I-80/94 BORMAN EXPRESSWAY

Preliminary Purpose and Need/ Logical Termini

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Prepared by:
Parsons

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Section 1 – INTRODUCTION

The study area for the 80/94 FlexRoad Planning and Environment Linkages (PEL) Study includes the I-80/I-94 corridor from I-65 in Indiana on the east to IL 394 in Illinois on the west. The Indiana portion of the corridor is called the Borman Expressway and is a critical interstate link between the Chicago area and points east. I-80/I-94 is predominantly an eight-lane facility with four continuous general purpose lanes in each direction. The average annual daily traffic (AADT) ranges from 204,000 vehicles at the state line to 158,000 vehicles at I-65. The corridor is a heavily used truck corridor with trucks comprising up to 31 percent of the daily traffic and up to 25 percent of peak-hour traffic. The corridor serves as both a connector for the local communities as well as a through-corridor for more regional trips. Origin-destination data shows that 60 percent of westbound and 44 percent of eastbound PM peak-period trips are through trips.

Traffic volumes throughout the corridor are forecasted to increase by 2040, the study's design year, exacerbating these issues. Peak-period traffic is expected to increase by up to 18 percent. The design year reflects a recognition that improvements that would address the corridor's issues 20-30 years into the future are likely beyond the states' available funding and would likely result in significant right-of-way and environmental impacts. Neither the Indiana Department of Transportation (INDOT) nor the Northwest Indiana Regional Planning Commission (NIRPC) long range planning documents identify funds for significant expansion in the corridor.

1.1 STUDY TERMINI

The limits of the study have been defined based on the identified needs in the corridor. The study will evaluate improvements to I-80/I-94 from IL 394 in Illinois to I-65 in Indiana (see Figure 1). East-west traffic in this area of the Midwest have several options east and west of Lake Michigan. However, to get around the south end of Lake Michigan, all the major routes are funneled into two main interstate corridors: I-80/I-94 and I-90 (tolled). The two termini identified provide natural breaks in the consistent facility in between. At the western terminus, the I-80/I-94 traffic fans out to the west on I-80/I-294 (tolled), to the south on IL 394, and to the north on I-94. At the eastern terminus at I-65, the I-80/I-94 traffic splits out to the south on I-65 and to the east via I-94 and I-80 (tolled).

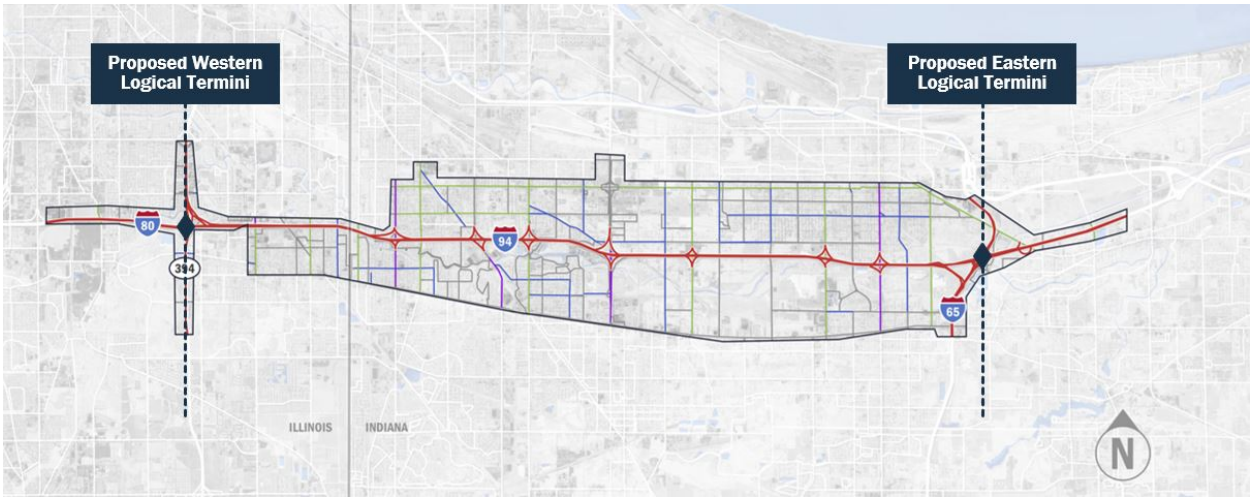


Figure 1 – Proposed Logical Termini

Congestion and safety concerns likely extend beyond the study termini, but this roadway segment is consistent in character (lane configuration, interchange spacing, development patterns, etc.) and the severity of the

issues within these limits is higher. The traffic volumes decrease significantly outside of these termini. Further, beyond the east and west termini, the roadway leaves the jurisdiction of INDOT and IDOT, respectively, and is the responsibility of independent toll authorities with their own congestion management programs.

Depending on the strategies considered, physical improvements may be required in the immediate vicinity of one or more of the ten interchanges with I-80/I-94 in the corridor. Also, upstream messaging may be necessary on the aforementioned roadways on approach to the I-80/I-94 corridor. For this reason, at the east and west termini, the study area will extend to the next interchange in each direction, and at intermediate interchanges, it will extend approximately 1,000 feet to the north and south along the intersecting roadway.

Section 2 – PROJECT NEEDS

The need for this project is based on recurring corridor congestion and elevated crash rates on I-80/I-94 between IL 394 in Cook County, Illinois and I-65 in Lake County, Indiana. Motorists within this corridor experience recurring congestion during weekday peak commuting periods and on Sunday afternoons/evenings, especially during the summer. The congestion results in poor travel time reliability[1] and low speeds during peak hours. NIRPC has identified this roadway as the most congested interstate highway corridor in northwest Indiana[2].

Two primary needs have been identified for the 80/94 FlexRoad project:

- Recurring traffic congestion – bottleneck locations that result in travel time delays, low travel speeds, and unacceptable levels of service
- Safety –segments of high crash rates in the corridor

A more detailed discussion of each of these projectneeds is included below.

2.1 TRAFFIC CONGESTION

The travelers of the 80/94 FlexRoad corridor suffer from congestion and delay on a regular basis. The congestion is quantified below in terms of travel times, speeds, and levels of service (LOS).

Travel Time

Travel times through the corridor were estimated using a microsimulation model (Aimsun) developed for the corridor and are shown in Table 1. Ideally, traveling from end to end through the corridor without delay (free-flow) takes 18 minutes in the westbound direction and 16 minutes in the eastbound direction. Estimates for 2020 show delay in both directions during both the AM and PM peak periods, with the most severe delay in the eastbound direction during the PM peak period when travel time is 54 percent greater than free-flow speeds. Volumes were projected to year 2040 to assess future conditions on the corridor. Travel times are estimated to further degrade with additional traffic. The PM peak period delay in the eastbound direction nearly doubles from 8.7 minutes to 17.0 minutes and the total travel time is double the travel during free-flow conditions (33 minutes compared to 16 minutes). The other three directions/time periods are not showing the same degree of travel time increase. This is partly due to the nature of travel demand forecasting. The NIRPC regional travel demand model, used for design year forecasts for this study, considers the corridor to be at capacity during the peak periods so much of the growth in the area was forecast for the midday hours or other roadways in the region. This indicates there will be latent demand in the future for the I-80/94 corridor.

[1] Travel time reliability is a consistency or dependability in travel times, as measured from day to day or across different times of day.
[2] MOVE NWI Congestion Management Process, NIRPC, 2020. https://nirpc.org/wp-content/uploads/2020/09/Move-NWI-Congestion-Management-Process.pdf

Table 1 – I-80/94 Average Weekday Peak-Period Travel Time, Delay (Compared to Free-Flow Conditions)

YEAR	TRAVEL TIME ROUTE	TRAVEL TIME AND DELAY (MINUTES)				
			AM PEAK PERIOD		PM PEAK PERIOD	
		FREE-FLOW TRAVEL TIME	TRAVEL TIME	DELAY	TRAVEL TIME	DELAY
2019	WB from I-65 to IL 394	18	18.9	+0.9	19.3	+1.3
	EB from IL 394 to I-65	16	18.8	+2.8	24.7	+8.7
2040	WB from I-65 to IL 394	18	19.5	+1.5	20.7	+2.7
	EB from IL 394 to I-65	16	19.2	+3.2	33.0	+17.0

Note: AM peak period is 6:00AM to 9:00AM; PM peak period is 3:00PM to 6:00PM.

While the average travel time delays for the westbound AM (0.9 minutes), eastbound AM (2.8 minutes), and westbound PM (1.3 minutes) peak-periods seem acceptable, the travel time reliability is an underlying problem, especially during the PM. As an example, Figure 2 shows the maximum PM peak-period travel time observations for westbound I-80/94 for each day in 2019. Many of the days show a travel time close to free-flow conditions. In fact, for sixty-nine percent of the weekdays (Monday through Thursday) the travel times are within five minutes of the average travel time. However, 10 percent of weekdays experience travel time delays of 10 to 15 minutes and 21 percent of weekdays (one out of every five days) experience travel time delays of more than 15 minutes. The PM peak-period travel times for eastbound I-80/94 show more variability than the westbound direction. This variability, or lack of travel time reliability, creates uncertainty and means that users of I-80/94 must plan for additional travel time in order to reach their destination on time. As travel time reliability on a facility improves, there is less wasted time for users.

Travel time reliability is less of an issue in the AM peak period for both directions of travel, but variability is still present. Charts for both directions and peak periods are provided in Appendix A. The weekends, especially Fridays and Sundays, show a similar trend.

These variances in travel time along with observed traffic volumes demonstrate that during the typical weekday peak periods, I-80/94 is operating near saturation flow rates. Any type of increase in traffic volumes, incident, or inclement weather can cause rapidly decreasing levels of service expressed in terms of increased delay.

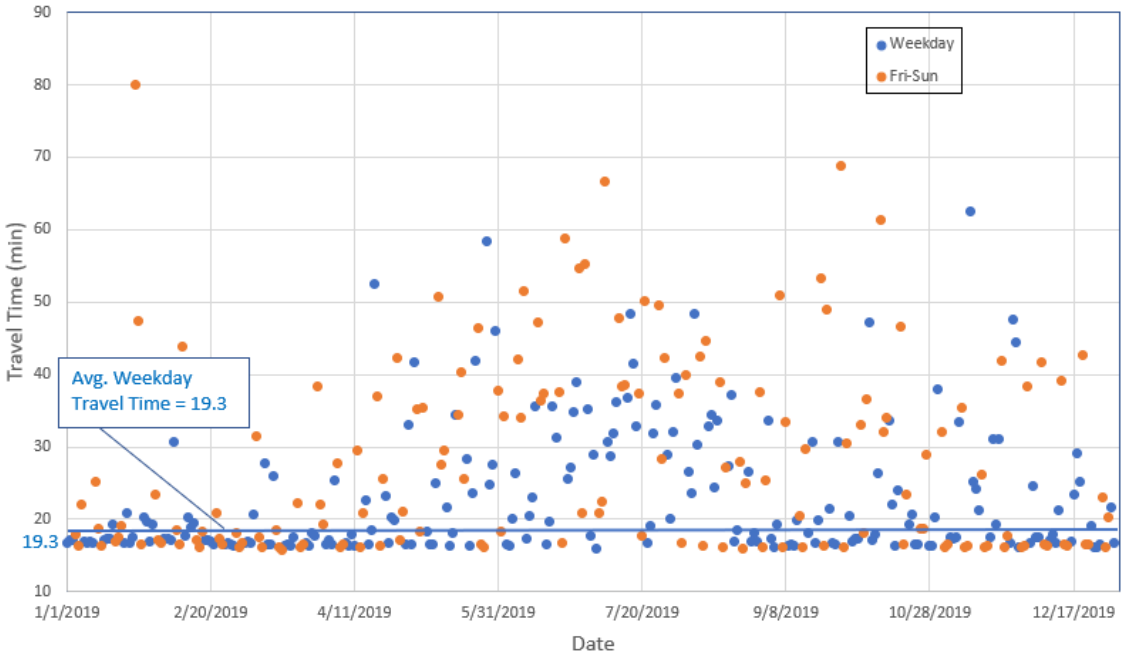
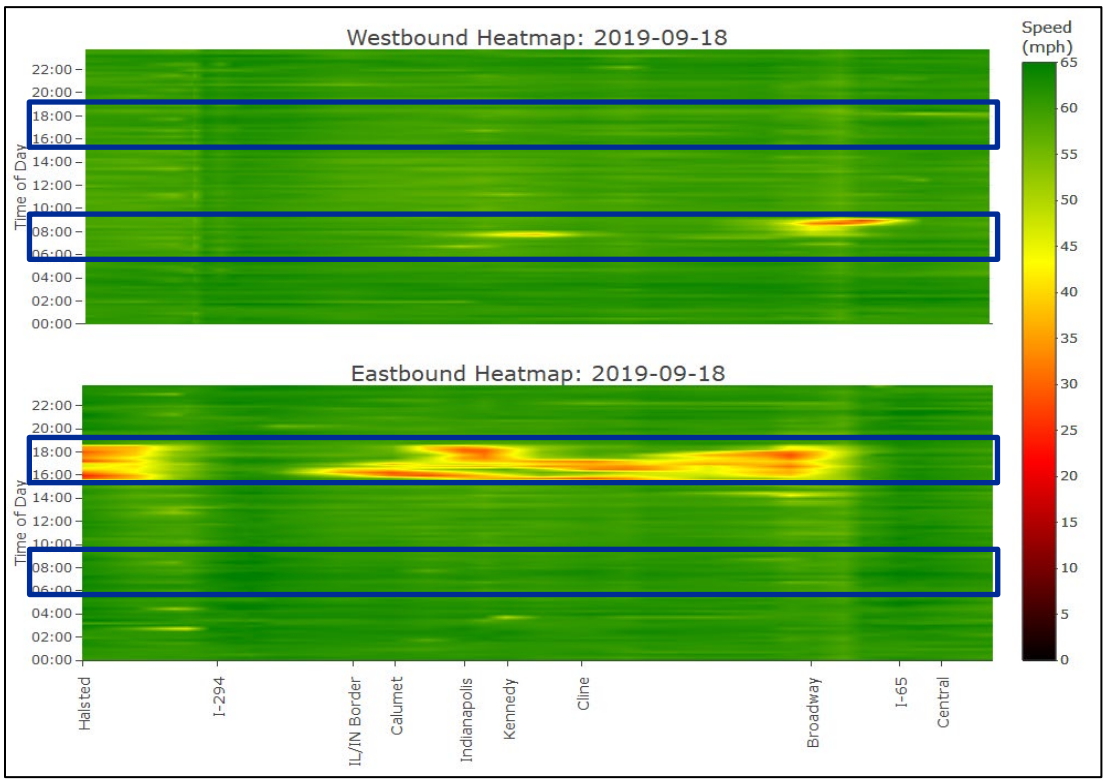


Figure 2 - Westbound PM Peak-Period Travel Times by Day (2019)

Speeds

Travelers in the corridor experience speed degradation due to congestion on a regular basis. Probe speed data was gathered along the length of the corridor for all hours of the day and plotted on heat maps. The data indicates that free-flow speed in the corridor is 62 mph. Average speeds below 50 mph indicate deteriorating levels of service. FHWA's newly prescribed cluster statistical analysis was performed on all days in 2019 to identify specific days of the year that represent typical weekday, Friday, and Sunday travel speeds. Data for each of these days are provided on Figures 3 through 5, respectively. As shown in Figure 3, similar to the travel times, eastbound travel during the PM peak-period shows the lowest speeds with the worst areas being from the Illinois/Indiana state line to I-65. Comments received from the public described recurring bottleneck locations on eastbound I-80/94 at the entrance ramps from I-94 and Cline Avenue and at the exit ramp to southbound I-65, which are corroborated by the speed heat maps.



Note: The AM and PM peak periods are indicated by the blue rectangles in the figure.

Figure 3 - Speeds – Typical Weekday – (Wednesday, September 18, 2019)

Being a key route to the east from Chicago, the I-80/I-94 sees a high number of leisure trips between Michigan (and other points east) and Chicago on the weekends, especially during the summer months. The origin-destination data confirms this as eastbound through trips increase from 60 percent on weekdays to 67 percent on Friday afternoon and 70 percent on Sundays. The westbound direction sees an increase in through trips from 44 percent on the weekdays to 58 percent on Fridays and 59 percent on Sundays. With these additional trips, Friday afternoons and Sundays see some of the worst congestion in the corridor. Figure 4 shows the average travel speeds along the corridor throughout a typical Friday. The addition of the leisure trips to the typical weekday commuting trips cause the weekday periods mentioned above to become even more congested. The areas of slower speeds increase in both size and severity indicating even lower speeds and an expansion of the peak period. Figure 5 shows typical speeds on a Sunday.

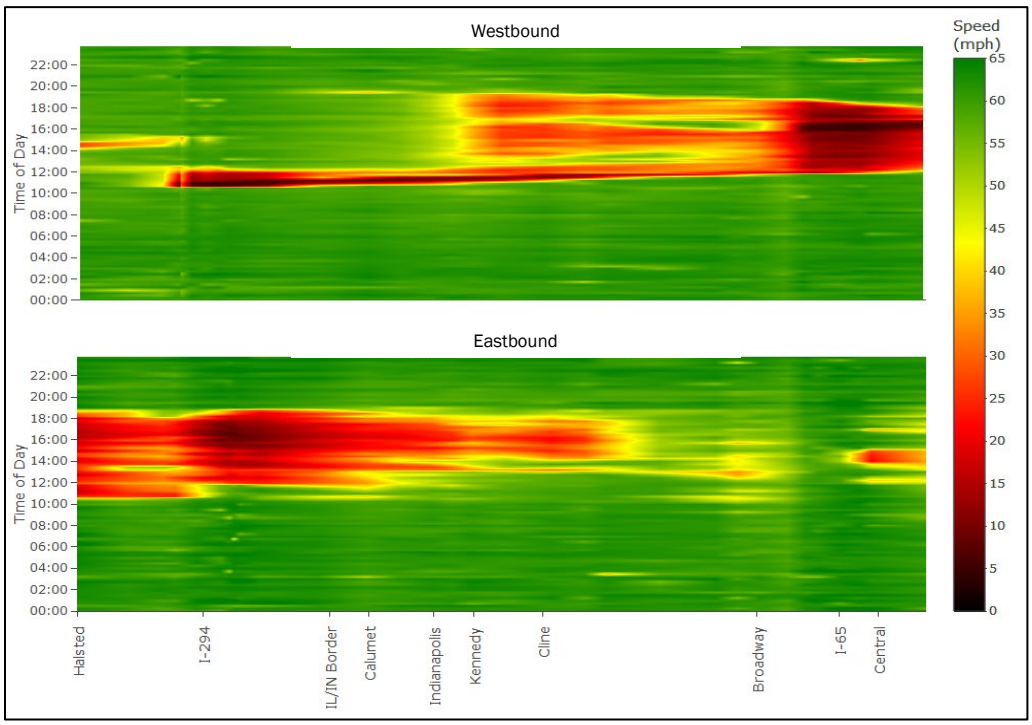


Figure 4 - Speeds – Typical Friday – (August 16, 2019)

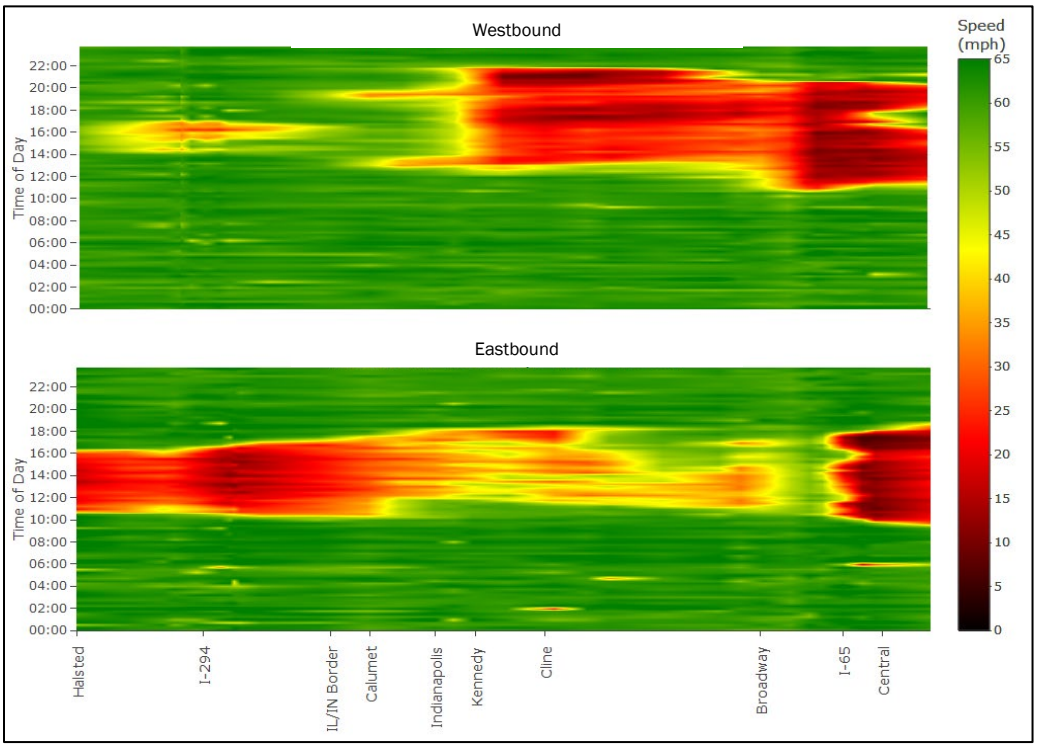


Figure 5 - Speeds – Typical Sunday - (August 4, 2019)

These lower speeds are reflected in modeled travel times across the corridor during Saturdays and Sundays as shown in Table 2. The best case is the westbound direction of travel on Fridays, with travel time increasing by 91 percent. Sundays in the eastbound direction are the worst case with travel times more than tripling.

Table 2 – I-80/94 Average Friday and Sunday Travel Time, Delay (Compared to Free-Flow Conditions)

YEAR	TRAVEL TIME ROUTE	TRAVEL TIME AND DELAY (MINUTES)				
		FREE-FLOW TRAVEL TIME	FRIDAYS		SUNDAYS	
			TRAVEL TIME	DELAY	TRAVEL TIME	DELAY
2019	WB from I-65 to IL 394	18	34.4	+16.4	42.5	+24.5
	EB from IL 394 to I-65	16	44.1	+28.1	51.4	+35.4

Design year 2040 travel speeds for the AM and PM peak periods were estimated using the Aimsun traffic microsimulation model. Because these are modeled future conditions, only the peak periods are included instead of the full day of recorded speeds shown in the previous figures. As shown in Figure 6, the modeled 2040 AM peak-period travel speeds remain relatively high (50+ mph) in both directions, except for a short period of lower speeds (35-45 mph) near the Burr Street interchange in the westbound direction. These speed patterns are similar to the existing conditions, but slightly worse.

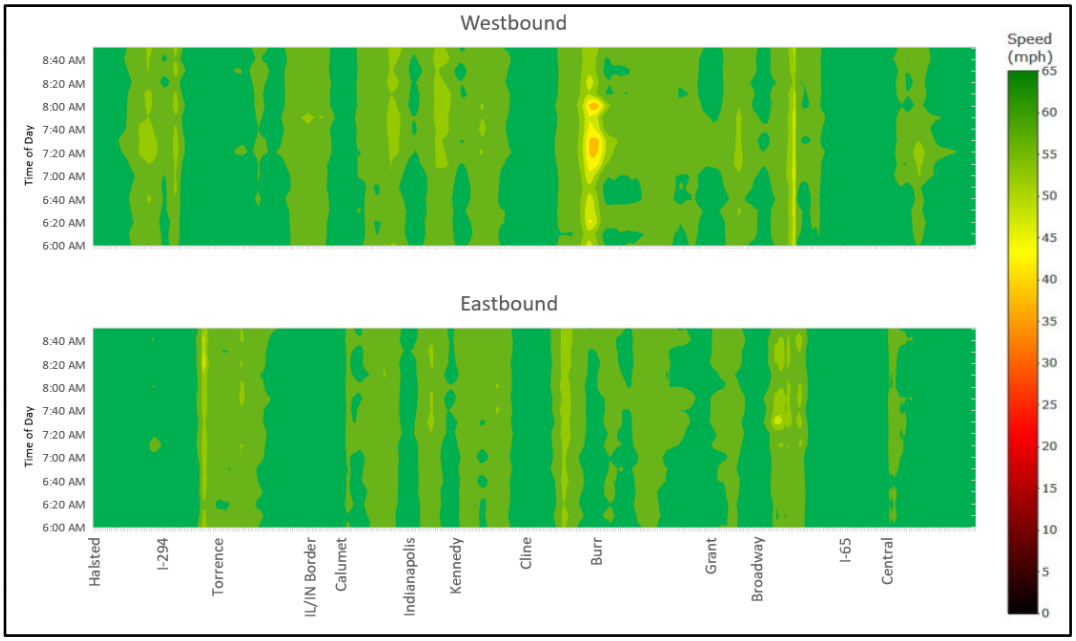


Figure 6 - Modeled Speeds - 2040 No-Build - Weekday - AM

During the 2040 PM peak period, shown in Figure 7, there are large pockets of speeds below 25 mph in the eastbound direction near weaving sections between Calumet Avenue and Indianapolis Boulevard, Cline Avenue and Burr Street, and Broadway and I-65. The 2040 PM speeds in the westbound direction show a pocket of

speeds below 25 mph in the area of Burr Street. These patterns are similar to those shown in the existing conditions, but much worse.

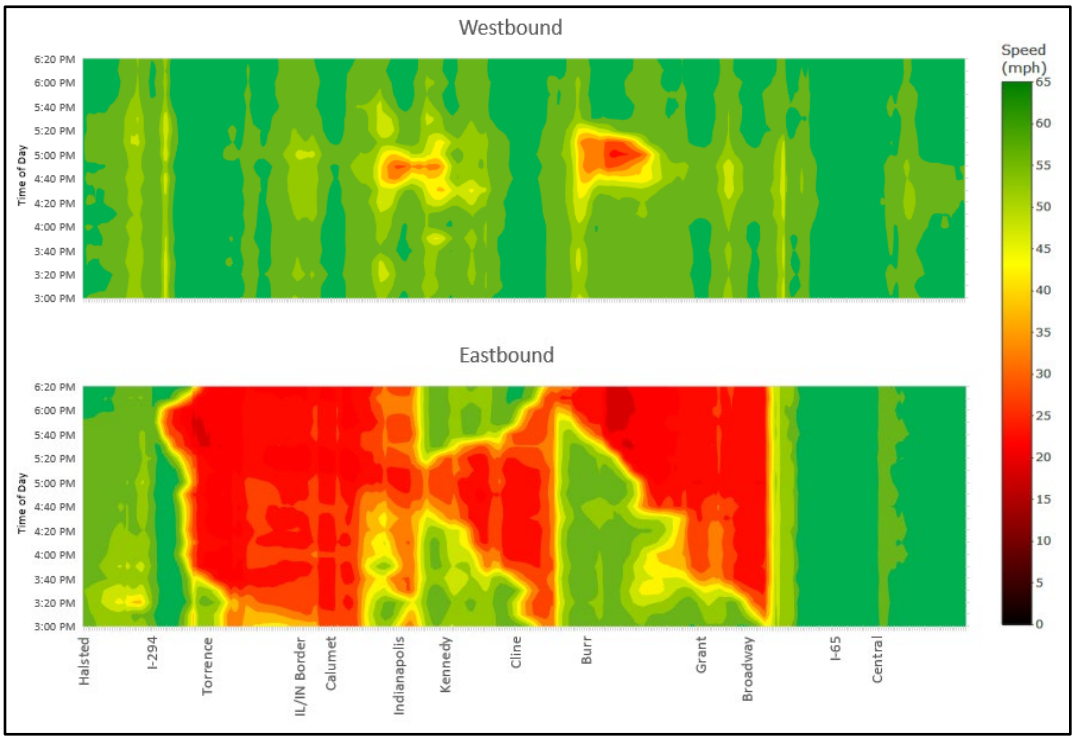


Figure 7 - Modeled Speeds - 2040 No-Build - Weekday - PM

Level of Service

Freeway operations for years 2019 and 2040 were assessed using the latest Highway Capacity Manual (HCM) procedures and Highway Capacity Software (HCS). Levels of service ranging from A (free-flow conditions) to F (severely congested conditions and low speeds) were calculated for the existing traffic operations for all mainline segments in the corridor. LOS D or better is generally considered acceptable for a freeway facility. Table 3 provides the number of roadway segments identified by HCS has having LOS E or F (i.e., unacceptable LOS) for both 2019 and 2040.

Table 3 – Existing and Future Traffic Operations - Level of Service

YEAR	DIRECTION OF TRAVEL	NUMBER OF FREEWAY SEGMENTS OPERATING AT LOS E OR F		
		TOTAL FREEWAY SEGMENTS	AM PEAK HOUR	PM PEAK HOUR
2019	Westbound I-80/94	34	0	1
	Eastbound I-80/94	37	2	10
2040	Westbound I-80/94	34	0	2
	Eastbound I-80/94	37	3	11

Note: AM peak period is 6:00AM to 9:00AM; PM peak period is 3:00PM to 6:00PM.

For the existing year 2019, two segments out of 37 in the eastbound direction operate at LOS E or F while all the westbound segments operate at LOS D or better during the AM peak hour. During the PM peak hour, 10 segments out of 37 in the eastbound direction operate at LOS E or F with the worst stretch being five consecutive segments from the Grant Street interchange to I-65 operating at LOS E or F. The westbound direction shows one segment operating at LOS E or F during the PM peak hour. The worsening levels of service in the eastbound direction during the PM peak hour match the pockets of lower speeds shown in Figure 3. For the future no-build conditions in 2040, there are three additional segments operating at LOS E or LOS F.

2.2 SAFETY – HIGH-CRASH LOCATIONS

Historical crash data for the I-80/I-94 corridor was analyzed to identify high-crash segments. INDOT utilizes a methodology (packaged in a software called RoadHAT) that compares observed crash rates and estimated crash costs to expected frequencies and costs that are based on averages from roadways across the state of similar segment type and traffic characteristics. Two safety indices are calculated, the Index of Crash Frequency (ICF) and the Index of Crash Cost (ICC), which are measures of frequency and severity respectively. These indices refer to the number of standard deviations from the statewide average for that particular facility type. INDOT flags segments with an ICF greater than or equal to 2.0 as high-crash frequency segments. If a segment has an ICF less than 2.0 but has an ICC greater than or equal to 2.0 it is still identified as a high-crash severity location.

The I-80/I-94 corridor was divided into 20 segments in the eastbound direction of travel and 22 segments in the westbound direction of travel. ICF and ICC were calculated for each segment using crashes from 2017 through 2019. Thirteen of the 20 eastbound segments were identified as either high-crash frequency (8) or high-crash severity (5) segments. Eleven of the 22 westbound segments were identified as high-crash frequency (6) or high-crash severity (5) segments. These segments are shown in red or orange, respectively, in Figure 8. This illustrates that the majority of the corridor is within a segment of safety concern. Public comments noted safety concerns at the eastbound merge of the I-94 on-ramp and the westbound merge of the I-65 on-ramp.

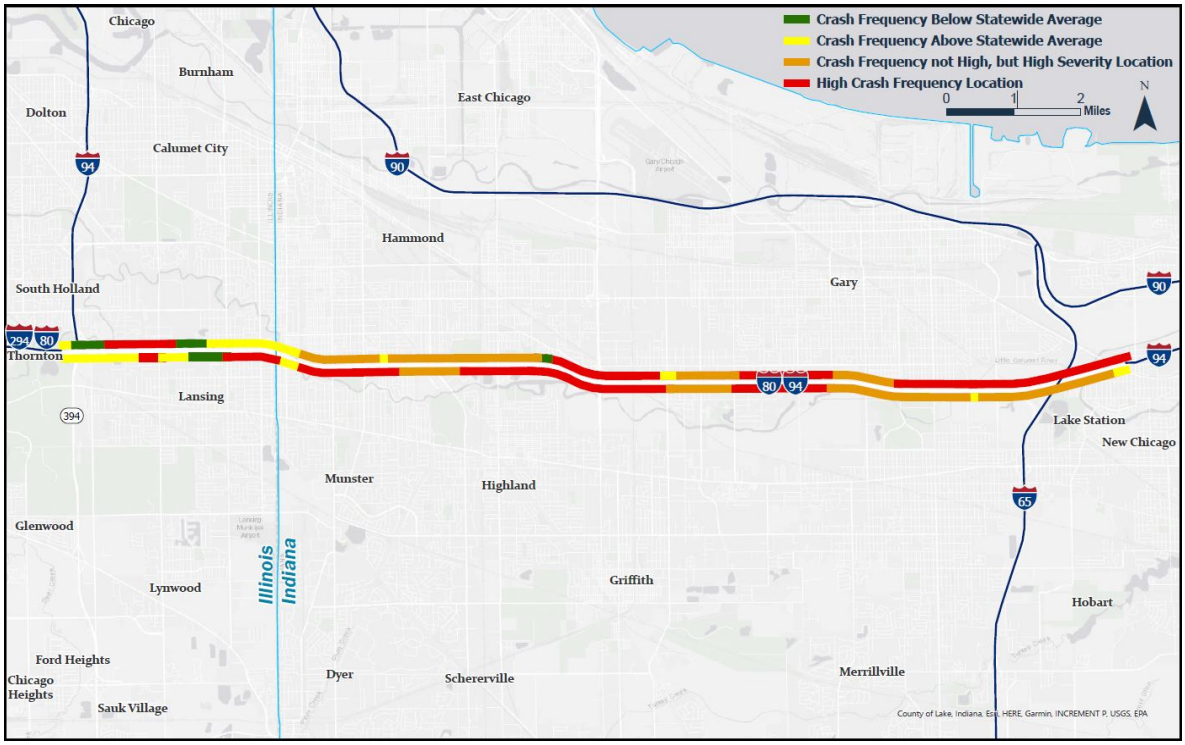


Figure 8 - High-Crash Segments

Section 3 – PROJECT PURPOSES

Based on the project's needs, the purpose of the project is to identify corridor improvements that, based on the design year of 2040, will:

1. Increase the operational efficiency of the corridor by reducing travel times and increasing travel time reliability, and
2. Improve safety in corridor by reducing crashes.

APPENDIX A

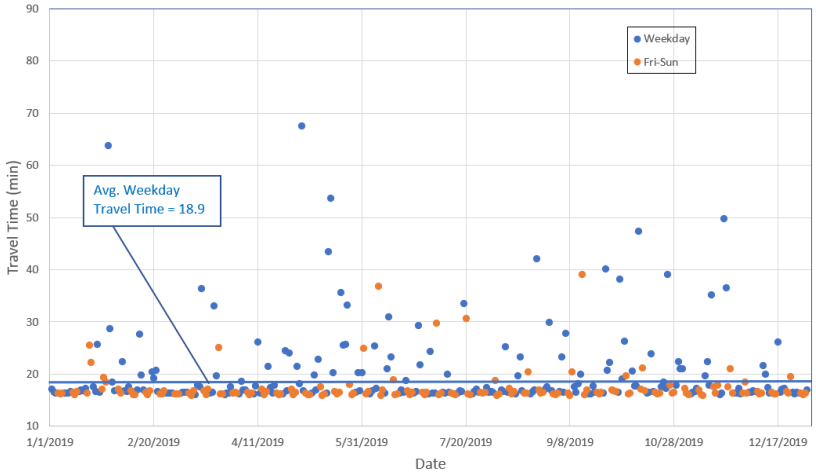


Figure 10 - AM Peak - Westbound

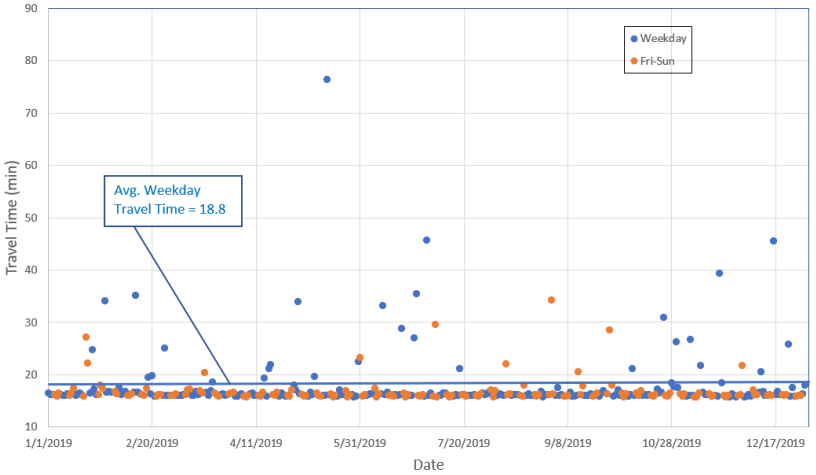


Figure 9 - AM Peak - Eastbound

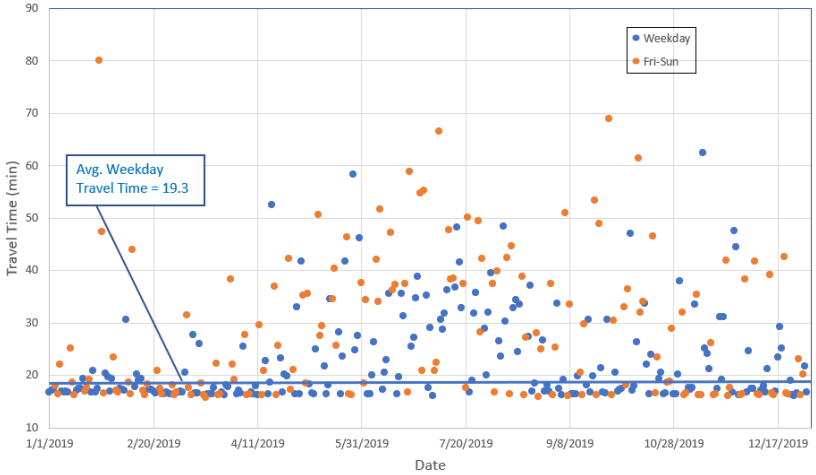


Figure 12 - PM Peak - Westbound

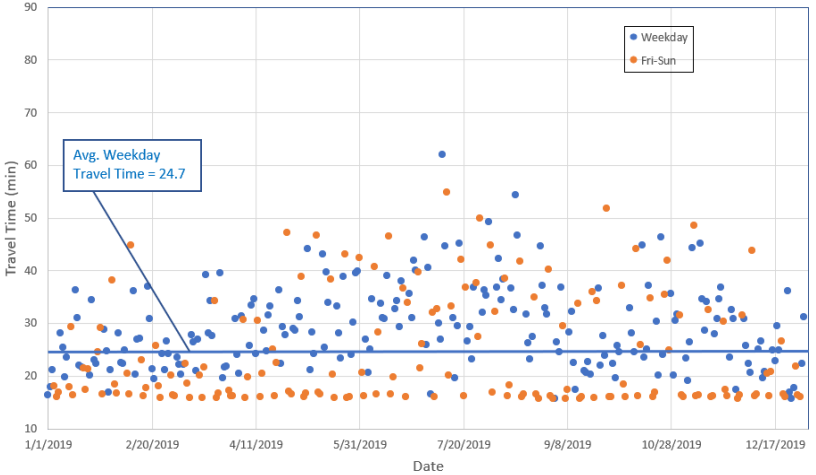


Figure 11 - PM Peak - Eastbound