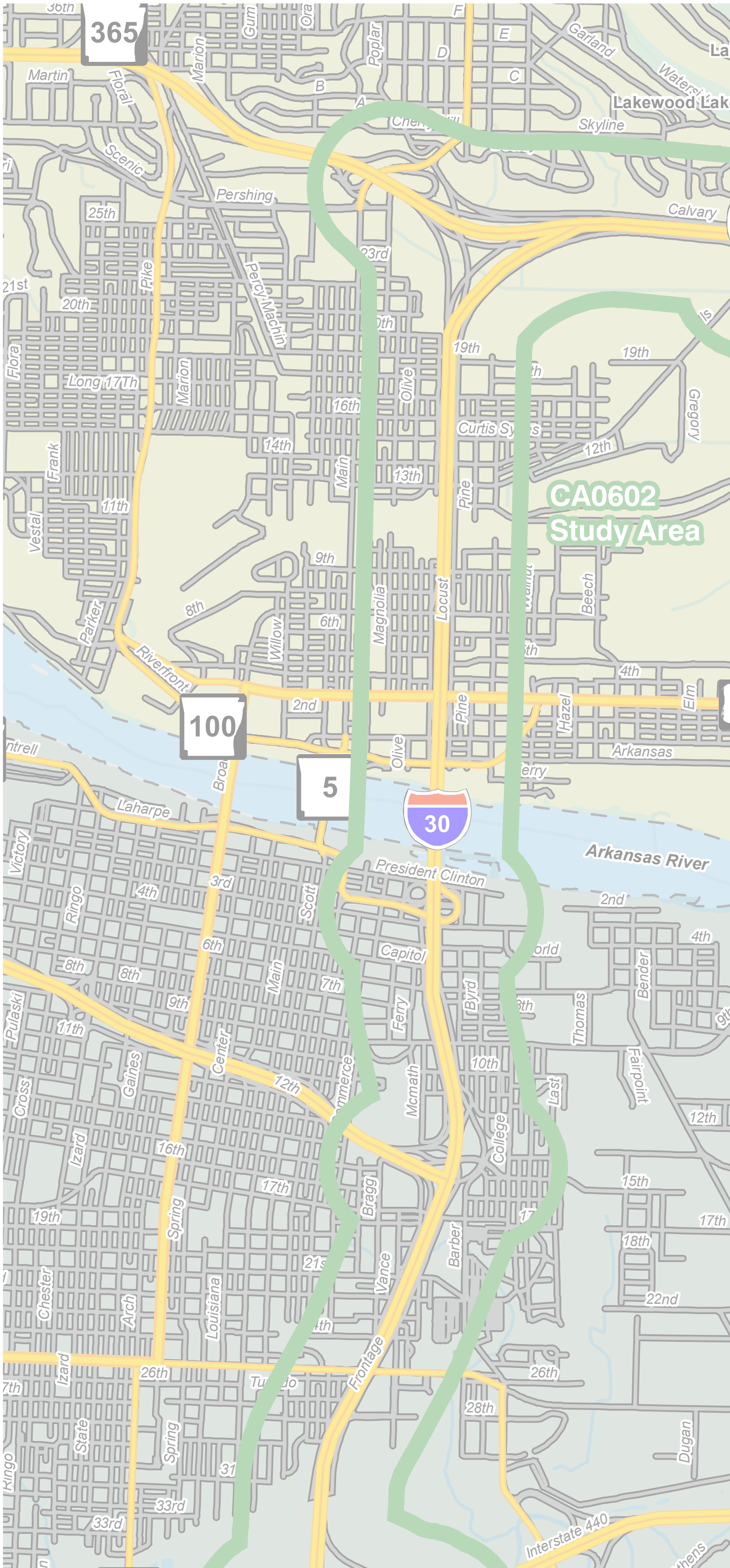

PLANNING AND ENVIRONMENTAL LINKAGES TRAFFIC AND SAFETY REPORT

INTERSTATE
30

CA0602

Interstate 530 – Highway 67

May 2015

CONNECTING ARKANSAS PROGRAM
CAP

Arkansas State Highway & Transportation Department

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
AHTD

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1 Introduction and Overview

With the passage of the temporary Arkansas one-half cent sales tax program in November 2012, the Arkansas State Highway and Transportation Department (AHTD) will finance an accelerated $1.8 billion four-lane State Highway Construction and Improvement Program that will be completed within approximately ten years called - Connecting Arkansas Program (CAP).

As part of the CAP, a planning and environmental linkages (PEL) study is being performed for project CA0602 – Interstate 30 (I-30) / Interstate 40 (I-40) Widening & Rehabilitation, Interstate 530 (I-530) to Highway 67 (Hwy 67).

The purpose of the PEL process is to meet agency needs while expediting transportation project delivery. The PEL is meant to foster a united process that supports:

- Early communication, coordination, and collaboration with and input by other local, state and federal agencies in the transportation planning process;
- Better informed and strategic transportation decisions; and
- Efficient and cost-effective solutions.

Early communication and collaboration among all interested parties is essential to the success of future planning, informing the National Environmental Policy Act (NEPA) process, and identifying issues. The traffic and safety portion of the I-30 PEL study is an essential part of the PEL process.

Traffic and safety are core components of the I-30 Purpose and Need. **Table 1** provides a summary of the Purpose and Need.

Table 1: I-30 PEL Purpose and Need

Needs (Problems)	Purpose (Solutions)
Traffic Congestion	To improve mobility on I-30 and I-40 by providing comprehensive solutions that improve travel speed and travel time to downtown North Little Rock and Little Rock and accommodate the expected increase in traffic demand. I-30 provides essential access to other major statewide transportation corridors, serves local and regional travelers, and connects residential, commercial, and employment centers.
Roadway Safety	To improve travel safety within and across the I-30 corridor by eliminating and/or improving outdated design features.
Structural and Functional Roadway Deficiencies	To improve I-30 roadway conditions and functional ratings.
Navigational Safety	To improve navigational safety on the Arkansas River Bridge by eliminating and/or improving outdated design features.
Structural and Foundational Bridge Deficiencies	To improve I-30 Arkansas River Bridge conditions and functional ratings.

Source: I-30 PEL Purpose and Need

The following report presents the traffic and safety analyses that comprised the PEL reports submitted to the Technical Oversight Committee (TOC), Technical Working Group (TWG), and the public. This report is organized into the following sections:

1. Introduction and Overview
2. Planning Assumptions and Analytical Methods
3. Existing Conditions
4. Future No Action Conditions
5. Future Build Alternatives Analysis
6. PEL Recommended Alternative Analysis

Each of the sections above provides a high level summary. More detailed information can be found in the appendix documents listed below.

1. CA0602 Traffic Forecast Plan
2. Traffic Technical Report
3. Vissim Model Methodology Report
4. Safety Technical Report
5. Level 2B Assessment
6. Transit Report
7. Traffic Forecast Tables
8. Mobility Exhibits
9. Measures of Effectiveness

1.1 Study Area Description

The study area for this corridor, shown in **Figure 1** on the following page, is comprised of I-30 and I-40 between I-530 and Hwy 67. This corridor runs primarily north and south through both North Little Rock and Little Rock. The corridor is approximately 6.7 miles long.

While I-30 is a primarily east-west interstate, the portion within the study area runs north-south. Within the study area, eastbound I-30 accommodates northbound traffic while westbound I-30 accommodates southbound traffic. In order to be clear about direction, this document will occasionally refer to eastbound I-30 as I-30 EB, and at other times will refer to it as I-30 in the northbound/eastbound direction. The same concept will apply vice versa to westbound I-30.

Figure 1: I-30 PEL Study Area

Source: I-30 CAP

1.2 Relevant Studies

Over recent years, there have been multiple studies conducted in or near the PEL study area. These studies have been reviewed and information from them incorporated into the PEL documents. The studies reviewed include:

- *Central Arkansas Regional Transportation Study, Areawide Freeway Study, Phases 1 and 2* (2003);
- *I-630 Fixed Guideway Alignment Study* (2010);
- *River Rail Airport Study, Phase 2 Final Report* (2011);
- *Metroplan Long-Range Transportation Plan* (2010); and
- *Metroplan Long-Range Transportation Plan (2014), Imagine Central Arkansas*

More detailed information for this section can be found in the appendices.

1.3 I-30/I-40 Corridor Description

The following components of the I-30/I-40 study area were considered in this analysis:

- Main Lane
- Cross Streets and Pedestrian Facilities
- Interchanges
- Frontage Roads

Generally speaking, there are three main lanes in each direction for the length of this corridor with occasional brief segments of two lanes at the connecting ramps and four lanes which include auxiliary lanes between closely spaced ramps. Most of the corridor contains frontage roads to the east and to the west of the I-30 main lanes.

In the 6.7-mile corridor, there are four system interchanges, seven service interchanges, and eight grade separations of the surface streets. Fourteen of the fifteen I-30 interchanges and grade separations allow pedestrians to cross I-30 and I-40 within the PEL study area. Throughout most of the corridor, frontage roads consisting of two one-way roads each travel parallel to the freeway.

The I-30/I-40 Corridor contains the following system-to-system interchanges:

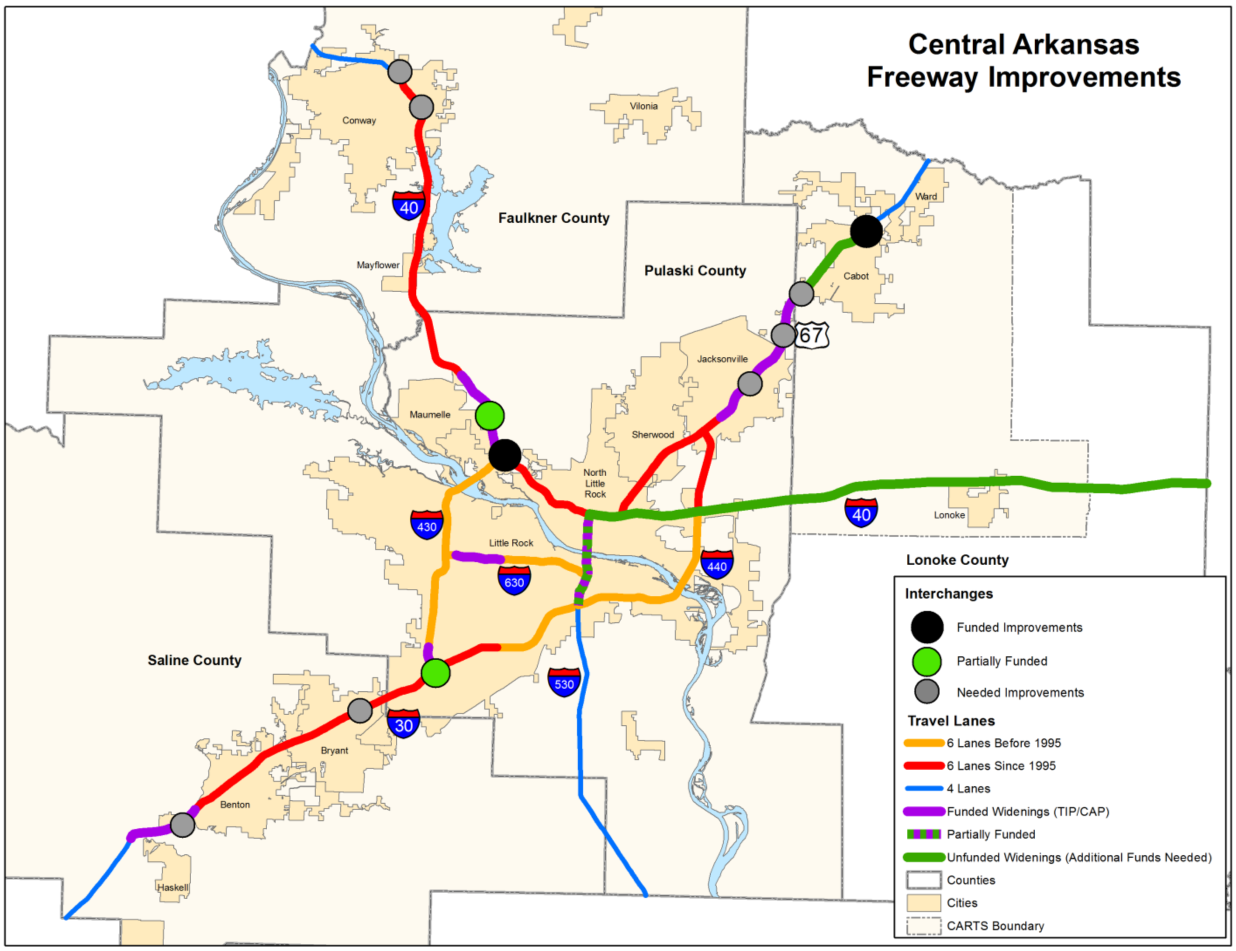
- I-40 & Hwy 67
- I-40 & I-30
- I-30 & I-630
- I-30, I-530 & I-440

1.4 Planned Improvements

The Metroplan long range transportation plan, *Imagine Central Arkansas*, adopted in December 2014, was reviewed and incorporated into the study. **Figure 2** shows the long-range area-wide freeway system, and **Figure 3** shows the 10-Year Financially Constrained Plan.

On the side streets, the Metroplan Long-Range Transportation Plan includes several improvements for bicycle, pedestrian, and motor vehicle facilities. The Central Arkansas Transit Authority (CATA) also has plans to expand upon the current bus and River Rail system.

Figure 2: Area Wide Freeway System



Source: Imagine Central Arkansas Figure 5-5, http://www.metroplan.org/files/53/2014-12LongRangePlan.pdf

Figure 3: Freeway System Identified in Metroplan's Long Range Plan

Source: Imagine Central Arkansas Figure 1-6, **http://www.metroplan.org/files/53/2014-12LongRangePlan.pdf**

2 Planning Assumptions and Analytical Methods

2.1 Traffic Volumes

In 2014, AHTD collected existing AM and PM peak hour turning volumes at 44 study intersections and 62 ramps in the study area. AHTD also collected 48-hour traffic data at three I-30/I-40 main lane locations:

1. I-40 between North Hills Boulevard Interchange and Hwy 67 Interchange
2. I-30 between Broadway Street Interchange and Cantrell Road/Clinton Avenue Interchange (note: this count was performed north of the Arkansas River Bridge)
3. I-30 between Roosevelt Road Interchange and I-440 Interchange

2.2 Traffic Forecast

The I-30/I-40 Traffic Count and Forecast Plan was developed in coordination with AHTD. This traffic forecast is provided in **Appendix 1 – CA0602 Traffic Forecast Plan.**

The *AHTD Traffic Monitoring System Handbook (November 2013)* was the primary resource used to develop the Traffic Count and Forecast Plan. This handbook offers procedures on traffic monitoring practices and techniques used by AHTD staff and consultants providing traffic information for project design, planning studies, and environmental documentation. This handbook provides instructions for traffic forecasting, turning movement count forecasting, equivalent single axle loading (ESAL) forecasting, testing and certification procedures for equipment, and the development of highway performance monitoring system data.

In addition to utilizing AHTD's procedures and data, Metroplan was consulted, and their regional travel demand model was used to help forecast traffic in the study corridor.

In general, the I-30/I-40 main lane traffic is estimated to increase approximately 1% per year (around 20% total) through the 2041 design year. Surface street traffic crossing the interstate corridor is forecasted to grow at less than 1% per year.

The base 2041 forecast for the study corridor was developed for an 8-lane facility. Traffic forecasts were based on the CARTS travel demand model, AHTD counts, the assumptions outlined in this report, and additional assumptions located in **Appendix 2 – Traffic Technical Report**. In order to provide forecasted volumes for a 6, 10, or 12 lane facility, the base 8-lane forecast volumes were adjusted by the range of percentages shown in **Table 2**, as documented by **Appendix 2**. Arterial cross street traffic was held constant in all forecasts.

Table 2: 2041 Forecast Adjustments

I-30 PEL Assumption	Forecast Assumption
Future 6-Lane	Base Assumption **minus 13-15%** main lane volumes
Future 8-Lane	Base Assumption
Future 10-Lane	Base Assumption **plus 4-7%** main lane volumes
Future 12-Lane	Base Assumption **plus 10-13%** main lane volumes

Source: HNTB Corporation - Base assumption is shown in Appendix 2

More detailed information can be found in **Appendix 1 – CA0602 Traffic Forecast Plan**.

2.3 Traffic Analysis

The I-30/I-40 traffic analysis was performed using a micro-simulation modeling software called Vissim (version 7.0). A detailed report that outlines the methodology used to create the model is provided in the **Appendix 3 – Vissim Model Methodology Report**. The two-hour peak periods were analyzed in the morning from 6:45-8:45 AM and in the afternoon from 4:00 - 6:00 PM.

In the micro-simulation phase, very large amounts of data were collected for the model. This data included AHTD traffic counts, travel time runs, field reconnaissance, public input, Google Traffic, HERE data, I-30 cameras, signal timing data, existing grades, public transit route information, and Metroplan model data. Model limits are shown in **Figure 4**.

Once data was collected and input to the traffic simulation model, the model was calibrated. Calibration is the process of replicating the regional driver behavior in the model. The Federal Highway Administration (FHWA) has standards for simulations which must be met in order for a model to be considered calibrated. These standards are detailed in **Appendix 3 – Vissim Model Methodology Report**. Once the model is calibrated, it can output massive amounts of data for use in analyzing the existing and future conditions of a roadway.

Once the I-30 model was calibrated to existing conditions, future (2041) traffic volumes were applied assuming a No Action (6-lane) condition. The No Action model is intended to show how existing problem areas become worse as well as to show where new problem areas are likely to emerge in the future. The model's geometry can then be modified to simulate various future build alternative scenarios.

The final major step in the model creation process was to create "build" versions of the model based on three potential freeway solutions: 8-lane C/D (3 main lanes plus a one-lane collector/distributor (C/D) system per direction), 10 main lane (3 main lanes plus 2 auxiliary lanes per direction), and 10-lane C/D (3 main lanes plus a two-lane C/D system per direction)

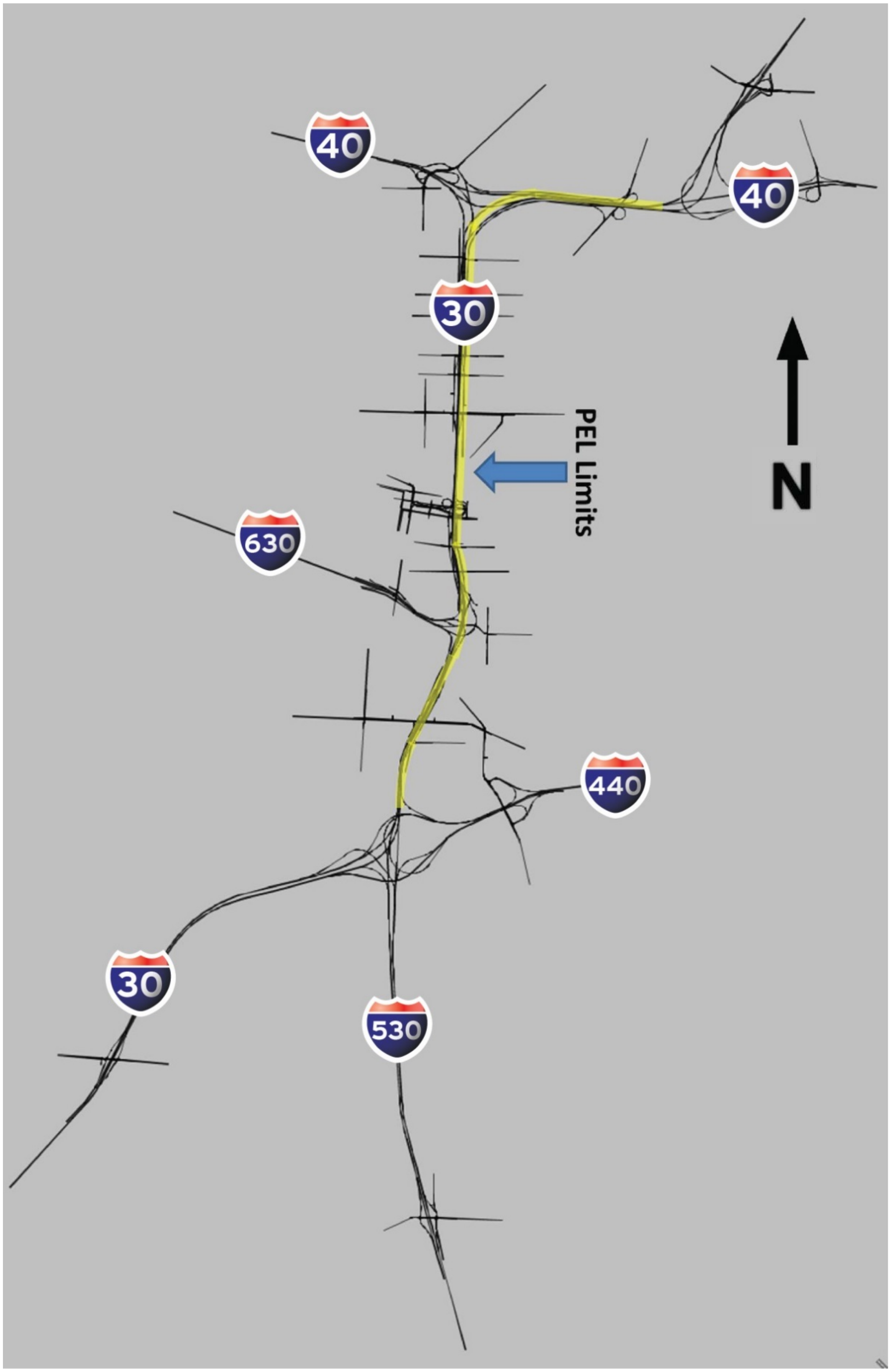
As shown in **Table 3**, various measures of effectiveness (MOEs) were output from Vissim and used to compare the performance of each model:

Table 3: I-30 PEL Vissim Mobility Measures of Effectiveness

PEL Corridor	**System-Wide (Entire Network)**

• Throughput
• Travel Time
    • Emergency Routes
    • Key Destinations
    • Between North Terminal and South Terminal
• Delay
• Speed
• LOS by freeway segment
• Percent LOS E & F
• LOS E & F Duration
• Percent LOS F
• LOS F Duration
• Safety
	• VMT – Vehicle Miles Traveled
	• VHT – Vehicle Hours Traveled
	• VHD – Vehicle Hours of Delay
	• Percent LOS E & F
	• Percent LOS F
	• Unserved Vehicles
	
	Arterial Intersections
	• Percent LOS E & F
	• Percent LOS F

Figure 4: Vissim Model Limits



Source: I-30 Vissim Model

2.4 Safety Assumptions and Study Methods

Safety is a key component in evaluating the impacts of the No Action and the proposed build alternatives. For this analysis, the safety project limits consisted of I-30 from the south terminal interchange with I-530/I-440 to the north terminal interchange with I-40 and to the east interchange of I-40 with Hwy 67.

A quantitative safety analysis was performed for the existing crashes, arterial connection conflict points, main lane conflict points, C/D conflict points, acceleration and deceleration ramps, weaving segments, main lane ramps per mile, and C/D ramps per mile. In addition, potential crash reductions were estimated based on crash modification factors for a particular design element.

Arterial conflict points were quantified for the No Action, 8-Lane C/D, 10 Main Lane, and 10-Lane C/D alternatives. As shown in **Table 4**, the number of arterial conflict points were determined from the number of vehicle paths that cross, merge, and diverge with another vehicle path based on legitimate movements through an intersection. The number of intersections analyzed varied from the No Action alternative to the various proposed alternatives due to the changes in geometry and lane configurations. However, results were identical for the 8-Lane C/D, the 10 Main Lane, and the 10-Lane C/D alternatives.

Table 4: Summary of Arterial Connection Conflict Points for Build Alternatives

	No Action	8-Lane C/D, 10 Main Lane, 10-Lane C/D
Total # Conflict Points	411	515
Avg. Conflict Points per Intersection	19.6	18.4

Source: Garver

The main lanes and C/D conflict points were quantified from the merge and diverge points on each system for No Action and all build alternatives. The conflict points occurred at the entrance and exit ramps, lane drops, and lane splits. If a ramp fed into its own lane and no lane change was required to stay on the system, then no conflict point was counted. All ramps that merged or diverged from the system were counted as a conflict point on that system, so ramps from the frontage road/arterial street that went directly to the C/D system were counted only for the C/D system and not for the main lanes. See **Tables 5** and **6** for summaries of the conflict points on the main lane and C/D systems.

Table 5: Summary of Main Lane Connection Conflict Points

	No Action	8-Lane C/D	10 Main Lane	10-Lane C/D
Total # Conflict Points	31	20	26	19

Source: Garver

Table 6: Summary of Collector Distributor System Conflict Points

	8-Lane C/D	10-Lane C/D
Total # Conflict Points	6	7

Source: Garver

The existing acceleration/deceleration and weaving lengths were measured in order to identify which lengths do not meet the minimum requirements. All lengths were measured from/to the gores as they appeared in *Google Earth* and are approximate. The freeway design speed for I-30 is 60 miles per hour, and the design speed for all ramps is ideally 50 miles per hour. However, for the existing conditions, there are locations that have less than 50 miles per hour (typically 40 miles per hour), and the loop ramps at the Cantrell Road interchange are 25 miles per hours. According to Table 10-3 of *A Policy on Geometric Design of Highways and Streets, 2011* (*Green Book)*, the acceleration length should be 180 feet for an on-ramp going from 50 miles per hour to 60 miles per hour, 550 feet from 40 miles per hour to 60 miles per hour, and 1020 feet from 25 miles per hour to 60 mile per hour. According to Table 10-5 of the *Green Book*, the deceleration length should be 240 feet for an off-ramp going from 60 miles per hour to 50 miles per hour, 350 feet from 40 miles per hour to 60 miles per hour, and 460 feet from 25 miles per hour to 60 mile per hour. However, the AHTD standard requires a minimum of 700 feet for parallel access lanes and 300 feet for tapers. Weaving lengths were evaluated based on Figure 10-106 of the *Green Book*. For evaluation of the existing lengths, the largest applicable minimum was applied. **Tables 7** and **8** show the results of this evaluation. These results are discussed in greater detail in **Appendix 4 – Safety Technical Report**.

Table 7: Acceleration and Deceleration Lengths

Description	Length (ft)	Meets Standard?
Roosevelt WB entrance	450' Accel + 300' Taper	no
I-630 EB entrance	510' Accel + 300' Taper	no
Cantrell Rd EB Entrance	430' Accel + 230' Taper	no
Broadway St WB Entrance	330' Accel + 300' Taper	no
7th St EB Entrance	380' Accel + 200' Taper	no
Curtis Sykes Dr. WB Entrance	175' Accel + 200' Taper	no
Curtis Sykes Dr. EB Entrance	No Accel Lane + 320' Taper	no
North Hills WB Entrance	675' Accel + 350' Taper	yes
9th St WB exit	No Decel Lane Length	no
6th St WB exit	No Decel Lane Length	no
Cantrell Rd WB Loop Exit	No Decel Lane Length	no
Broadway St EB Exit	No Decel Lane Length	no
7th St WB Exit	No Decel Lane Length	no
Curtis Sykes Dr. EB Exit	No Decel Lane Length	no
Curtis Sykes Dr. WB Exit	No Decel Lane Length	no
North Hills EB Exit	No Decel Lane Length	no

Table 8: Weaving Lengths

From	To	Length (ft)	Requirement (ft)	Meets Standard?
I-440 EB Entrance	Roosevelt EB Exit	1200	2000	no
Roosevelt Rd EB Entrance	I-630 WB Exit	1350	2000	no
I-630 EB Entrance	Roosevelt WB Exit	970	2000	no
9th St WB Exit	6th St WB Exit	650	1000	no
6th St EB Entrance	Cantrell Rd EB Exit	1000	2000	no
Cantrell Rd WB Entrance	6th St WB Exit	550	2000	no
Cantrell Road WB Entrance	9th St WB Exit	1200	2000	no
7th St EB Entrance (to Broadway St)	Curtis Sykes St Exit	1600	2000	no
Curtis Sykes WB Entrance	7th St WB Exit (to Broadway St)	1600	2000	no
Curtis Sykes EB Entrance	I-40 Split	1100	2000*	no*
I-40 Converge	15th Street WB Exit	1000	2000*	no*
North Hills WB Entrance	I-40/I-30 Split	2000	2000*	yes*

*These weaving distances should ideally be greater than 2000 feet because they contain left exits/entrances

The total numbers of main lane ramps were compared between existing and build alternatives for both directions of travel along the 6.7 mile stretch of I-30 and I-40 from the south terminal interchange at I-530 and I-440 to the north terminal interchange and east to the Hwy 67 interchange.

The C/D system was proposed in the 8-Lane C/D and 10-Lane C/D alternatives. This separate system interacts with the freeway system to help remove some of the weaving movements and ramps from the freeway main lanes. The C/D system would have lower operating speeds and traffic volumes. Therefore, the number of C/D ramps per mile was quantified separately than the freeway system.

The projected crashes for 2041 were estimated based on the historic crash rates. An average crash rate between the three study years (2010-2012) was estimated for three sections of the main lanes. The three sections were I-30 from I-530/I-440 to I-630, I-30 from I-30/I-630 to I-40, and I-40 from I-30 to Hwy 67. With the assumption that the roadway conditions remain the same and no safety measures would be implemented, the average crash rate is assumed to remain constant through the design year. To project the number of crashes for 2041, the average crash rate was applied to the future No Action volumes.

For this analysis, the projected crashes for 2041 were used in the evaluation of potential crash reductions. These were broken down by segment and location. Crash Modification Factors (CMFs) were then applied to quantify the potential crash reductions in the different build alternatives. It was assumed that the No Action would not have these improvements.

Additional discussion regarding KA crashes will be performed in the Interchange Justification Report (IJR).

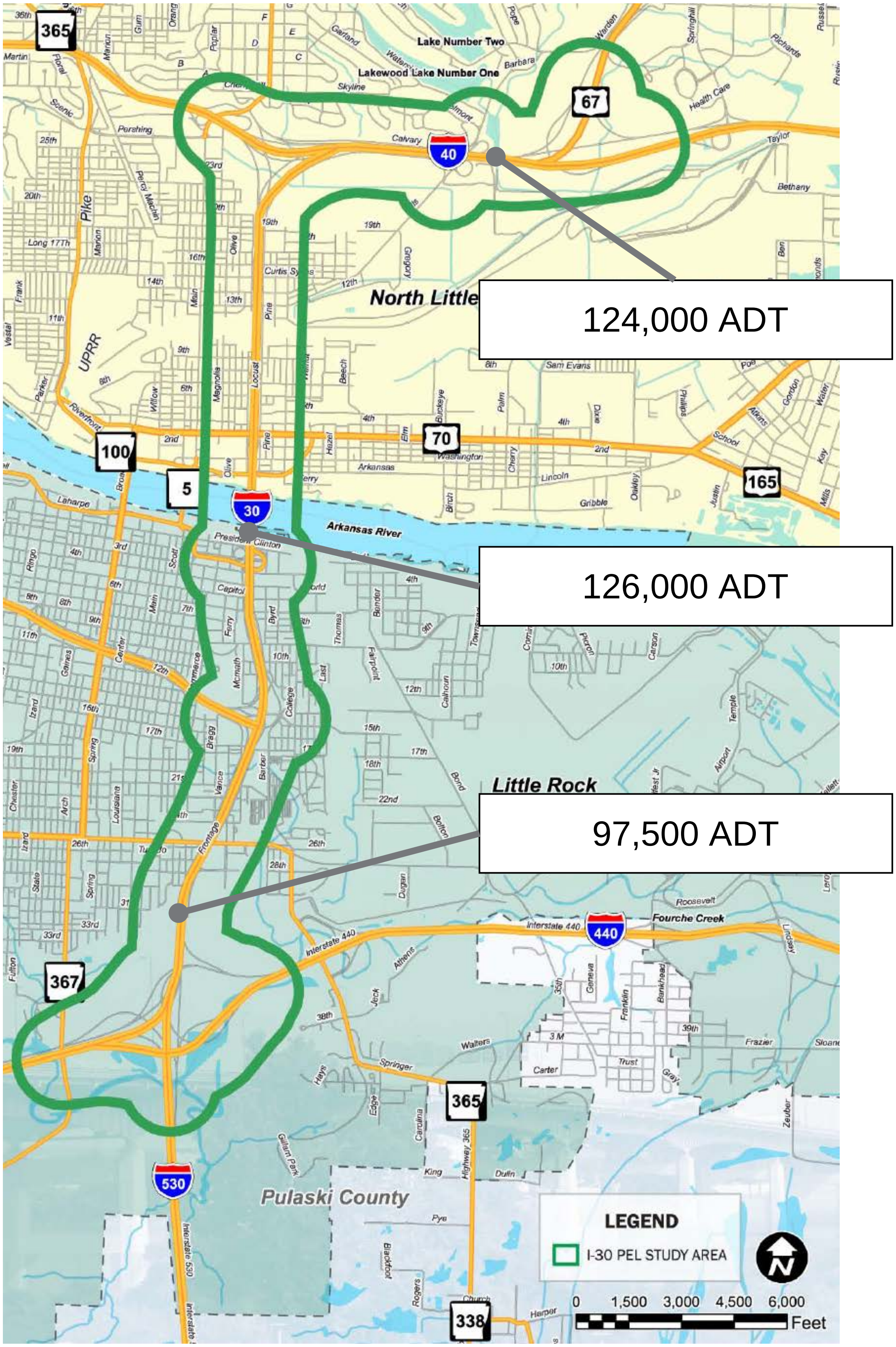
3 Existing Conditions

Existing mobility and safety conditions were analyzed for the PEL study corridor using the methods described above, and results are summarized in this chapter. More detailed information can be found in **Appendix 2 – Traffic Technical Report** and **Appendix 4 – Safety Technical Report**.

3.1 Traffic Demand

As discussed in Chapter 2, AHTD collected a large amount of existing traffic data. **Figure 5** shows the daily traffic volumes measured at three locations. Existing traffic demand in the corridor ranges from 97,500 daily vehicles to 126,000 daily vehicles. The highest traffic volume is over the Arkansas River. Full corridor wide daily traffic can be found in **Appendix 1.**

Figure 5: Existing (2014) Average Daily Traffic



Source: AHTD - ADT = average daily traffic

3.2 Alternative Modes

All travel modes were reviewed for mobility and safety. This section will provide information related to trucks, transit, bicycle, and pedestrian mobility.

3.2.1 Trucks

Daily truck percentages on I-30 are in the range of 6-8% during the AM and PM peak hours. On Hwy 67 north of the study corridor, truck percentages are higher, ranging 8-11%. Historical truck percentages on Cumberland Street west of I-30 were around 2-5% over several years.

Trucks carrying hazardous materials are prohibited from using I-30 within the project limits unless they are delivering to that area (e.g. gasoline being delivered to a gas station). Permits for oversized trucks are specific concerning the route the truck can take. Like HAZMAT, oversized trucks may only route to I-30 if delivering to the downtown areas.

Truck percentages are highest on the perimeter routes of I-440 and Interstate 430 (I-430). This is primarily due to trucks avoiding the congestion and safety concerns of multiple access points with short acceleration and deceleration lanes along the I-30 corridor.

3.2.2 Transit

Residents of Little Rock, North Little Rock, and the surrounding region are served by a public transit system known as CATA. CATA operates 36 transit routes within the Little Rock metropolitan area as shown in **Figure 7** on the following page. One route is operated along the I-30 corridor. A summary of bus operations from the CATA website indicates the following:

- Number of buses in peak hour of service – 49
- Number of buses in fleet – 59
- Weekday fixed route service miles – almost 8,500
- 2012 Passenger Trips – 2,823,695
- 20% increase in ridership since 2009
- Less than 1% increase in revenue hours since 2009
- More than 1% decrease in revenue miles since 2009

Route 26 (Maumelle Express) is the only route to travel over the I-30 bridge. It runs five times a day beginning at the River Cities Travel Center (shown as “Travel Center” in **Figure 6**). at the following times: 6:30 am, 7:00 am, 4:10 pm, 5:10 pm, and 5:40 pm. Routes 20 (Airport/College) and 23 (Baseline/Southwest) travel south on I-30 beginning at the River Cities Travel Center from 5:30 am to 8:30 pm with 50-60 minute headways.

Figure 6: Existing Transit Routes

Source: Central Arkansas Transit Authority System Map
http://www.cat.org/wp-content/uploads/2013/05/System-Map1.pdf

3.2.3 Pedestrian/Bicycle

Adequate pedestrian and bicycle facilities are important for individuals who live and work around the study corridor. Today, 14 of the 15 I-30 grade separations and interchanges allow pedestrians and bicyclists to cross I-30 and I-40. In addition, there are specialized bridges and paths for bikes and pedestrians to use. Although pedestrian volumes were not analyzed in the mobility analysis, pedestrian walk times were included in the signal timings of the models at the study intersections.

In 2013, North Little Rock updated their master street plan which included a bicycle plan in Article 7. North Little Rock has been designated by The League of American Bicyclists as a bronze level Bicycle Friendly Community since 2009.

In 2009, the City of Little Rock updated their Master Street Plan which included a bicycle plan in Section 4.

3.2.4 Mobility

The ease of mobility within the existing PEL study corridor was analyzed using a variety of measures of effectiveness (MOEs), as detailed in **Table 3**. **Figure 7** gives a high-level overview of the levels of service (LOS) in the PEL corridor during the most congested time of each peak hour. In this figure, green represents free-flow conditions (LOS A-C), and red represents high levels of congestion (LOS F). Detailed and precise information for the corridor's existing levels of service is provided in **Appendix 8.** As shown in this figure, existing congestion is present in several locations heading into the downtown areas in the AM and heading away from the downtown areas in the PM. These mobility results are consistent with stakeholder feedback and field reconnaissance.

Another useful measure of mobility relates to speed and duration. In **Figure 8**, speeds for each peak period are shown throughout the length of the corridor over the entire two-hour simulation period. Colors ranging from green to dark red represent speeds ranging from free-flow to standstill, respectively. Time is plotted along the x-axis beginning 30 minutes before the start of the peak hour and ending 30 minutes after the end of the peak hour for a total of two hours. The y-axis represents the location along the PEL corridor. The left side of each graph marks key points along the study area corridor progressing north to south from top to bottom.

As shown in the speed graphs, the average speed for vehicles on I-30 eastbound between I-630 and the Arkansas River at 5:00 pm on a typical day is about 20-30 mph. The graphs also show the progression of backups and location of bottlenecks on the freeway main lane. Bottlenecks occur when traffic is congested in a particular section of a roadway segment, causing sizeable queues upstream of the congested area. This congestion limits the amount of traffic able to get downstream of the congested area. Since only a small number of vehicles are able to make it through the congestion at a time, downstream roadway segments usually appear to function well. When this happens, the downstream segment is meeting the capacity requirements of the upstream throughput, but not necessarily the capacity requirements of the upstream demand.

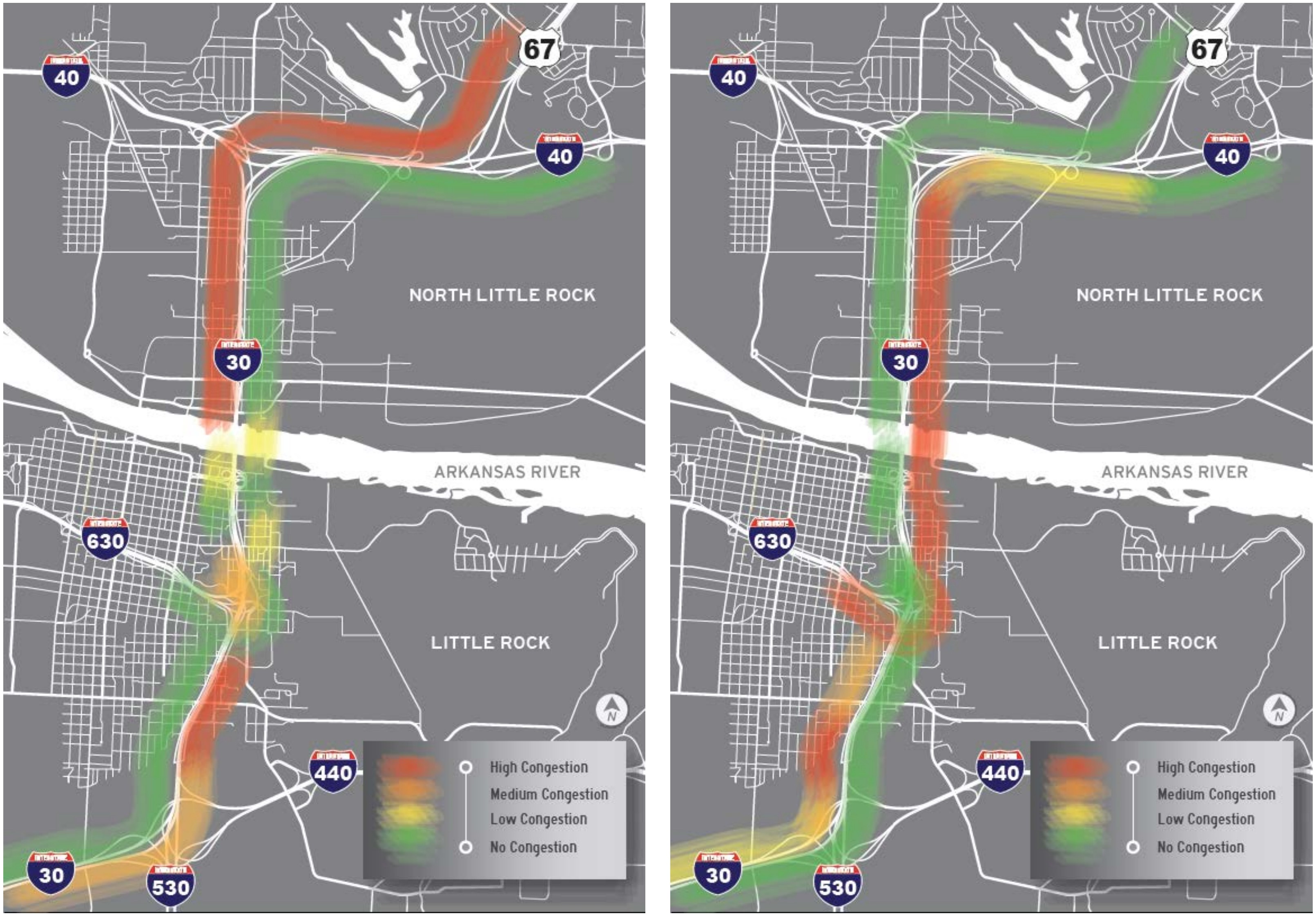
In the southbound direction during the AM peak, it is evident that the Arkansas River Bridge is the location of a bottleneck. North of the bridge, queues related to congestion slowly build from the bridge all the way back to Hwy 67. Because of the backup, traffic south of this point is able to move at free flow speed.

In summary, peak direction travel speeds were approximately 30-40 miles per hour on average which resulted in travel times of approximately 11-12 minutes. Since corridor travel times during free flow conditions are around 5-7 minutes, peak hour travel times are almost twice as long as free flow travel. For each 15-minute subdivision within the two-hour study period, at least one LOS segment in the corridor operates at LOS F. Most of the analyzed intersections in the corridor performed at LOS A-D. In both the AM and PM models, the I-40 WB on-ramp intersection with JFK operates at LOS F due to a small number of vehicles (<10) attempting to turn on to JFK from the ramp, which is two-way for a short distance to accommodate local businesses. In the PM model, The Bishop Lindsey/N Cypress intersection operates at LOS E. Also in the PM model, the College Blvd/15th Street intersection operates at LOS F. This is because EB I-630 vehicles attempting to bypass congestion on EB I-30 will exit at College Blvd and make a left at the College Blvd/15th street intersection.

Stakeholder feedback, field observations, and data revealed a common mobility trend of congestion heading into the Little Rock and North Little Rock downtowns in the AM and heading away from the downtowns in the PM. The existing Vissim simulation, once calibrated, accurately reflected the congestion, volumes, and speeds typically seen in the I-30 PEL corridor during the peak periods.

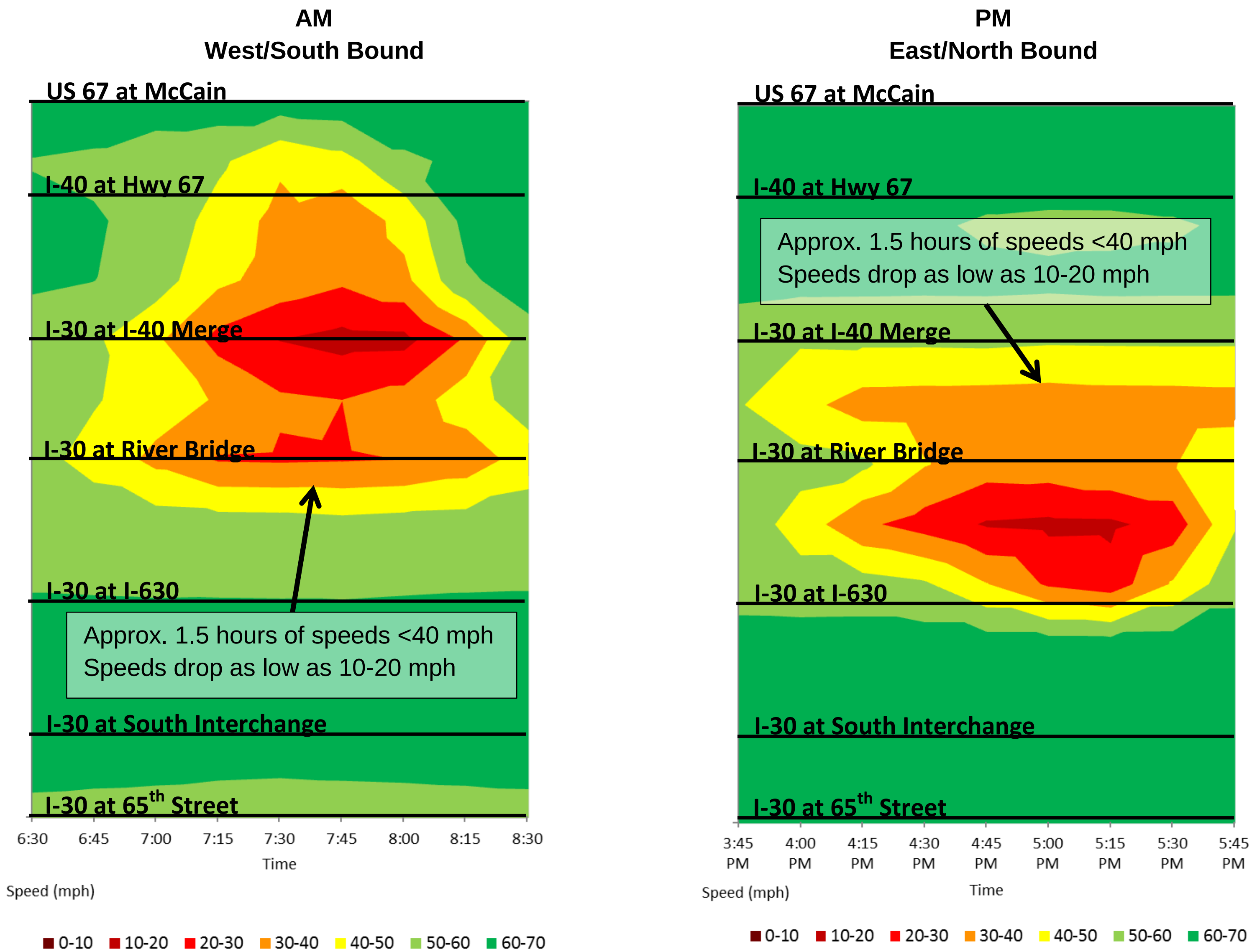
Figure 7: Existing 2014 Peak Hour Mobility

AM Peak Hour **PM Peak Hour**



Source: I-30 PEL Vissim models

Figure 8: Existing 2014 Peak Hour Speed Profiles



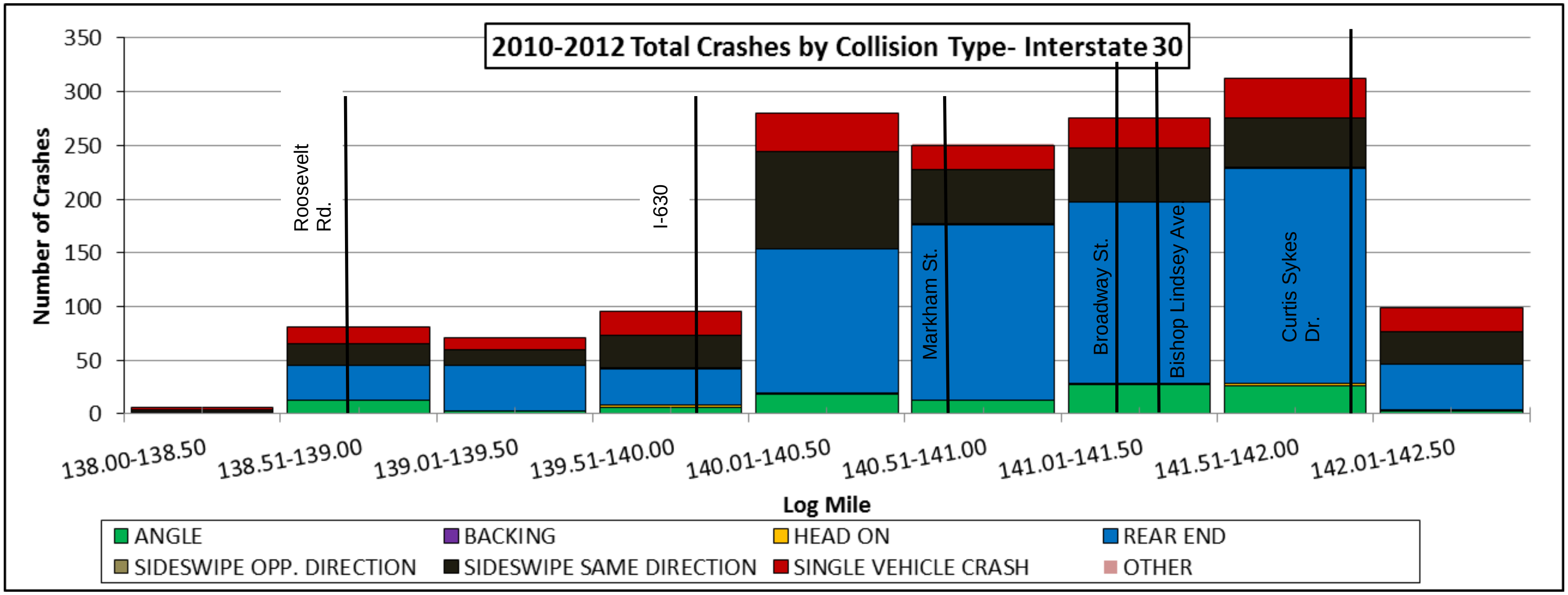
Source: I-30 PEL Vissim models

3.3 Safety

Crash data from 2010, 2011, and 2012 (the latest three years of available data) were reviewed for the PEL study limits. The locations of crashes along the main lanes were plotted by log mile for the combined three years in **Figures 9 and 10** on the following pages. Locations of the crashes along the main lanes and cross streets throughout the study area were plotted graphically by year in **Appendix 4 – Safety Technical Report**.

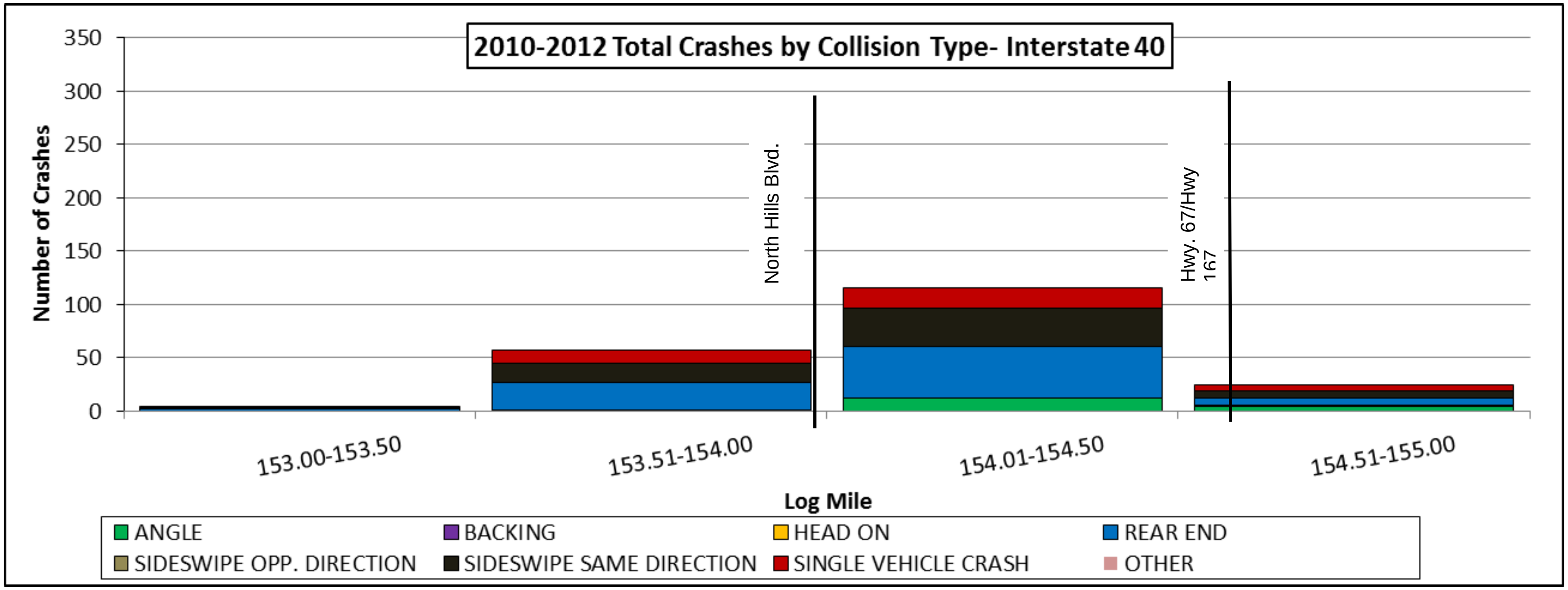
A few key locations exhibit large clusters of crashes consistently throughout the three year study period. The interchange area of I-30 at E. Broadway Street is notable with consistently high numbers of crashes both along I-30 and along the frontage roads (S. Cypress Street and S. Locust Street). Other areas with elevated numbers of crashes include the interchange areas of I-30 at Curtis Sykes Drive, Main Street at W. Pershing Boulevard along with the nearby intersection of Hwy 107/J.F.K. Boulevard at the I-40 access road, and Hwy 67at McCain Boulevard.

Figure 9: 2010-2012 Total Crashes along Interstate 30



Source: Garver compiled using AHTD Database

Figure 10: 2010-2012 Total Crashes along Interstate 40



Source: Garver compiled using AHTD Database

Crash rates for I-30 and I-40 were calculated and compared to the statewide averages for similar types of corridors. Crash rates were calculated for total collisions with all severity types as well as collisions with only fatal (K) and severe injury (A) (KA Crash Rate). As shown in **Table 9**, the KA crash rate along the entire stretch of I-30 was more than double the statewide average of 0.06 crashes per million vehicle miles traveled (MVMT) for KA crashes on a six or more-lane divided highway with full-control access (freeways). The portion of I-30 from I-630 to I-40 had a KA crash rate of 0.15 crashes/MVMT which was nearly three times the statewide average for KA crashes (0.06 crashes/MVMT). This segment had a total crash rate of 4.28 crashes/MVMT which was over three and a half times the statewide average for total crashes (1.23 crashes per MVMT). The KA crash rate along I-40 was 0.08 crashes/MVMT which was also somewhat elevated above the statewide KA average of 0.06 crashes/MVMT for six or more-lane divided highway with full-control access (freeways), but the total crash rate of 0.96 crashes/MVMT was slightly lower than the statewide average total crash rate of 1.23 crashes/MVMT. These crash rates demonstrate a great need for improvements along I-30, particularly the portion between I-630 and the north terminal.

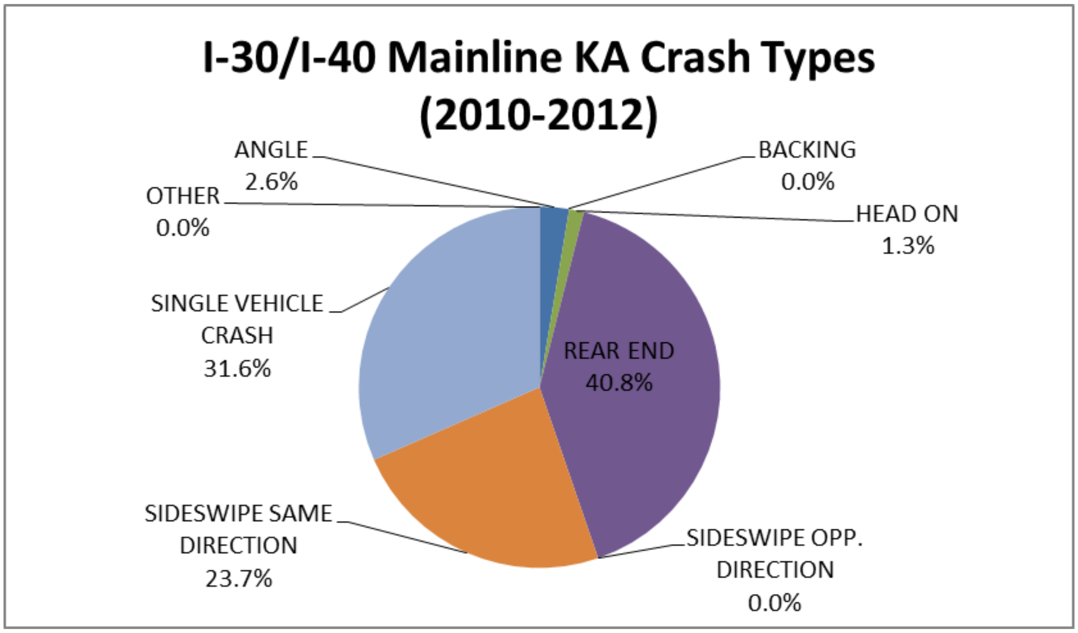
A total of 76 KA crashes occurred from 2010-2012 within the study corridor. These KA crashes were investigated further to identify any patterns that could be indicative of deficiencies in the roadway facility. **Figure 11** on the following page shows a pie chart of these KA crashes by type.

Table 9: Crash Rates for 2010-2012

		Number of Crashes		Crash Rate (MVMT)		AR Avg. Crash Rate			Crash Rate/ AR Avg Crash Rate	
Length (miles)	**Weighted ADT**	**All Severity Types**	**KA**	**All Severity Types**	**KA**	**All Severity Types**	**KA**	**Type**	**All Severity Types**	**KA**
Interstate 30, Section 230, Log Mile 138.39-139.67 (Interstate 530/Interstate 440 to Interstate 630)										
1.28	96,000	224	16	1.66	0.12	1.23	0.06	Six-Lane Access Control	1.35	2.20
Interstate 30, Section 230, Log Mile 139.67-142.02 (Interstate 630 to Interstate 40)										
2.35	113,000	1247	44	4.28	0.15	1.23	0.06	Six-Lane Access Control	3.58	2.73
Interstate 40, Section 330, Log Mile 153.25-154.88 (Interstate 30 to Highway 67)										
1.63	116,000	199	16	0.96	0.08	1.23	0.06	Six-Lane Access Control	0.80	1.40

Source: Garver calculated the rates and compared to AHTD rates

Figure 11: I-30/I-40 Mainline KA Crash Types (2010-2012)



As shown in **Figure 11**, rear-end crashes were the predominant type of crash out of all crashes resulting in severe or fatal injury. This type of crash is typically associated with severe congestion as vehicles experience sudden stops in traffic and typically leave less headway between themselves and the vehicle in front of them. Single vehicle and sideswipe-same direction crashes also comprised a notable percentage of the total KA crashes. Both of these types of crashes could also be partially attributed to congestion as vehicles make sudden maneuvers to change lanes and/or avoid another vehicle. These types of crashes could also indicate insufficient acceleration and deceleration lengths at the ramps. If vehicles are not able to safely adjust their speed outside of the interstate main lanes, a large speed differential is created, and all three of these most common types of collisions occur.

4 Future No Action Conditions

The future No Action scenario is very similar to the existing scenario with a few modifications and assumptions:

- Traffic volumes change from 2014 to 2041 (see the Traffic Forecast plan in **Appendix 1 – CA0602 Traffic Forecast Plan**)
- Traffic signals are optimized to meet future demand
- Other regional improvements are implemented as identified in the Metroplan Long-Range Transportation Plan, *Imagine Central Arkansas.* http://www.metroplan.org/files/53/2014-12LongRangePlan.pdf (December 2014).

4.1 Traffic Demand

Future No Action traffic volumes were forecasted to the year 2041 as described in Chapter 2. **Figure 12** shows the forecasted average daily traffic at three locations along the corridor. Traffic volumes range from 122,000 daily vehicles to 158,000 daily vehicles. These volumes represent around a 20% total increase from existing conditions.

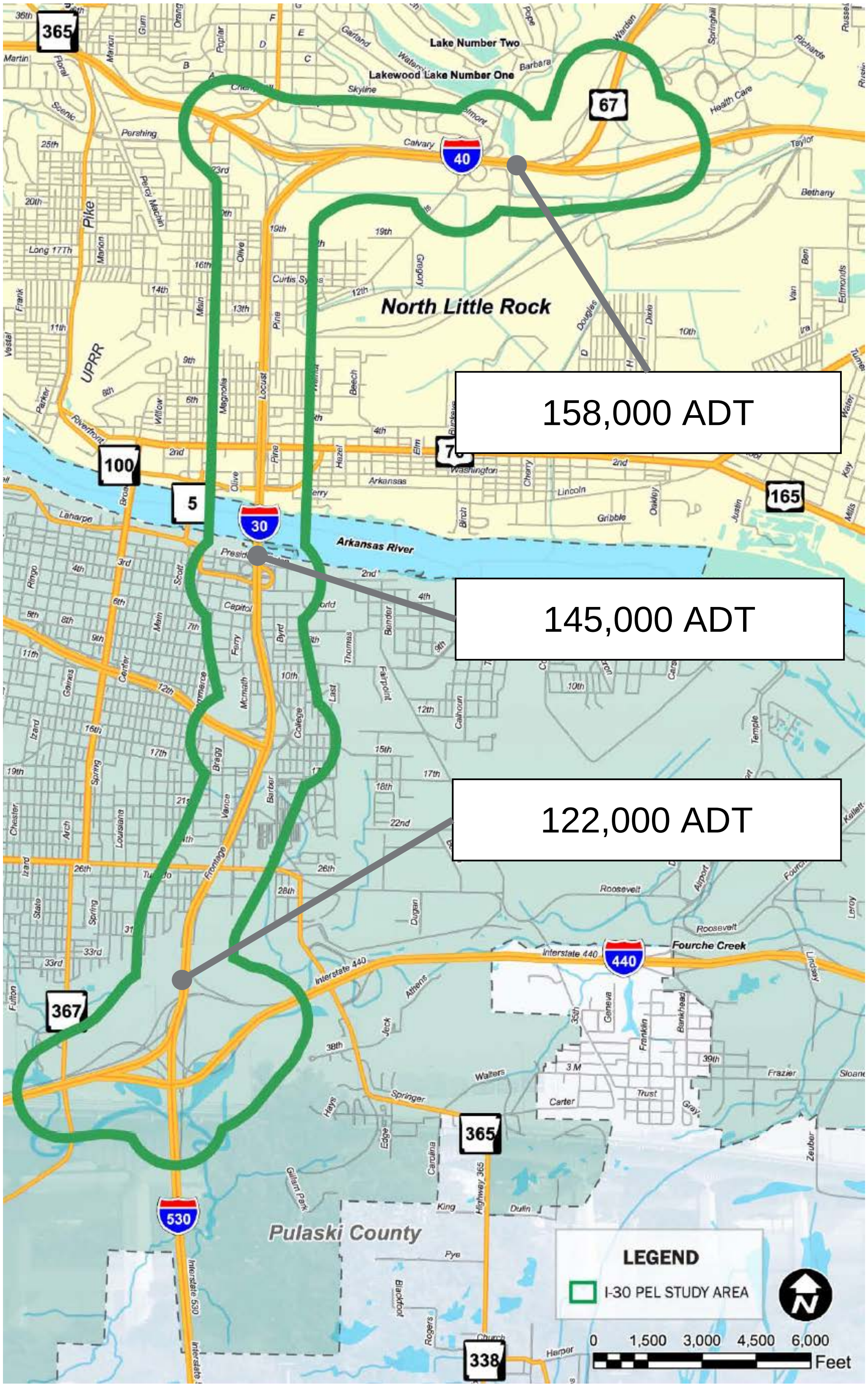
Figure 13 shows the travel characteristics for all vehicle trips passing through the location where 100% is shown. From these exhibits, the percentage of trips to each interchange as well as the percentage of local vs. through trips is summarized in **Table 10** below.

Table 10: Percentage of Local and Through Trips to Each Interchange

		To		
		Local Exit	I-630	Through
From	Just South of I-40	52%	30%	18%
	Just North of I-440/I-530	41%	45%	14%

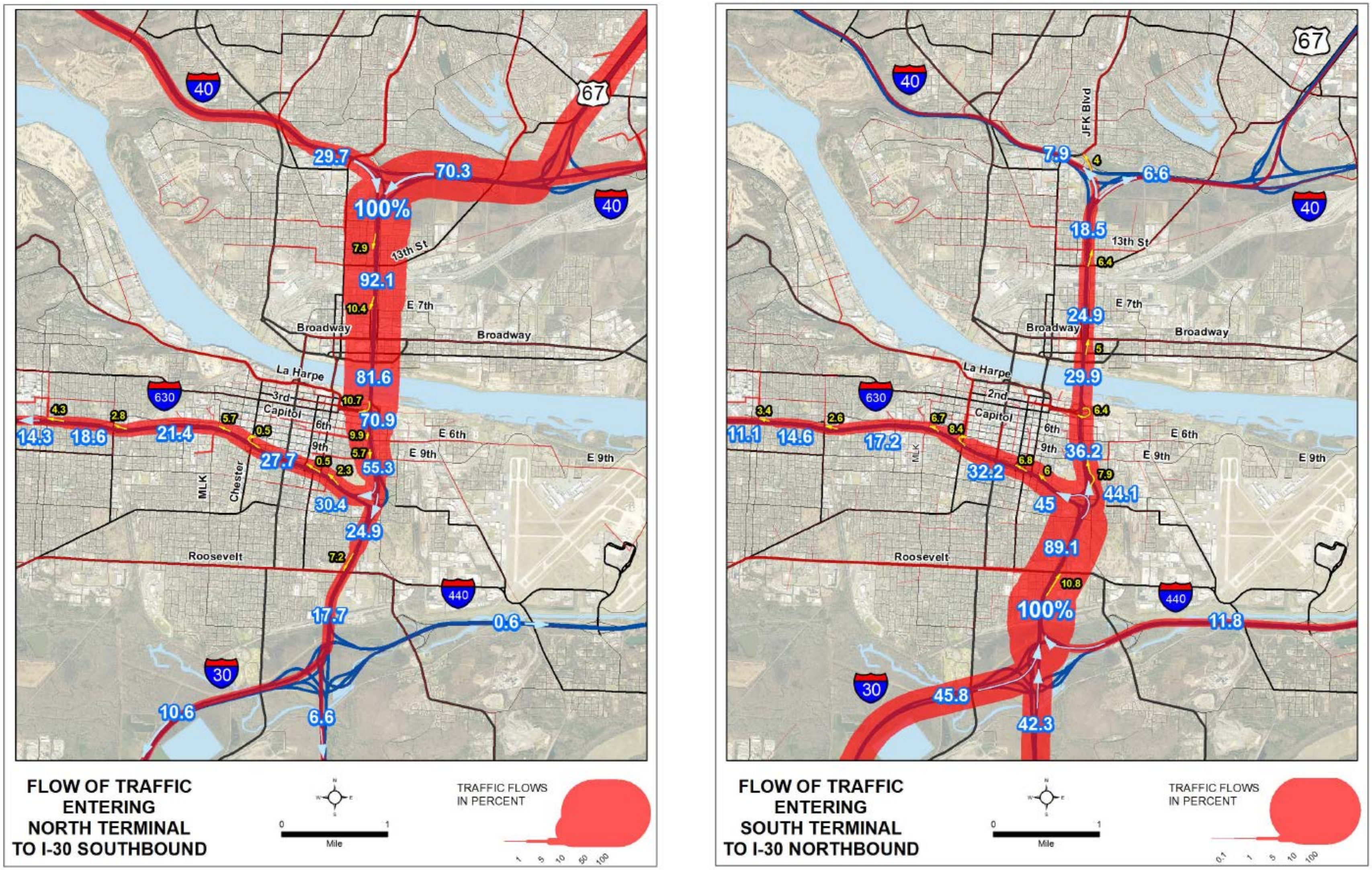
The Metroplan model data shows that only 14-18% of the traffic on I-30 is "through" traffic which means that the traffic is not exiting or entering from an I-30 local service interchange or I-630. Full corridor wide daily traffic can be found in **Appendix 1**.

Figure 12: Future (2041) No Action Average Daily Traffic



Source: AHTD - ADT = average daily traffic

Figure 13: Trip Origins and Destinations Future (2041) No Action Average Daily Traffic



Source: Metroplan

4.2 Mobility

As with the existing scenario, the ease of mobility within the existing PEL study corridor was analyzed using a variety of measures of effectiveness (MOEs).

Based on the future No Action Vissim model data, **Figure 14** summarizes the mobility in the PEL corridor during the most congested time of each peak hour. As shown in this figure, the problems that were evident in the existing model are now extending to the model limits. It is important to note that in this 2041 No Action scenario, severe bottlenecks in certain areas such as I-30 WB at the Arkansas River Bridge are causing artificial downstream free flow conditions. As mentioned in Chapter 3, bottlenecking occurs when traffic is congested in a particular area of a roadway segment, causing sizeable queues upstream of the congested area and little traffic downstream of the congested area since the traffic desiring to reach the downstream area is blocked by the localized congestion. Occurrences of bottlenecking are more evident in the speed profiles in **Figure 15**. This figure shows bottlenecks in several locations throughout the 6-lane corridor which cause backups to extend outside the model area. In all cases, the congestion lasts through the end of the two-hour simulation.

Peak direction travel speeds have decreased to 20-30 mph, and corridor-wide travel time is now 16-18 minutes (nearly three times that of free flow conditions). For each 15-minute subdivision within the two-hour simulation, at least one LOS segment operates at LOS F. The following intersections now operate at LOS E or F:

AM

- I-40 WB Off Ramp & JFK Blvd – LOS F
- I-40 WB On Ramp & JFK Blvd – LOS F
- I-30 & Broadway Street Interchange – LOS E
- Broadway Blvd & N Locust Street – LOS E
- Broadway Blvd & Riverfront Drive – LOS F
- 2nd Street & Ferry Street – LOS F
- 2nd Street & Mahlon Martin Street – LOS E
- I-30 & 65th Street Interchange – LOS F

PM

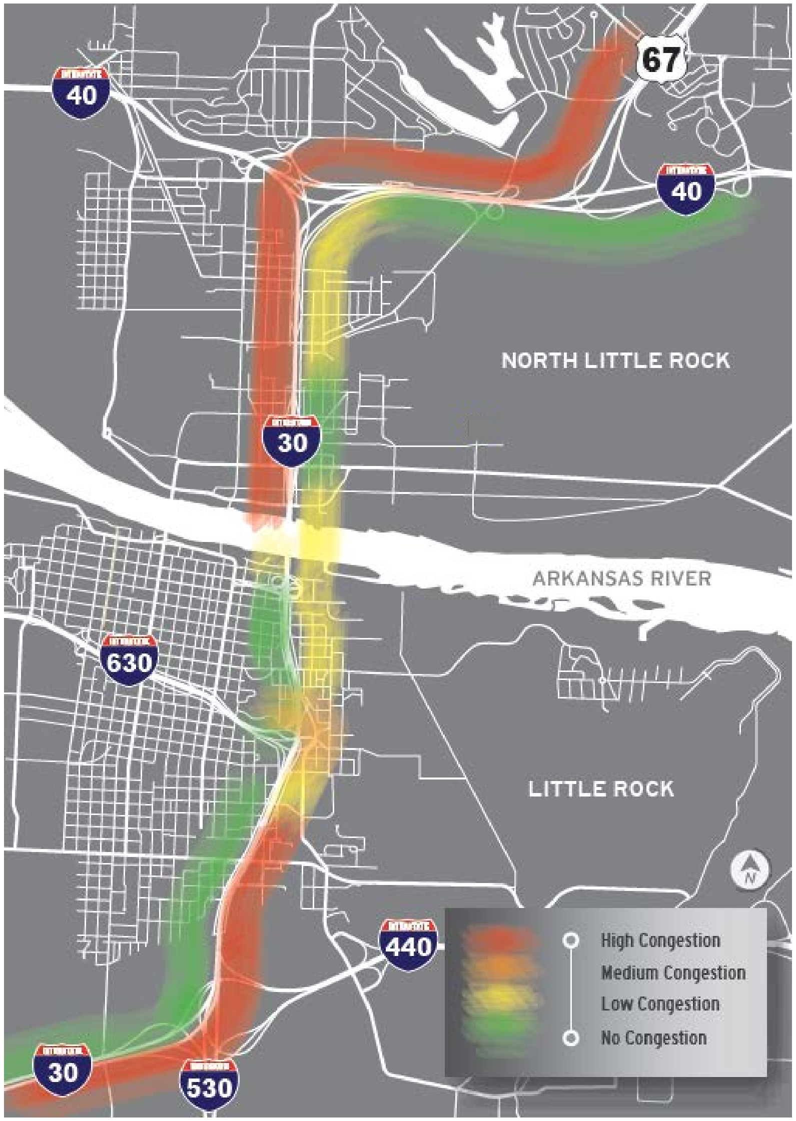
- I-40 Ramps & Springhill – LOS F
- I-40 WB On Ramp & JFK Blvd – LOS F
- I-30 & Curtis Sykes Interchange – LOS F
- Bishop Lindsey Ave & N Cypress Street – LOS E
- I-30 & Broadway Street Interchange – LOS F
- Cumberland & 3rd Street – LOS F
- Cumberland & 2nd Street – LOS F
- Cumberland & Markham Street – LOS F
- 2nd Street & Ferry Street – LOS F

- 3^{rd} Street & I-30 Frontage Road – LOS F
- 3^{rd} Street & Mahlon Martin Street – LOS F
- 2^{nd} Street & Mahlon Martin Street – LOS F
- I-30 & 6^{th} Street Interchange – LOS F
- I-30 & 9^{th} Street Interchange – LOS F
- 65^{th} Street & I-30 SB Ramps – LOS F

Areas of high congestion in the existing scenario are made worse by the future increase in traffic demand. In addition, new areas of concern are beginning to emerge as side street congestion causes vehicles to back up onto the freeway in both peak and off-peak directions.

Figure 14: Future 2041 No Action Peak Hour Mobility

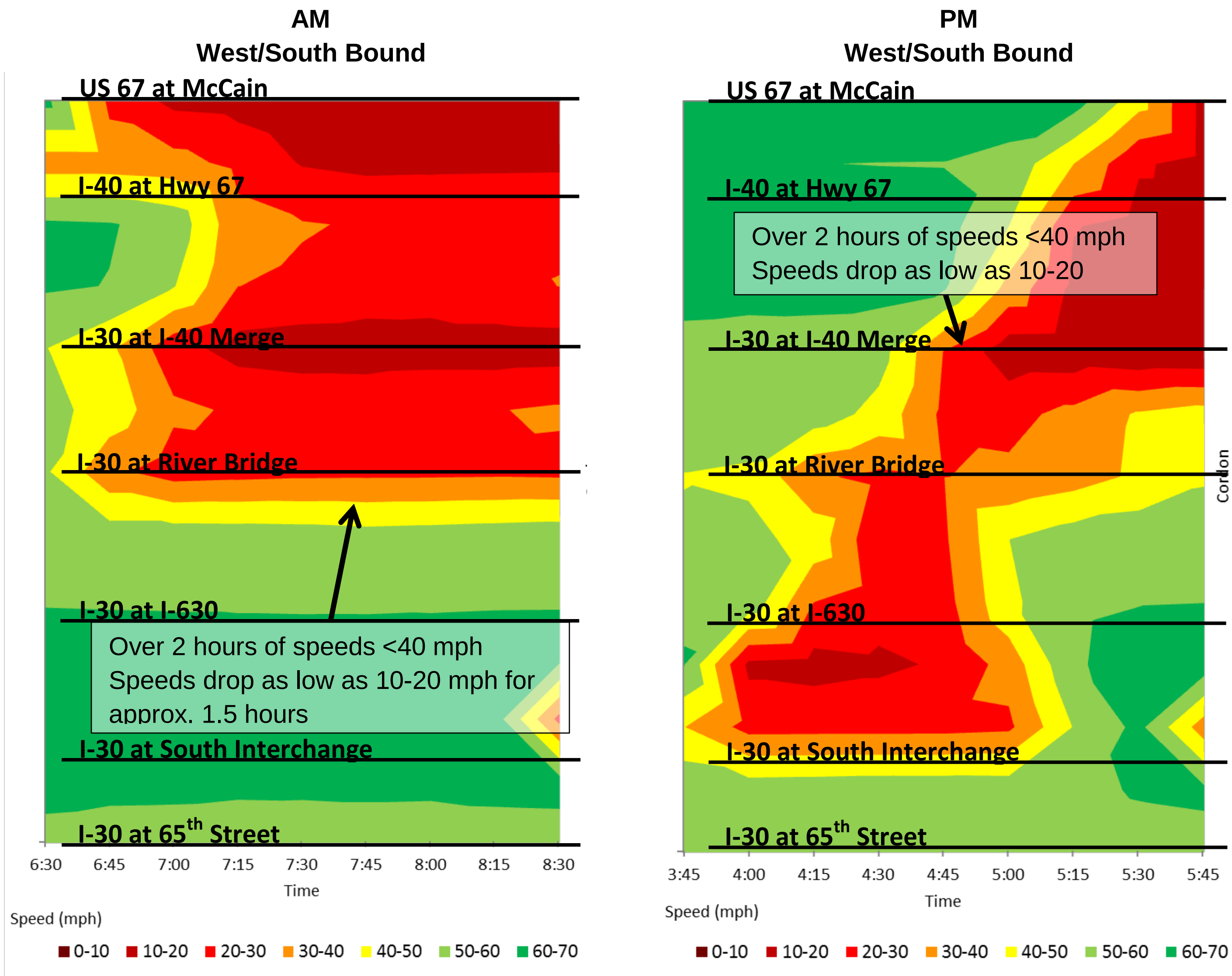
AM Peak Hour



PM Peak Hour

Source: I-30 PEL Vissim models

Figure 15: Future 2041 No Action Speed Profiles



Source: I-30 PEL Vissim models

4.3 Safety

The No Action alternative will continue to have safety issues in regards to the non-standard design elements and ever growing congestion within the system. This alternative has the most conflict points and non-standard ramp acceleration/deceleration lengths and weaving lengths when compared to the build alternatives. The documented crash trend is higher than the statewide average. The No Action option will not address the current needs for safety improvements.

The projected number of crashes was calculated based on historic crash data for I-30 and I-40 for the PEL study area. An average crash rate between the three study years (2010-2012) was estimated for main lanes of sections of I-30 from I-530/I-440 to I-630, I- 30 from I-630 to I-40, and I-40 from I-30 to Hwy 67. With the assumption that the roadway condition remains the same and no safety measures would be implemented, the average crash rate is assumed to remain constant through the design year. To project the number of crashes for 2041, the average crash rate was applied to the future No Action volumes. Average crash rates and projected numbers of crashes for 2041 are shown in **Table 11**.

Table 11: Projected Number of Crashes

I-30, Section 230, Log Mile 138.39-139.67 (I-530/I-440 to I-630)							
Year	**Length (miles)**	**Average Crash Rate (MVMT)**	**Projected 2041 ADT (No Action)**	**Projected # Crashes**	**AR 2012 Avg Crash Rate**	**Type**	**Avg Crash Rate/ AR 2012 Avg Crash Rate**
2041	1.28	1.66	122,000	95	0.95	Six-Lane Access Control	1.75
I-30, Section 230, Log Mile 139.67-142.02 (I-630 to I-40)							
Year	**Length (miles)**	**Average Crash Rate (MVMT)**	**Projected 2041 ADT (No Action)**	**Projected # Crashes**	**AR 2012 Avg Crash Rate**	**Type**	**Avg Crash Rate/ AR 2012 Avg Crash Rate**
2041	2.35	4.28	145,000	533	0.95	Six-Lane Access Control	4.51
I-40, Section 330, Log Mile 153.25-154.88 (I-30 to Hwy 67)							
Year	**Length (miles)**	**Average Crash Rate (MVMT)**	**Projected 2041 ADT (No Action)**	**Projected # Crashes**	**AR 2012 Avg Crash Rate**	**Type**	**Avg Crash Rate/ AR 2012 Avg Crash Rate**
2041	1.63	0.96	158,000	90	0.95	Six-Lane Access Control	1.01

Source: Garver

5 Future Build Alternatives Analysis

The I-30 PEL study had three levels of analysis. Level 1 represented a high level qualitative assessment of mobility and safety related to the Purpose and Need of the study. Level 2 was a qualitative assessment of alternatives compared to the project study goals with some quantitative analysis. Level 3 was a quantitative assessment of reasonable alternatives to identify a PEL recommended alternative.

5.1 Level 1 Analysis

In Level 1, alternatives were given a *pass* or *fail* rating for each of the screening criteria. A *pass* rating was not required on all criteria for an alternative to move on to the next level; alternatives must have shown an overall positive impact on the I-30/I-40 corridor and be determined practicable.

Alternatives that did not meet the Purpose and need, and those that were clearly impractical based on cost or effectiveness in Little Rock and North Little Rock, were eliminated at this level. Eliminated alternatives include:

- **Elevated Lanes (Roadway)** – This alternative was deemed impractical and eliminated because of the high construction cost and the difficulties associated with constructability.
- **Truck Lanes/Ramps** – This alternative was eliminated because it would have minimal effect due to the low percentage of trucks currently using I-30.
- **Elevated Lanes (Bridge)** – This alternative was deemed impractical and eliminated because of the high construction cost and the difficulties associated with constructability.
- **Heavy Rail** – This alternative was deemed impractical and eliminated because of the high construction and operating cost.
- **High Speed Rail** – This alternative was deemed impractical and eliminated because of the high construction and operating cost.

5.2 Level 2 Analysis

Although Level 2 was identified to be primarily a qualitative assessment of alternatives related to the study goals, it was determined early in the study process that some quantitative analysis would be necessary to fully understand the mobility trade-offs. Level 2 was divided into 2 parts as Level 2A and Level 2B. Level 2A was an assessment of individual alternatives, and Level 2B was an assessment of alternatives combined into scenarios.

Level 2A
Preliminary alternatives were evaluated individually to determine those most capable of meeting the study goals. For each of the study goals, each alternative was ranked on the scale shown in **Table 12**.

Table 12: Level 2A Evaluation Measures

Rating	Evaluation	Score
+ +	Substantial positive effects	2
+	Some positive effects	1
O	Neutral effects	0
–	Some negative effects	-1
– –	Substantial negative effects	-2
Yes	Used for EJ/LEP Measures	-1 to +1
No	Used for EJ/LEP Measures	-1 to +1

Since Level 2A was mostly a qualitative screening process, the ratings given were based on the following assumptions:

- All other alternatives are compared to the No-Action
- Normal operations and maintenance only
- Traffic would continue to grow in the corridor through 2040
- Other regional projects identified in the Metroplan Long Range Plan would be implemented
- Impacts analyzed in the PEL study area
- Only peak hour benefits were analyzed
- Used Metroplan travel demand model results to determine the change in travel demand with varying number of through lanes
- Bypass was assumed to be at Chester Street
- CATA 10-Year Strategic Plan was used
- I-30 PEL Transit Analysis was used
- Arterial bus lane and BRT would remove a general purpose lane during peak hours as a starting point to maximize their benefits. Buses could use a shared lane but benefits would be compromised
- Managed lane was assumed to be barrier separated and tolled
- Ramp meter assumed to include a queue bypass lane for buses
- Non-recurring congestion assumed off-peak hour benefits

Level 2B

Historical growth rates and the Metroplan travel demand model were used to estimate 2041 traffic volumes in the study area. Analysis was performed to quantify the volume of traffic that would be attracted or diverted to I-30 as a result of changes in corridor capacity and complimentary alternative improvements such as transit in the study area. These volumes were then added or subtracted from the projected 2041 traffic volumes to produce modified I-30 traffic demand. The resulting volumes were then used as the basis for evaluating the various lane scenarios and the impact that C/D roads could provide for the main lanes at a high level of analysis only. This analysis is only a snapshot at three locations along the corridor and does not take into account downstream queuing or main lane merging, diverging, or weaving. The target Level-of-Service (LOS) of D was used as AHTD’s standard for an urban corridor during the peak hour of travel. Consideration for LOS E was also performed. Much more detailed mobility analysis was performed in the Level 3 analysis. The Level 2B Transportation Analysis described above is provided in **Appendix 5 – Level 2B Assessment.**

More detail on the Level 2A and 2B analysis can be found under separate cover of the *Environmental Linkages Level 2 Screening Methodology and Results Memorandum.*

5.3 Level 3 Analysis

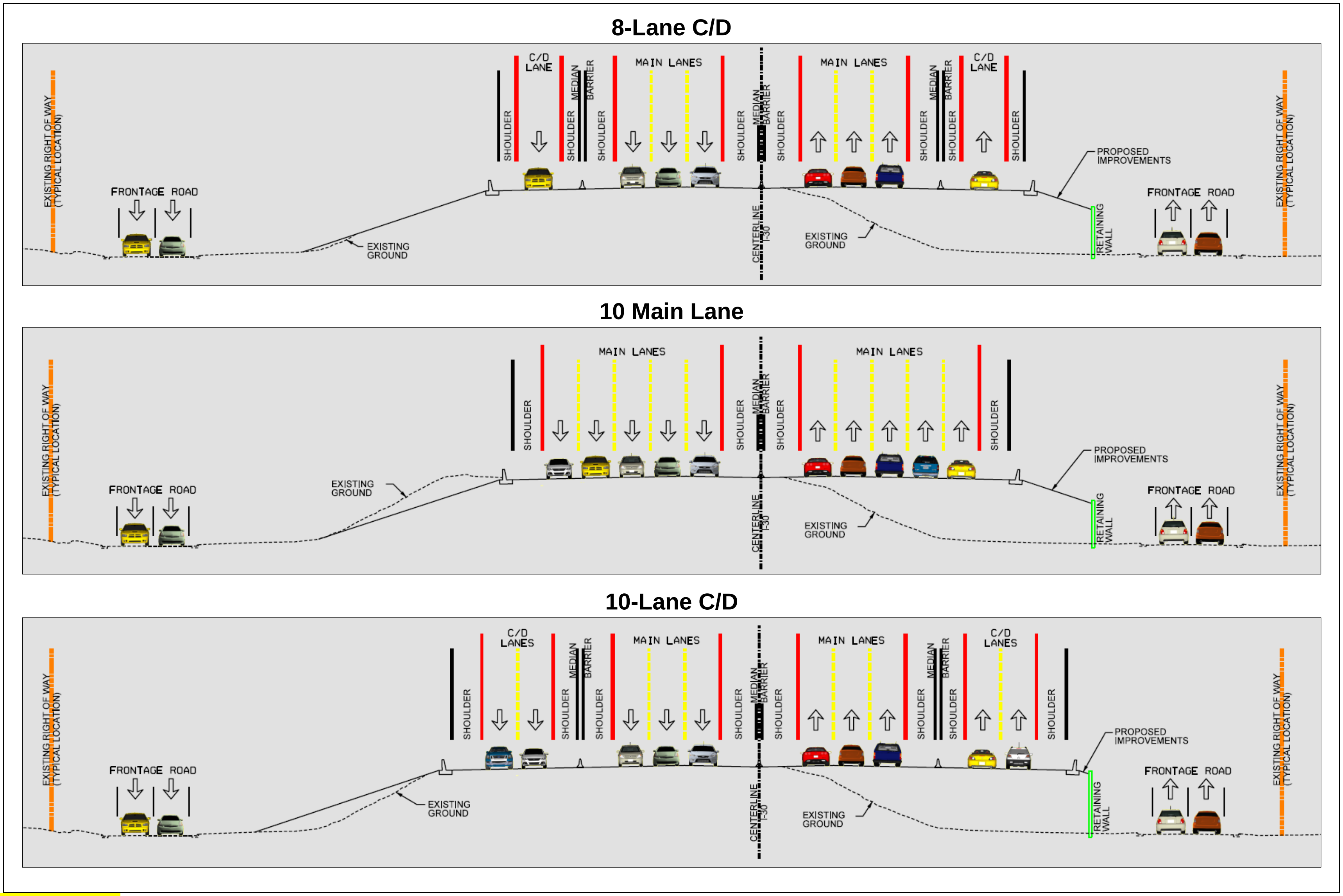
The I-30 PEL study identified three reasonable build alternatives to advance to more detailed analysis in Level 3. Typical cross sections of these alternatives are shown in **Figure 16**. The layouts for the alternatives are shown in **Figures 17-19**. The build alternatives include the primary highway build improvements described below and complementary improvements shown in **Figure 20**.

- **8-Lane C/D** (3 main lanes + 1 C/D lane in each direction) East and West – This scenario included adding 1 C/D lane in each direction from near 6th Street in North Little Rock to just south of Broadway Street in North Little Rock. Outside the location of the C/D road, the new facility included 4 main lanes in each direction. This scenario also included replacement of the I-30 Bridge over the Arkansas River with the new bridge being constructed partially to the east or to the west of the existing bridge location.

- **10 Main Lane** (5 main lanes in each direction) East and West Basic Scenarios – This scenario included widening on both sides of the current 6-Lane facility to 10 main lanes throughout the corridor (5 lanes in each direction) with the new I-30 Bridge over the Arkansas River being constructed partially to the east or to the west of the existing bridge.

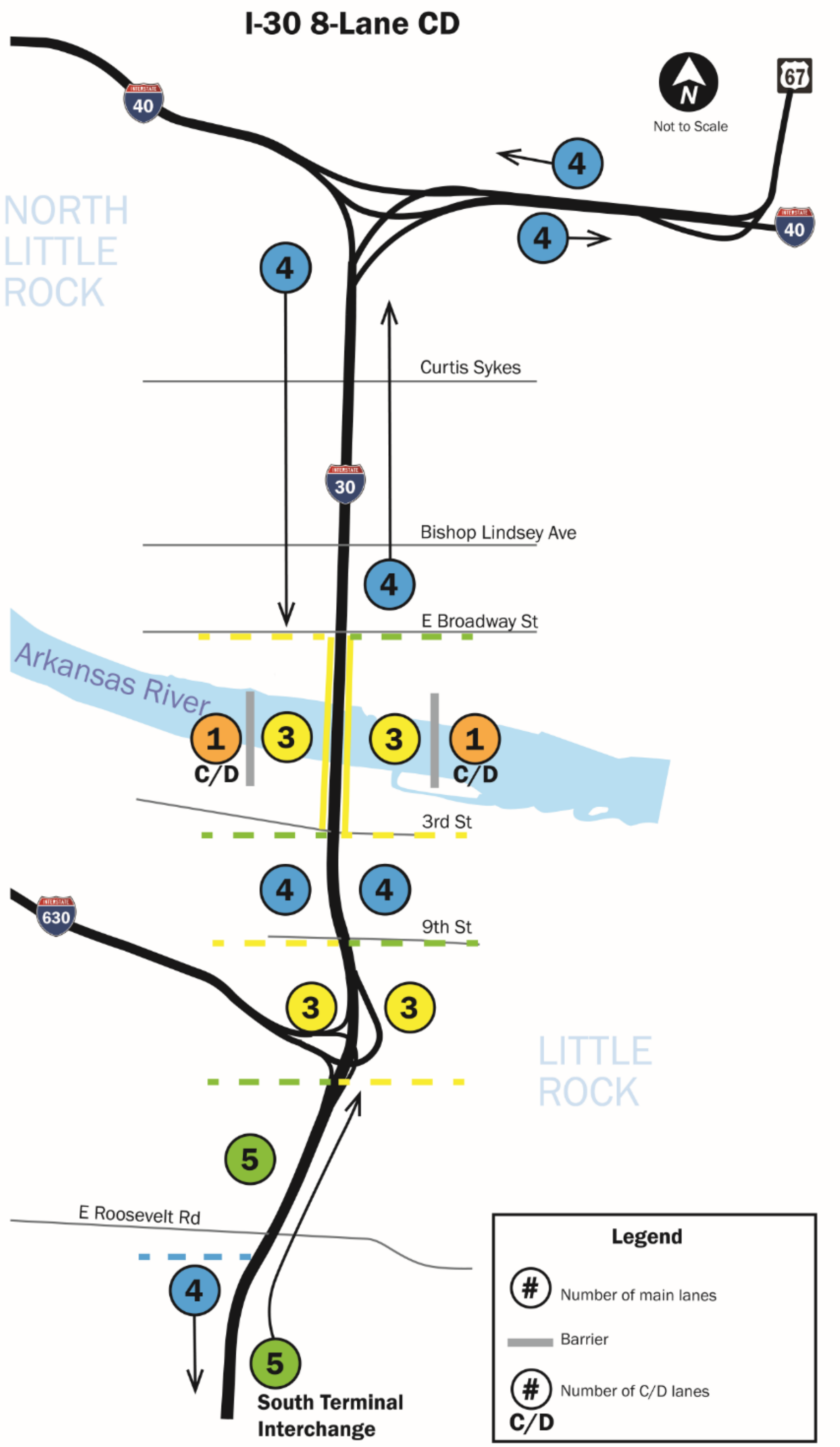
- **10-Lane C/D** (3 main lanes + 2 C/D lane in each direction) – This scenario included adding 2 C/D lanes in each direction from near 7th Street in North Little Rock to just south of 6th Street in Little Rock. Outside the location of the C/D roads, the new facility included 5 main lanes in each direction with the same footprint as the 10 Main Lane Scenario. This scenario also included replacement of the I-30 Bridge over the Arkansas River.

Figure 16: Typical Cross Sections for Alternatives



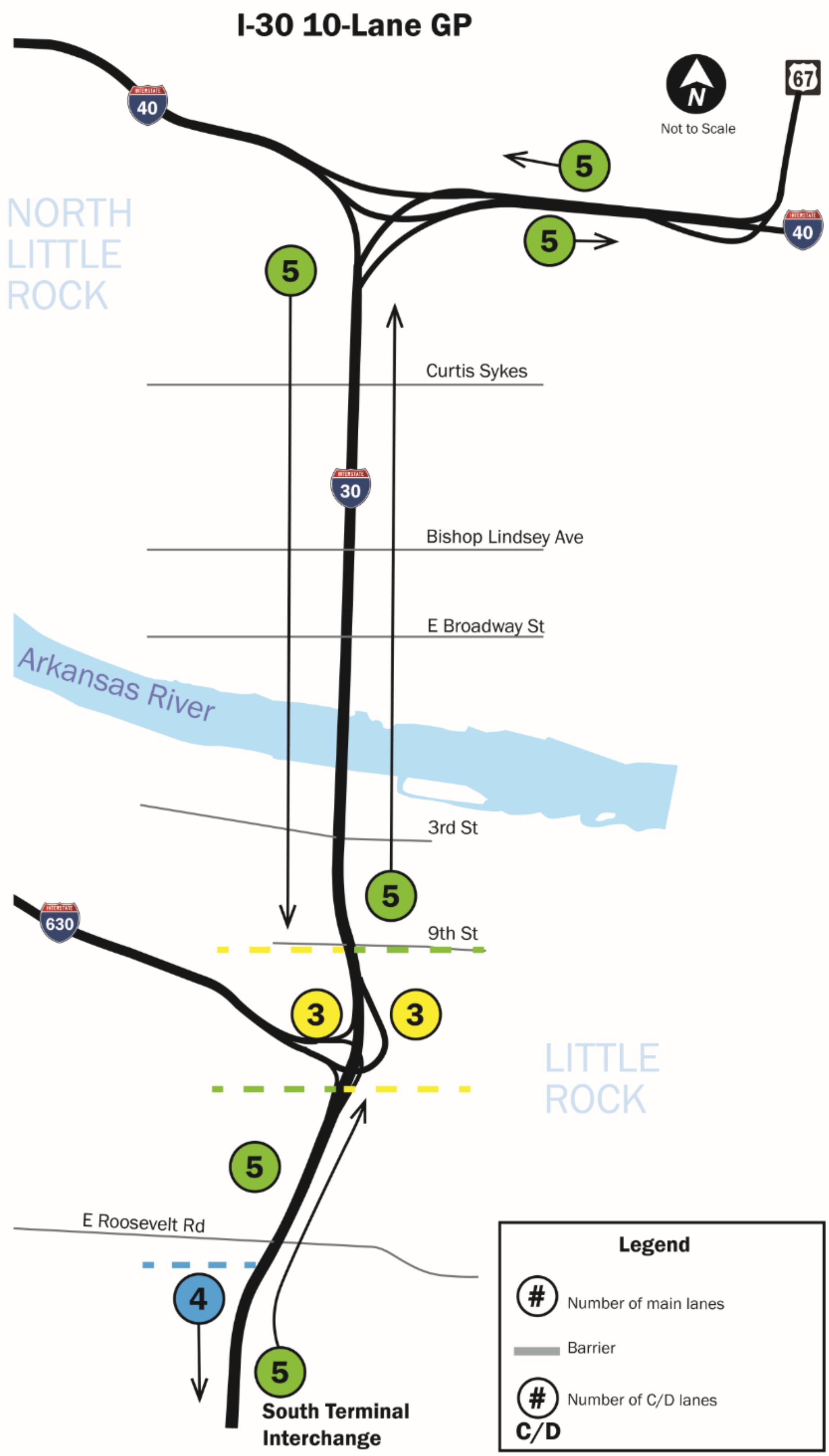
Source: I-30 PEL

Figure 17: 8-Lane C/D Lane Configuration



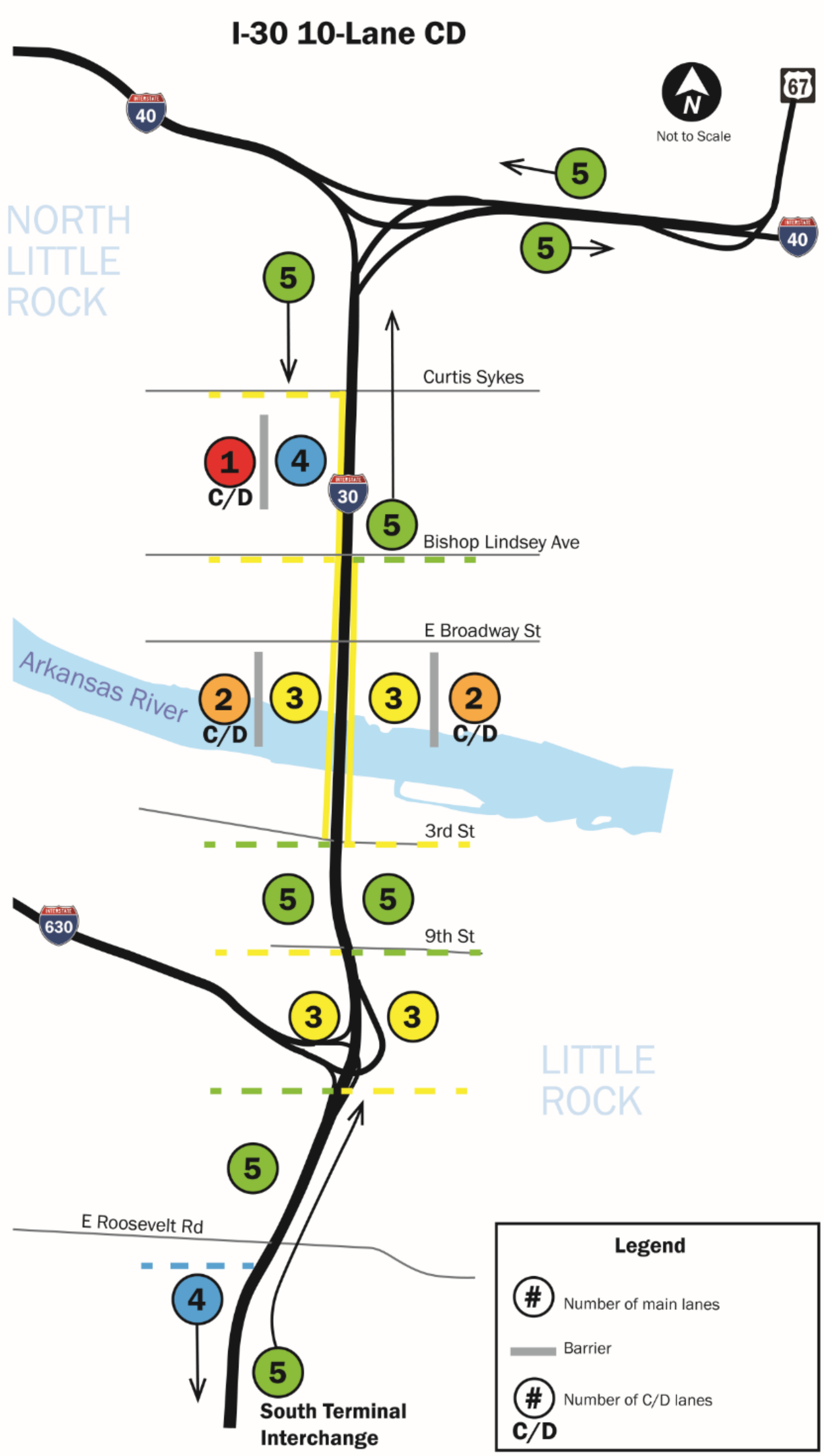
Source: I-30 PEL

Figure 18: 10 Main Lane Configuration



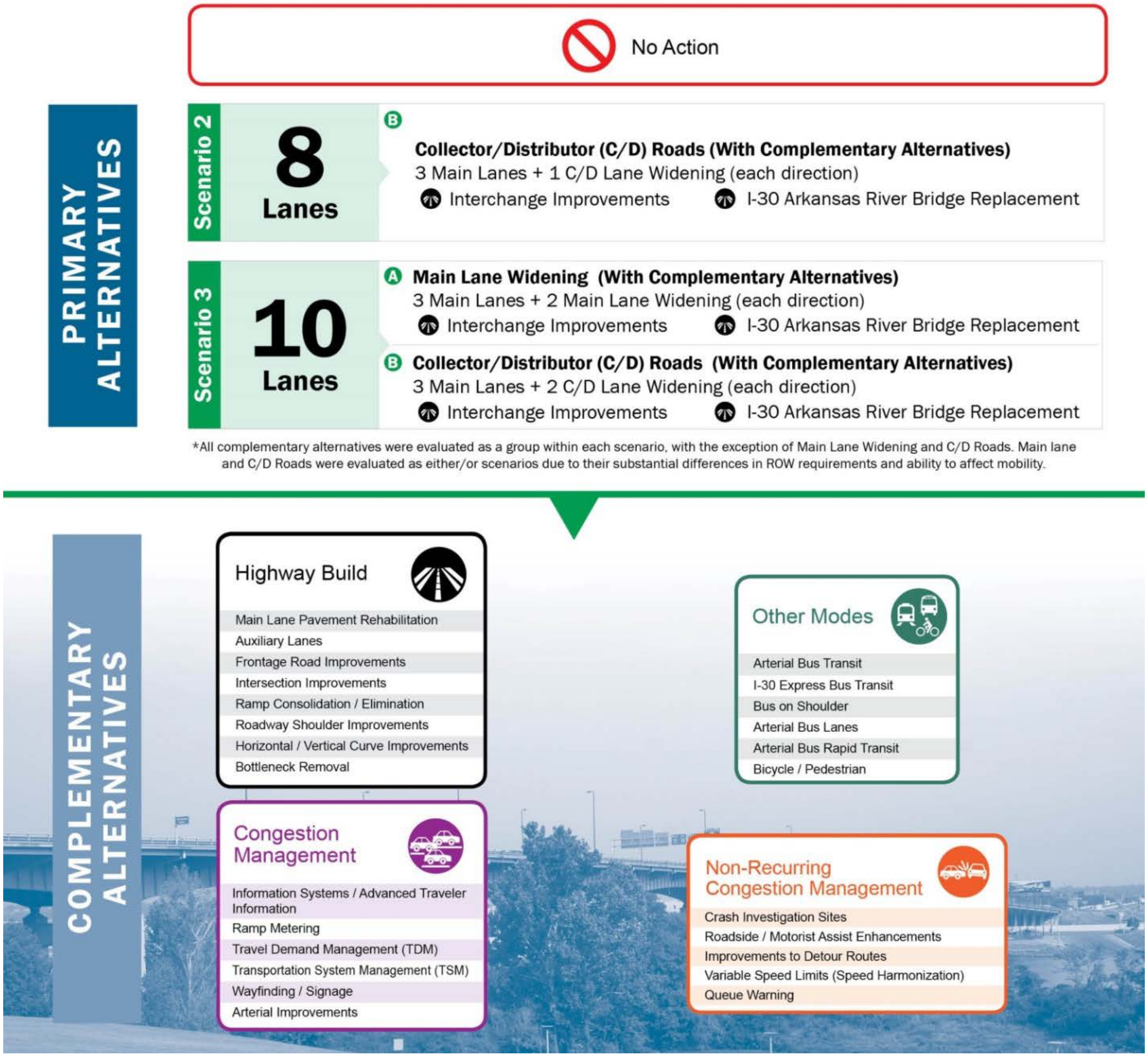
Source: I-30 PEL

Figure 19: 10-Lane C/D Lane Configuration



Source: I-30 PEL

Figure 20: No Action, Primary, and Complementary Alternatives



Source: I-30 PEL Public Meeting #3

Complementary build alternatives are minor improvements that were assumed for each of the three major build alternatives. They include several components.

“Highway Build” improvements are improvements to the roadway geometry and infrastructure such as pavement rehabilitation, ramp consolidation, shoulder improvements, and intersection improvements.

Congestion management techniques require a small amount of capital investment compared to highway build improvements. By adding a ramp meter signal, improving signage, and using Intelligent Transportation Systems (ITS) practices, some amount of congestion can be mitigated.

Improving other modes of transportation can divert the total demand on a system. By increasing the quality of bus service or providing dedicated bike lanes on side streets, for instance, some individuals may choose to leave their vehicle at home.

Non-recurring congestion management techniques are most useful in the event of a traffic incident. Providing advanced warning to upstream motorists reduces the likelihood of secondary crashes and allows vehicles to divert to detour routes. This reduces the amount of congestion caused by an incident.

Other improvements outside the PEL study limits but not included in the Long Range Transportation Plan included:

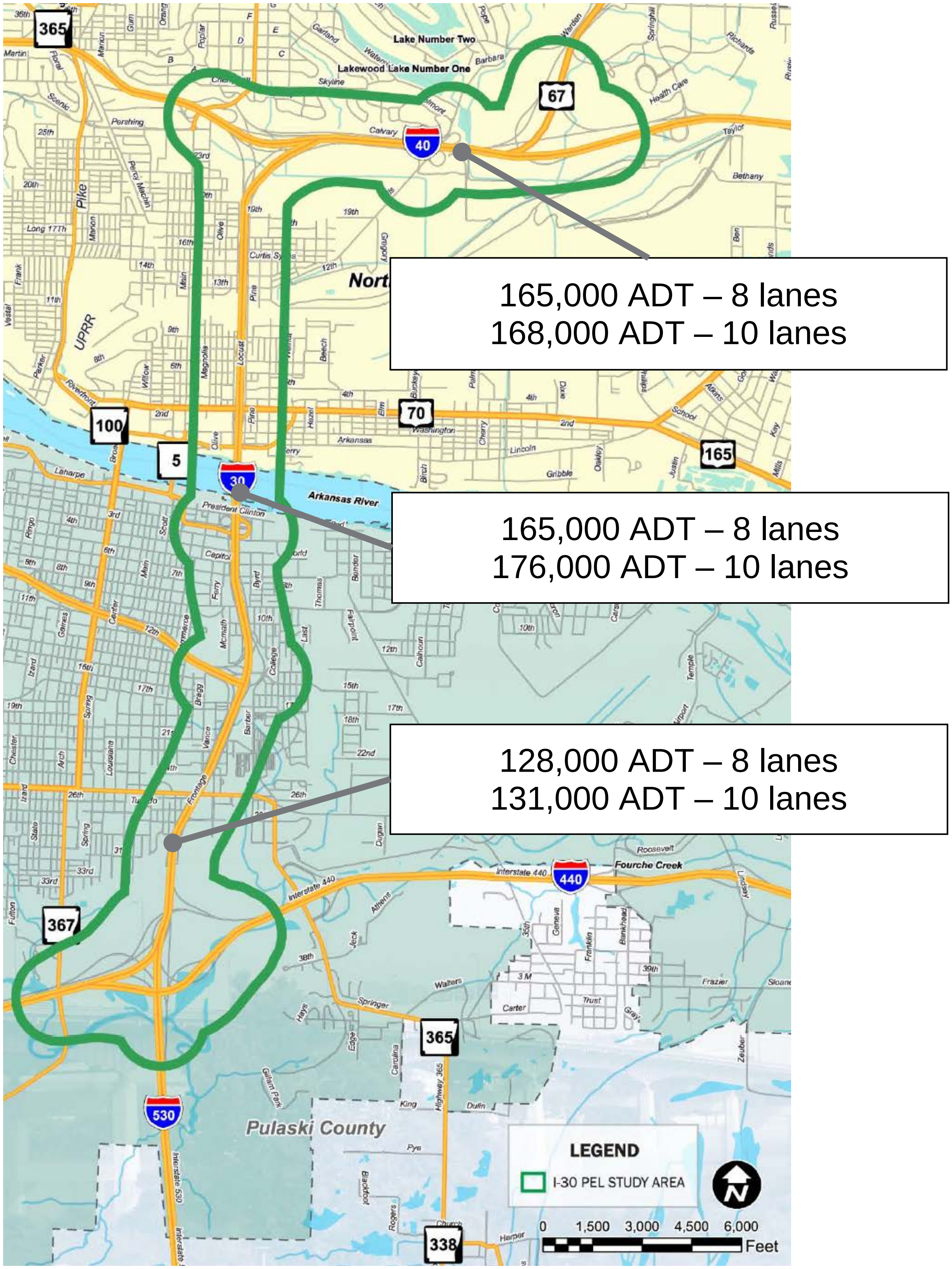
- Additional lane on I-630 WB west of Louisiana Street
- Additional lane in each direction on I-30 between the I-30/I-440/I-530 interchange and 65th Street

These additional improvements were deemed necessary to avoid backups from congestion outside the PEL limits to inside the PEL limits. AHTD is currently working on a corridor study on I-30 southwest of the PEL study area and has indicated the desire to perform a corridor study of I-630 west of the PEL study area.

5.3.1 Traffic Demand

As discussed in Chapter 2, traffic demand for each of the reasonable build alternatives was calculated using Metroplan’s travel demand model. Modifications to volumes were considered for each of the complementary alternatives and were the same for all three build scenarios. Since the 10 Main Lane and the 10-Lane C/D alternatives are both 10 lanes, they use the same future volumes. Traffic volumes for the build alternatives, shown in **Figure 21**, range from 128,000 to 165,000 for the 8-Lane C/D alternative and from 131,000 to 168,000 for both 10-lane alternatives. These represent a 30% to 40% increase from existing conditions. For information about transit impacts, see **Appendix 6 – Transit Report.**

Figure 21: Future (2041) Build Average Daily Traffic



Source: Metroplan Travel Demand Model

5.3.2 Mobility

The projected mobility was analyzed separately for each of the aforementioned build alternatives. The following section will provide commentary on each individual alternative before comparing them all side by side.

5.3.2.1 8-Lane C/D Scenario

Figure 22 summarizes the 8-Lane C/D mobility in the PEL corridor during the most congested time of each peak hour. This figure shows that approximately 45-60% of the corridor operates at LOS F in 2041 during the peak periods with the 8-Lane C/D alternative. This is marginally better than the future No Action condition. Severe bottlenecks upstream may cause artificial free flow sections downstream. For instance, in the southbound direction in both peak periods there is red on I-30 between I-40 and Broadway Blvd, followed by green south of Broadway Blvd. This happens because the traffic demand exceeds the freeway's capacity just north of Broadway Blvd. Traffic moves very slowly upstream of the congestion point, and fewer vehicles than normal are able to pass through the point due to the reduced speed and increased vehicle density. Since fewer vehicles are making it past the bottleneck at any given time, the freeway appears to be operating very well downstream of the bottleneck.

In **Figure 23**, speeds for each peak period are shown throughout the length of the corridor over the entire simulation period. As the speed profiles show, congestion in the corridor lasts at least two hours for both peak time periods. Speeds below 40 miles per hour were observed for at least two hours in the AM, dropped as low as 0-10 miles per hour. The following intersections experienced LOS E or F in the 8-lane C/D Scenario:

AM

- I-40 EB Off Ramp & I-30 Frontage Road – LOS F
- I-40 WB Off Ramp & JFK Blvd – LOS F
- I-40 WB On Ramp & JFK Blvd – LOS F
- I-30 & Curtis Sykes Interchange – LOS F
- I-30 & Broadway Blvd Interchange – LOS F
- Cumberland & Markham Street – LOS E
- 3rd Street & I-30 Frontage Rd – LOS F
- Diverging intersection at the Cantrell Interchange – LOS F

PM

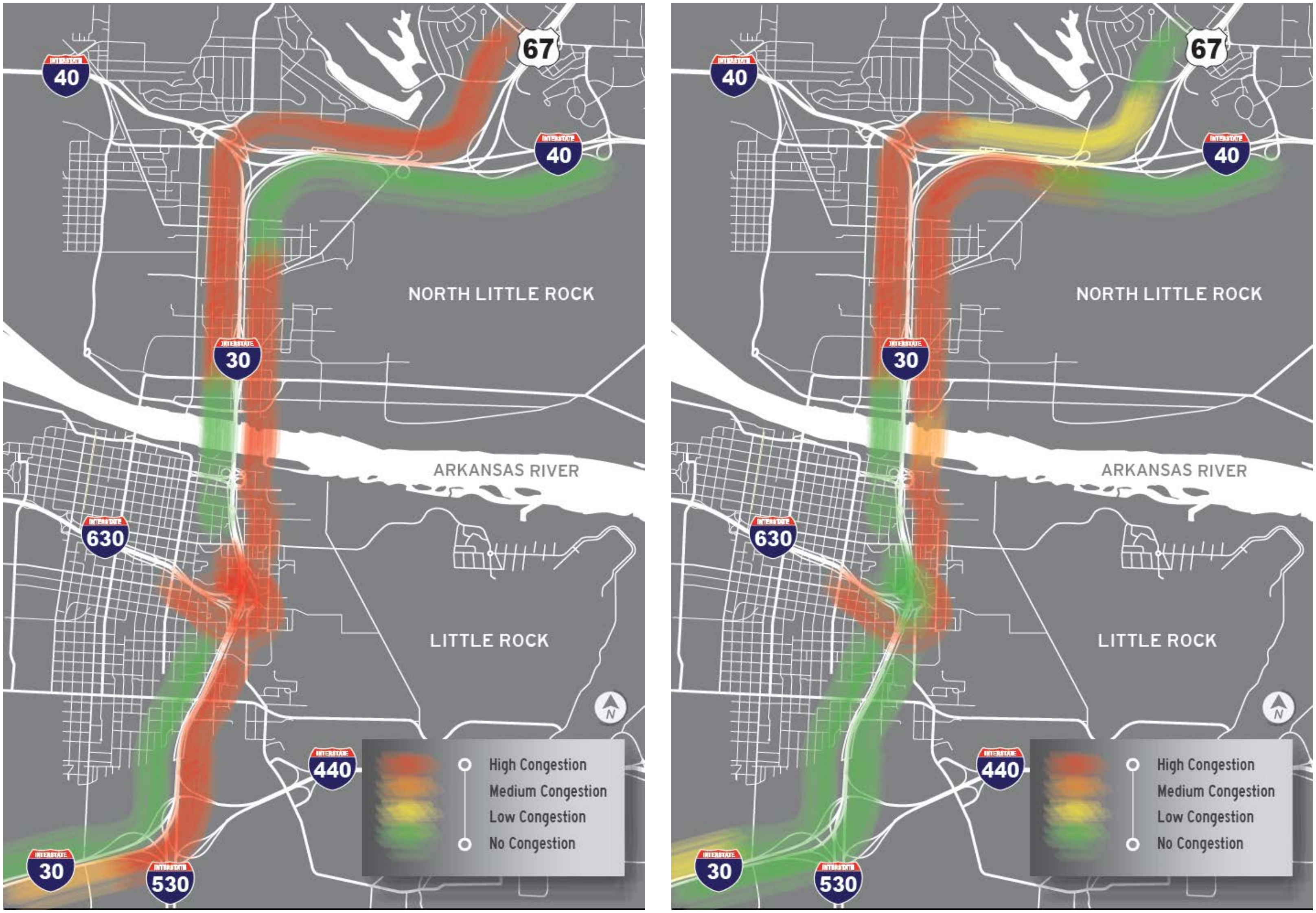
- I-40 WB On Ramp & JFK Blvd – LOS F
- Cumberland & 3rd Street – LOS F
- Cumberland & 2nd Street – LOS F
- Cumberland & Markham Street – LOS E
- 3rd Street & I-30 Frontage Road – LOS F
- 3rd Street & Mahlon Martin Street – LOS F
- I-30 & 6th Street Interchange – LOS F

- I-30 & 9th Street interchange – LOS F
- College & 15th Street – LOS E
- Diverging intersection at the Cantrell Interchange – LOS E
- River Market Ave and I-30 Ramps – LOS F

From a mobility standpoint, this scenario does not achieve the I-30 PEL purpose and need. Traffic flows are in some cases worse than the future No Action condition.

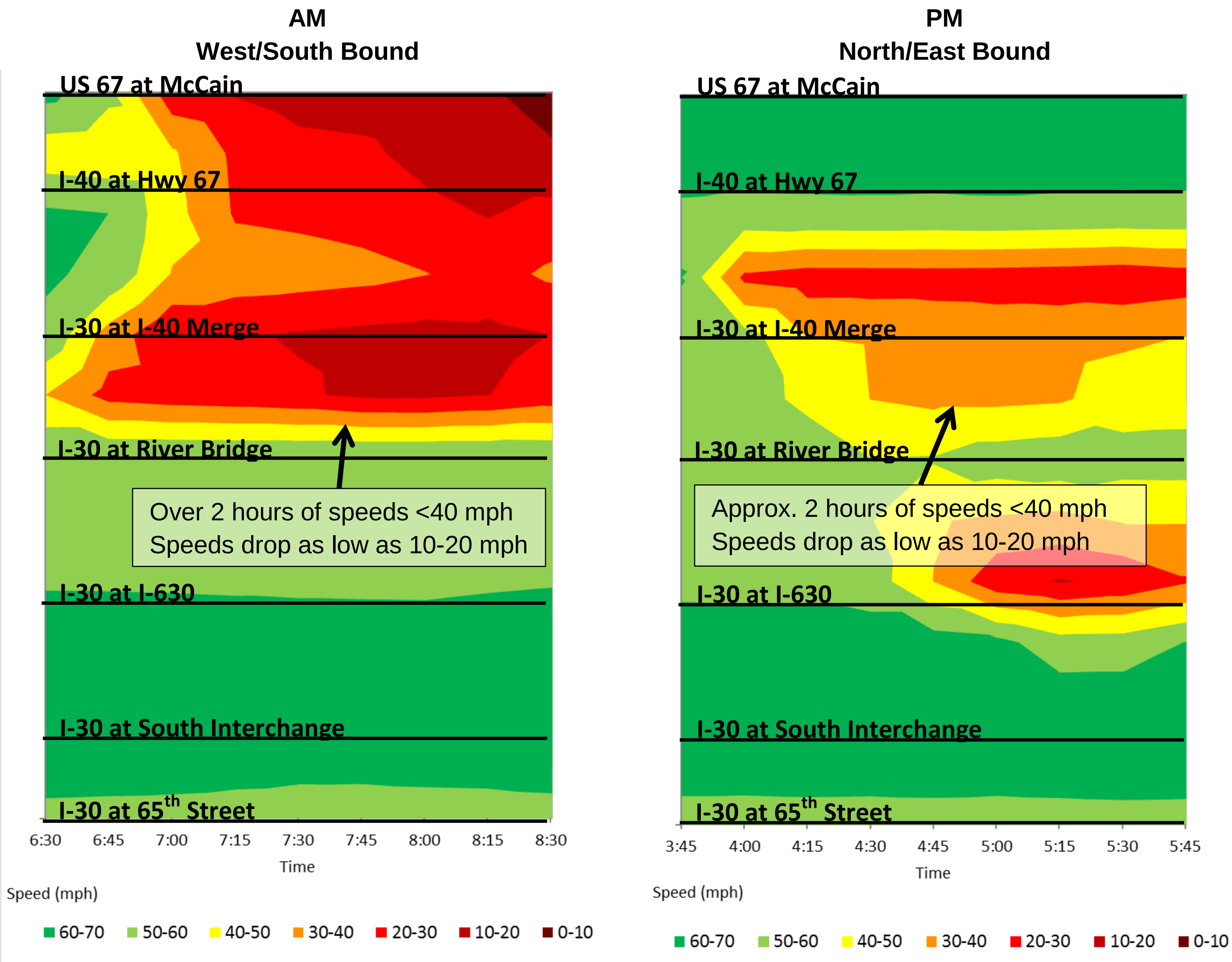
Figure 22: Future (2041) 8-Lane C/D Mobility

AM Peak Hour **PM Peak Hour**



Source: I-30 PEL Vissim models

Figure 23: Future (2041) 8-Lane C/D Speed Profiles



Source: I-30 PEL Vissim models

5.3.2.2 10 Main Lane Scenario

Figure 24 summarizes the 10 Main Lane mobility in the PEL corridor during the most congested time of each peak hour for the 10 Main Lane scenario. As is evident in this figure, the 10 Main Lane build alternative offers a mobility improvement over the future No Action scenario and the 8-Lane C/D scenario. Where the 8-lane C/D scenario exhibits approximately 45-60% congestion within the corridor, the 10 Main Lane Scenario experiences around 3-11% congestion. According to this figure, reduced speeds are evidenced in two main areas as shown by the red designation which indicates high congestion. The reductions in speed at these two locations occur due to constraints that are outside of the study area. In the AM peak (northbound/eastbound) direction, traffic experiences reduced speeds just south of I-630. This is because the demand exceeds the capacity for vehicles using the flyover ramp to I-630 WB. In the PM peak (southbound/westbound) direction, reduced speeds occur mostly outside of the study area due to demand exceeding capacity on I-30 WB at 65th street.

In **Figure 25**, speeds for each peak period are shown throughout the length of the corridor over the entire simulation period. As shown in this figure, the previously mentioned reductions in speed only occur for a brief amount of time in the simulation. In both the AM and PM models, the I-40 WB on-ramp intersection with JFK operates at LOS F due to a small number of vehicles (<10) attempting to turn on to JFK from the ramp, which is two-way for a short distance to accommodate local businesses. In the PM model, the College Blvd/15th Street intersection operates at LOS F. This is because EB I-630 vehicles that were previously attempting to bypass congestion on EB I-30 will exit at College Blvd and make a left at the College Blvd/15th street intersection. In order to compare apples to apples across all three build alternatives in relation to the No Action model, the volumes making this bypass movement were not changed when mainline conditions improved for the three build alternatives. Note that the bypass volumes are reassigned in the recommended alternative.

Compared to the future No Action and even the existing scenarios, the duration and severity of congestion is minimal in this 10 Main Lane scenario.

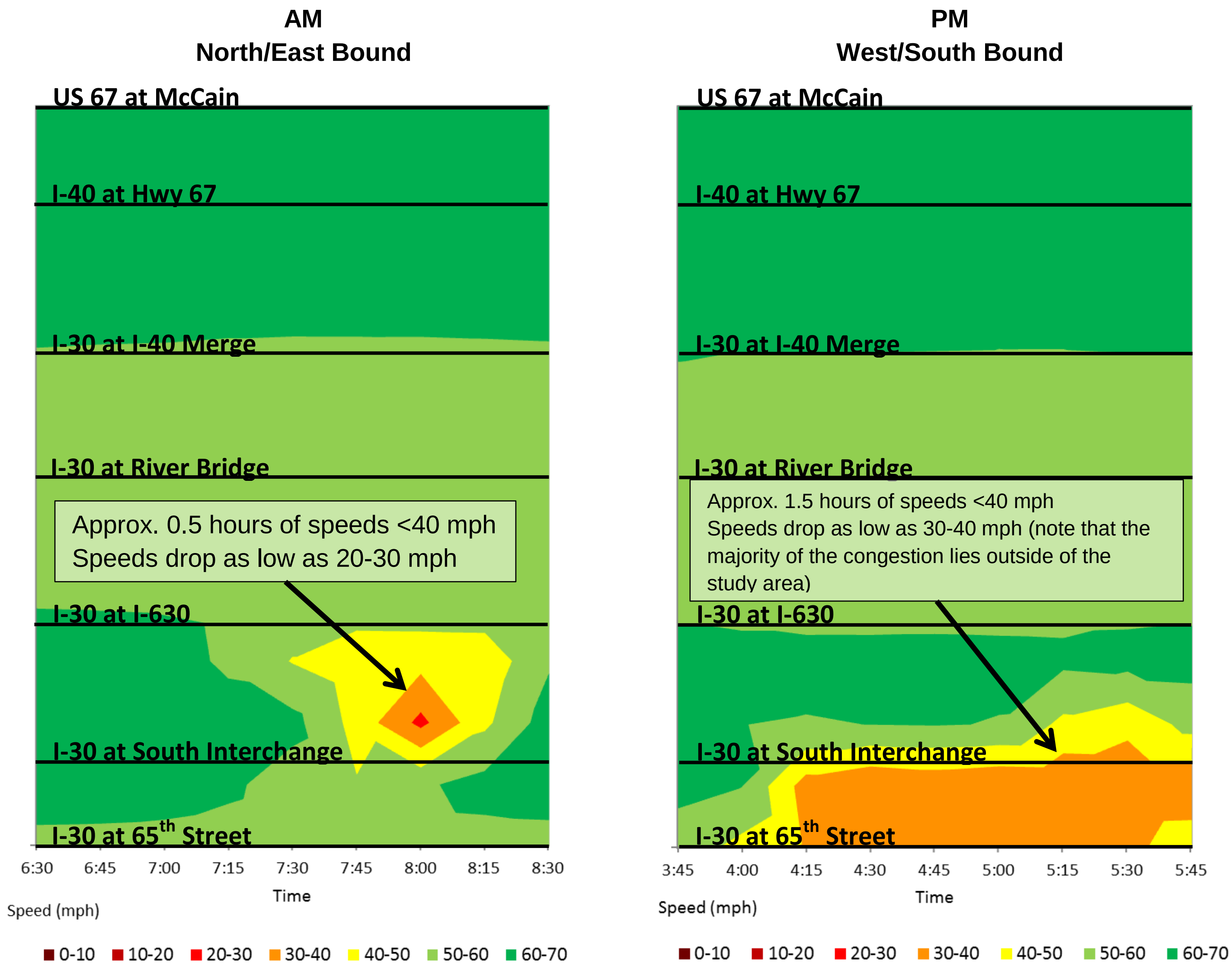
Figure 24: Future (2041) 10 Main Lane Congestion

AM Peak Hour

PM Peak Hour

Source: I-30 PEL Vissim models

Figure 25: Future (2041) 10 Main Lane Speed Profiles



Source: I-30 PEL Vissim models

5.3.2.3 10-Lane C/D Scenario

Figure 26 summarizes the 10-Lane C/D mobility in the PEL corridor during the most congested time of each peak hour. As can be seen in this figure, the 10-Lane C/D scenario operates very similarly to the 10 Main Lane scenario. Where the 10 Main Lane scenario experiences 3-11% congestion within the corridor during the peak hours, the 10-Lane C/D exhibits 5-10% congestion. The two areas where reduced speeds are evident are related to constraints outside of the study area. In the AM peak (northbound/eastbound) direction, traffic experiences a slowdown just south of I-630. This is because the demand exceeds the capacity for vehicles using the flyover ramp to I-630 WB. In the PM peak (southbound/westbound) direction, reduced speeds occur mostly outside of the study area due to demand exceeding capacity on I-30 WB at 65th street.

In **Figure 27**, speeds for each peak period are shown throughout the length of the corridor over the entire simulation duration. As with the 10 Main Lane scenario, the previously mentioned reduced speeds only occur for a brief amount of time in the simulation. Compared to the future No Action and even the existing scenarios, the duration and severity of congestion is minimal in this 10-Lane C/D scenario.

In both the AM and PM models, the I-40 WB on-ramp intersection with JFK operates at LOS F due to a small number of vehicles (<10) attempting to turn on to JFK from the ramp, which is two-way for a short distance to accommodate local businesses. It may be beneficial to consider a signal at this intersection, or to prohibit left turns. In the PM model, the Cumberland & 3rd Street intersection operates at LOS E due to high volume northbound and eastbound movements. Also in the PM model, the College Blvd/15th Street intersection operates at LOS F. This is because EB I-630 vehicles were previously attempting to bypass congestion on EB I-30 will exit at College Blvd and make a left at the College Blvd/15th street intersection. In order to compare apples to apples across all three build alternatives in relation to the No Action model, the volumes making this bypass movement were not changed when mainline conditions improved for the three build alternatives. Note that the bypass volumes are reassigned in the recommended alternative.

From a mobility standpoint, the 10 Main Lane scenario and the 10-Lane C/D scenario function very similarly.

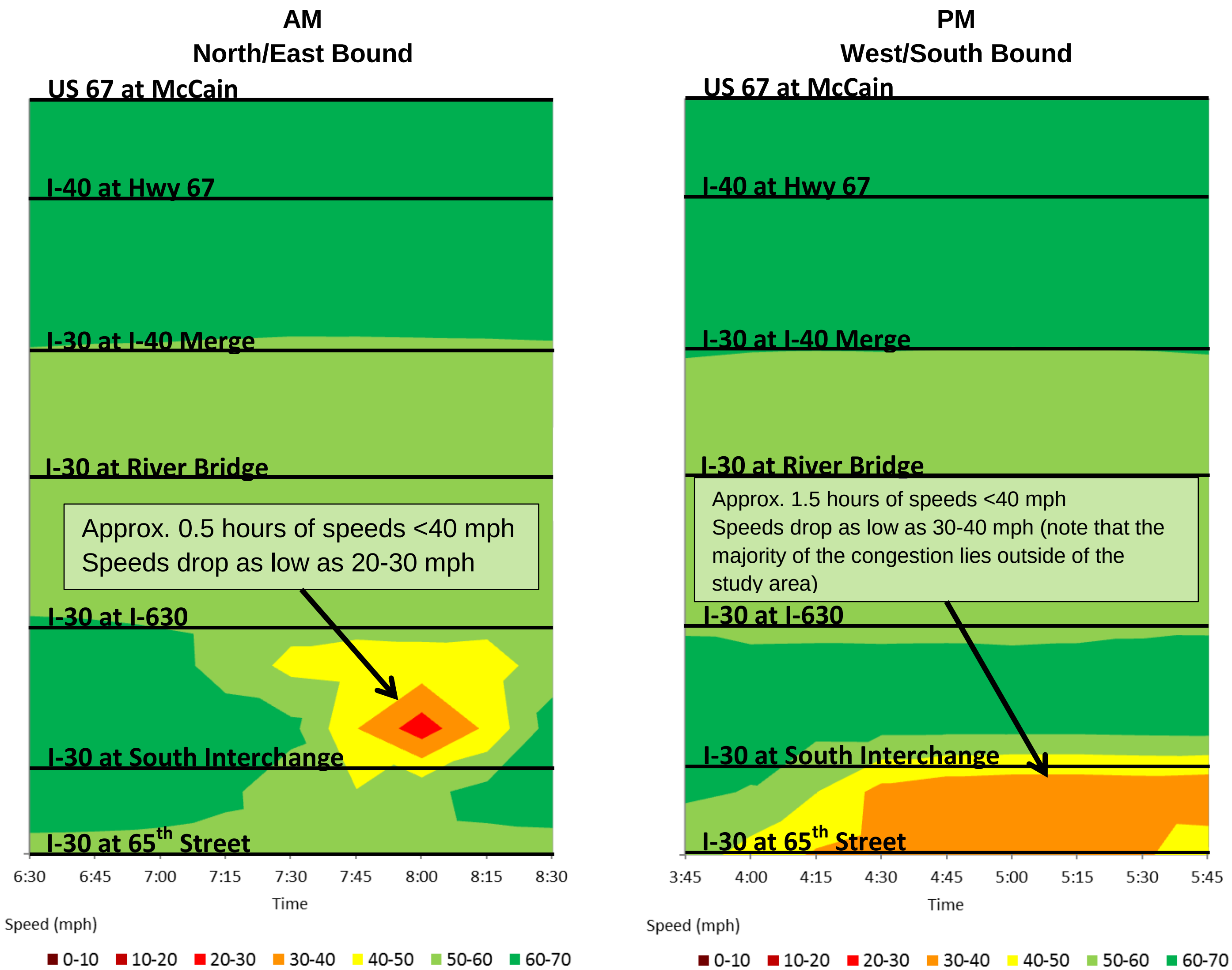
Figure 26: Future (2041) 10-Lane C/D Mobility

AM Peak Hour

PM Peak Hour

Source: I-30 PEL Vissim model

Figure 27: Future (2041) 10-Lane C/D Speed Profiles



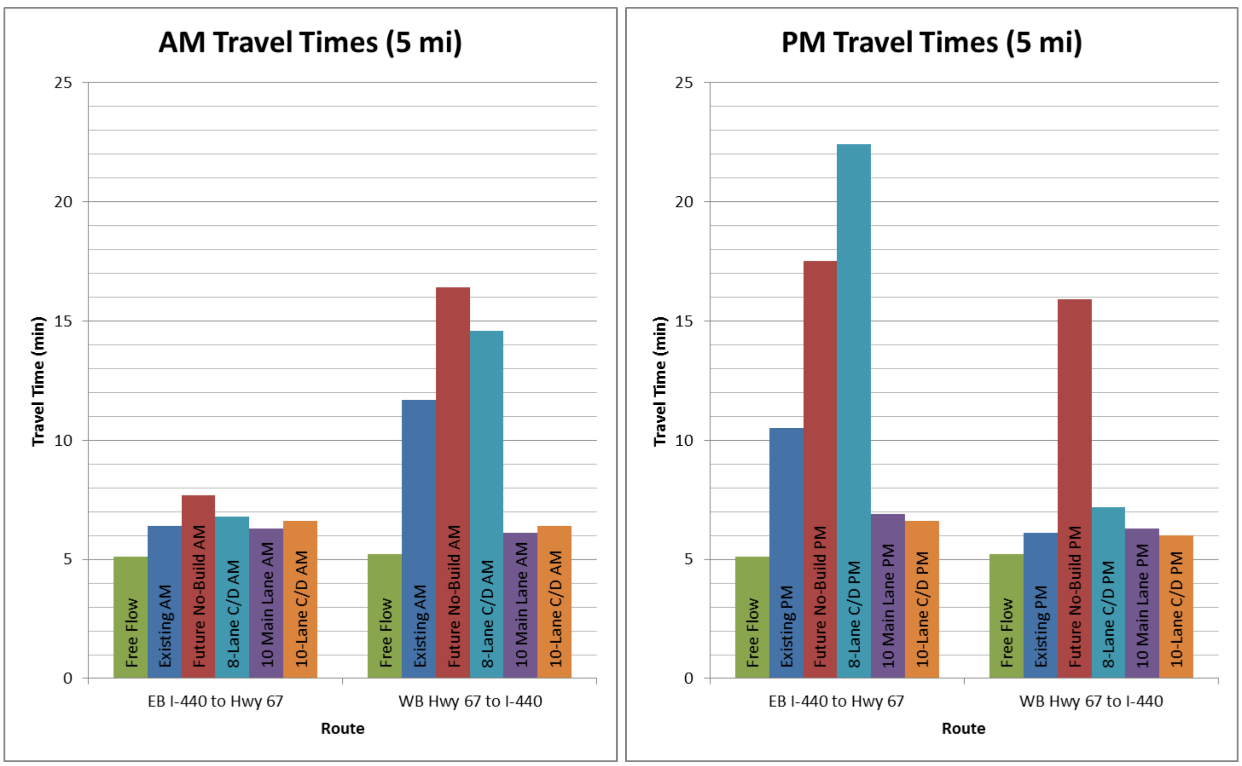
Source: I-30 PEL Vissim models

5.3.2.4 Build Alternative Mobility Comparison

There are multiple ways to compare the mobility of build alternatives, and many factors must be taken into consideration before selecting the optimal solution.

In **Figure 28**, the average travel time for all scenarios is compared. Travel time was measured along the approximately 6.7-mile segment between Hwy 67 at E McCain Boulevard and the I-30/I-530/I-440 interchange. Only vehicles that traversed the entire distance were considered in the travel time calculation. A baseline "free flow" travel time was also added. This is the amount of time it would take to traverse the corridor in ideal off-peak conditions such as at 9:00 am on a Saturday when the roads are fairly clear. The free flow travel time is a baseline for comparing the various scenarios.

Figure 28: Travel Time Comparisons between Hwy 67 at McCain and I-30/I-530/I-440



Source: I-30 PEL Vissim models

Figure 29 shows that the future No Action condition and the 8-Lane C/D scenario both exhibit considerably increased travel times compared to the existing condition. In the existing condition, it can take up to twice as long to travel the corridor as it does during off-peak (free flow) times. In each peak and for each direction, the 10 Main Lane scenario and the 10-Lane C/D scenario both have comparable travel times to free flow times.

Table 13 shows the system-wide measures of effectiveness of all alternatives analyzed.

Table 13: Measures of Effectiveness

Total Simulation	Variable	AM					PM				
Total System		Existing (2014)	Future No-Build (2041)	8-Lane C/D	10 Main Lanes	10-Lane C/D	Existing (2014)	Future No-Build (2041)	8-Lane C/D	10 Main Lanes	10-Lane C/D
VHT	Total Vehicle Hours Traveled	6,935	14,243	16,661	8,360	8,507	7,998	18,843	15,312	12,069	11,427
VHD	Total Vehicle Hours of Delay	1,622	8,541	11,486	1,582	1,649	2,202	13,352	8,409	4,095	3,427
VMT	Total Vehicle Miles Traveled	303,069	325,612	291,944	384,662	386,984	332,338	311,247	385,933	446,907	446,894
% LOS E or F	% LOS E or F (miles)	20%	45%	40%	13%	17%	15%	56%	29%	16%	14%
% LOS F	% LOS F (miles)	15%	44%	35%	10%	9%	11%	44%	23%	15%	12%
Unserved Vehicles	Total vehicles unserved	0	6191	11082	0	0	0	15518	8158	461	869
Emergency Vehicles	Emergency Vehicle Travel Time[1] (min)	-	-	-	-	-	5	7	11	4	4
Key Destinations	Travel Time to Key Destination[2] (min)	15	24	23	9	8	18	37	24	8	8

Note: This table includes results for the entire simulation area, and not just the PEL study area.

[1]Emergency Vehicle Travel Time is measured from Fire Station 1 to Incident west of N. Hills Blvd. in the PM

[2]Travel Time to Key Destination is measured between McCain and Capitol (To Capitol in the AM and From Capitol in the PM)

Eastbound	Variable	AM					PM				
I-30/I-40 (from I-440 to Hwy 67)		Existing (2014)	Future No-Build (2041)	8-Lane C/D	10 Main Lanes	10-Lane C/D	Existing (2014)	Future No-Build (2041)	8-Lane C/D	10 Main Lanes	10-Lane C/D
Throughput	Total Vehicles in Peak Hour	382	355	275	563	581	422	454	382	664	647
Travel Time	Average Vehicle Travel Time in Minutes	6	8	7	6	6	11	18	22	7	6
Delay	Seconds delay compared to free flow speed per veh.	74	155	102	72	80	326	743	1,037	29	25
Speed	Average Speed in MPH	54	45	48	51	50	33	20	15	58	59
LOS E or F	% LOS E or F (miles)	16%	21%	68%	21%	29%	43%	95%	60%	0%	0%
Duration	Hours LOS E or F for any portion of the corridor	1.00	1.75	1.25	1.00	1.00	2.00	2.00	2.00	0.00	0.00
LOS F	% LOS F (miles)	16%	21%	68%	21%	20%	43%	95%	47%	0%	0%
Duration	Hours LOS F for any portion of the corridor	0.50	1.50	1.00	0.75	0.75	2.00	2.00	2.00	0.00	0.00

Note: This table includes results for the eastbound direction of the PEL study area only.

Westbound	Variable	AM					PM				
I-30/I-40 (from Hwy 67 to I-440)		Existing (2014)	Future No-Build (2041)	8-Lane C/D	10 Main Lanes	10-Lane C/D	Existing (2014)	Future No-Build (2041)	8-Lane C/D	10 Main Lanes	10-Lane C/D
Throughput	Total Vehicles in Peak Hour	487	352	357	437	436	565	758	1,015	1,102	1,112
Travel Time	Average Vehicle Travel Time in Minutes	12	16	15	6	6	7	18	7	6	6
Delay	Seconds delay compared to free flow speed per veh.	392	671	561	51	53	100	774	118	61	49
Speed	Average Speed in MPH	30	22	24	58	58	51	19	49	57	58
LOS E or F	% LOS E or F (miles)	58%	58%	45%	0%	0%	16%	100%	45%	6%	10%
Duration	Hours LOS E or F for any portion of the corridor	2.00	2.00	2.00	0.00	0.00	2.00	2.00	2.00	1.00	1.25
LOS F	% LOS F (miles)	58%	58%	45%	0%	0%	12%	100%	45%	6%	10%
Duration	Hours LOS F for any portion of the corridor	1.50	2.00	2.00	0.00	0.00	1.75	2.00	2.00	0.75	1.25

Note: This table includes results for the westbound direction of the PEL study area only.

Source: I-30 PEL Vissim models

It is apparent that the 8-Lane C/D has considerable mobility problems and does not achieve the purpose and need of the I-30 PEL study. The 10 Main Lane and 10-Lane C/D alternatives both offer considerably improved traffic operations that can operate better in 2041 than the current system operates today.

5.3.3 Safety

The build alternatives were compared based on quantitative analysis. All build alternatives show an improvement when compared to the No Action alternative. The 10 Main Lane alternative included just widening the general purpose lanes to five lanes in each direction. The 8-Lane C/D and the 10-Lane C/D alternatives included a collector distributor system adjacent to the freeway system with additional main lane widening. Therefore, the 8-Lane C/D and the 10-Lane C/D alternatives include an additional system type to quantify the conflict points and ramps as shown in **Table 14**.

Table 14: Safety Comparison of Proposed Alternatives

	8-Lane C/D	10 Main Lane	10-Lane C/D
Total # Arterial Conflict Points	515	515	515
Total # Main Lane Conflict Points	20	26	19
Total # C/D Conflict Points	6	0	7
Non-standard Weaving Lengths	6	6	7

Source: Garver

The 10-Lane C/D alternative had the least amount of ramps on the main lanes but had the most ramps on the C/D system. In addition, 10-Lane C/D had an additional non-standard weaving length between the 19th Street exit ramp and the major split at I-40.

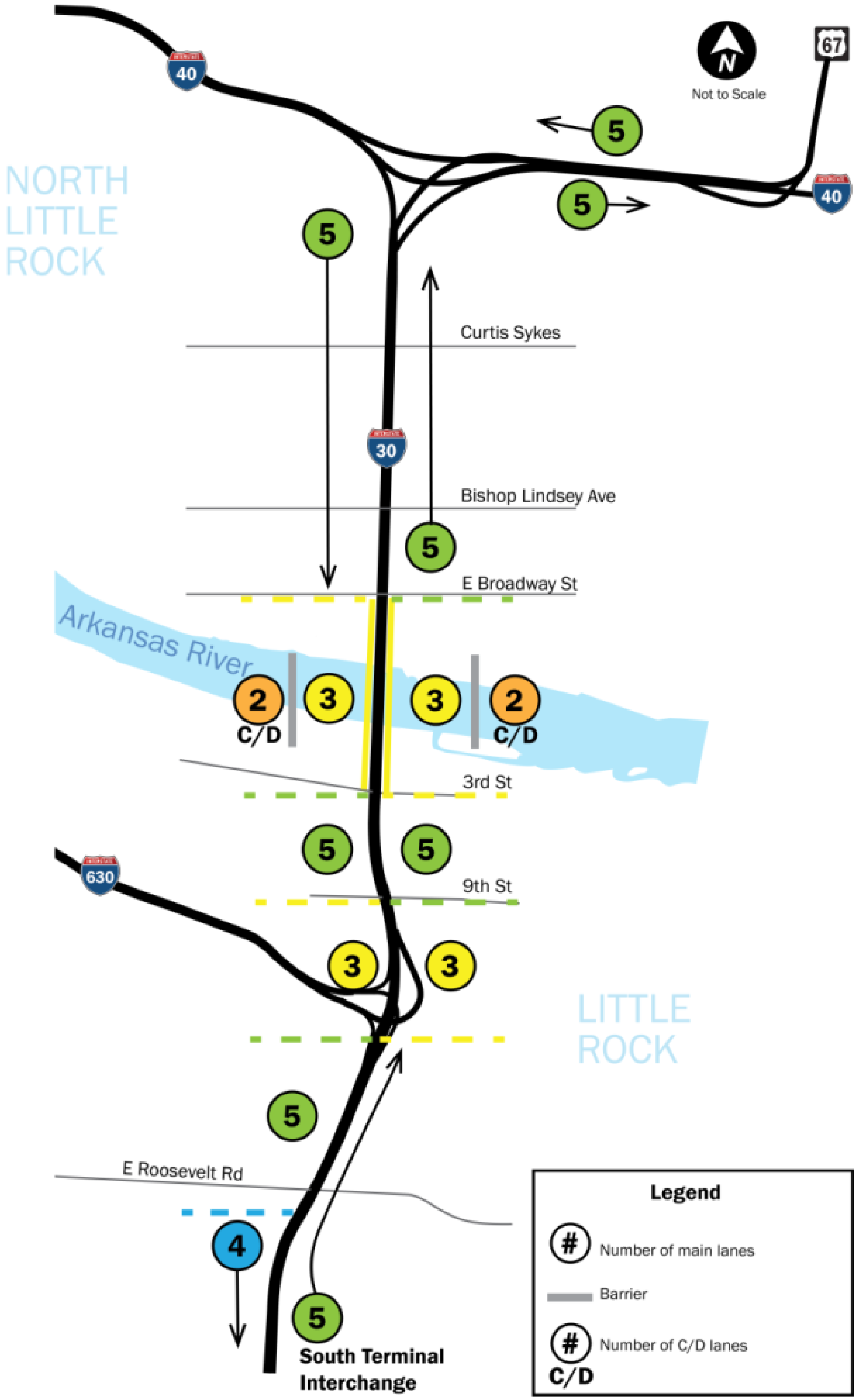
6 PEL Recommended Alternative

It was determined that the 10-Lane C/D system with modifications would provide the best mobility and safety solution for the I-30 PEL study corridor. The 10-Lane C/D system was modified in the following ways to provide even greater benefits:

- Moved the north limits of the C/D system further south to increase the distance from the C/D system to the north terminal
- Added bus-on-shoulder in each direction on I-30
- Made minor intersection modifications

Figure 29 shows the basic lane configuration of the I-30 PEL Recommended Alternative. For the Vissim analysis, five lanes were evaluated heading south on I-30 between I-630 and the South Terminal, and an additional lane was added from the south terminal down to 65th street due to capacity needs outside of the PEL study area. This was added to the model in order to prevent congestion that occurred outside of the PEL study area from backing up into the PEL study area. Capacity improvements outside of the PEL study area are currently being analyzed in a separate AHTD Study, and are assumed to be addressed outside of the CAP program. Therefore, the CAP program will only build the fifth lane between I-630 and Roosevelt, and will build four lanes between Roosevelt and the South Terminal.

Figure 29: Recommended Alternative-Basic Lane Configuration



Source: I-30 PEL

6.1 Traffic Demand

The recommended alternative used the same traffic volumes as the 10-Lane C/D alternative.

6.2 Mobility

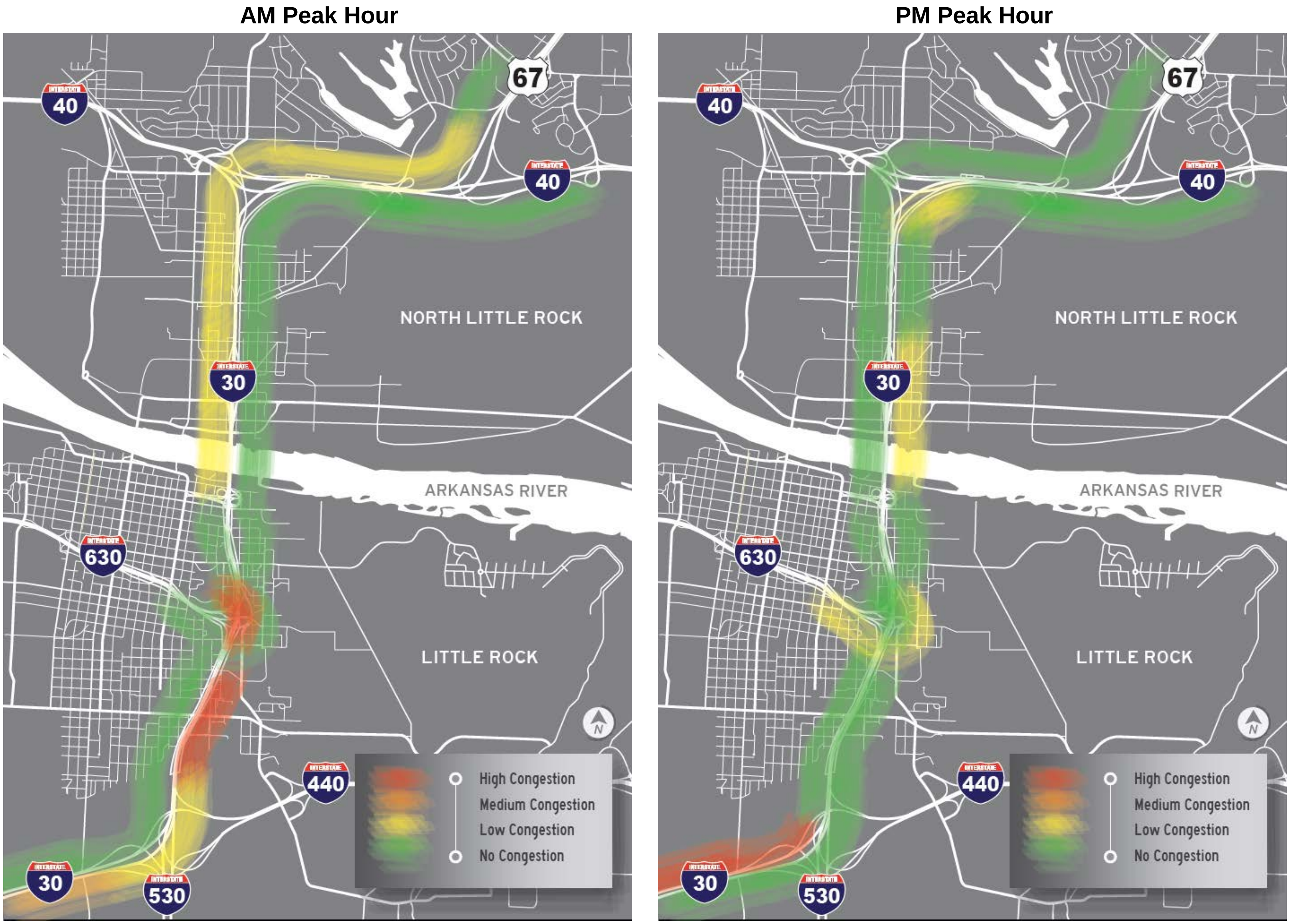
Figure 30 summarizes the mobility in the PEL corridor during the most congested time of each peak hour. As seen in this figure, the PEL recommended alternative operates very similarly to the 10 Main Lane and 10-Lane C/D scenarios. The two areas where reduced speeds are evident are related to constraints outside of the study area. In the AM peak (northbound/eastbound) direction, traffic experiences a slowdown just south of I-630. This is because the demand exceeds the capacity for vehicles using the flyover ramp to I-630 WB. In the PM peak (southbound/westbound) direction, reduced speeds occur mostly outside of the study area due to demand exceeding capacity on I-30 WB at 65th street.

In both the AM and PM models, the I-40 WB on-ramp intersection with JFK operates at LOS F due to a small number of vehicles (<10) attempting to turn on to JFK from the ramp, which is two-way for a short distance to accommodate local businesses. In the AM peak, the I-40 EB Off ramp & Spring Hill intersection exhibits LOS E with an average delay of 35.2 seconds. The threshold between LOS E and LOS D is at 35 seconds, so the intersection is very close to being considered LOS D. In the PM Model, Cumberland & 3rd Street, 3rd Street & River Market, and 3rd Street & Mahlon Martin Street all experience LOS F.

One of the modifications to the recommended alternative was to move the north terminus of the C/D road further south to create a greater weaving distance between the C/D system and the north terminal. Results from the Vissim model indicate that the greater weaving distance allows for better mobility than in the initial 10-Lane C/D alternative.

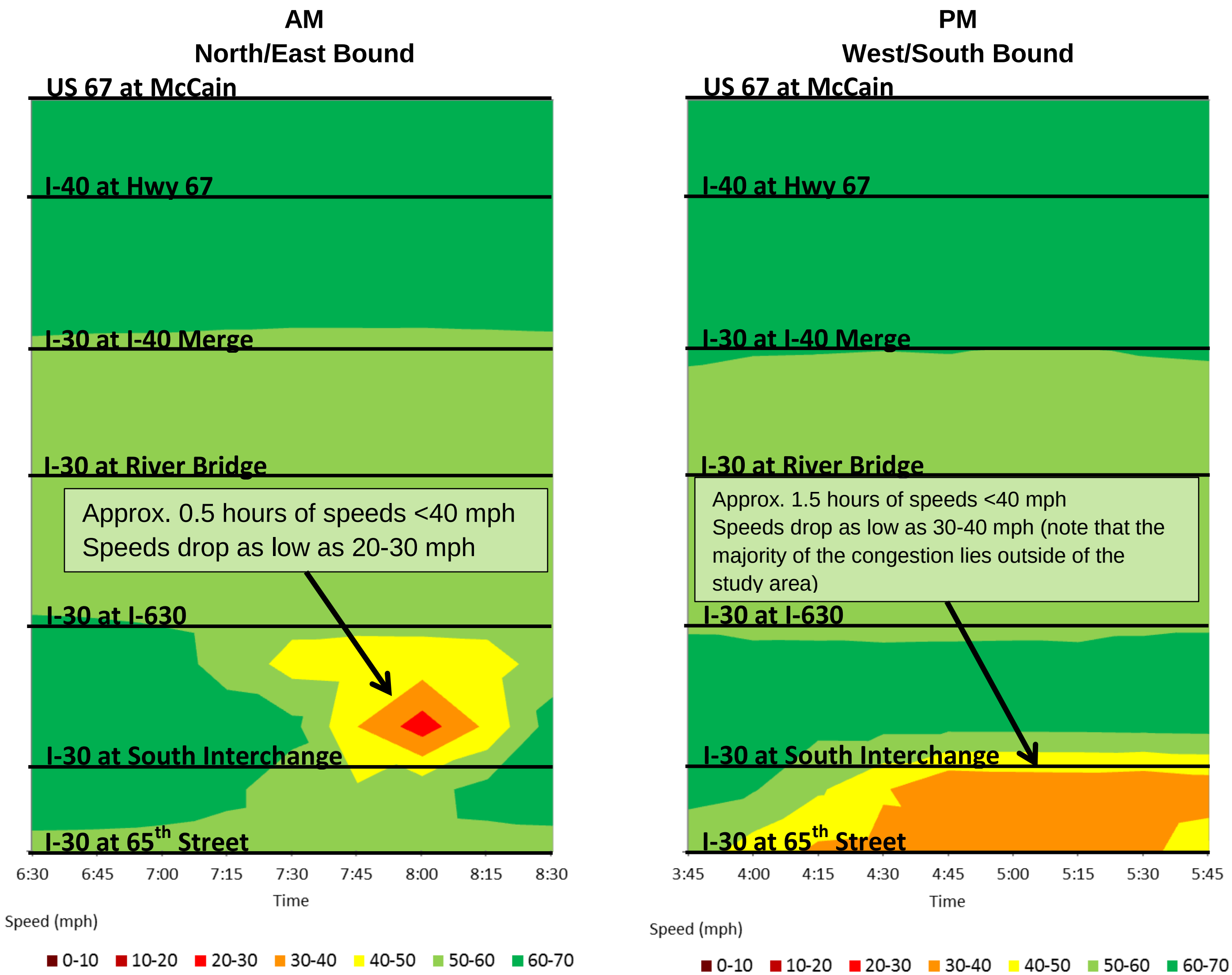
In **Figure 31**, speeds for each peak period are shown throughout the length of the corridor over the entire simulation duration. As with the 10 Main Lane and 10-Lane C/D scenarios, the previously mentioned speed reductions only occur for a brief amount of time in the simulation. Compared to the future No Action and even the existing scenarios, the duration and severity of congestion is minimal in this 10-Lane with Downtown C/D scenario.

Figure 30: Future (2041) PEL Recommended Mobility



Source: I-30 PEL Vissim models

Figure 31: Future (2041) 10-Lane C/D Speed Profiles



Source: I-30 PEL Vissim models

6.3 Safety

The PEL Recommended 10-Lane with Downtown C/D alternative has fewer combined conflict points (main lanes and C/D system) than the other C/D options and removes the non-standard weaving length from the 19th Street exit ramp to the Interstate 40 split. In addition, there are fewer connecting arterial conflict points than the other build alternatives. See **Table 15** for comparisons of conflict points between alternatives.

Table 15: Safety Comparison of PEL Recommended with Alternatives

	8-Lane C/D	10 Main Lane	10-Lane C/D	PEL Recommended 10-Lane with Downtown C/D
Total # Arterial Conflict Points	515	515	515	483
Total # Main Lane Conflict Points	20	26	19	21
Total # C/D Conflict Points	6	0	7	4
Non-standard Weaving Lengths	6	6	7	6

The current potential crash reductions were performed using CMFs and assumptions for the C/D system. During the NEPA phase, a predictive safety analysis using the methods in the *Highway Safety Manual* for freeways, ramps, and C/D roads will be performed. This will give a better indication of the potential crashes associated with this preferred alternative. As shown in **Table 16**, the 10-Lane C/D alternative had the most potential for crash reduction due to the fact that the C/D system extended further north to include the existing high crash segment between Bishop Lindsey Avenue and Curtis Sykes Drive. However, this high level analysis does not quantify the system as a whole.

Table 16: Potential Crash Reductions

Potential Crash Reductions				
No Action	8-Lane C/D	10 Main Lane	10-Lane C/D	PEL Recommended 10-Lane with Downtown C/D
0	175	159	229	197

7 Summary

Table 17 provides a summary of several key MOEs for the No Action, Build, and PEL Recommended Alternatives. For a more complete list of MOEs, see **Appendix 8 – Mobility Exhibits** and **Appendix 9 – Measures of Effectiveness.**

Of the three original build alternatives, the 10 Main Lane and 10-Lane C/D options are closely matched in overall mobility benefits. However, the 10-Lane C/D alternative offers additional benefits over the 10 Main Lane alternative with the number of potential crash reductions. The PEL Recommended Alternative is a modification of the 10-Lane C/D alternative intended to improve weaving conditions north of the C/D system.

Table 17: Summary Table

I-30 PEL Need	Measure	Description	No Action	8-Lane C/D	10 Main Lane	10-Lane C/D	PEL Rec. Alternative
Traffic Congestion	Mobility in PEL Study Area	Distance and duration of LOS E or F (Miles/Minutes during PM Peak)	9.67/120	5.34/120	0.67/60	0/0	0/0
	Total travel time	Hwy. 67 to S. Terminal AM SB/PM NB travel time (minutes)	16/17	15/22	6/7	6/6	6/6
	Average peak hour travel speed through corridor	Hwy. 67 to S. Terminal AM SB/PM NB average speed (mph)	22/20	24/15	58/58	58/59	58/58
	Travel time to key destinations in PEL Study Area	Between McCain and Capitol (To Capitol in the AM and From Capitol in the PM) (Minutes)	24/37	23/24	9/8	8/8	8/8
Roadway Safety	Potential accident reductions	Reduction in number of Annual Crashes	0	175	159	229	197
	Emergency Vehicle Travel Time	Fire Station 1 to Incident west of N. Hills Blvd. in the PM (minutes)	7	11	4	4	4
	Total Conflict Points (Main Lanes and C/D)	Total	31	26	26	26	25
	deceleration and weaving lengths	Number of lengths not meeting current standards	22	6	6	7	6

Legend: Best — Worst

Source: I-30 Vissim Models