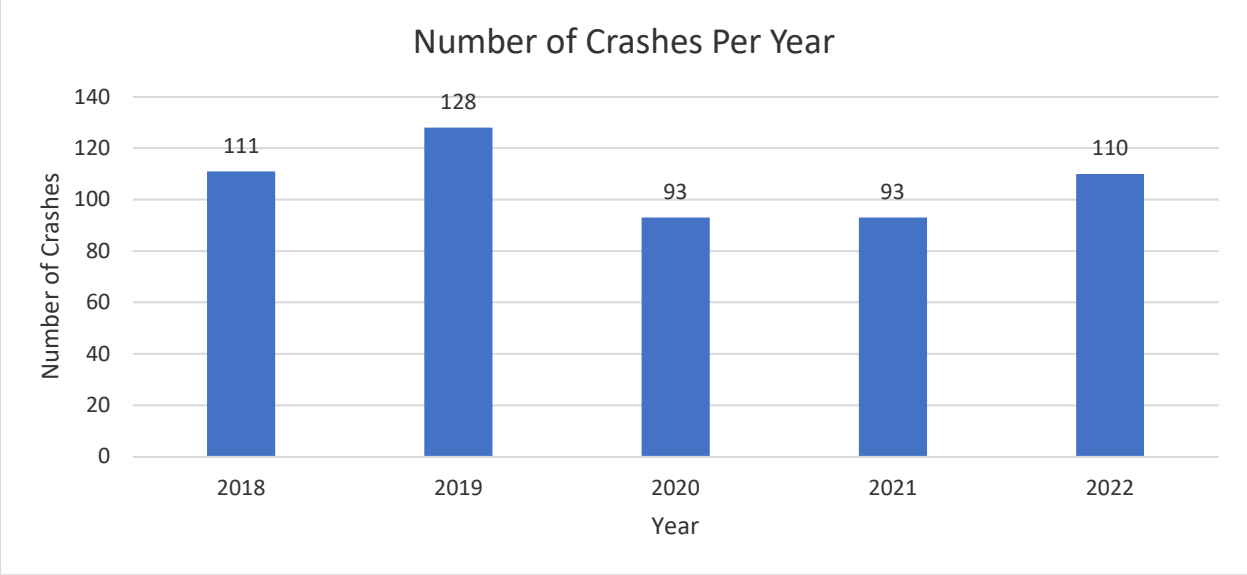
Figure 1: *Project Location*



CRASH OVERVIEW AND LOCATIONS

Between the five years of 2018 to 2022, there were 535 total crashes that occurred within the project limits. The greatest number of crashes occurred in 2019, with 128 crashes during that year. A reduction in crash numbers can be seen in 2020 and 2021 to 93 in both years. COVID-19 had an impact on the number of vehicles traveling throughout the country and Illinois as a whole saw a reduction in overall crashes during this time. This could have contributed to the reduction along the Wilmington-Peotone corridor as well. The 2022 crash data indicates a climb in crashes, closer to the pre-COVID numbers with 110 crashes throughout the project limits. The number of crashes for each year is plotted in **Figure 2**.

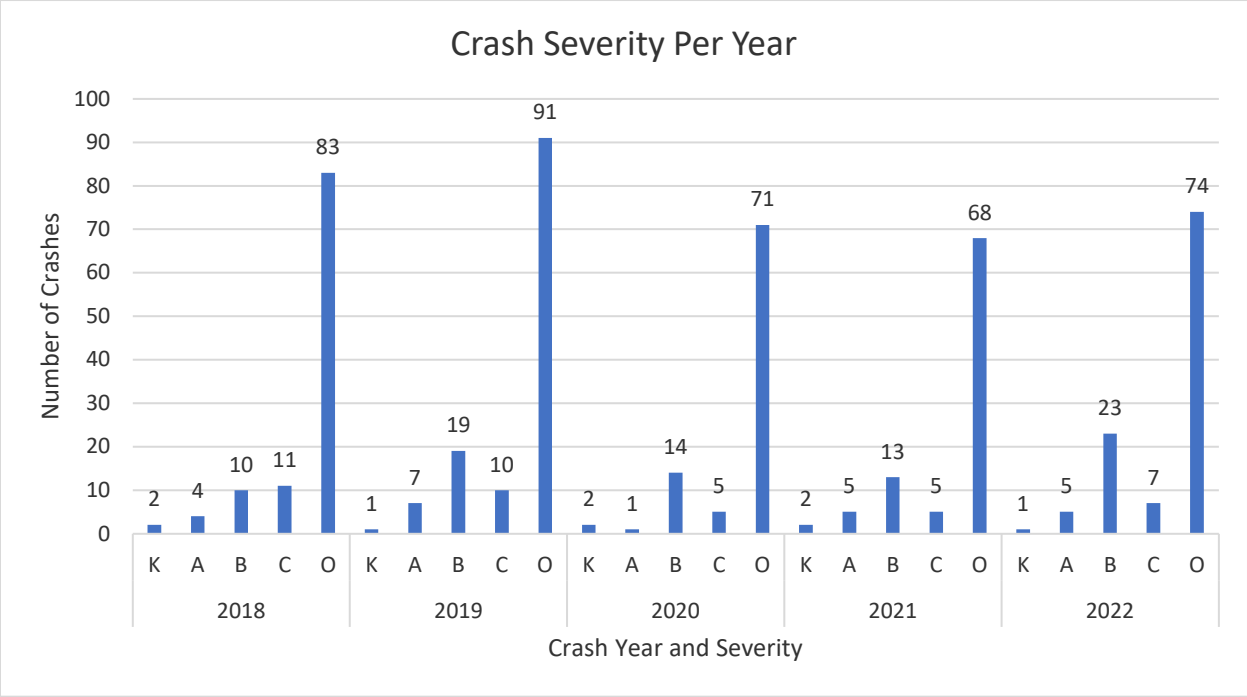
***Figure 2**: Number of Crashes per Year*



Crash Severity

Crash severity was plotted for each year in **Figure 3** per the KABCO injury scale. The KABCO injury scale is used in transportation to indicate the severity of a crash. K represents a fatal injury, A represents an incapacitating injury, B represents a non-incapacitating injury, C represents an injury that is reported or claimed, and O represents no indication of injury. At least one fatal crash occurred in the study area each year that was analyzed for a total of 8 fatal crashes. These crashes were located in various locations along the corridor and comprised of Front to Front, Angle, Fixed Object, and Pedestrian crash types. The segment sections below will discuss these crashes in more detail to determine potential mitigation measures to be evaluated as part of this PEL study.

Figure 3: *Crash Severity per Year*



State and County Comparison

A comparison of the project's crash statistics to the Illinois Department of Transportation Crash Facts for the years 2018-2021 and the Will County Crash Summary Report was done to identify if the crash severity along Wilmington-Peotone exceeds the state and county averages; results can be seen in **Table 1**. The Wilmington-Peotone Corridor saw above both the state and county fatal crash proportions for every year evaluated, sometimes more than 4 times as high. It also exceeded both the state and county injury crash proportions every year with the exception of the county average in the year 2020.

Table 1: *Project Comparison to State and County Fatal and Injury Crash Proportions*

	Project Avg		Illinois State Avg		Will County Avg	
Year	% Injury Crashes	% Fatal Crashes	% Injury Crashes	% Fatal Crashes	% Injury Crashes	% Fatal Crashes
2018	22.73%	1.82%	21.10%	0.30%	22.69%	0.35%
2019	28.13%	0.78%	20.40%	0.30%	20.88%	0.37%
2020	21.51%	2.15%	21.10%	0.44%	21.74%	0.51%
2021	24.73%	2.15%	20.60%	0.41%	22.07%	0.45%
2022	31.82%	0.91%	*Summary reports for 2022 have not been released*			

With injury and fatal crash rates significantly greater than the state and county averages for of the most study time, it is clear that improvements are needed to provide a safer corridor for all users. The more detailed segment discussion to follow discusses the locations and crash types in an effort to determine the appropriate mitigation measures for the Wilmington-Peotone corridor.

Truck Crashes

Growth in logistical and distribution facilities in the area has led to an increase in truck traffic along Wilmington-Peotone, because of this a closer look at crashes involving trucks was conducted. The study corridor volume is comprised of 18% truck traffic. River Road and Wilmington-Peotone Road are designated local class II truck routes; IL 53 is a state maintained class II truck route. Out of all the crashes about 20% listed a truck as one of the vehicles involved in the crash, slightly greater than the percentage of trucks by volume along the corridor. Given the volume of trucks along their corridor and their size, it is likely that trucks could have been a factor in other crashes along the corridor; without the full crash reports this analysis is limited to those that list a truck as at least one of the vehicles involved. The majority of crashes that involved trucks were front to rear crashes (26%), commonly referred to as rear end crashes, and turning crashes (22% of crashes). This suggests that semi-truck crashes were often with other vehicles in motion and commonly at intersections. These crashes resulted in mostly property damage only crashes, but there were seven total crashes that resulted in incapacitating injuries and one that resulted in a fatality. The fatality was an angle crash that involved a drug impaired driver. There was no clear pattern from the information available for these crashes. Given the continued growth and development in this area, the ability for this corridor to move both trucks and passenger vehicles safely is a priority and will be considered through the remainder of this tech memo and the PEL study as a whole.

SEGMENT CRASH ANALYSIS

Given the length of the corridor, more detailed analysis has been conducted to determine location specific crash trends. The following sections discuss the crash findings for the following three segments: River Road, IL 53, and Wilmington-Peotone Road.

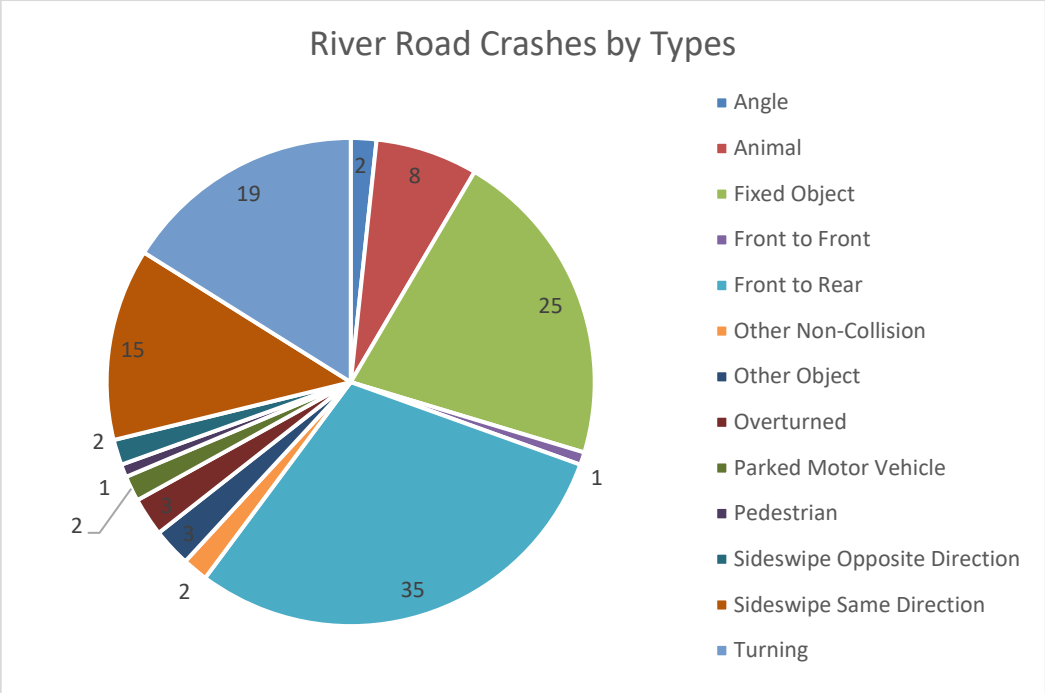
RIVER ROAD CRASH ANALYSIS

The River Road portion of the project is 4 miles long from I-55 to IL 53, representing about 18% of the overall project area. River Road is an east-west principal arterial with a 55 mph design speed. There are two unsignalized intersections within this segment as well as the interchange with I-55. The typical section includes a 2-lane undivided roadway with 12-foot travel lanes, 10-foot paved shoulders, and centerline and shoulder rumble strips. There are several curves along River Road that are No Passing Zones, but passing is present along 45% of River Road within the study limits. Much of the River Road corridor is adjacent or within the Midewin National Tall Prairie Nature Preserve and the western terminus runs along the Kankakee River. River Road is unlit with the exception of the I-55 interchange which is common in environmental areas. This western portion of the project also includes a crossing over Prairie Creek as well as an at grade crossing of the Union Pacific railroad. The crash types, locations, and injury numbers along River Road are described below.

River Road Crash Types

River Road experienced 118 crashes during the study period, 22% of the total crashes. The most common crash types were front to rear (29% of crashes), followed by fixed object (21% of crashes), turning (16% of crashes), and same direction sideswipe (13% of crashes). A full list of all crash types along River Road can be seen in **Figure 4.**

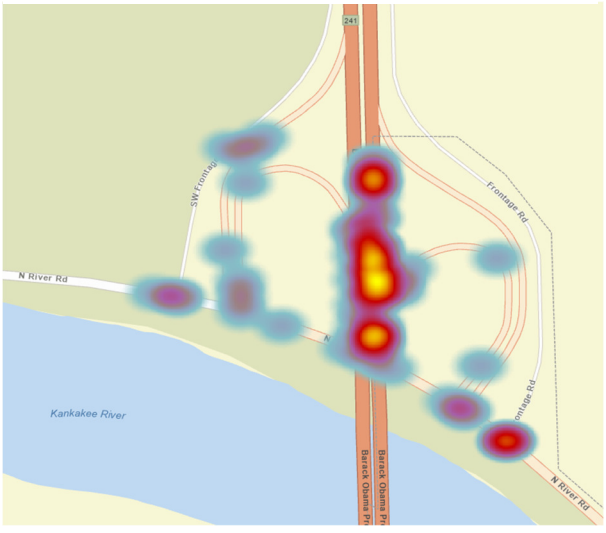
***Figure 4**: River Road Crashes by Type*



I-55 / River Road Interchange Hot Spot Analysis

The I-55/River Road interchange is a parclo interchange with unsignalized intersections at the ramp terminals with River Road. Throughout the interchange there is a raised median separating opposing traffic. Left turn lanes are present for eastbound River Road traffic onto the I-55 ramps. Both travel directions include a single travel lane. There were 65 crashes at the I-55/River Road interchange, over half of all crashes along River Road, four of which resulted in incapacitating injury crashes making this a hot spot along the corridor. **Figure 5** shows the location of crashes through the interchange. This includes crashes along the River Road through the interchange, interchange ramps, as well as their connection with I-55. I-55 mainline crashes outside of the ramp interchange area were not included. In Figure 5 and all future hot spot imagery, the light blue coloring indicates a sparse distribution of crash numbers in that area and the yellow coloring indicates a dense distribution of crash numbers. The most common crash type was rear end crashes (42% of crashes), followed by fixed object (22% of crashes), and same direction sideswipe (20% of crashes). Rear end crashes are common at intersections that experience congestion due to drivers not being able to stop in time for stopped traffic which could be contributing to the rear ends at this intersection; this will be confirmed in conjunction with the traffic

***Figure 5**: River Road and I-55 Crash Hot Spot*



analysis of the existing corridor. Additionally, the presence of significant truck traffic and an unsignalized intersection located on a bridge on a vertical curve could be creating sight distance concerns with drivers unable to stop in time for unexpected queues. Other potential enhancements to this area could include lighting, adequate auxiliary lane lengths, and signing and pavement marking enhancements which will be considered in future alternative development.

Fixed object crashes were the second most common crash type; all of the incapacitating injuring crashes at this interchange were fixed object crashes. The I-55 ramps include a number of tight curves and the surrounding area surrounding is heavily wooded with barriers and guardrails which could be contributing to fixed object crashes in this area. The locations of the incapacitating injuries are displayed in **Figure 6**.

***Figure 6**: River Road Incapacitating Injury Crash Locations*

River Road Fatalities and Severe Injuries

Within the segment along River Road from I-55 to IL 53, there were 29 crashes reported in the River Road segment resulting in an injury or fatality. A deeper look at the relationship between crash types and crash severity can be observed in **Table 2**. The greatest number of injuries were due to fixed object, front to rear, and turning, followed by various other crash types allocating smaller portions of the injury crashes.

***Table 2**: River Road Crash Type and Severity*

Crash Type	Number of Injury and Fatal Crashes	Number of Injuries	Number of Fatalities	% of Injury and Fatal Crashes
Angle	1	1	0	3%
Animal	2	2	0	7%
Fixed Object	8	12	0	28%
Front to Front	1	2	1	3%
Front to Rear	5	9	0	17%
Other Object	1	1	0	3%
Overturned	1	1	0	3%
Pedestrian	1	1	0	3%
Sideswipe Same Direction	3	3	0	10%
Turning	6	8	0	21%
Grand Total	**29**	**40**	**1**	

Incapacitating injuries comprised of four of the crashes on River Road and all occurred at the I-55 interchange as previously noted. A fatal crash was also recorded along River road as can be seen in **Figure 7**. This head-on crash occurred in the morning hours when a vehicle was attempting to pass a truck in a no-passing zone. The corridor is constrained by environmental resources through this area, but a review of traffic numbers and flow will be performed to determine the need for additional capacity or passing lanes through this area and develop potential mitigation measures.

***Figure 7**: River Road Fatal Crash Location*

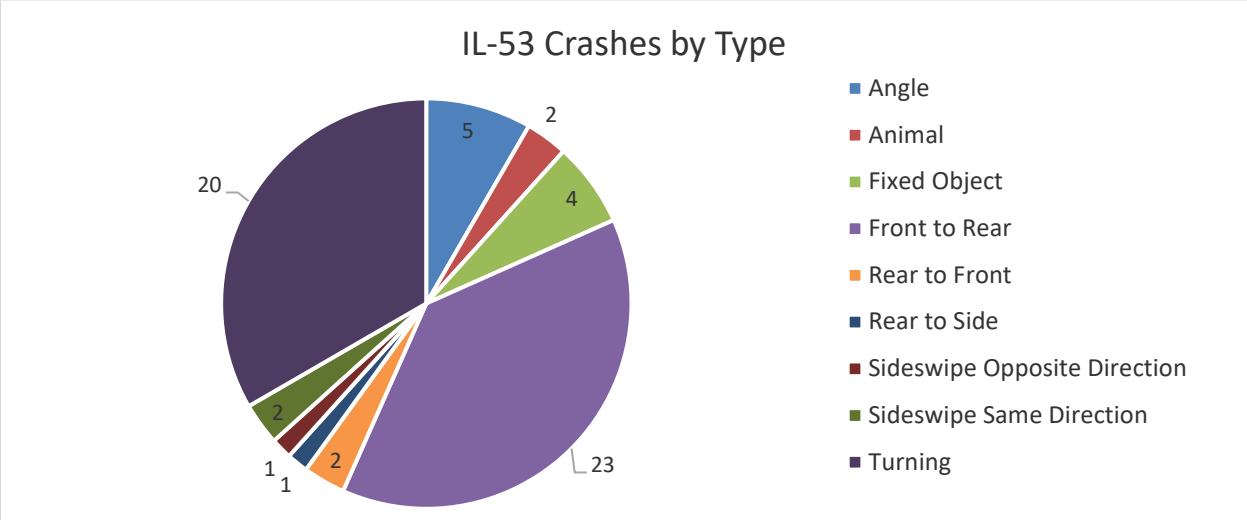
IL 53 CRASH ANALYSIS

The IL 53 section is 0.6 miles long, 3% of the overall corridor, but experienced 11% of all crashes. IL 53 is a north-south principal arterial with a 55-mph posted speed limit. The typical section includes a 2-lane undivided roadway with 11-foot travel lanes and 6-foot paved shoulders. Passing is allowed within the project limits and left turn lanes are present at the intersections with both River Road and Wilmington-Peotone Road. Where IL 53 connects River Road to Wilmington-Peotone Road, there are industrial, open space, vacant, and single-family residential land uses. The intersections with both River Road and Wilmington-Peotone Road are signalized intersections. A crosswalk is present along the southern leg of the IL 53 and River Road intersection. The crash types, locations, and injury numbers along IL 53 are described below.

IL 53 Crash Types

IL 53 experienced 60 crashes during the study period, 53 of which were intersection related. The crashes that occurred on IL 53 were modeled by crash type in **Figure 8.** The most common crash types were front to rear (38% of crashes) and turning (33% of crashes). This segment is a small portion of the overall corridor length but includes two highly trafficked intersections which could be contributing to the increased crash rate.

***Figure 8**: IL 53 Crashes by Type*



IL 53 / River Road Intersection Hot Spot Analysis

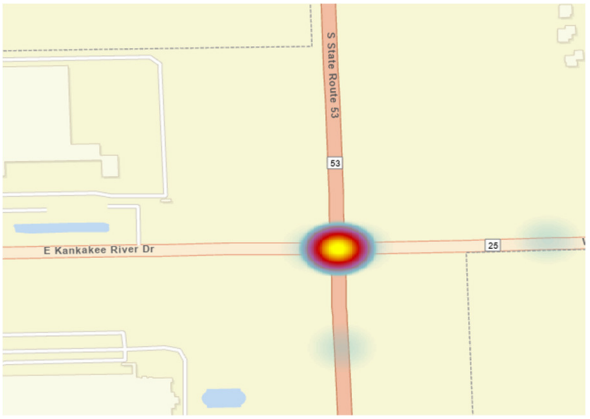
The IL 53/River Road intersection is a three-legged signalized intersection. There were 25 crashes at the IL 53/River Road intersection, none of which resulted in incapacitating injuries or fatalities. **Figure 9**. shows the location of crashes. The most common crash type was rear end crashes (52% of crashes), followed by turning (24% of crashes), and angle (12% of crashes). Rear end crashes are common at intersections that experience congestion as previously noted. Some considerations to combat congestion related crashes include capacity improvements, lighting, and phasing improvements which will be considered in future alternative development.

Figure 9: IL 53 and River Road Crash Hot Spot

IL 53 / Wilmington-Peotone Intersection Hot Spot Analysis

The intersection of IL 53 and Wilmington-Peotone Road experienced 35 crashes making this a hot spot along the Wilmington-Peotone corridor. The second intersection located along IL 53 is a four-way signalized intersection. Left turn lanes are present along IL 53 for those turning onto Wilmington-Peotone Road. This intersection is displayed in **Figure 10**. Turning crashes were most common (40% of crashes), followed by rear end (29% of crashes). The results are expected, statistically speaking, since intersections involve multiple conflict points. In future efforts to improve this hot spot intersection, alternative intersection designs can be evaluated to reduce the points of conflict, as well as signal timing and phasing among other options.

Figure 10: IL 53 and Wilmington-Peotone Road Crash Hot Spot



IL 53 Fatalities and Severe Injuries

The relationship between crash type and crash severity along IL 53 can be seen in **Table 3**. There were seven injury crashes, none of which were incapacitating or fatal crashes during the study period. The greatest number of injuries were due to front to rear crashes, followed by turning and angle crashes.

Table 3: IL 53 Crash Type and Severity

Crash Type	Number of Injury and Fatal Crashes	Number of Injuries	Number of Fatalities	% of Injury and Fatal Crashes
Angle	1	1	0	14%
Front to Rear	4	4	0	57%
Turning	2	2	0	29%
Grand Total	**7**	**7**	**0**	

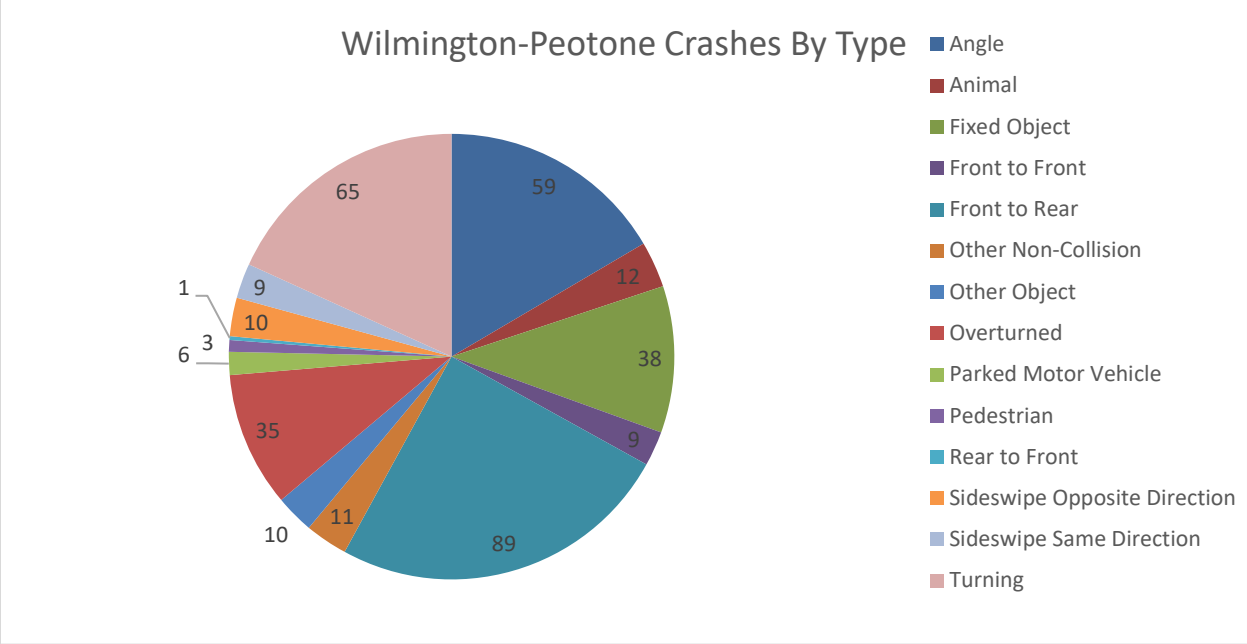
WILMINGTON-PEOTONE ROAD CRASH ANALYSIS

Wilmington-Peotone Road is a 17.4 mile, east-west principal arterial making it the longest section of the corridor and 79% of the overall length. This segment of the corridor includes 27 unsignalized intersections and the I-57 interchange. The majority of the land use along the corridor is agricultural. The project's eastern terminus runs through the village of Peotone where land use includes single and multi-family residential, commercial, industrial, and vacant properties. Wilmington-Peotone Road is a 2 lane undivided typical section with 11-foot travel lanes and includes minimal unpaved shoulders. Most of the corridor is posted at 55 mph, but the eastern portion of this segment, east of I-57 is posted at 45 mph and includes a 5-foot paved shoulder with curb and gutter. Wilmington-Peotone Road crosses the Wauponsee Glacial Trail and crosses Forked Creek. This segment also includes an at-grade crossing of the Canadian National Railway. The crash types, locations, and injury numbers along Wilmington-Peotone Road are described below.

Wilmington-Peotone Road Crash Types

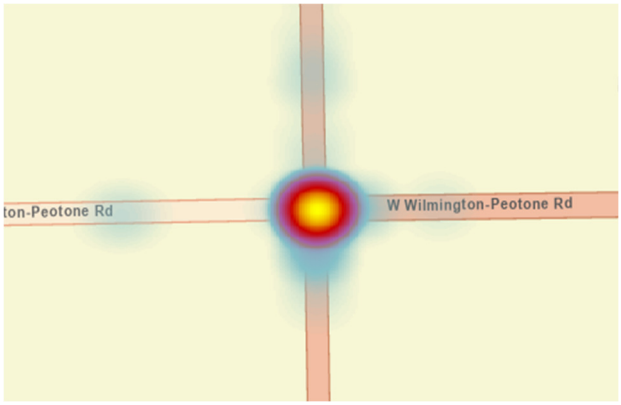
Wilmington-Peotone Road experienced 357 crashes during the study period. The crashes that occurred on Wilmington-Peotone Road are modeled by crash type in **Figure 11**. The most common crash types were front to rear (24% of crashes), followed by turning (18% of crashes), angle (16% of crashes), and fixed object (11% of crashes).

Figure 11: *Wilmington-Peotone Road Crashes by Type*



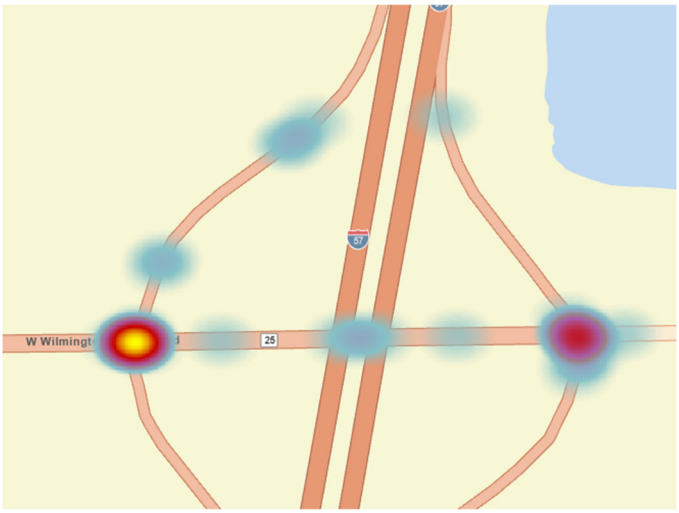
Wilmington-Peotone/US 45 Intersection Hot Spot Analysis

Figure 12: US Route 45 and Wilmington-Peotone Road Crash Hot Spot



Seventy-one (71) crashes occurred at the intersection of US Route 45 and Wilmington-Peotone Road during the study period, the most of any other intersection or interchange along the corridor. This is consistent with the IDOT safety tiers being the only intersection identified as "Critical." Three of these crashes resulted in incapacitating injuries, due to an angle crash, fixed object crash, and front to rear crash. The intersection of Wilmington-Peotone Road and US Route 45 is displayed in **Figure 12**. Rear end crashes were most common (51% of crashes), followed by angle (32% of crashes) and turning (7% of crashes). This location is a four-way stop-controlled intersection with no turn lanes. As noted previously, the conflict points present at intersections can present safety concerns which can result in angle and turning crashes. A look at the existing traffic patterns through this area will be used in conjunction with this crash analysis to determine how best to address the safety concerns at this intersection. The potential to eliminate points of conflict or provide a signalized intersection could help to improve the flow of traffic through this area. Given the high number of crashes at this location and "critical" safety tier classification, the intersection of Wilmington-Peotone Road and US 45 will be a point of focus when developing alternatives to provide safety improvements.

Figure 13: IL-57 and Wilmington-Peotone Road Crash Hot Spot



Wilmington-Peotone/I-57 Interchange Hot Spot Analysis

A high number of crashes were also observed at the I-57 and Wilmington-Peotone Road interchange. This interchange is a diamond interchange with unsignalized ramp terminals and can be seen in **Figure 13**. Wilmington-Peotone Road is a two-lane intersection with no turn lanes present through the interchange. There were 42 crashes at this interchange, one of which resulted in an incapacitating injury crash. Turning crashes were most common (29% of crashes), followed by rear end (24% of crashes), fixed object (19% of crashes), and angle (12% of crashes). Similar to the I-55 interchange, Wilmington-Peotone Road is on a vertical curve over I-57. There is also a high volume of trucks using this interchange. The increased number of conflicts at the intersections combined with the reduced sight lines around large trucks could be contributing to the turning and rear end crashes through the I-57 interchange.

Wilmington-Peotone Road / IL 50 Intersection

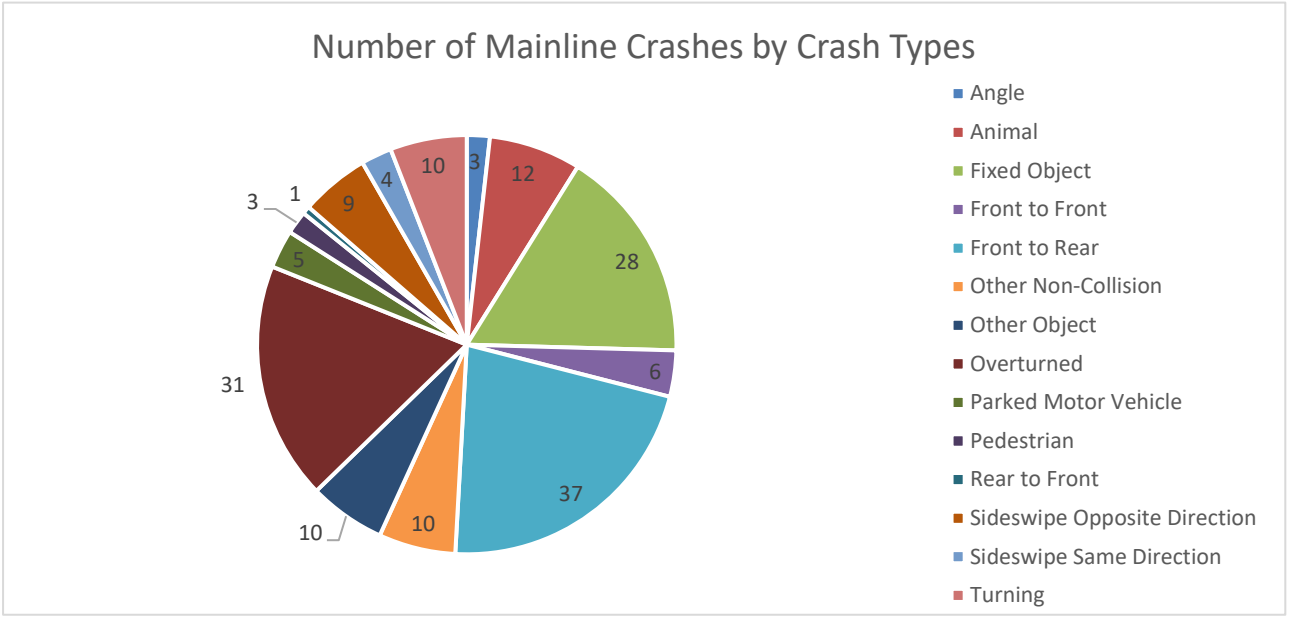
The Wilmington-Peotone Road and IL 50 intersection is included in the IDOT 2020 safety tiers as a "high" intersection location. The intersection is a four-way stop controlled, skewed intersection. IL 50 includes a four-lane cross-section with no turn lanes. Wilmington-Peotone Road is a single lane in either direction with turn lanes. **Figure 14** shows the existing intersection configuration. Seventeen (17) crashes were recorded at this intersection within the study period; the majority being property damage crashes but four included B-injuries. While this is less than the previously identified hot spot locations, a closer look was done at this intersection due to the "high" IDOT safety tier identification. Consistent with the rest of the corridor, rear ends were the most common crash type followed by turning and fixed object crashes. The skew of the intersection combined with the high number of lanes present at the stop controlled intersection could be contributing to crashes in this location and the IDOT safety tier "high" classification.

***Figure 14**: IL 50 and Wilmington-Peotone Road*

Wilmington-Peotone Road Mainline Crashes

While many of the hot spot locations are intersection-related, almost half (169) of the crashes along Wilmington-Peotone Road occurred outside of intersection locations. The crash types are displayed in **Figure 15**.

***Figure 15:** Mainline Non-Intersection Related Crashes by Crash Type*



Rear end crashes made up the largest proportion of the mainline non-intersection related (22% of crashes), followed by overturned (18% of crashes), and fixed object (17% of crashes). Rear end crashes are the leading crash type for overall crashes and non-intersection-related mainline crashes. Many of the mainline rear end crashes, 28 of the 37, were located near intersections, so could be intersection related crashes despite not being located within the intersection functional area. Rear ends tend to occur in areas where there is congestion or unexpected stopping. With minimal shoulders throughout the area, there are few refuge areas for users in situations of need. Almost half of the fixed object crashes are not intersection-related and occur on the mainline, four of which resulted in a fatality. An evaluation of the clear zone can be done to determine how to best reduce the occurrence of fixed object crashes. The addition of shoulders and potentially rumble strips could also help to alert drivers when they are getting close to leaving the roadway. Nearly all the overturned vehicle crashes occurred on the mainline, sporadically located throughout the corridor, and resulted in three incapacitating injury crashes. Of the overturned crashes that occurred on the mainline, four occurred in dark conditions, 11 occurred in weather that was not clear, and 12 of the overturn crashes occurred in road surface conditions that were not dry. Overturning crashes can occur on a segment of high-speed roadway when a driver over-corrects and runs off the road, especially if the side slope is not forgiving. The shoulder width is only several feet for most of Wilmington-Peotone Road, not leaving much room for correction maneuvers at the posted speeds. Seeing how much of Wilmington-Peotone Road is a passing zone, overturns may be related to incorrect judgement of passing distance or passing speeds.

Wilmington-Peotone Road Fatalities and Severe Injuries

The relationship between crash type and crash severity was observed in **Table 4**. Out of the eight fatal crashes, seven occurred on Wilmington-Peotone Road. Three fatalities were due to angle crashes, two fatalities were due to fixed object crashes, and two fatalities were due to pedestrian crashes. Angle crashes resulted in the greatest portion of the injury crashes and fatal crashes on Wilmington-Peotone Road. Angle crashes were frequently located at intersections, indicating countermeasures such as intersection control, alternative intersections, signing, and pavement marking considerations. Out of the angle crashes on Wilmington-Peotone Road at intersections, 52% of the crashes occurred at intersections without left turn lanes. Incapacitating injuries compromised 18 of the crashes on Wilmington-Peotone Road.

***Table 4**: Wilmington-Peotone Road Crash Type and Severity*

Crash Type	Number of Injury and Fatal Crashes	Number of Injuries	Number of Fatalities	% of Injury and Fatal Crashes
Angle	27	42	3	25%
Fixed Object	13	11	4	12%
Front to Front	7	15	0	6%
Front to Rear	20	28	0	18%
Other Non-Collision	4	4	0	4%
Other Object	1	1	0	1%
Overturned	17	19	0	15%
Parked Motor Vehicle	1	1	0	1%
Pedestrian	1	2	2	1%
Sideswipe Opposite Direction	1	2	0	1%
Sideswipe Same Direction	1	1	0	1%
Turning	17	21	3	15%
Grand Total	**110**	**147**	**9**	

The incapacitating injury crashes were mostly due to angle and turning crashes. The locations of the incapacitating injuries are displayed in **Figure 16** several of which occurred at the hot spots. The fatal crashes were compromised of angle, fixed object, and pedestrian; half of these included a drug-impaired driver. While this is outside of a designer's control, a closer look at the locations and types of crashes could reveal potential improvements to reduce the occurrence of these severe crashes. The fatal crashes were located sporadically along the corridor, but improvements that could result in a reduction in angle and fixed object crashes will be prioritized in an effort to eliminate or reduce crashes involving severe injuries in the future. These will include alternatives that improve traffic flow/traffic control at intersections or reduce points of conflict for angle crashes. Additionally, the addition of shoulders and a detailed clear zone analysis could minimize the presence of fixed object crashes. The pedestrian crashes did not occur at the crossing with the Wauponsee Trail and occurred close to midnight; with no current pedestrian accommodations near the crash report, high speeds, and no lighting along the corridor it is assumed this was an unusual occurrence but with the information available it is difficult to determine the exact cause of these crashes. The fatal injuries are displayed in **Figure 17.**

***Figure 16**: Wilmington-Peotone Road Incapacitating Injury Crash Locations*

***Figure 17:** Wilmington-Peotone Road Fatal Injury Crash Locations*

CONTRIBUTING FACTORS

Contributing factors are documented in police reports or insurance claims and include attributes that were present during the crash that may have increased the likelihood of the crash occurring. Contributing factors are often related to distracted driving, driving under the influence, weather, speeding, failure to comply with traffic control devices, and improper turns. Road conditions were also analyzed as they can be large factors in contributing to crashes.

Lighting

The first condition analyzed was lighting. The lighting indicates the amount of natural light present during the time of the crash, and if there was street lighting present. Daylight conditions were present for 69% of crashes. Dark conditions were present for 21% of total crashes. Dark conditions with street lighting made up 4% of crashes, dawn lighting made up 4% of crashes and dusk lighting was present for 2% of crashes. With the vast majority of crashes occurring during daylight conditions, it is not assumed to be a major contributing factor to safety concerns along the corridor. With environmental resources in the western portion of the project and a significant amount of agricultural land use, the addition of lighting throughout will also likely not be a desirable solution as it could impact the context and resources in the area.

Weather

Overall crashes were analyzed for weather conditions. Most crashes (74% of crashes) occurred in clear weather conditions, followed by rainy conditions (11% of crashes), snow (8% of crashes), cloudy/overcast (3% of crashes), fog/smoke/haze (2% of crashes), severe cross wind (1% of crashes), sleet/hail (1% of crashes), and less than 1% of other weather conditions, blowing snow and freezing rain conditions. Given the majority of crashes occurred in clear conditions, weather does not seem to be a primary cause of crashes.

Road Surface

Most of the crashes occurred on dry roads (71% of crashes), followed by 18% of crashes that occurred on wet roads, 6% of crashes occurred on snow or slushy roads, 5% of crashes occurred on icy roads and less than 1% of crashes occurred on roads of other conditions. With a majority of crashes occurring on dry roads in clear weather conditions, it is likely that the traffic conditions, rather than pavement conditions, are a primary cause of crashes in the corridor.

CONCLUSIONS

From the 535 crash reports within the project limits over the 5 years from 2018 to 2022, there are some trends that can be seen throughout the corridor. Rear ends were the most common at both intersections and along the mainline. This can be common at intersections that experience congestion or where there is unexpected stopping as well as along corridors that lack channelization. Semi-trucks were involved in 20% of all crashes, most often being rear end and turning. The presence of trucks and large farm equipment could be contributing to rear end crashes, with vehicles behind large trucks unable to see what is occurring in front of them. Fixed object crashes were also prevalent along the corridor and contributed to a high number of injury crashes. With minimal shoulders through the majority of the corridor, the tight roadway can be unforgiving to vehicles when they do not have time to stop and there is no shoulder to provide a refuge which could be contributing to both rear end and fixed object crashes.

Finally with a high number of angle and turning crashes, the numerous unsignalized and signalized intersections will be evaluated; potential alternatives will look for opportunities to reduce the number of conflict points or provide improvements to traffic flow and control. Several hot spot locations identified include: the Wilmington-Peotone Road and US Route 45 intersection experienced the largest number of crashes, followed by the I-55 and River Road interchange, River Road/IL 53 intersection, IL 53/Wilmington-Petone Road intersection, and I-57 and Wilmington-Peotone Road interchange. These areas will be a focus of potential improvements to provide the most benefit from potential improvements along the corridor.

Exhibit 5C: Design Criteria and Assumptions

BURNS McDONNELL

WILMINGTON PEOTONE PEL Study

SUMMARY OF DESIGN CRITERIA

River Road, Illinois Route 53 (IL 53), and Wilmington-Peotone Road are Strategic Regional Arterials (SRA). The design criteria are based on SRA criteria, where applicable. The existing posted and design speed is 55 mph along River Road and IL 53. Wilmington-Peotone Road has two separate design speeds: from IL 53 to 88th Avenue and from 88th Avenue to Drecksler Road where the roadway enters the Village of Peotone. The posted and design speed east of 88th Avenue is 55 MPH; to the west the posted speed will be dropped to 40 MPH and the design speed will be 45 MPH. Relevant design criteria from the Will County Division of Transportation (WCDOT), IDOT Bureau of Design and Environment (BDE) Design Manual, and IDOT Bureau of Local Roads and Streets (BLR) Design Manual, are summarized below:

I. Basic Design Controls		Source
a. Roadway Classification		
• River Rd	Strategic Regional Arterial	Chapter 46
• IL 53	Strategic Regional Arterial	
• Wilmington-Peotone Rd.	Strategic Regional Arterial	
b. Design Forecast Year	2050	BDE 31-4.02
c. Level of Service	C	BDE Fig. 46-4.C
d. Design Speed:		WCDOT
• River Rd.	55 mph	
• IL 53	55 mph	
• Wilmington-Peotone Rd. (IL 53 to west of 88th Ave.)	55 mph	
• Wilmington-Peotone Rd. (west of 88th Ave. to Drecksler Rd.)	45 mph	
e. Design Vehicle	WB-65	BDE Fig. 36-1.V

II. CROSS SECTION ELEMENTS		
a. Traveled Way Pavement Widths		BDE 34-2.01
• River Road	12 ft desirable	
• IL 53		
• Wilmington-Peotone Road		
b. Median Width		BDE 47-2.J
• River Rd.	N/A	
• IL 53	N/A	
• Wilmington-Peotone Rd. (IL 53 to west of 88th Ave.)	N/A	
• Wilmington-Peotone Rd. (west of 88th Ave. to Drecksler Rd)	Flush: 14'	
c. Shoulder		
• Width	10’ paved	BDE 34-2.02
• Auxiliary/Passing	4' paved	BDE 47-2.J

III. PASSING LANES		
a. Passing Lane Widths • Traveled Way	12'	BDE 47-2.04(C)
b. Taper • Entrance • Exit	25:1 taper 50:1 taper	BDE 47-2.04(C)
c. Length	0.5 - 1 miles	BDE 47-2.04(C)
d. Spacing	3-10 miles	BDE 47-2.04(C)

IV. HORIZONTAL ALIGNMENT		
a. Maximum superelevation rate • River Rd • IL 53 • Wilmington-Peotone Rd.	E_{max} =6%	BDE Fig. 32-3.A
b. Minimum Curve Radius (e_{max} = 6% and V = 55 mph) • River Rd • IL 53 • Wilmington-Peotone Rd. (IL 53 to west of 88th Ave.)	1060’	BDE Fig. 32-2.E
(e_{max} = 6% and V = 45 mph) • Wilmington-Peotone Rd. (west of 88th Ave. to Drecksler Rd)	643’	BDE Fig. 32-2.E
c. Horizontal Curve Approaching Intersection	20 mph less than design speed	BDE 36-1.05(b)

V. VERTICAL ALIGNMENT		
a. Minimum Grade • Uncurbed Pavements	Minimum = 0.00% (with adequate cross slope) Desirable = 0.50%	BLRS 30-1.02
b. Maximum Grades • Level • Rolling	+/- 3.0% +/- 4.0%	BDE Fig. 46-4.D

VI. INTERSECTIONS		
a. Turn Lanes		
• Width	Desirable = 12’ minimum = 11'	BDE 36-3.02
• Length of Taper		
■ V = 45 mph	200'	BDE Fig. 36-3.I
■ V = 55 mph	240'	
• Deceleration Lane		
■ large number of truck turn movements	500' for V= 45mph 625' for V= 55mph	BDE 36-3.02 (b)2.f
b. Turning Roadways		
• Width (Case I)	18' (R=300')	BDE Fig 36-2.I
• Length of Taper		
■ V = 45 mph	200'	BDE Fig. 36-3.I
■ V = 55 mph	240'	

VII. INTERCHANGES		
a. Design Speed (Current Posted Speed)		
• I-55	75 mph	BDE Fig. 44-5.A
• I-57	75 mph	
• Interchange ramps	55 mph [desirable]/ 40 mph [minimum]	BDE Fig. 37-4.E
■ Ramp portion approaching controlled terminal	desirable = 30 mph minimum = 25 mph	BDE Fig. 37-4.E / 37-3.02(d)
• Loop Ramps	30 mph	BDE Fig. 37-4.E
b. Minimum curve radius		
• Interchange Ramps		
■ e_{max} = 6% and V= 55 mph (BDE Fig. 37-6.G)	1060'	
■ e_{max} = 6% and V= 50 mph (BDE Fig. 37-6.G)	833'	BDE Fig. 32-3.C
■ e_{max} = 6% and V= 40 mph (BDE Fig. 37-6.G)	643'	
• Loop Ramps		
■ e_{max} = 6% and V= 30 mph	231'	BDE Fig. 32-3.C
c. Ramp Superelevation	E_{max} =6%	BDE Fig. 32-3.A
d. Ramp Maximum Grades	+4%, -6%	BDE 37-4.08(a)
e. Ramp Traveled Way Width	16' (one lane)	BDE 37-4.06
f. Ramp Shoulder Width		
• Left Shoulder	6'	BDE 37-4.06
• Right Shoulder	8'	
g. Ramp Taper		
• Standard Exit ramp	min. length = 360'	BDE Fig. 37-6.A
• Standard Entrance Ramp	min. length = 950'	BDE Fig. 37-6.K

VII. INTERCHANGES (CONT.)		
h. Gore Width • Exit Ramp ■ Physical Nose ■ Gore Nose (10' mainline shoulder)	 6'-4" 20'-2 3/4"	 BDE Fig. 37-6.H
• Entrance Ramp ■ Physical Nose ■ Gore Nose (10' mainline shoulder)	 4'-0" 2'-0"	 BDE 37-6.02(e)

VIII. STATIONING		
a. Mainline	Match Existing	
b. Ramps	Direction of travel	

Exhibit 5D: Drainage Design Criteria

BURNS McDONNELL

WILMINGTON PEOTONE
PEL Study

DRAINAGE DESIGN CRITERIA		
Hydrology		
CRITERIA	**STANDARD**	**SOURCE**
Conveyance Systems (Ditches and Storm Sewers)	Rational Method for Tributary Area ≤ 20 acres; NRCS Method for Tributary Area > 20 acres	WCSTGM, T202.5
Detention Systems	NRCS Method Modified Rational Method (1.3 Multiplier required)	WCSTGM, T203.2
Climatic Section	North East Climatic Section Data	WCSTGM, T202.6
Rainfall Data	Bulletin 75	ISWS
Run-off coefficients	Table H1, Appendix H	WCSTGM, Appendix H
Curve Numbers	TR-55 Manual	WCSTGM
Cross-Road Culverts		
CRITERIA	**STANDARD**	**SOURCE**
Design Storm Frequency	50-year	Will County
Min. Culvert Size	Entrances: 15 in Roadways except arterials: 18 in Arterials: 24 in	Figure 40-3.c IDOT BDE Manual
Min. Culvert Class	Class A	Figure 40-3.a IDOT BDE Manual
Min. Depth of Cover	12" between top of pipe and bottom of pavement subbase	38-3.02 IDOT BLR
Freeboard	3' from Design Headwater to lowest pavement elevation (50-yr) Below edge of shoulder (100-yr)	1-305 IDOT Drainage Manual
Floodplain Fill	Compensatory storage required	WCSTGM
Software	HY-8	Will County
Roadside Ditches		
CRITERIA	**STANDARD**	**SOURCE**
Design Storm Frequency	50-Year	38-1.02 IDOT BLR
Roadside Ditch Lining Design Storm Frequency	10-year	38-1.02 IDOT BLR
Depth	3 feet	38-1.03 IDOT BLR
Shape	Trapezoidal, min. 2 ft bottom V ditches not permitted on County highways	38-1.03 IDOT BLR
Slope Grades	4:1 Foreslope 3:1 Backslope	Will County
Freeboard	1 ft. below shoulder of roadway (for 50 year) No Overtopping (100-Year)	9-403 IDOT Drainage Manual
Min. Grade	0.3% min; 0.5% preferred	9-302 IDOT Drainage Manual
Ditch Lining	Based on max. permissible velocities	Figure 38-1C IDOT BLR
Maximum Permissible Velocities	As listed in IDOT BLR Manual, Figure 38-1C	Figure 38-1C IDOT BLR
Hydraulics	Manning's equation	WCSTGM T202.3
Storm Sewer		
CRITERIA	**STANDARD**	**SOURCE**
Design Storm Frequency	10-Year (Full gravity flow)	WCSTGM T202.2
Min. Velocity	3 ft/sec (preferred)	WCSTGM T202.2 Chapter 8 IDOT Drainage Manual
Max. Velocity	10 ft/sec	Chapter 8 IDOT Drainage Manual
Min. Separation from a Water Mains	10' Horizontal 18" Vertical (if Water Main above) If water main below, use water main quality storm sewer or encase in water main quality casing	Standard Specifications for Water and Sewer Construction in Illinois
Min. Pipe Size by Roadway Class (Mainline- highway)	15" (Mainline- highway) 12" (Mainline-arterial) 12" (Lateral-highway)	Chapter 8 IDOT Drainage Manual 38-2.04 IDOT BLR Chapter 8 IDOT Drainage Manual 38-2.04 IIDOT BLR
Min. Storm Sewer Class	Class A	Chapter 8 IDOT Drainage Manual
Min. Depth of Cover	3 ft. minimum 12" min. between bottom of sub-base and crown of pipe	WCSTGM T202.2 8-008.08 IDOT Drainage Manual
Manhole spacing	300 ft (10"-24" Pipes) 400 ft (27"-36" Pipes) 500 FT (42"-54" Pipes) 1000 ft (60"+ Pipes)	8-101.02 IDOT Drainage Manual
Manhole drop	Maximum 24" drop without a drop structure	IL Admin Code 35 Section 370.330

Storm Sewer - Inlets		
CRITERIA	**STANDARD**	**SOURCE**
Design Storm Frequency	10-Year	Table 1-305 IDOT Drainage Manual
Sag inlet requirements	One flanking inlet on each side of sag Distance according to table 8-203.01	8-203 IDOT Drainage Manual
Max. Inlet spacing on continuous grade	250 ft	8-203 IDOT Drainage Manual
Enroachment	No encroachment (Sections with full shoulders (6 ft. or more)	38-2.09 IDOT BLR
Detention		
CRITERIA	**STANDARD**	**SOURCE**
Requirement Threshhold	Required if >2 acres of new impervious area. Area must be continuous	WCSTGM, T200.2
Release Rate	100-year: Max 0.15 cfs/acre of new impervious area 2-year: Max 0.04 cfs/acre of new impervious area	WCSTGM T203.1
Design Storm	24-hour duration; 100-year storm Antecedent moisture condition = 2 Bulletin 75 Distribution	WCSTGM T203.2, ISWS
Orifice/Restrictor Size	Minimum: 4" Diameter	Will County
Depressional Storage	Filled depressional storage must be compensated for at a 1:1 ratio in addition to detention and incremental.	WCSTGM T201.7
Local Ordinances	Local Ordinance requirements are considered as long as ROW acquisition or pipe sizes are reasonable. WCSO should be followed unless ROW acquisitionor pipe sizes are unreasonable. Combination of WCSWO and IDOT methodology may be utilized at the County's discretion. A volume comparison may be required.	Will County
Detention Pond Grading	Pond bottom shall have a 1% slope across to outlet	Will County
Bridge Deck Drainage		
CRITERIA	**STANDARD**	**SOURCE**
Design Storm Frequency	10-Year, 5 minute (Bulletin 75)	Will County
Encroachment	1 ft (Design speed > 50 mph) 3 ft (Design speed < 50 mph)	IDOT Bridge Manual 2.3.6.1
Floor Drains	15 ft spacing when the longitudinal grade is <0.50% Note: Longitudinal grade less than 0.5% will require a design exception.	IDOT Bridge Manual 2.3.6.1
Waterway Openings		
CRITERIA	**STANDARD**	**SOURCE**
Design Storm Frequency	50-year	Will County
Freeboard	3' from Design Headwater to lowest pavement elevation (50-yr) Below edge of shoulder (100-yr)	1-305 IDOT Drainage Manual
Clearance	Minimum 1' Above Design High-Water Elevation	Figure 36-5B IDOT BLR
Permitting	IDNR Part 3708 & 3700 (non-designated floodway zone)	7.2.01 IDOT BLR
Field Tiles		
CRITERIA	**STANDARD**	**SOURCE**
Tile within ROW	Replace existing field tile with concrete pipe	Will County
Observation Structures	Install at ROW line	Will County

Sources:
1) IDOT Drainage Manual. July 2011.
2) IDOT Bureau of Design and Environment Manual. Revised February 2023.
3) IDOT Bureau of Local Roads and Streets Manual. Revised December 2018.
4) Will County Stormwater Technical Guidance Manual. Revised August 25, 2010.
5) IDOT Bridge Manual. January 2023
6) Standard Specifications for Water and Sewer Construction in Illinois
7) Illinois State Water Survey, Precipitation Frequency Study for Illinois, Bulletin 75, March 2020

Exhibit 5E: Geometric Review of Existing Alignment

BURNS McDONNELL

BURNS McDONNELL

Technical Memorandum

Date: June 14, 2024

To: Christina Kupkowski, WCDOT

From: Burns & McDonnell

Project: Wilmington-Peotone PEL Study

Subject: Geometric Review of Existing Alignment

1. Introduction

The purpose of this technical memorandum is to evaluate the existing alignment of River Road, Illinois Route 53 (IL 53), Wilmington-Peotone Road, the Interstate 57 (I-57) interchange ramps, and the Interstate 55 (I-55) interchange ramps and identify substandard geometric elements within the Project between I-55 in Wilmington, IL and Drecksler Road in Peotone, IL.

2. Design Criteria

The IDOT Bureau of Design and Environment (BDE) and Bureau of Local Roads and Streets (BLRS) manuals were used to establish the design criteria for the design of the Wilmington-Peotone PEL Study. The design criteria used to evaluate the geometric design is included at the end of this memo as **Attachment A**.

There are two design speeds along the roadways within the Project corridor:

- **45 mph** – Wilmington-Peotone Road (From West of 88th Avenue to Drecksler Road.)
- **55 mph** – River Road, IL 53, Wilmington-Peotone Road (From IL 53 to west of 88th Avenue.)

Geometric elements that have been reviewed include:

- Horizontal Alignment
- Vertical Alignment
- Cross Sectional Elements

This technical memorandum includes a high-level evaluation of the existing geometry and identifies substandard elements. Horizontal and vertical alignments were created using existing plans, as available, and recently obtained aerial photos and topographic survey information as part of this evaluation.

Substandard elements are listed in blue throughout this memorandum.

3. Horizontal Alignment

Evaluated horizontal alignment design elements include curve radius, curve length, and superelevation. IL 53 does not contain curved alignment sections within the project corridor and was not evaluated. The right edge of the ramp traveled way was used for the horizontal baseline of the I-55 and I-57 interchange ramps.

A. Wilmington-Peotone Road

Existing plans were used where available along Wilmington-Peotone Road, the majority of the alignment information has been determined using aerial and topographic survey information. A 6% max superelevation rate and 55 mph design speed were used to evaluate the curve radii along Wilmington-Peotone Road. All curves meet the minimum required length and maximum superelevation criteria. There are two horizontal curve elements near Old Chicago Road that do not meet 55 mph criteria for minimum radius. Despite the proximity to the intersection, the curve radii must meet the minimum requirement for a 55 mph design speed since the mainline is not stop controlled.

Table 1: Horizontal Curve Elements - Wilmington-Peotone Road

Curve #	PC Station	PT Station	e (%)	Radius (ft.)	Min. Required Radius (ft.)	Min. Radius for 50 mph (ft.)	Length (ft.)	Min. Required Length (ft.)
WPR1	147+15.17	157+39.78	2.20%	6,031.14	6,110’	5,100’	1025	1025.0
WPR2	159+67.96	169+90.80	2.00%	6,510.89	6,820’	5,700’	1023	1023.0

B. River Road

A 6% max superelevation rate and 55 mph design speed were used to evaluate the curve radii along River Road. All curves meet the minimum required length. Three (3) curves contain a 7% superelevation rate, which exceeds the maximum 6% rate. The curve through the I-55 interchange area along River Road does not meet the minimum radius.

Table 2: Horizontal Curve Elements – River Road

Curve #	PC Station	PT Station	e (%)	Radius (ft.)	Min. Required Radius (ft.)	Length (ft.)	Min. Required Length (ft.)
RR1	37+89.47	58+12.42	2.60%	2,546.48	5,020’	1594	1593.7
RR2	16+61.45 R2	23+05.31 R2	4.20%	3,819.71	2,590’	653	653.0
RR3	47+59.48 R2	72+88.52 R2	7.00%	2,291.83	**1,480’	2529	2528.0
RR4	114+35.95 R2	143+06.68 R2	7.00%	2,291.83	**1,480’	2873	2871.2
RR5	150+30.83 R2	178+27.04 R2	7.00%	2,291.83	**1,480’	2797	2795.9

** Minimum required radius based on an 8% max superelevation rate and 55 mph design speed

C. I-55 Interchange

No existing plans for the I-55 ramps were available; curve radii along the ramps were evaluated using a 6% max superelevation rate and 30 mph design speed for loop ramps, and 40 mph for standard ramps. Two (2) curves along the NB entrance ramp and 2 curves along the SB exit ramp do not meet the minimum radius. One (1) curve along the NB exit loop ramp and 1 curve along the SB entrance loop ramp do not meet the minimum radius. The advisory posted speed limit for the NB exit ramp is 25 mph. All curves along the loop ramp meet the minimum radius for a 25 mph design speed.

Table 3: Horizontal Curve Elements – I-55 Ramps

Curve #	PC Station	PT Station	e (%)	Radius (ft.)	Min. Required Radius (ft.)	Length (ft.)
NB Entrance						
55_NBEnt_1	3+30.62	5+65.86	6.00%	485	485’	23
55_NBEnt_2	7+39.1	11+09.62	6.00%	440	485’	35
55_NBEnt_3	13+84.85	17+37.55	6.00%	430	485’	348
NB Exit						
55_NBEx_1	0+00.00	2+20.69	6.00%	485	231’	213
55_NBEx_2	2+20.69	4+08.89	6.00%	240	231’	204
55_NBEx_3	4+08.89	6+58.	6.00%	145	231’	240
55_NBEx_4	8+02.85	10+31.07	6.00%	448	231’	228
SB Entrance						
55_SBEnt_1	5+62.44	9+09.48	6.00%	157	231’	347
55_SBEnt_2	9+09.48	11+19.86	6.00%	327	231’	211
SB Exit						
55_SBEx_1	+73.54	3+71.79	6.00%	445	485’	321
55_SBEx_2	6+22.47	9+69.18	6.00%	442	485’	347

D. I-57 Interchange

No existing plans for the I-57 ramps were available to determine the existing superelevations along the ramps; curve radii along the ramps were evaluated using a 6% max superelevation rate and 40 mph design speed. One (1) curve along the NB exit ramp, 1 curve along the SB entrance ramp, and 1 curve along the SB exit ramp do not meet the minimum radius.

Table 4: Horizontal Curve Elements – I-57 Ramps

Curve #	PC Station	PT Station	e (%)	Radius (ft.)	Min. Required Radius (ft.)	Length (ft.)
NB Entrance						
57_NBEnt_1	4+61.63	8+84.2	6.00%	665.00	485’	423
NB Exit						
57_NBEx_1	1+86.81	6+37.06	6.00%	725	485’	450
57_NBEx_2	8+97.98	11+26.3	6.00%	423	485’	228
SB Entrance						
57_SBEnt_1	1+23.57	3+35.11	6.00%	443	485’	212
57_SBEnt_2	6+06.63	10+53.87	6.00%	671	485’	447
SB Exit						
57_SBEx_1	1+25.53	5+41.61	6.00%	693	485’	416
57_SBEx_2	8+00.28	10+38.25	6.00%	433	485’	238

4. Vertical Alignment

Evaluated vertical alignment design elements include curve length, stopping sight distance (SSD), and maximum grade. The minimum curve length used to evaluate the existing alignment varies based on the design speed and is equal to 3V, where V equals the design speed in mph (BDE Eqn. 32-4.1). K Values were evaluated to determine if the minimum SSD is met along each curve. BDE Fig. 33-4.E and BDE Fig. 33-4.F were used to determine minimum K Values for sag vertical curves, and BDE Fig. 33-4.A and BDE Fig. 33-4.B were used to determine minimum K Values for crest vertical curves. A maximum grade of +/-3% was used in evaluating the existing grades along Wilmington-Peotone Road, IL 53, and River Road. Maximum grades of +4% and -6% were used to evaluate the existing grades along the I-55 and I-57 interchange ramps.

A. Wilmington-Peotone Road

Given the length of the segment, the complete vertical curve data for Wilmington-Peotone Road is included in **Attachment B**. The profile was evaluated using the maximum 3% grade for level terrain since the majority of the corridor is located within level terrain; however, there are portions of the corridor with more rolling terrain. Nine segments of Wilmington-Peotone Road exceed the maximum grade requirement. There are 11 curves which do not meet the minimum curve length and 23 curves which do not meet the minimum SSD. The majority of these deficient curves and grades are localized in three portions of the corridor: between Riley Road and Indian Trail Road, Cedar Road and Elevator Road, and 120th Ave and Center Road.

B. IL Route 53

All curves and grades along IL 53 within the project corridor meet the design criteria for a 55 mph design speed as can be seen in **Table 5** to the right.

Table 5: Vertical Curve Elements – IL 53

55 mph Design speed K_{min} crest = 114, K_{min} sag = 115							
VPI STA.	Grade	Length (ft.)	K Value	VPI STA.	Grade	Length (ft.)	K Value
	-0.02%				0.05%		
445+250		300	782	484+1200		300	2034
	-0.41%				-0.10%		
450+4500		200	218	487+5500		300	863
	0.51%				0.25%		
462+7500		200	467	492+8000		300	931
	0.08%				0.57%		
466+5000		170	231	499+6500		800	953
	-0.65%				-0.27%		
471+7500		250	250	509+9000		400	1426
	0.35%				0.01%		
473+85.00		170	358	522+1000		300	670
	-0.13%				0.46%		
478+2000		350	1946	526+5500		250	325
	0.05%				-0.31%		

C. River Road

The vertical alignment information for River Road can be seen in **Table 6**. All curves meet the minimum required length. One (1) curve does not meet the minimum SSD; the sag curve is located east of the I-55 interchange which contains a K Value of 82. Two segments of River Road exceed the maximum grade requirement at the I-55 interchange.

Table 6: Vertical Curve Elements – River Rd.

55 mph Design speed K_{min} crest = 114, K_{min} sag = 115							
VPI STA.	**Grade**	**Length (ft.)**	**K Value**	**VPI STA.**	**Grade**	**Length (ft.)**	**K Value**
	4.55%						
50+00.00		1120	127		-0.15%		
	-4.24%			79+00.00 R2		600	2222
59+07.78		380	82		0.12%		
	0.39%			119+00.00 R2		400	606
15+44.71 R2		400	528		0.78%		
	-0.37%			125+48.40 R2		500	505
23+30.56 R2		1100	724		-0.21%		
	1.15%			130+69.79 R2		300	698
31+50.00 R2		500	523		0.22%		
	0.19%			144+43.63 R2		400	1000
42+67.86 R2		500	343		0.62%		
	1.65%			150+20.00 R2		600	531
51+50.00 R2		1200	857		-0.51%		
	0.25%			165+43.63 R2		500	1087
71+00.00 R2		400	1000		-0.05%		
	-0.15%			194+64.69 R2		800	2202

D. I-55 Interchange Ramps

Existing profiles along the I-55 interchange ramps were developed using topographic survey information. None of the interchange ramps exceed the maximum grade requirements. Three (3) curves along the I-55 interchange ramps do not meet the minimum SSD all of which are the final curves approaching the River Road intersection. The I-55 interchange ramp profiles can be found in **Table 7**.

Table 7: Vertical Curve Elements – I-55.

SB Exit Loop				NB Exit Loop			
Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value	Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value
	0.91%				-0.80%		
0+64.98		120	39	1+84.57		200	113
	-2.16%				0.97%		
2+38.07		50	39	7+45.38		150	124
	-0.87%				2.18%		
3+21.46		50	133	10+65.50		200	118
	-1.24%				3.87%		
5+19.42		100	166	12+75.48		80	12
	-0.64%				-2.62%		
9+64.21		100	346				
	-0.35%						
10+71.56		50	346				
	-0.50%						

SB Entrance Ramp				NB Entrance Ramp			
Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value	Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value
	-0.44%				3.31%		
3+39.86		120	166	0+45.00		60	9
	0.28%				-3.33%		
5+71.38		100	351	2+06.76		180	153
	0.57%				-2.15%		
7+99.67		100	326	5+08.26		220	110
	0.26%				-0.15%		
13+25.53		82	37	16+17.34		240	204
	2.47%				1.03%		
14+05.22		50	17				
	-0.55%						

E. I-57 Interchange Ramps

Existing profiles along the I-57 interchange ramps were developed using topographic survey information. None of the interchange ramps exceed the maximum grade requirements and all vertical curves meet criteria for curve length and stopping sight distance. The I-57 interchange ramp profiles can be found in **Table 8**.

Table 8: Vertical Curve Elements – I-57.

SB Exit Ramp				NB Exit Ramp			
Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value Used	Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value Used
	-1.80%				0.14%		
0+74.66		150	182	3+93.07		300	161
	-2.62%				2.00%		
2+61.44		100	91				
	-3.72%						
6+22.49		350	63				
	1.86%						
9+37.72		100	283				
	2.22%						
SB Entrance Ramp				**NB Entrance Ramp**			
Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value Used	Approx. VPI STA.	Approx. Grade	Approx. Length (ft)	K Value Used
	-2.02%				-0.50%		
2+14.83		250	127	0+60.00		120	79
	-3.99%				-2.02%		
6+17.50		400	87	4+05.87		290	69
	0.62%				2.21%		
10+12.52		200	185				
	-0.46%						

5. Cross Sectional Elements

Evaluated cross sectional elements include traveled way and shoulder widths. A traveled way width of 12' and minimum outside shoulder width of 10' were used in evaluating Wilmington-Peotone Road, IL 53, and River Road. A traveled way width of 16', minimum lefthand paved shoulder width of 4', and minimum righthand paved shoulder width of 6' were used in evaluating the I-55 and I-57 interchange ramps.

Wilmington-Peotone Road

The majority of the corridor includes two 11' lanes and 4' aggregate outside shoulders. The existing traveled way and outside shoulder widths do not meet the specified criteria.

Illinois Route 53

IL 53 includes two 12' lanes and 8' paved outside shoulders within the project corridor. The existing outside shoulder widths do not meet the specified criteria.

River Road

River Road includes two 12' lanes and 10' paved outside shoulders within the project corridor. The existing traveled way and outside shoulder widths meet the specified criteria.

I-55 interchange ramps

The I-55 interchange includes an entrance and exit ramp for both directions of travel. The existing traveled way and shoulder widths for all ramps meet the specified criteria.

I-57 interchange ramps

The I-57 interchange includes an entrance and exit ramp for both directions of travel. The existing traveled way and shoulder widths for all ramps meet the specified criteria.

Table 10: Ramp Widths – I-55

Ramp	Traveled Way Width	Left Shoulder Width	Right Shoulder Width
NB Entrance	16'	4'	8'
NB Exit	16'	4'	6'-10'
SB Entrance	16'	4'	8'-9.5'
SB Exit	16'	4'	8'-10

Table 11: Ramp Widths - I-57

Ramp	Traveled Way Width	Left Shoulder Width	Right Shoulder Width
NB Entrance	16'	4'	8'
NB Exit	16'	4'	10'-11'
SB Entrance	16'	4'	10'-12'
SB Exit	16'	4'	10'-12'

6. Conclusion

A complete evaluation of the vertical, horizontal, and cross-sectional elements with the identified deficiencies listed are included as **Attachment B.**

The number of identified deficient curves or segments along each evaluated roadway is included below.

Horizontal Alignment

- Minimum Curve Radius
  - **River Road:** 1 curve
  - **IL 53**: N/A
  - **Wilmington-Peotone Road:** 0 curves
  - **I-55 Ramps**: 2 NB entrance curves, 1 NB exit curve, 1 SB entrance curve, 2 SB exit curves
  - **I-57 Ramps**: 1 NB exit curve, 1 SB entrance curve, 1 SB exit curve
- Minimum Horizontal Curve Length
  - **River Road:** 0 curves
  - **IL 53**: N/A
  - **Wilmington-Peotone Road:** 0 curves
  - **I-55 Ramps**: N/A
  - **I-57 Ramps**: N/A
- Maximum Superelevation Rate
  - **River Road:** 3 curves
  - **IL 53**: N/A
  - **Wilmington-Peotone Road:** 0 curves
  - **I-55 Ramps**: N/A
  - **I-57 Ramps**: N/A
- Horizontal Stopping Sight Distance
  - **River Road:** 0 curves
  - **IL 53**: N/A
  - **Wilmington-Peotone Road:** 0 curves
  - **I-55 Ramps**: N/A
  - **I-57 Ramps**: N/A

Vertical Alignment

- Minimum Vertical Curve Length
  - **River Road:** 0 curves
  - **IL 53:** 0 curves
  - **Wilmington-Peotone Road:** 11 curves
  - **I-55 Ramps**: N/A
  - **I-57 Ramps**: N/A
- Maximum Grade
  - **River Road:** 2 segments
  - **IL 53:** 0 segments

  - **Wilmington-Peotone Road:** 9 segments
  - **I-55 Ramps:** 0 segments
  - **I-57 Ramps:** 0 segments
- Minimum Stopping Sight Distance
  - **River Road:** 1 curve
  - **IL 53:** 0 curves
  - **Wilmington-Peotone Road:** 29 curves
  - **I-55 Ramps**: N/A
  - **I-57 Ramps**: N/A

Cross Sectional Elements

- Minimum Traveled Way Width
  - **River Road:** 0 segments
  - **IL 53:** 0 segments
  - **Wilmington-Peotone Road:** throughout corridor
  - **I-55 Ramps:** 0 segments
  - **I-57 Ramps:** 0 segments
- Minimum Shoulder Width
  - **River Road:** 0 segments
  - **IL 53:** throughout corridor
  - **Wilmington-Peotone Road:** throughout corridor
  - **I-55 Ramps:** 0 segments
  - **I-57 Ramps:** 0 segments

Attachment B – Geometric Evaluations

1. Vertical Alignment Evaluations

Table 1: River Road Vertical Alignment Review

55 mph Design Speed				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
	4.55%			Grade exceeds max 3%; near the I-55 SB exit ramp
50+00.00		1120	127	
	-4.24%			Grade exceeds max 3%; near the I-55 NB entrance ramp
59+07.78		380	82	K value meets 40 mph criteria based on grade adjusted K value
	0.39%			
15+44.71		400	528	
	-0.37%			
23+30.56		1100	724	
	1.15%			
31+50.00		500	523	
	0.19%			
42+67.86		500	343	
	1.65%			
51+50.00		1200	857	
	0.25%			
71+00.00		400	1000	
	-0.15%			
79+00.00		600	2222	
	0.12%			
119+00.00		400	606	
	0.78%			
125+48.40		500	505	
	-0.21%			
130+69.79		300	698	
	0.22%			
144+43.63		400	1000	
	0.62%			
150+20.00		600	531	
	-0.51%			
165+43.63		500	1087	
	-0.05%			
194+64.69		800	2202	
	0.31%			

Table 2: IL 53 Vertical Alignment Review

55 mph Design Speed				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value Used**	**Notes**
	-0.02%			
445+25.00		300	782	
	-0.41%			
450+45.00		200	218	
	0.51%			
462+75.00		200	467	
	0.08%			
466+50.00		170	231	
	-0.65%			
471+75.00		250	250	
	0.35%			
473+85.00		170	358	
	-0.13%			
478+20.00		350	1946	
	0.05%			
484+12.00		300	2034	
	-0.10%			
487+55.00		300	863	
	0.25%			
492+80.00		300	931	
	0.57%			
499+65.00		800	953	
	-0.27%			
509+90.00		400	1426	
	0.01%			
522+10.00		300	670	
	0.46%			
526+55.00		250	325	
	-0.31%			

Table 3: Wilmington-Peotone Road Vertical Alignment Review

55 mph Design Speed				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
	-0.32%			
2+00.00		300	789	
	0.06%			
8+10.00		230	160	
	1.50%			
11+00.00		210	124	
	-0.20%			
17+50.00		280	144	
	1.75%			
20+25.00		200	93	meets 50 mph criteria
	-0.40%			
23+50.00		300	577	
	0.12%			
38+40.00		700	610	
	1.27%			
59+00.00		700	197	
	4.82%			
63+70.00		165	30	meets 35 mph criteria
	-0.66%			
66+50.00		320	125	
	1.75%			
71+50.00		240	72	meets 45 mph criteria
	-1.60%			
73+75.00		165	250	
	-0.94%			
78+20.00		200	69	meets 40 mph criteria
	1.95%			
80+75.00		100	47	meets 30 mph criteria
	-0.15%			
84+00.00		130	236	meets 40 mph criteria
	0.40%			
85+50.00		165	92	meets 50 mph criteria
	-1.40%			
90+00.00		300	84	meets 45 mph criteria
	2.18%			
92+90.00		200	54	meets 40 mph criteria
	-1.50%			
96+50.00		300	229	
	-2.81%			
100+50.00		200	121	
	-1.15%			
104+50.00		350	96	meets 50 mph criteria
	2.50%			
108+50.00		300	119	
	-0.02%			
112+75.00		220	117	
	-1.90%			
117+75.00		500	134	
	1.83%			
122+95.00		260	117	
	-0.40%			
127+10.00		300	158	
	1.50%			

Table 3: Wilmington-Peotone Road Vertical Alignment Review (Cont.)

55 mph Design Speed (Cont.)				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
130+75.00		250	177	
	0.09%			
136+35.00		450	306	
	1.56%			
142+00.00		500	338	
	0.08%			
150+70.00		280	118	
	-2.30%			
157+00.00		400	138	
	0.60%			
163+00.00		400	163	
	3.05%			
168+50.00		200	190	
	2.00%			
173+00.00		200	182	
	0.90%			
183+00.00		400	421	
	-0.05%			
188+00.00		200	1000	
	0.15%			
194+00.00		170	828	
	-0.06%			
201+80.00		165	175	
	-1.00%			
206+75.00		600	571	
	0.05%			
211+50.00		200	339	
	0.64%			
213+00.00		100	136	meets 30 mph criteria
	-0.10%			
215+50.00		360	512	
	0.61%			
223+15.00		300	271	
	-0.50%			
227+00.00		180	600	
	-0.20%			
262+00.00		350	1414	
	0.05%			
305+00.00		275	3359	
	0.13%			
316+60.00		200	1038	
	-0.06%			
324+50.00		400	227	
	1.70%			
329+40.00		300	154	
	-0.25%			
333+80.00		280	295	
	0.35%			
340+00.00		240	320	
	-0.40%			
342+25.00		165	220	
	0.35%			
347+00.00		180	116	

Table 3: Wilmington-Peotone Road Vertical Alignment Review (Cont.)

55 mph Design Speed (Cont.)				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
	-1.20%			
351+00.00		300	248	
	0.01%			
361+50.00		500	397	
	-1.25%			
366+20.00		300	270	
	-0.14%			
375+20.00		300	263	
	1.00%			
380+00.00		300	390	
	0.23%			
387+20.00		300	268	
	1.35%			
393+20.00		300	130	
	-0.95%			
405+00.00		650	394	
	0.70%			
409+50.00		200	136	
	-0.77%			
412+40.00		200	206	
	0.20%			
415+00.00		170	256	
	-0.46%			
421+00.00		1000	509	
	1.50%			
432+50.00		300	214	
	0.10%			
437+40.00		300	429	
	0.80%			
441+50.00		180	300	
	0.20%			
444+20.00		300	857	
	0.55%			
455+65.00		200	357	
	-0.01%			
459+30.00		500	617	
	0.80%			
463+50.00		300	285	
	-0.25%			
480+25.00		500	271	
	1.59%			
485+00.00		400	981	
	2.00%			
488+50.00		300	99	meets 50 mph criteria
	-1.03%			
491+50.00		300	226	
	0.30%			
502+00.00		400	400	
	1.30%			
507+50.00		165	194	
	0.45%			
518+30.00		165	173	
	-0.50%			
521+25.00		250	147	
	1.20%			

Table 3: Wilmington-Peotone Road Vertical Alignment Review (Cont.)

55 mph Design Speed (Cont.)				
Min. Curve Length = 165'	**K_{min} Crest Curve = 114**		**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
530+50.00		500	119	
	-3.01%			
541+75.00		1100	175	
	3.28%			
549+10.00		300	68	meets 45 mph criteria
	-1.05%			
553+00.00		200	91	meets 50 mph criteria
	-3.20%			
556+00.00		300	194	
	-1.70%			
561+75.00		450	157	
	1.11%			
569+00.00		400	266	
	2.61%			
573+50.00		350	110	meets 50 mph criteria
	-0.56%			
578+00.00		500	369	
	0.80%			
587+00.00		400	667	
	0.20%			
594+50.00		200	479	
	-0.22%			
598+50.00		200	324	
	0.40%			
603+00.00		165	688	
	0.64%			
618+00.00		165	423	
	0.25%			
627+75.00		165	330	
	-0.25%			
637+50.00		200	363	
	0.30%			
642+00.00		170	131	
	-1.00%			
644+25.00		200	468	
	-0.57%			
649+75.00		460	138	
	-3.90%			
653+60.00		300	132	
	-1.62%			
657+60.00		300	121	
	0.85%			
662+00.00		240	92	meets 45 mph criteria
	3.45%			
670+75.00		400	78	meets 45 mph criteria
	-1.68%			
680+75.00		1000	263	
	2.12%			
688+50.00		180	262	
	1.43%			
693+00.00		200	156	
	0.15%			
696+25.00		100	187	meets 30 mph criteria
	0.68%			
698+58.48		165	285	

Table 3: Wilmington-Peotone Road Vertical Alignment Review (Cont.)

55 mph Design Speed (Cont.)				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
	1.26%			
700+35.00		150	64	meets 45 mph criteria
	-1.10%			
702+00.00		165	110	meets 50 mph criteria
	0.40%			
704+00.00		165	236	
	1.10%			
707+00.00		240	104	meets 50 mph criteria
	-1.20%			
709+50.00		165	275	
	-0.60%			
713+20.00		180	600	
	-0.30%			
716+50.00		200	122	
	-1.94%			
720+20.00		500	170	
	1.00%			
724+60.00		240	103	meets 50 mph criteria
	-1.34%			
733+40.00		500	184	
	1.38%			
739+25.00		500	281	
	-0.40%			
744+25.00		300	240	
	0.85%			
750+00.00		165	330	
	1.35%			
752+60.00		240	167	
	-0.03%			
756+00.00		165	522	
	-0.53%			
758+50.00		165	243	
	0.30%			
760+20.00		165	144	
	-1.00%			
763+00.00		165	471	
	-0.65%			
766+50.00		200	267	
	0.10%			
774+35.00		240	126	
	2.00%			
776+60.00		210	117	
	0.20%			
781+00.00		100	100	meets 30 mph criteria
	1.20%			
782+25.00		150	52	meets 40 mph criteria
	-1.70%			
785+95.00		240	117	
	0.35%			
788+50.00		165	176	
	1.28%			
790+50.00		200	179	
	0.17%			
796+10.00		300	170	
	-1.60%			

Table 3: Wilmington-Peotone Road Vertical Alignment Review (Cont.)

55 mph Design Speed (Cont.)				
Min. Curve Length = 165'		**K_{min} Crest Curve = 114**	**K_{min} Sag Curve = 115**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
800+10.00		200	68	meets 40 mph criteria
	1.35%			
802+75.00		150	68	meets 45 mph criteria
	-0.85%			
805+50.00		250	135	
	1.00%			
810+90.00		200	56	meets 40 mph criteria
	-2.60%			
814+70.00		300	272	
	-1.50%			
818+80.00		165	206	
	-2.30%			
825+50.00		380	147	
	0.28%			
828+80.00		200	219	
	-0.63%			
831+00.00		200	140	
	0.80%			
833+75.00		200	253	
	0.01%			
838+75.00		200	225	
	0.90%			
841+25.00		200	211	
	-0.05%			
800+10.00		200	68	meets 40 mph criteria
	1.35%			
802+75.00		150	68	meets 45 mph criteria
	-0.85%			
805+50.00		250	135	
	1.00%			
810+90.00		200	56	meets 40 mph criteria
	-2.60%			
814+70.00		300	272	
	-1.50%			
818+80.00		165	206	
	-2.30%			
825+50.00		380	147	
	0.28%			
828+80.00		200	219	
	-0.63%			
831+00.00		200	140	
	0.80%			
833+75.00		200	253	
	0.01%			
838+75.00		200	225	
	0.90%			
841+25.00		200	211	
	-0.05%			

Table 3: Wilmington-Peotone Road Vertical Alignment Review (Cont.)

45 mph Design Speed				
Min. Curve Length = 135'		**K_{min} Crest Curve = 61**	**K_{min} Sag Curve = 79**	**Max Grade=3%**
VPI STA.	**Grade**	**Curve Length (ft)**	**K Value**	**Notes**
	-0.05%			
846+35.00		450	118	
	3.77%			
851+75.00		200	122	
	2.13%			
859+50.00		511	120	
	-2.13%			
864+50.00		400	1538	
	-1.87%			
871+50.00		300	92	
	1.40%			
874+50.00		220	98	
	-0.85%			
877+35.00		135	104	
	0.45%			
879+90.00		150	167	
	-0.45%			
884+15.00		150	120	
	0.80%			
887+60.00		150	103	
	-0.65%			
889+95.00		135	115	
	-1.82%			
892+50.00		150	99	
	-0.30%			
897+25.00		150	150	
	0.70%			
909+95.00		300	215	
	-0.70%			
916+50.00		135	123	
	0.40%			
919+75.00		200	250	
	-0.40%			
924+20.00		150	107	
	1.00%			
929+00.00		300	118	
	-1.55%			
937+00.00		120	43	meets 30 mph criteria
	1.25%			
938+00.00		70	30	meets 35 mph criteria
	-1.00%			
939+15.00		50	42	meets 30 mph criteria
	0.03%			
940+75.00		200	154	
	1.40%			
943+25.00		140	64	
	3.60%			
944+90.00		170	34	meets 35 mph criteria
	-1.40%			
946+60.00		140	108	
	-0.10%			
949+50.00		200	70	
	-2.95%			
952+75.00		230	161	
	-1.52%			

Table 4: I-55 and I-57 Interchange Ramps Vertical Alignment Review

I-55 SB exit loop				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	0.91%			
0+64.98		120	39	
	-2.16%			
2+38.07		50	39	
	-0.87%			
3+21.46		50	133	
	-1.24%			
5+19.42		100	166	
	-0.64%			
9+64.21		100	346	
	-0.35%			
10+71.56		50	346	
	-0.50%			

I-55 SB entrance				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	-0.44%			
3+39.86		120	166	
	0.28%			
5+71.38		100	351	
	0.57%			
7+99.67		100	326	
	0.26%			
13+25.53		82	37	
	2.47%			
14+05.22		50	17	
	-0.55%			

I-55 NB entrance				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	3.31%			
0+45.00		60	9	
	-3.33%			
2+06.76		180	153	
	-2.15%			
5+08.26		220	110	
	-0.15%			

I-55 NB exit loop				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	-0.80%			
1+84.57		200	113	
	0.97%			
7+45.38		150	124	
	2.18%			
10+65.50		200	118	
	3.87%			
12+75.48		80	12	
	-2.62%			

I-57 SB exit				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	-1.80%			
0+74.66		150	182	
	-2.62%			
2+61.44		100	91	
	-3.72%			
6+22.49		350	63	
	1.86%			
9+37.72		100	283	
	2.22%			

I-57 SB entrance				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	-2.02%			
2+14.83		250	127	
	-3.99%			
6+17.50		400	87	
	0.62%			
10+12.52		200	185	
	-0.46%			

I-57 NB entrance				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	-0.50%			
0+60.00		120	79	
	-2.02%			
4+05.87		290	69	
	2.21%			

I-57 NB exit				
Approx. VPI STA.	**Approx. Grade**	**Approx. Length (ft)**	**K Value Used**	**Notes**
	0.14%			
3+93.07		300	161	
	2.00%			

2. Horizontal Alignment Evaluations

Table 5: Wilmington-Peotone Road and River Road Horizontal Alignment Review

Curve #	PC Sta.	PT Sta.	R (ft.)	Deflection angle (deg.)	e	Length (ft)	Min. Length (ft.)	Min. RSSD (ft.)	Min. SSD Inside of curve (HSO) (ft.)
Wilmington-Peotone Road									
WPR1	147+15.17	157+39.78	6,031.14	9.7	2.20%	1025	1025.0	495	5
WPR2	159+67.96	169+90.80	6,510.89	9	2.00%	1023	1023.0	495	5
River Road									
RR_E1	37+89.47	58+12.42	2,546.48	*35.88	2.60%	1594	1593.7	495	12
RR3	16+61.45 R2	23+05.31 R2	3,819.71	9.80	4.20%	653	653.0	495	8
RR4	47+59.48 R2	72+88.52 R2	2,291.83	63.23	7.00%	2529	2528.0	495	13
RR5	114+35.95 R2	143+06.68 R2	2,291.83	71.82	7.00%	2873	2871.2	495	13
RR6	150+30.83 R2	178+27.04 R2	2,291.83	69.93	7.00%	2797	2795.9	495	13

* Value was not provided in existing plans and is based on a best-fit horizontal alignment line of existing terrain

Table 6: I-55 and I-57 ramps Horizontal Alignment Review

Curve #	PC Sta.	PT Sta.	R (ft.)	Deflection angle (deg.)	e	Length (ft)	Min. Length (ft.)	Min. RSSD (ft.)	Min. SSD Inside of curve (HSO) (ft.)
I-55									
NB Entrance									
55_NBEnt_1	3+30.62	5+65.86	485.00	-	-	235.24	-	-	-
55_NBEnt_2	7+39.1	11+09.62	440.00	-	-	370.52	-	-	-
55_NBEnt_3	13+84.85	17+37.55	430.00	-	-	352.70	-	-	-
NB Exit									
55_NBEx_1	0+00.00	2+20.69	485.00	-	-	220.69	-	-	-
55_NBEx_2	2+20.69	4+08.89	240.00	-	-	188.20	-	-	-
55_NBEx_3	4+08.89	6+58.00	145.00	-	-	249.11	-	-	-
55_NBEx_4	8+02.85	10+31.07	447.82	-	-	228.22	-	-	-
SB Entrance									
55_SBEnt_1	5+62.44	9+09.48	157.08	-	-	347.04	-	-	-
55_SBEnt_2	9+09.48	11+19.86	327.24	-	-	210.38	-	-	-
SB Exit									
55_SBEx_1	0+73.54	3+71.79	444.68	-	-	298.25	-	-	-
55_SBEx_2	6+22.47	9+69.18	441.98	-	-	346.71	-	-	-
I-57									
NB Entrance									
57_NBEnt_1	4+61.63	8+84.20	665.00	-	-	422.57	-	-	-
NB Exit									
57_NBEx_1	1+86.81	6+37.06	725.36	-	-	450.25	-	-	-
57_NBEx_2	8+97.98	11+26.30	423.05	-	-	228.32	-	-	-
SB Entrance									
57_SBEnt_1	1+23.57	3+35.11	442.77	-	-	211.54	-	-	-
57_SBEnt_2	6+06.63	10+53.87	670.84	-	-	447.24	-	-	-

SB Exit									
57_SBEx_1	1+25.53	5+41.61	693.26	-	-	416.08	-	-	-
57_SBEx_2	8+00.28	10+38.25	432.54	-	-	237.97	-	-	-

Note: All ramp values are based on a best-fit horizontal alignment line of existing terrain

3. Cross Section Elements Evaluations

Table 7: Roadway Cross Sectional Elements Review

Roadway	Traveled Way Width	Outside Shoulder Width
River Road	12’	10’
IL 53	12’	8’
Wilmington-Peotone Road	11’	4’

Table 8: Ramp Cross Sectional Elements Review

Ramp	Traveled Way Width	Left Shoulder Width	Right Shoulder Width
I-55 Ramps			
NB Entrance	16’	4’	8’
NB Exit	16’	4’	6’-10’
SB Entrance	16’	4’	8’-9.5’
SB Exit	16’	4’	8’-10
I-57 Ramps			
NB Entrance	16’	4’	8’
NB Exit	16’	4’	10’-11’
SB Entrance	16’	4’	10’-12’
SB Exit	16’	4’	10’-12’