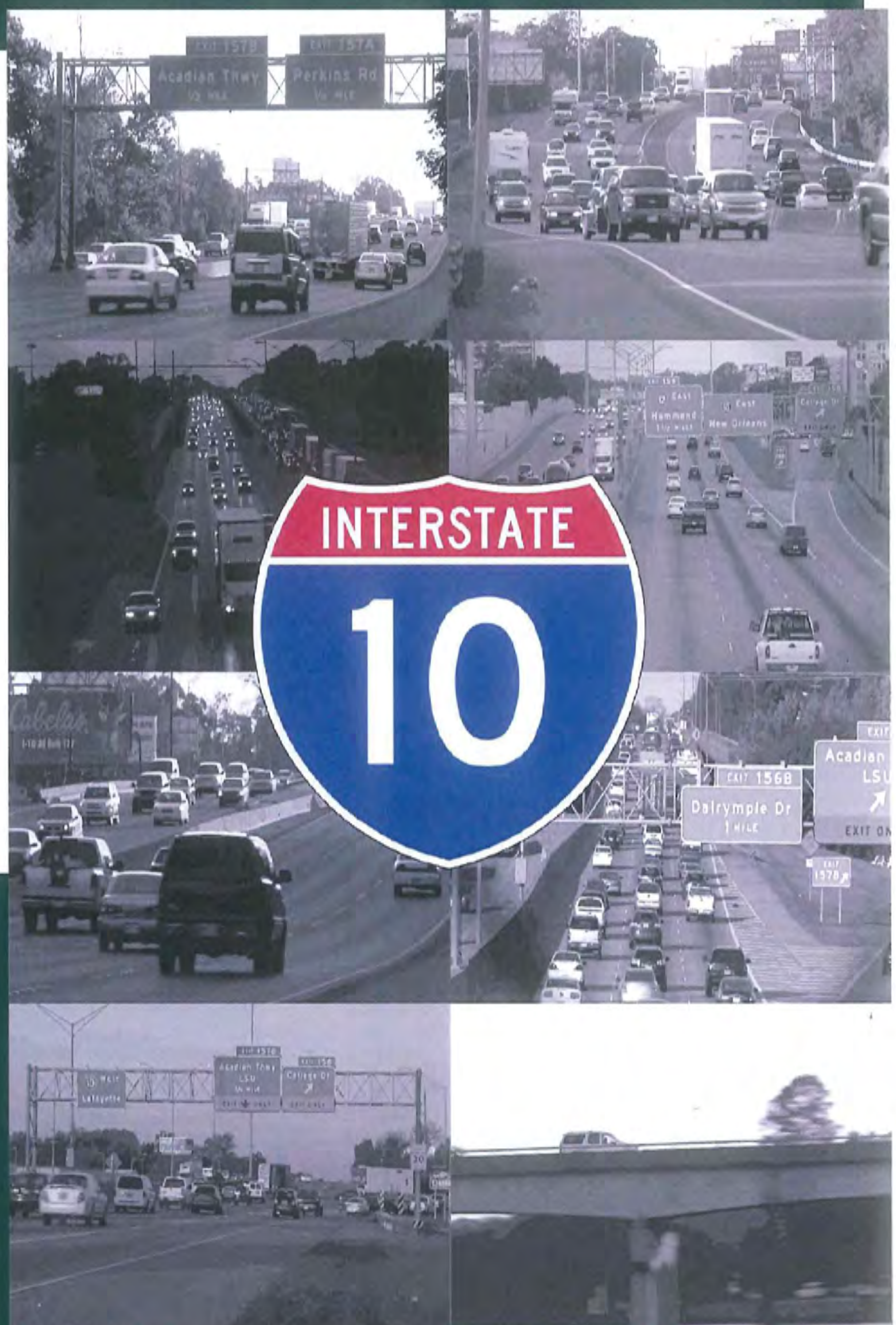
APPENDIX B

TRAFFIC STUDY

TRAFFIC STUDY

for: I-10 Stage "0" Feasibility Study

I-10 Baton Rouge
East & West Baton Rouge Parishes, Louisiana



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Prepared for

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

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I-10 Executive Summary

Introduction

This executive summary presents the findings of the traffic study prepared to assess the feasibility of various alternatives for increasing the capacity on Interstate 10 (I-10) from LA 415 (Lobdell Highway) to LA 3064 (Essen Lane) in Baton Rouge, Louisiana. The traffic study was part of an overall Stage "0" Feasibility Study which included an evaluation of various additional criteria such as geometry, social and environmental impacts, and cost.

Project History

The initial phase of this project began in October of 2011 with the objective of identifying and developing improvements to mitigate the operational deficiencies in the study area based on both existing and projected future traffic conditions.

In August of 2012 the focus of the project shifted from developing improvements for the I-10 mainline to identifying principal urban arterials that serve as alternate routes to I-10. Additionally, the microsimulation model was expanded to include I-10 from Essen Lane to Highland Road and I-12 from Essen Lane to LA 447.

In October 2014, the focus shifted back to the completion of the initial phase, identifying feasible operational improvements to I-10 mainline and interchanges between LA 415 and Essen Lane.

The following summarizes the objective and findings of each project phase.

Section 1. Initial Capacity Analysis, Initial Vissim Modeling, Safety Evaluation, and Volume Projections

The objectives of this phase were to identify the existing and future operational needs of the corridor and interchanges, identify potential improvements, and estimate the effect each improvement is expected to have on safety and capacity.

Traffic volumes, classification data and Traffic Signal Inventories (TSI) were provided by DOTD from various sources and time periods. The data was reviewed and base conditions volumes were developed and approved.

Initial Capacity Analysis

Existing conditions capacity analysis was to be performed using HCS+ Software with the approved base conditions traffic volumes, existing geometry and traffic control. The capacity analysis included ramp terminal intersections, ramp junctions (merge and diverge), mainline weave sections and mainline freeway segments. The capacity analysis parameters, excluding traffic volumes and vehicle classification, were approved in January 2012. The base traffic volumes were approved in May 2012. The base conditions capacity analysis was not completed during this phase as the heavy vehicle percentages were not approved until September 2012, after the project objective shifted.

Existing Conditions Vissim Modeling – Phase 1

Microsimulation modeling for the base conditions PM peak was developed using Vissim Software and followed the standards set forth in the DOTD Microsimulation Guidelines. Below are the major Vissim Model related submittals:

- Microsimulation Phase 1 Deliverable Report – Draft January 2012, Final April 2012
- Initial Framework Vissim Model and Draft Data Collections Report - January 2012
- Fully Coded PM Vissim and Final Data Collection Results – September 2012
- Project direction shifted, remaining tasks completed in subsequent phases

Safety Evaluation

Detailed crash lists were provided by DOTD for the mainline corridors for 2008, 2009 and 2010. Crashes associated with the ramp terminal intersections were not included. The crash lists were evaluated to identify crash patterns and/or underlying causes. The analysis of crash history resulted in the following conclusions:

- Most segments (13 out of 17) experienced a crash rate higher than the statewide average.
- Most accidents types (56%) were rear-end.
- More accidents occurred during the PM peak period than any other time (19%)
- The percent of accidents which occurred at night was proportionate to the nighttime volume; therefore lighting did not appear to be a major factor.

Traffic Projections

CRPC Travel Demand Model (CRP TDM), historic growth rates, known projects and engineering judgment were utilized to develop proposed growth rates along the corridor. The proposed growth rates were submitted in May 2012. Subsequent to DOTD review and discussions, it was decided to use a universal growth rate of 1.5% per year for the entire study area.
Prior to the completion of the base conditions capacity analysis and the start of the AM base conditions Vissim Modeling, the project objective was shifted to improving the surrounding roadway network.

Section 2. Expanded Vissim Modeling and Alternative Route Selection and Incident Management Route Selection for Stage 0 Analysis

The objectives of this phase were to expand the PM base year I-10 Vissim Model to include I-10 from Essen Lane to Highland Road and I-12 from Essen Lane to LA 447, to create an AM base conditions Vissim Model and to conduct a study to identify principal urban arterials that serve as alternate routes to I-10 within the project area. The intention was to conduct Stage 0 analyses for the identified alternative routes. This included an evaluation of which routes would be expected to serve traffic during an incident that closes I-10.

Expanded Vissim Modeling – Phase 2

The fully coded PM Vissim model that was previously developed was utilized as the base for the expanded model. A Vissim model created by others for I-12 from Essen Lane to LA 447 as well as additional traffic data was provided by DOTD. Additional counts were collected by Urban Systems in September 2013. The new traffic data and volume and route inputs in the I-12 model compared to the previously approved base traffic volumes and new base conditions traffic volumes were developed for both the AM and PM peaks for the expanded limits. The following lists the major Vissim Model related submittals:

- Final Phase 1 PM Calibrated Vissim Model (original Essen limits) – February 2013
- Updated PM Peak Traffic Volumes for expanded Phase 2 limits – January 2014
- Technical Memorandum for I-110 SB Reconfiguration – February 2014
- Draft Phase 2 Calibrated PM Vissim Model and Draft Calibration Report – July 2014
- Updated AM Peak Traffic Volumes – October 2014

Alternative Route Selection

A comparison of twenty-four (24) different parameters was conducted and summarized in matrix format to determine which of the alternative routes to I-10 should be analyzed for potential improvements through the Stage 0 process. The CRPC TDM was used to determine a portion of the parameters. Five (5) parameters were selected for the final screening (v/c ratio, volume, safety, cost for capacity improvements and cost for traffic safety management improvements).

An incident management route selection matrix was also developed based on 46 models generated using the 2017 CRPC TDM to represent the potential incidents on I-10.

Based on the results of the comparison and subsequent meeting discussions the following routes were identified for further study:

- College Drive
- Perkins Road
- US 61 (Airline Hwy)
- Florida Blvd

Prior to submitting the calibrations report and during the scope development for these Stage 0 studies, the focus shifted to the original objectives to improve I-10.

Section 3. Project Justification and Mainline/Interchange Improvement Tier 1 Analysis

The objectives of this phase were to complete the expanded Vissim model, to perform No Build analysis and a comparative evaluation of various regional projects, to aid in the development of potential I-10 mainline corridor and interchange improvements, and to evaluate the potential improvements based on safety and operations to provide input for a Tier 1 analysis.

Expanded Vissim Model Completion

Once the PM peak model was approved by DOTD, it was used as a base to create the AM and the Final Phase 2 Expanded Limits AM and PM Calibrations Report and Vissim Models which were submitted in May 2015.

Project Justification

A variety of traffic analysis tools were utilized to identify existing and future capacity constraints. Capacity analyses were conducted using HCS+ software for freeway segments, ramp junctions, weave sections and intersections. CAP-X in MS Excel was used to estimate interchange operations. CRPC TDM was used to develop traffic projections, and Vissim was used to create microsimulation models.

The Base conditions traffic volumes as identified in Section 1 of this report and the 2032 No Build traffic volumes were analyzed to identify existing and potential future corridor deficiencies.

The capacity analysis results indicated that failing level of service (LOS) is anticipated by the design year along the entire I-10 corridor within the original study area - I-10 eastbound and westbound between LA 415 (Lobdell) and LA 3064 (Essen). They also indicated failing level of service conditions on I-110 and I-12 within the study area and at many of the ramp terminal intersections.

The following deficiencies were also identified:

- Lack of shoulders on I-10
- I-10/I-110 eastbound merge and Washington Street Exit
- High density of entrance/exit ramps along I-110
- Lack of surface road connectivity
- Weave locations. (College/I-12, College/Acadian, I-110/Washington)

Vissim models were created for the design year of 2032 and the output indicated that without improvements, travel times are estimated to greatly increase. This supported the capacity analysis and indicates the need for improvements on I-10.

An evaluation was performed to determine if various regional projects could be expected to attract enough traffic that improvements would not be required on I-10. Results from previous studies and the CRPC TDM were used to estimate the effect that various regional projects would have on the traffic volumes on I-10, in particular on the I-10 Mississippi River bridge. The following projects were considered:

- Baton Rouge Urban Renewal and Mobility Plan (BUMP)
- LA 1 to I-10 Connector (LA 415)
- Westside Expressway
- LA 1 to LA 30 (Southern Mississippi River Bridge Crossing)
- Baton Rouge Loop
- Northern Bypass

Multiple combinations of these projects were considered, and the reduction of bridge traffic was estimated. The results indicated that even with a combination of these projects, the traffic demand on I-10 is expected to be more than the current 2015/2016 volumes. Therefore, it was concluded that improvements to I-10 must be part of the overall multi-faceted solution to address the traffic concerns in Baton Rouge.

The analyses were presented at the initial round of Public Meetings in late August and early September 2015. Video clips of the Vissim Base Model and the 2032 No Build Model at key locations along the corridor were presented side-by-side for comparison.

Mainline/Interchange Improvement Development and Analysis

As an initial step in determining potential improvements, a freeway segment threshold analysis was performed for the I-10 corridor to determine the number of lanes that would adequately service the expected traffic demand on the interstate in the design year of 2032. Capacity Analysis for Planning of Junctions (CAP-X) software was utilized to screen interchange configurations. Public input from the first round of public meetings was also taken into consideration during alternative development.

With all the interest and concern regarding the Washington Street exit, additional data was needed to determine whether vehicles exiting at Washington Street are primarily coming from I-110 or I-10. Data indicated that only 1%-6% of the total traffic volume on I-10 take the Washington Street exits. It also indicates that approximately 88% of the exiting traffic at Washington Street is from I-110 Southbound with only 12% from I-10 eastbound.

The following list of improvements was developed based on the analysis results, public input and additional data:

- One additional lane in each direction on I-10
- College and Acadian service roads with braided ramps
- Dedicated ramps to College from I-10 and I-12
- Modifications to Dalrymple/Washington Street interchanges
- Terrace/Washington Street left exit from I-110 southbound
- Multi-lane, restricted access Highpass (tolled and untolled)
- Frontage roads from Government to Dalrymple
- Separate bridge dedicated for I-110 traffic
- LA 1 to LA 30 direct connection
- Mutli-lane addition with parallel bridge

Alternatives Analysis

Average Daily Traffic volumes (ADTs) and AM/PM peak period volumes were obtained from CRPRC TDM for each of these scenarios. The output volumes were compared to the Design Year No Build model volumes and select capacity analysis was performed to determine their feasibility. The objective of these efforts was to provide input for the traffic portion of the Tier 1 analysis.

To complete the Tier 1 Matrix, alternatives were analyzed using Vissim modeling. The base model was cropped and recalibrated to represent 2015/2016 conditions particularly to replicate the unique lane selection behavior that occurs on I-10 EB near the Bridge/merge I-110 SB. CRPC TDM output was used to develop revised base and projected traffic volumes for the various improvement scenarios for use in the following Vissim models:

- Re-calibrated AM and PM Model cropped at Essen Lane (2015 Base and 2032 No Build)
- Initial Concept – One Additional Lane on I-10 (2015 base and 2032)
- Initial Concept - One Additional Lane on I-10 with Washington St Left Exit and College Directional Ramps (2015 base and 2032)
- Direct connection to/from LA 1 and LA 30 (2015 PM Only)
- Four-lane Highpass between LA 415 and I-12 (2015 AM & PM)

The Vissim modeling output indicated the additional lane would provide improvement, but over time the increased traffic demand would require improving access from the westbank to the eastbank. It also indicated that the additional lane by itself was not enough to service the expected 2032 design year traffic demand.

At the second round of Public Meetings in February and March 2016, analysis results and video clips of the cropped Base Model and the base year Initial Concept Model at key locations along the corridor were presented side-by-side for comparison.

<u>Conclusions</u>

Safety Improvements

The proposed improvements are expected to include design features which act as countermeasures such as construction of/widening of shoulders and lengthening of acceleration/deceleration lanes. These features will be added where possible based on right of way and geometric constraints. Adding capacity is expected to reduce congestion which should mitigate congestion related crashes.

Traffic Operations

Based on traffic operations only, the following lists each of the potential improvements that should be considered for further study:

I-10 Mainline Improvements

- One Additional Lane in each direction on I-10 (except across the bridge span)
- Mutli-lane Addition on I-10 with a new adjacent bridge
- Multi-lane, restricted access Highpass (tolled and untolled)

While these alternatives were feasible based on expected traffic operations the multi-lane addition with a new bridge and the multi-lane highpass alternatives were eliminated based on other factors.

The mainline improvements are expected to be accompanied by various interchange improvements. The LA 415, Acadian Thwy and College Dr interchanges are recommended to be further studied for potential conversion to Single Point Urban Interchange (SPUI) or Diverging Diamond Interchange (DDI). The following lists additional interchange modifications that should be considered for further study:

- Addition of Terrace/Washington St left exit from I-110 southbound
- Washington/Dalrymple Service Roads with modifications to existing ramp placement
- Removal of Perkins Rd ramps
- Extension of Washington/Dalrymple service roads along I-110 to Government Street
- College and Acadian Service Roads with braided ramps eastbound and an auxiliary lane westbound
- Dedicated ramps to College from I-10 and I-12

Potential improvements to be analyzed further will be selected based on both traffic operations and safety as well as other criteria such as geometry, social and environmental impacts and cost.

Section 1. Initial Capacity Analysis, Initial Vissim Modeling, Safety Evaluation, and Volume Projections

The original objectives of the study were to identify the existing and future operational needs of the corridor and interchanges, identify potential improvements, and estimate the effect each improvement is expected to have on safety and capacity.

Study Area

The study area included Interstate 10 (I-10) from LA 3064 (Essen Lane) to LA 415 (Lobdell Highway), Interstate 12 (I-12) from I-10 to LA 3064, and Interstate 110 (I-110) from I-10 to US 61 Business (Florida Boulevard) in Baton Rouge, Louisiana. The study included the interchanges, merge and diverge ramp junctions, weaving segments, and the ramp intersections. Figure 1.1 presents a vicinity map of the study area.

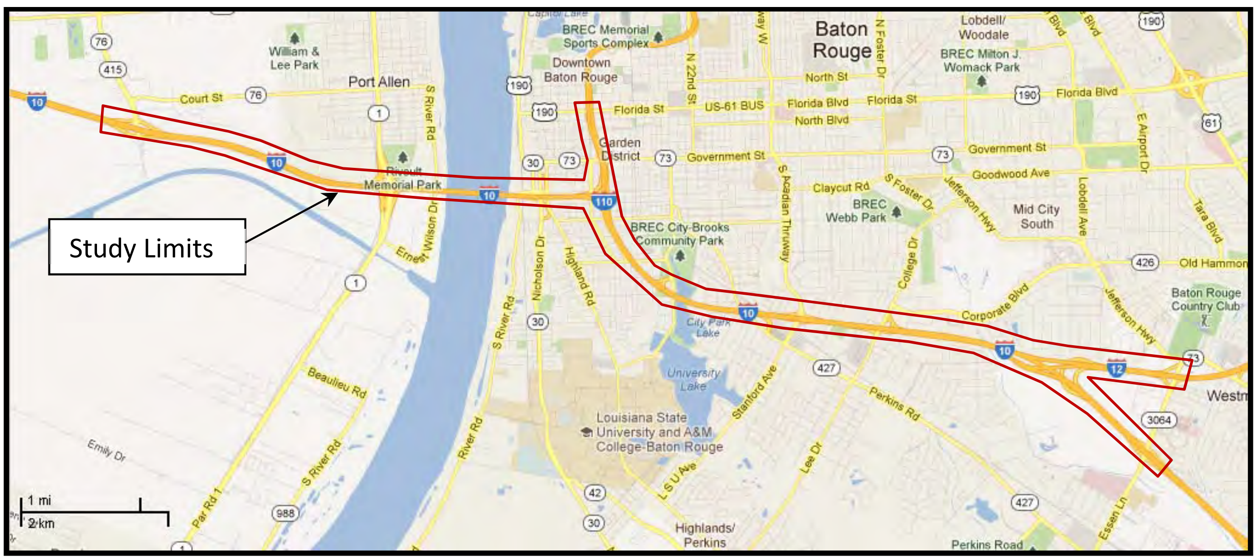

Figure 1.1 – Vicinity Map

Interstate 10

Interstate 10 in the study area is a fully controlled access interstate that has a general northwest-southeast orientation throughout the study area. It is the major east-west interstate through the southern portion of the United States and is utilized by both local and regional traffic. It services a large percentage of commercial and freight vehicles.

Interstate 12

I-12 in the study area is a fully controlled access interstate that has a general east-west orientation. I-12 is an east-west link between I-10 in Baton Rouge and I-10 in Slidell north of Lake Pontchartrain. It is used by both local and regional traffic and services a large percentage of commercial and freight vehicles as a by-pass of I-10 through New Orleans.

Interstate 110

I-110 in the study area is a fully controlled access interstate that has a general north-south orientation. I-110 is a 9-mile, north-south link between I-10 in downtown Baton Rouge and US 61 in northern Baton Rouge. I-110 provides an alternative route to Airline Highway, access to US 190, Mississippi River crossing, and to the Baton Rouge airport.

<u>Previous Studies and Planned Projects</u>

At the time of this portion of the study, the following projects were either in progress or planned and expected to complete by the 2032 design year:

- Widening of I-10 from LA 42 to I-12 (from four to six lanes)
- Widening of I-12 from I-10 to LA 447 (from four to six lanes)
- Widening of LA 3064 (addition of two turn lanes to provide dual left turns for northbound and southbound LA 3064)
- Widening of the I-10 at Essen Lane eastbound on and off ramps and westbound on ramp (from one lane to two lanes)
- Modification to I-12 at Essen Lane interchange

The following previous studies were reviewed to develop an understanding of alternatives and analysis that had already been conducted.

I-10 Modeling Project, Neel-Schaffer, April 2010

In this project, a model was developed to analyze detour routes for the I-10 Mississippi River Bridge for closures due to construction. The model included I-10, LA 415, LA 1, US 190 (from 415 to I-110) and I-110 (from US 190 to I-10).

The National I-10 Freight corridor Study, DOTD, February 2003

The purpose of this project was to assess the importance of freight on I-10, to identify current and future capacity and safety problems and to identify and evaluate strategies to facilitate freight flow. The report concluded that freight is important to the economy and identified multiple investment options for potential funding of improvements. The report provided recommendations such as increasing capacity on high volume corridors and incorporating technologies such as Intelligent Transportation Systems (ITS)/Commercial Vehicle Operations.

I-10 BR-Major Investment Study- Phase 1, Parsons Brinckerhoff, September 1996

This study documented recommended improvements to I-10 from the Mississippi River Bridge to I-12.

- Recommendations:
    - Widen I-10 to 8 lanes with shoulders
    - Modify eastbound ramp of I-10 at the I-110 interchange to provide 2 continuous lanes
    - Relocate Washington St. off ramp
    - Change layout of College Dr. interchange by adding new frontage roads and connections to relocating the eastbound on ramp
    - Improve safety at other on/off ramps
    - Consider additional frontage roads between I-10/I-110 and Dalrymple.
    - Consider eastbound on ramp at Dalrymple
    - Implement congestion management plan
    - Do not rule out a bypass.

I-10 Major Investment Study – Final Report, Parsons Brinckerhoff Quade & Douglas, August 2000

This study documented recommended improvements to I-10 with 16 alternatives studied (including No Build). Several were currently being implemented, these were recommended for further study:

- Washington/Dalrymple options
    - Eastbound Auxiliary Lanes – I-10 widening with existing off ramp configuration
    - Eastbound Louise Exit – I-10 widening with left exit to Louise
    - Westbound existing ramps – I-10 widening with existing off ramp configuration
- Washington/Dalrymple Add-ons
    - Modify 50 MPH curve
    - Consider Dalrymple eastbound on ramp
- Perkins/Acadian options
    - I-10 widening with existing off ramp configuration
- College/Split/Essen Options
    - Eastbound /westbound One-Way Frontage Road System w/ street access
- College/Split/Essen Add-On
    - Essen Lane SPUI

Improvements included 8-lanes on I-10 between the Bridge and Acadian Thruway. Also, two options were included to address merge and diverge problems at the Washington St. curve on I-10 and to improve to current standards. Other recommendations included a frontage road system between Perkins and College with interchange modifications.

<u>Data Collection</u>

Traffic Volumes

The original base conditions traffic volumes were developed from a compilation of 24 hour traffic volume and turning movement counts from various sources. The source and date, where available, of each count location are presented in the data collection logs in Appendix 1A. The collected traffic data was balanced and adjusted to develop the proposed existing conditions traffic volumes based on the following methodology:

- The mainline peak hour volumes were balanced by adjusting the provided mainline counts while maintaining the interchange ramp volumes recently collected by DOTD. The majority of the emphasis with regard to volume balancing was given to the I-10 corridor between Essen Lane and I-110.
- The turning movement counts at each of the at grade interchange intersections were developed by adjusting the interchange ramp volumes recently collected by DOTD based on the movement distribution of provided counts. The through volumes at each intersection were balanced accordingly.
- Once the traffic volumes were balanced and adjusted they were compared to the data provided by DOTD to aid in finding inconsistencies in the data which may indicate potential count collection or mathematical errors. In general, when inconsistences were present, the more conservative volumes were used.

Comments provided by DOTD were addressed, and the approved existing conditions traffic volumes were submitted in April 2012. Letters summarizing the traffic volume development methodology and assumptions for each submittal are presented in Appendix 1A. Figures 1.2 to 1.6 present the approved 2012 base conditions traffic volumes.

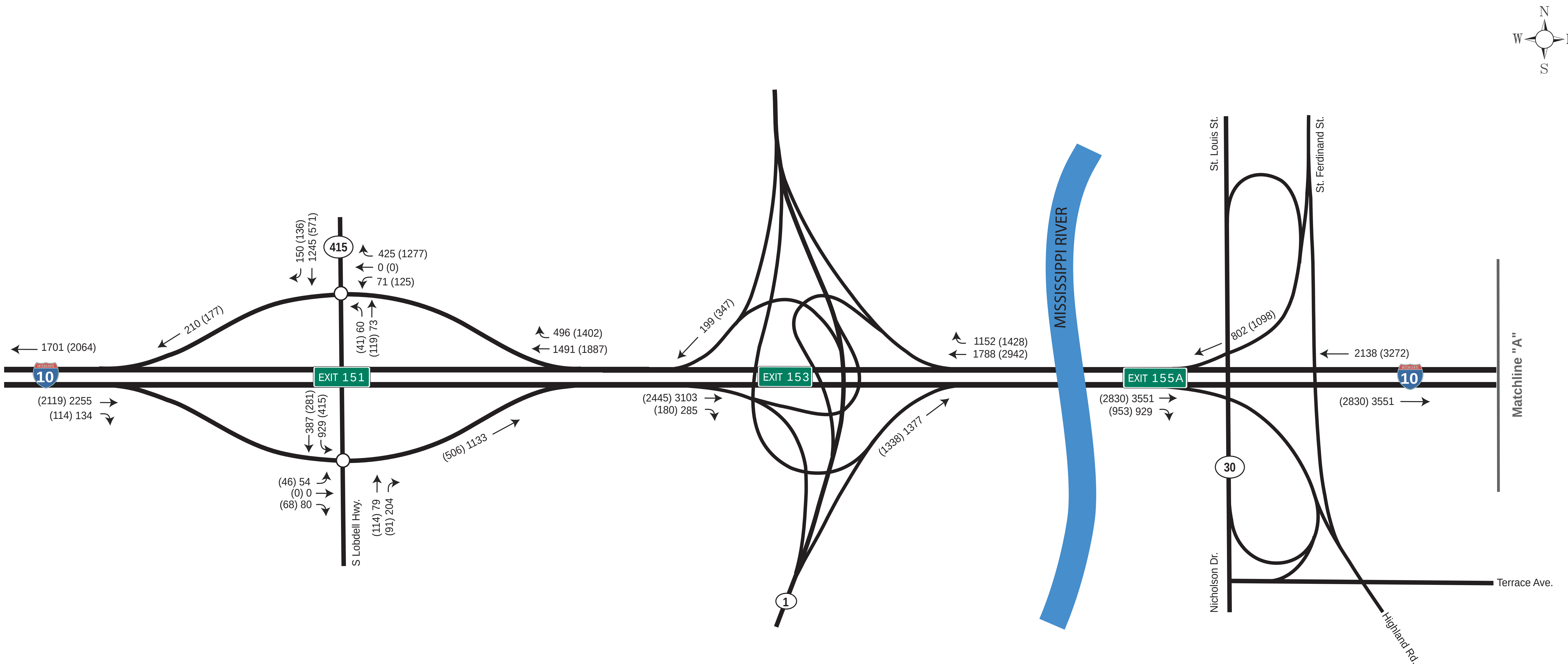

Figure 1.2

Segment 1: 2012 Base Volumes

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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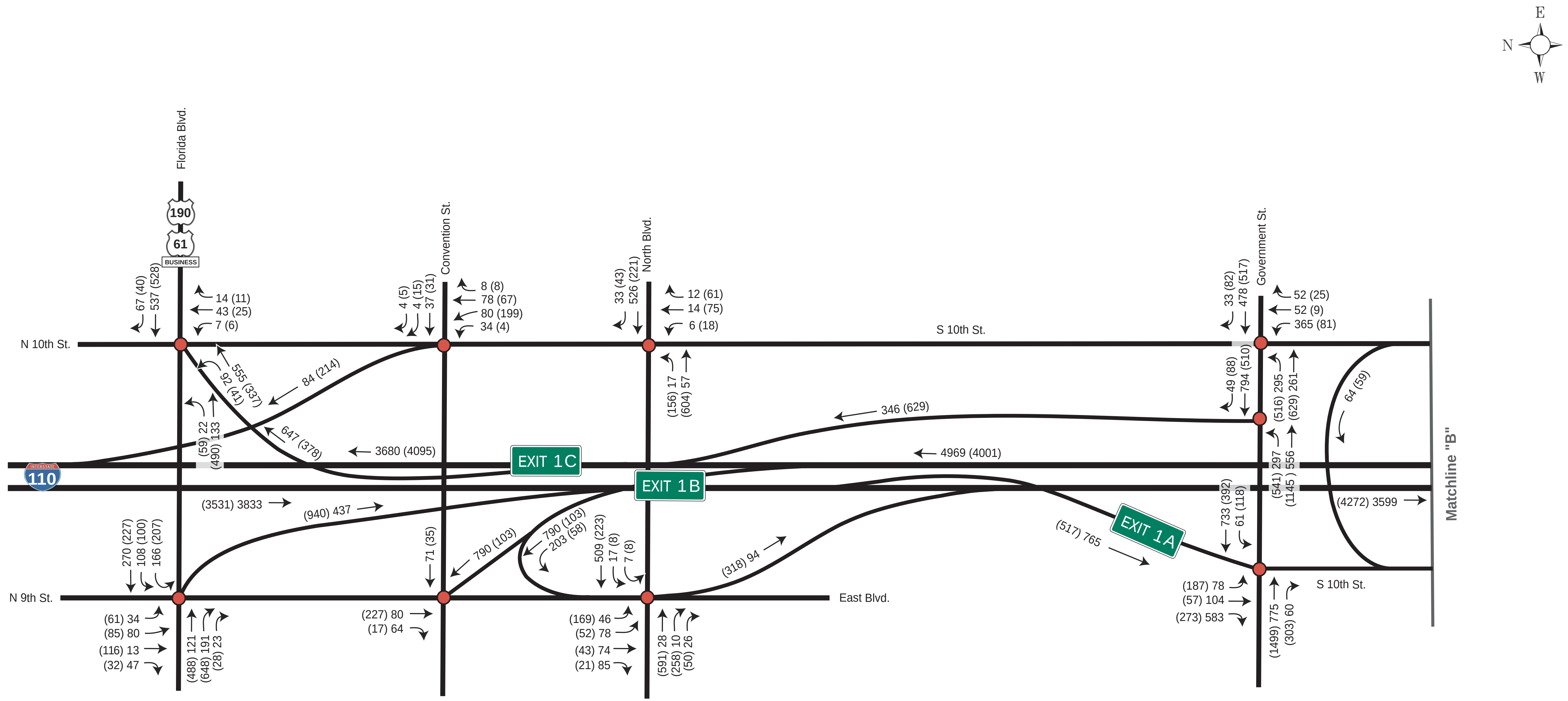

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

Figure 1.3

Segment 2: 2012 Base Volumes

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
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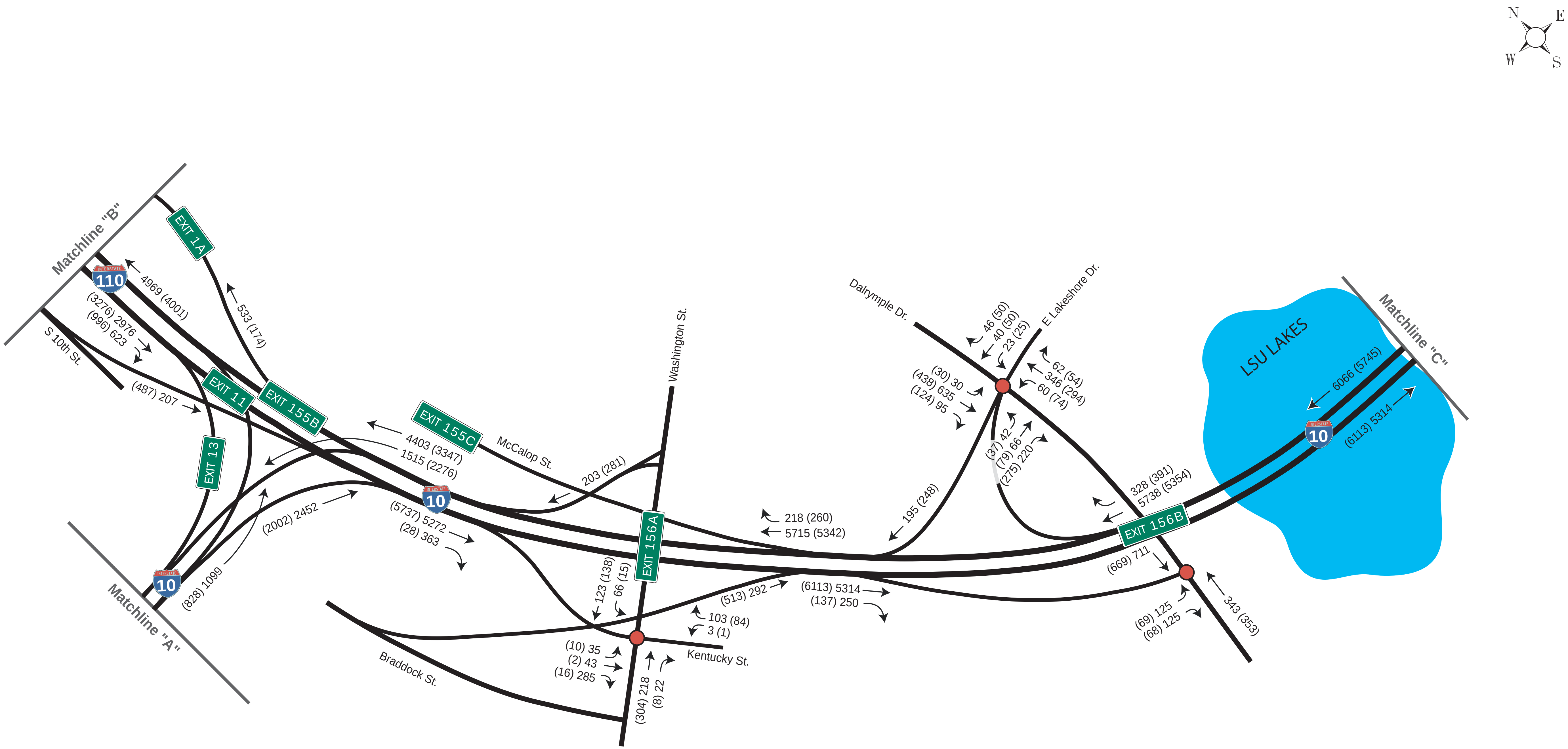

Figure 1.4

Segment 3: 2012 Base Volumes

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
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LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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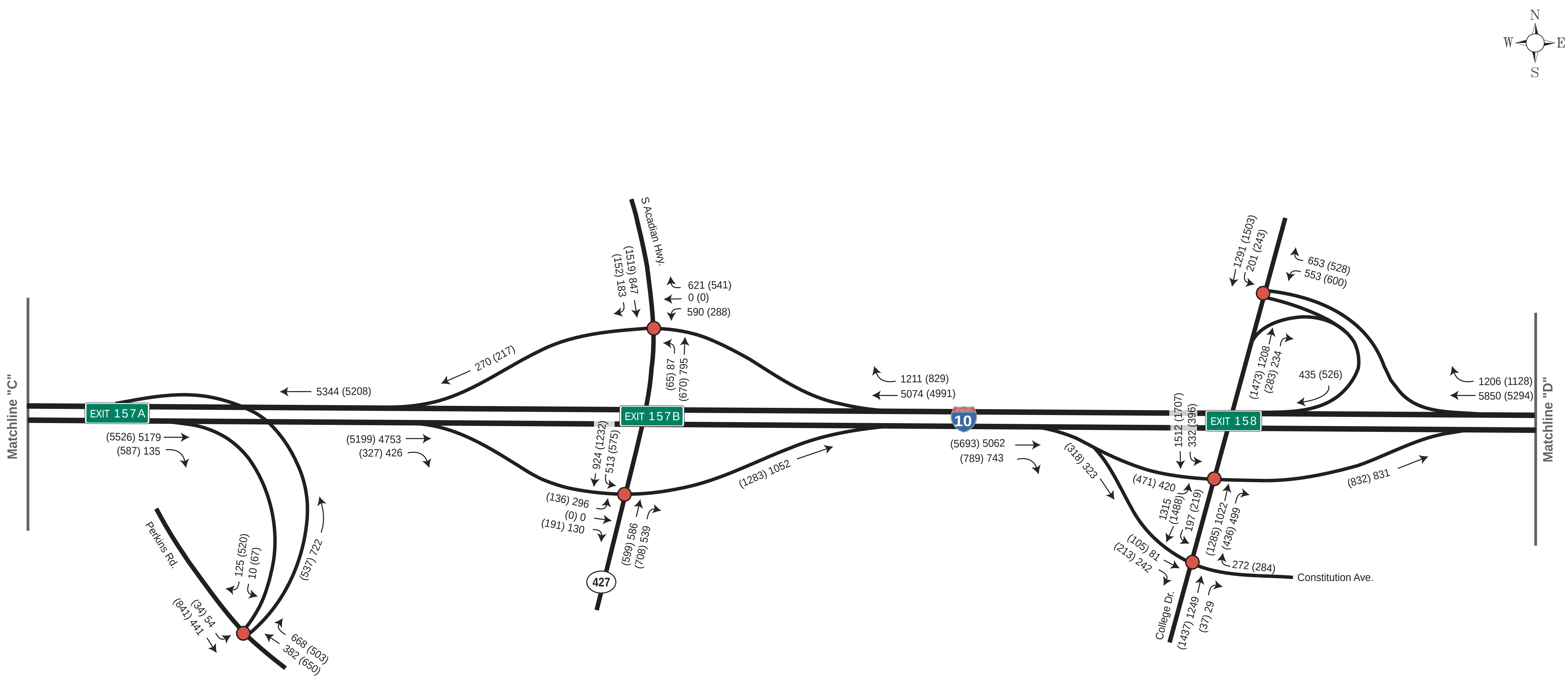

Figure 1.5

Segment 4: 2012 Base Volumes

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
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LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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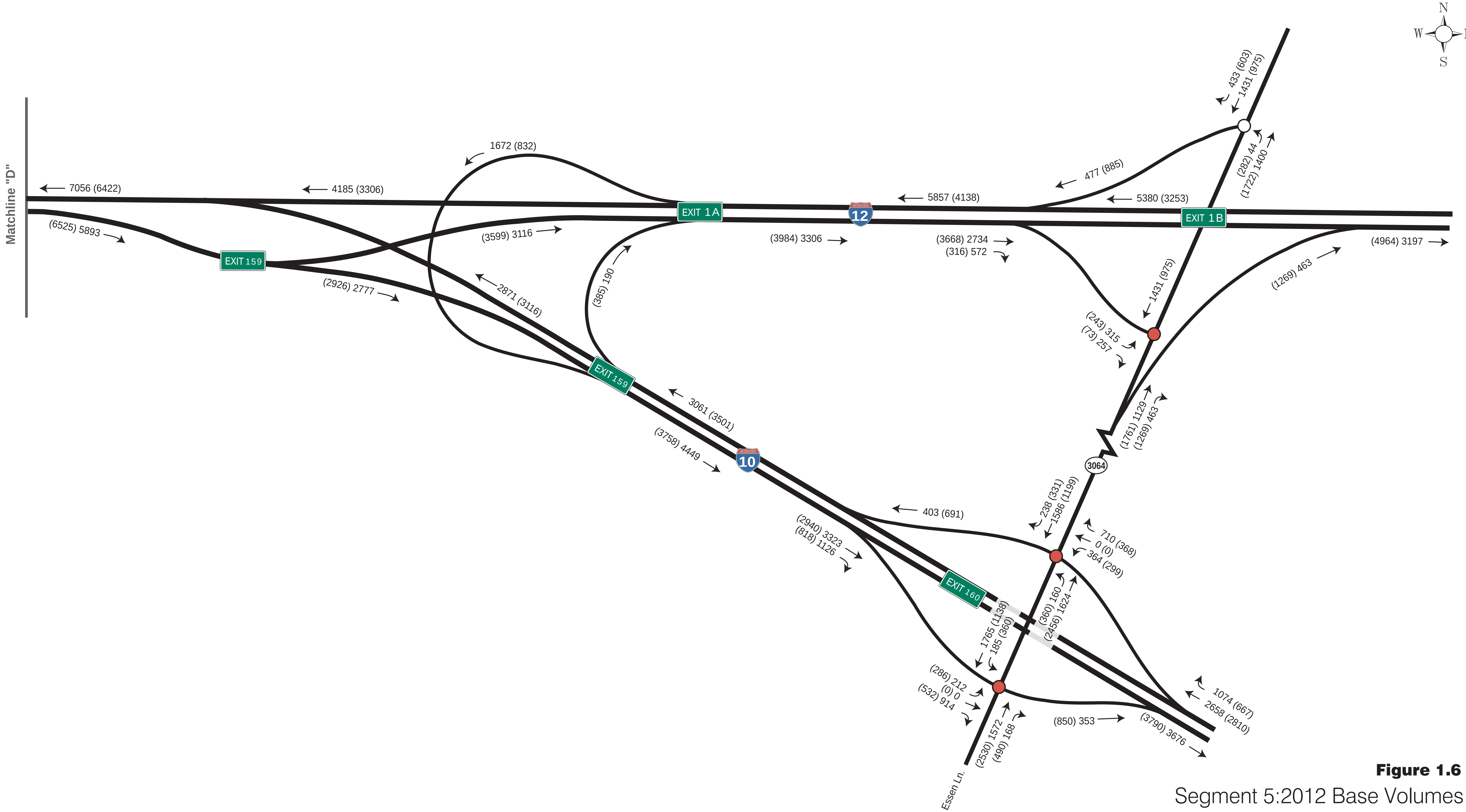

Figure 1.6

Segment 5:2012 Base Volumes

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
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LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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Project # 10-085

Classification Data

Classification data was provided by DOTD via Southern Traffic Services, DOTD count collectors and Manual Counts from ITS Video. A letter to DOTD which summarizes the classification data and recommended heavy vehicles percentages is provided in Appendix 1A. The recommended heavy vehicle percentages were adjusted per DOTD comments. Tables 1.1 and 1.2 present the approved heavy vehicle percentages for use in the Vissim Modeling and HCS+ Capacity Analysis.

Table 1.1
Heavy Vehicle Percentages
Vissim Modeling

Location	Vehicle	AM Peak (%)	PM Peak (%)
I-10 EB at Begin Model (W of LA 415)	PC	77	75
	HV	23	25
I-110 SB at Begin Model (N of Florida)	PC	91	87
	HV	9	13
I-10 WB at Begin Model (E of Essen)	PC	90	86
	HV	10	14
I-12 WB at Begin Model (E of Essen)	PC	90	86
	HV	10	14
Interstate Ramps	PC	95	95
	HV	5	5
LA 1 Ramps	PC	90	90
	HV	10	10

Table 1.2
Heavy Vehicle Percentages
Capacity Analysis Recommendations

Location	Vehicle	AM Peak (%)	PM Peak (%)
Freeway Analyses			
I-10 East of I-110 (Westbound)	RV	3	4
	Buses/HV	7	10
I-10 East of I-110 (Eastbound)	RV	2.5	3
	Buses/HV	5.5	10
I-10 West of I-110 (Westbound)	RV	8	6
	Buses/HV	20	15.5
I-10 East of I-110 (Eastbound)	RV	5.5	6
	Buses/HV	16.5	19
I-110 North of I-10 (Southbound)	RV	2.5	3
	Buses/HV	5.5	10
I-110 North of I-10 (Northbound)	RV	3	4
	Buses/HV	7	10
Intersection Analyses			
Interstate Ramps	HV	5	5
Cross Streets	HV	2	2

Travel Times

Travel time data was a primary tool used to calibrate the models. Travel time data was collected in 2012 for the AM and PM peak periods as determined by the hourly counts. Travel time runs were collected for each of the following possible routes to/from the project limits:

1. I-10 WB-WB: Essen Ln to LA 415
2. I-10 EB-EB: LA 415 to Essen Ln
3. I-12/I-10 WB-WB: Essen Ln to LA 415
4. I-10/I-12 EB-EB: LA 415 to Essen Ln
5. I-10/I-110 WB-NB: Essen Ln to Florida Blvd
6. I-110/I-10 SB-EB: Florida Blvd to Essen Ln
7. I-12/I-110 WB-NB: Essen Ln to Florida Blvd
8. I-110/I-12 SB-EB: Florida Blvd to Essen Ln

The data collectors attempted to gather a range of data, performing the 3 runs in each direction for each route over different days and times within the peak period as possible. This resulted in 36 travel time runs for each peak.

The "floating car method" was used, meaning the driver attempted to pass as many vehicles as were passing him. The passenger recorded each run using a video camera. The passenger verbally noted the interchanges, approximate speed, levels of congestion and any other pertinent information.

The video data was translated to maps and spreadsheets for each run of each route showing the travel time. Speeds, dates/times and any other relevant information were included. Travel time data and results are summarized in the Fully Coded PM Vissim and Final Data Collection Results in Appendix 1B.

Safety Evaluation

Crash patterns were reviewed to identify specific factors that may contribute to greater accident frequency, including location, type of collision and time of day. Interstate mainline crashes were reviewed including those on the on and off ramps. The ramp terminal intersection crashes were not included.

Data Collection

DOTD provided available detailed crash lists from January 2008 through December 2010. The provided data was divided into seventeen segments ranging in length, primarily sectioned by natural roadway geometry such as interchanges. Crash rates were provided by DOTD for each segment using the segment crash rate formula. In addition, detailed crash lists provided information for each accident including the location, type of crash, damages and date/ time.

Methodology

A statewide average of 1.39 accidents per million vehicle miles was identified by DOTD for urban interstates for the year 2008. This value was used as the basis for comparison and segments with rates higher than the statewide average were identified.

The accident data for each segment was categorized detailing the accidents by location, collision type and time of day. Location was determined by dividing each segment into parts (three per segment or more based on length) to determine if a higher percentage of accidents were occurring at a particular spot. Collision type was determined by reviewing reports and was separated into the following categories:

- Collision w Vehicle - Rear End
- Collision w Vehicle - Side Swipe
- Collision w Vehicle - Unspecified
- Collision w Vehicle - Rt Angle
- Collision w Fixed Object
- Run off Road
- Other

The time of day analysis for each segment detailed if the accident occurred during daylight hours or nighttime. A separate analysis was conducted detailing the breakdown of accidents for each hour, and the peak periods. The percentage of accidents occurring at nighttime and for the peak periods was compared to the percent of traffic volume occurring at these times.

Crash Data Analysis

The crash rate by segment is presented in Table 1.3. Segments with a crash rate higher than the statewide average of 1.39 accidents/MVM for segments are highlighted.

Table 1.3
Crash Rates by Segment

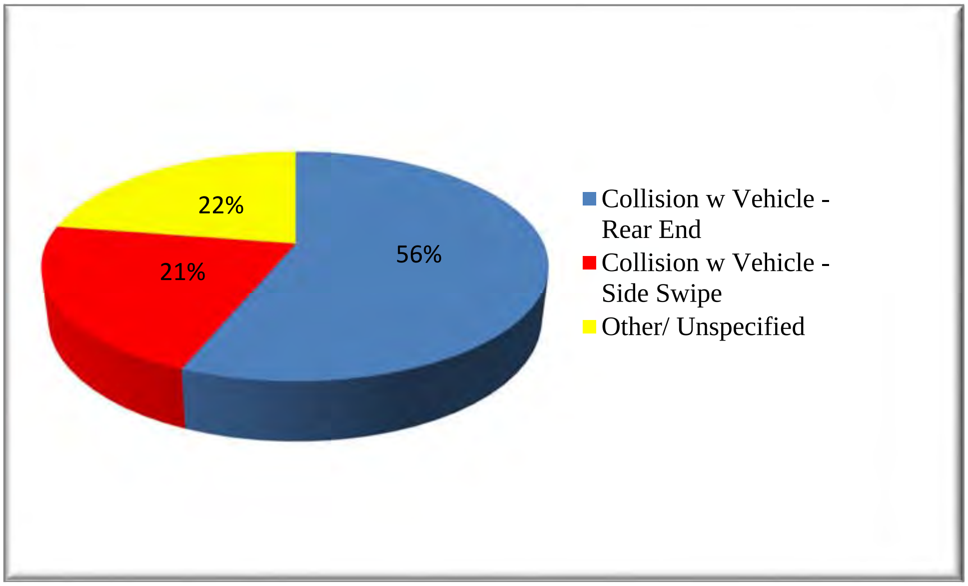
Description	Section Crash Rate (Per Million Vehicle Miles)	ADT	Length of Section (miles)
I-12, Split to Essen Ln	0.569	143,400	1.444
I-10, LA 415 to MM 10.1 to 10.2699	3.030	40,800	0.1699
I-10, LA 415 to LA 1	1.226	59,300	2.1099
I-10, LA 1 to Begin Bridge	2.741	106,200	0.32
I-10, MS Bridge Main Span	1.430	106,200	0.86
I-10, MS Bridge to 10/110 Split	3.290	102,900	0.499
I-10, 10/110 Split to Terrace St	1.662	95,600	0.2299
I-10, Terrace St to Missouri St	2.280	162,200	0.6099
I-10, Missouri St to E Lakeshore Dr	1.691	174,100	0.459
I-10, E Lakeshore Dr to Perkins Rd	1.703	165,400	0.4799
I-10, Perkins Rd to S Acadian	1.268	190,900	0.1999
I-10, S Acadian to Yazoo St	2.036	157,000	0.3999
I-10, Yazoo St to College Dr	2.210	190,900	0.7599
I-10, College Dr to 10/12 Split	0.878	196,600	1.0799
I-10, 10/12 Split to Essen Ln	2.146	119,000	1.23
I-110, I-10 to North Blvd	1.968	92,200	0.7399
I-110, North Blvd to Florida St	2.896	109,300	0.176

Crash Patterns and Influence

A quantitative analysis of crash patterns was conducted to identify specific factors that may contribute to greater accident frequency.

Chart 1.1 presents a distribution of collisions by type.

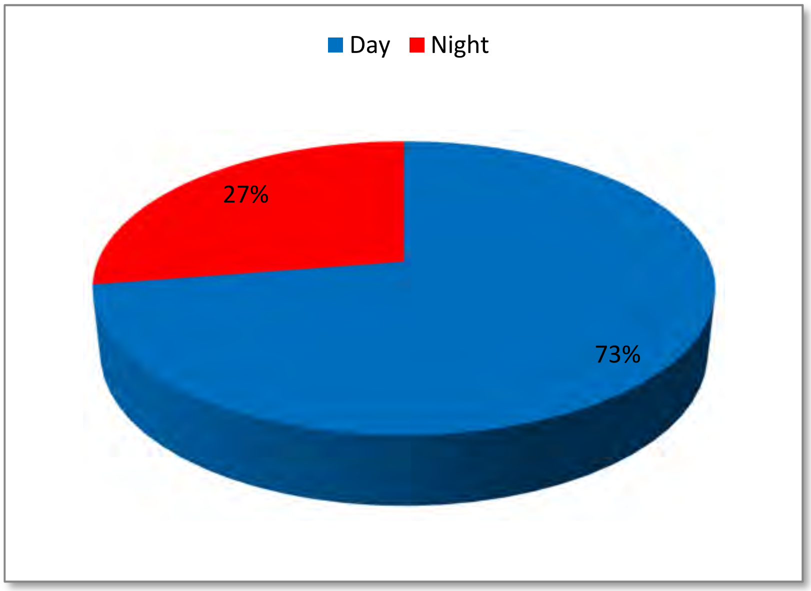
Chart 1.1
Collisions by Type



The majority of accidents at 56% were rear-end. Other/ unspecified includes other types of vehicle collisions such as right-angle or head-on as well as collisions with fixed objects and run off road. Other/ unspecified also accounts for accidents for which the type was not clear or not specified.

The accident data was reviewed to analyze the percentage of accidents that were occurring in daylight and nighttime hours. A breakdown of the day/ night conditions of the collisions is presented in Chart 1.2.

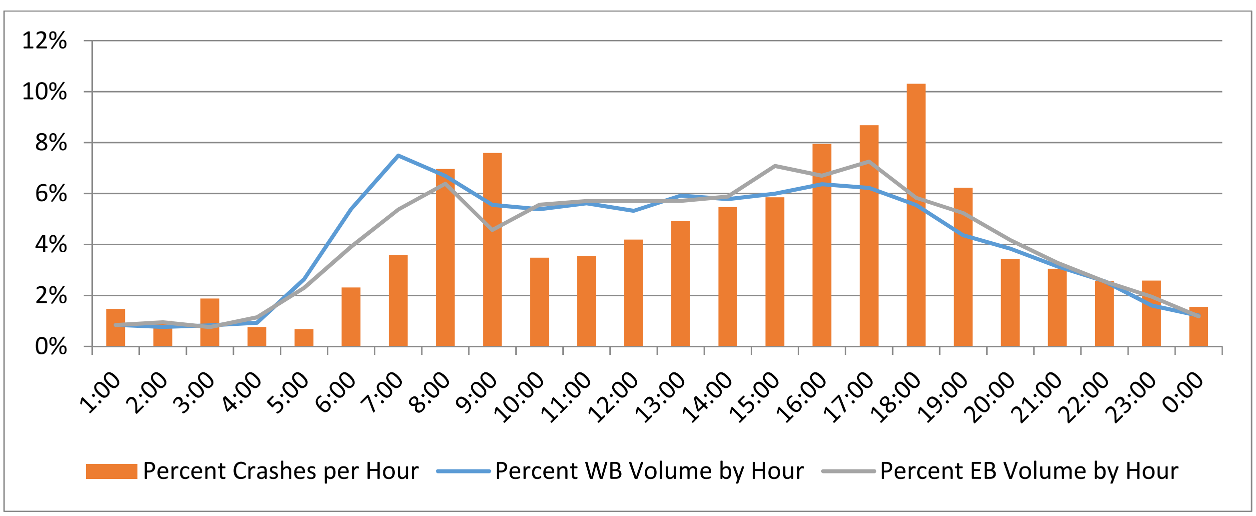
Chart 1.2
Collisions by Time of Day



The percent of accidents occurring at night and during the daylight hours was compared to the percent of traffic volume present at these times to determine if lighting or other nighttime conditions were contributing factors. The data showed that approximately 27% of the traffic volume occurs at night; therefore the percent of nighttime accidents is proportional to the traffic volume.

An hourly distribution was generated to analyze the times during which collisions were occurring. The hourly distribution of collisions is presented in Chart 1.3.

Chart 1.3
Collisions by Hour



A review of Chart 1.3 indicates that in general, the accident distribution correlated with the traffic volumes. The exception was the PM peak period when the percent of accidents (19%) was higher than the percent of traffic volume (12%). This data in addition to the high instance of rear-end and side-swipe collisions indicates that congestion is the primary factor of vehicle accidents.

The analysis of crash history resulted in the following:

- Most segments (13 out of 17) experienced a crash rate higher than the statewide average
- Most accidents types (56%) were rear-end
- More accidents occur during the PM peak period than any other time (19%)
- The percent of accidents occurring at night is proportionate to the nighttime volume; therefore lighting did not appear to be a major factor

More than 75% of the crashes along the corridor are rear-end and side swipes, the majority of which occur during the highest peak travel times. This is expected as the higher traffic volumes increase exposure and congestion which generally results in erratic driving behavior such as unexpected stopping and sudden lane changes. The proposed improvements are expected to include design features which act as countermeasures such as construction of shoulders, widening of shoulders, and lengthening of acceleration/deceleration lanes. These features will be added where possible based on right of way and geometric constraints. Adding capacity is expected to reduce congestion which should mitigate congestion related crashes.

<u>Initial Capacity Analysis</u>

Existing conditions capacity analysis was started using HCS+ Software with the existing geometry and traffic control. Capacity analysis was started for ramp terminal intersections, ramp junctions (merge and diverge), mainline weave sections and mainline freeway segments. The capacity analysis parameters excluding traffic volumes and vehicle classification were approved in January 2012. The focus of the project shifted prior to the approval of both the base conditions traffic volumes and the heavy vehicle percentages.

<u>Existing Conditions Vissim Modeling</u>

A base Vissim model was to be developed for both the AM and PM peak hours for the base year and no build design year conditions based on the DOTD Microsimulation Guidelines. A base model was provided by DOTD that included LA 415 to I-110. The model was expanded to include the study limits. The model parameters were updated and new count data was coded in. The models were calibrated using travel time run data and CCTV camera data provided by DOTD.

Microsimulation modeling for the base conditions PM peak was developed using Vissim Software, version 5.3 and 5.4 and followed the standards set forth in the DOTD Microsimulation Guidelines. Below are the major Vissim Model related submittals:

- ***Microsimulation Phase 1 Deliverable Report – Draft January 2012, Final April 2012*** This report documented the scope, schedule and plans that would govern the Vissim coding to create a calibrated model.
- ***Initial Framework Vissim Model and Draft Data Collections Report - January 2012*** This model included all elements that could be coded prior to the traffic data collection being finalized. It includes the geometry, intersection control and signal timing data.
- ***Fully Coded PM Vissim and Final Data Collection Results – September 2012*** This model included the accepted Initial Framework with vehicle information such as flow, routes and speed data added. The vehicle elements were approved prior to calibrating.
- ***Project direction shifted, remaining tasks completed in subsequent phases.*** The next steps in the process were to calibrate the *Fully Coded PM model* and create the AM calibrated model. These were complete in the next phase.

The above reports that were submitted to DOTD are included in Appendix 1B. The focus of the study shifted prior to beginning the base conditions AM peak model.

Traffic Projections

The 2032 No Build model volume projections were based on existing traffic volume data, the DOTD and CRPC TDM, DOTD historic average daily traffic (ADT), previous studies, and planned projects. CRPC TDM is created in a program called TransCAD which uses geographic information, population figures, socioeconomic data, and vehicular origin/destination areas within regional area to project future traffic volumes. As the CRPC model is limited to a set of network years, the 2009 and 2032 CRPC TDM scenarios were provided by DOTD for the purpose of this project.

The CRPC TDM 2009 output and 2032 No Build output was used to calculate the annual growth rates estimated by TransCAD on the study interstate segments and ramps. Annual growth rates were selected based on the relationship between the actual count data and the CRPC TDM output, TransCAD estimated growth rates (as determined by a comparison between the 2009 and 2032 model output), and growth rates based on DOTD historic ADT.

The proposed growth rates were submitted in May 2012. Subsequent to DOTD review and discussions, it was decided to use a universal growth rate of 1.5% per year for the entire study area.

The project objective was shifted to improving the surrounding roadway network prior to the submittal of the base conditions capacity analysis and the start of the AM base conditions Vissim Modeling.

Section 2. Expanded Vissim Modeling and Alternative Route Selection and Incident Management Route Selection for Stage 0 Analysis

This phase included two distinct sets of objectives.

The first was to expand the PM base year I-10 Vissim Model to include I-10 from Essen Lane to Highland Road and I-12 from Essen Lane to LA 447 in Walker and to create an AM base conditions Vissim Model. The second was to compare various parameters to determine which alternative routes to I-10 (due to no improvements on the interstate) should be analyzed through the Stage 0 process. This included an evaluation of which routes would be expected to serve traffic during an incident that closes I-10.

Expanded Vissim Modeling – Phase 2

The fully coded PM Vissim model that was previously developed was utilized as the base for the expanded model. A Vissim model created by others for I-12 from Essen Lane to LA 447 as well as additional traffic data was provided by DOTD.

Data Collection

Data collection was conducted to validate and/or provide variables to adjust the available data (ex: I-12 traffic count data in the model was not current), to provide data where it was not already available and to capture conditions that may have changed due to completion of construction projects.

Utilizing video count collection equipment, 24-hour flow counts per lane were collected on the mainline at the following locations:

- I-12 East of Essen Lane (EB & WB)*
- I-12 WB btw. Exit Ramp to I-10 EB and I-10 WB Merge
- I-12 EB btw. I-10 EB Split and I-10 WB Entrance Ramp
- I-10 East of Essen Lane (EB & WB)
- I-10 WB btw. Exit Ramp to I-12 EB and I-12 WB Merge
- I-10 EB btw. I-12 EB Split and I-12 WB Entrance Ramp
- I-10 btw. Perkins Road and Dalrymple Drive (EB & WB)
- I-10 btw. Dalrymple Drive and Washington Street (EB & WB)*
- I-10 btw. LA 1 and LA 415 (EB& WB)*
- I-10 West of LA 415 (EB & WB)
- I-10 btw Bluebonnet and Highland Road (EB & WB)*
- I-12 btw LA 447 and LA 1026 (EB & WB)*
  *These locations included classification data

Turning Movement Counts were also collected at the intersections of Bluebonnet with the I-10 eastbound and westbound ramps during the AM and PM peak periods in October 2013. The raw traffic count data is included in Appendix 2A.

Existing conditions and severity of congestion were documented based on field observations. Travel time runs were conducted by Providence using the “floating car method” in October of 2013. A minimum of three (3) travel time runs were conducted in each direction for each peak hour for the following routes:

- I-10 at Highland Road to/from I-10 at LA 415
- I-12 at LA 447 to/from I-10 at LA 415
- I-10 at Highland Road to/from I-10 at I-110 at Florida Blvd
- I-12 at LA 447 to/from I-10 at I-110 at Florida Blvd
- I-10 at Highland Road to/from I-12 at LA 447
- I-10 at LA 415 to/from I-10 at I-110 at Florida Blvd

Urban Systems reviewed the travel time data and prepared it for use in calibrating the models. Tables 2.1 and 2.2 present a summary of the recorded travel time data.

Table 2.1
AM Peak Travel Time Results (mins)

Route #	Route Description	Field Average	Field Range
1	WB - WB: I-10 at Highland to I-10 at LA 415	14.7	13-16
2	EB - EB: I-10 at LA 415 to I-10 at Highland	20.3	15-27
3	WB - WB: I-12 at LA 447 to I-10 at LA 415	39.0	29-48
4	EB - EB: I-10 at LA 415 to I-12 at LA 447	21.3	21-22
5	WB - NB: I-10 at Highland to I-110 at Florida Blvd	11.3	9-13
6	SB - EB: I-110 at Florida Blvd to I-10 at Highland	12.3	11-14
7	WB - NB: I-12 at LA 447 to I-110 at Florida Blvd	25.0	22-28
8	SB - EB: I-110 at Florida Blvd to I-12 at LA 447	19.7	18-22
9	WB - EB: I-10 at Highland to I-12 at LA 447	19.0	19
10	WB - EB: I-12 at LA 447 to I-10 at Highland	33.3	27-38
11	EB - NB: I-10 at LA 415 to I-110 at Florida Blvd	4.7	4-5
12	SB - WB: I-110 at Florida Blvd to I-10 at LA 415	4.3	4-5

Table 2.2
PM Peak Travel Time Results (mins)

Route #	Route Description	Field Average	Field Range
1	WB - WB: I-10 at Highland to I-10 at LA 415	15.7	14 -17
2	EB - EB: I-10 at LA 415 to I-10 at Highland	24.7	15-30
3	WB - WB: I-12 at LA 447 to I-10 at LA 415	21.0	21
4	EB - EB: I-10 at LA 415 to I-12 at LA 447	34.7	30-44
5	WB - NB: I-10 at Highland to I-110 at Florida Blvd	11.0	11
6	SB - EB: I-110 at Florida Blvd to I-10 at Highland	16.3	14-20
7	WB - NB: I-12 at LA 447 to I-110 at Florida Blvd	20.3	20-21
8	SB - EB: I-110 at Florida Blvd to I-12 at LA 447	27.0	23-31
9	WB - EB: I-10 at Highland to I-12 at LA 447	26.7	24-31
10	WB - EB: I-12 at LA 447 to I-10 at Highland	21.3	19-24
11	EB - NB: I-10 at LA 415 to I-110 at Florida Blvd	9.0	4-12
12	SB - WB: I-110 at Florida Blvd to I-10 at LA 415	5.0	4-6

Traffic Volume Balancing

The new traffic data collected was compared to the original data approved by DOTD and used for the original limits base year Vissim models. The new data was also compared to the route, volume and speed input from the I-12 Vissim model provided by DOTD. The data was compiled and used to develop the AM and PM peak hour volumes for use in the expanded Vissim model. Figures were prepared to present the proposed hourly volumes and submitted to DOTD for review and approval. Sketches and hand markups indicating the various volume sources compiled were also provided for use during DOTD review.

The resulting approved AM and PM peak balanced volumes used at this stage of the project are presented in Figures 2.1 through 2.10.

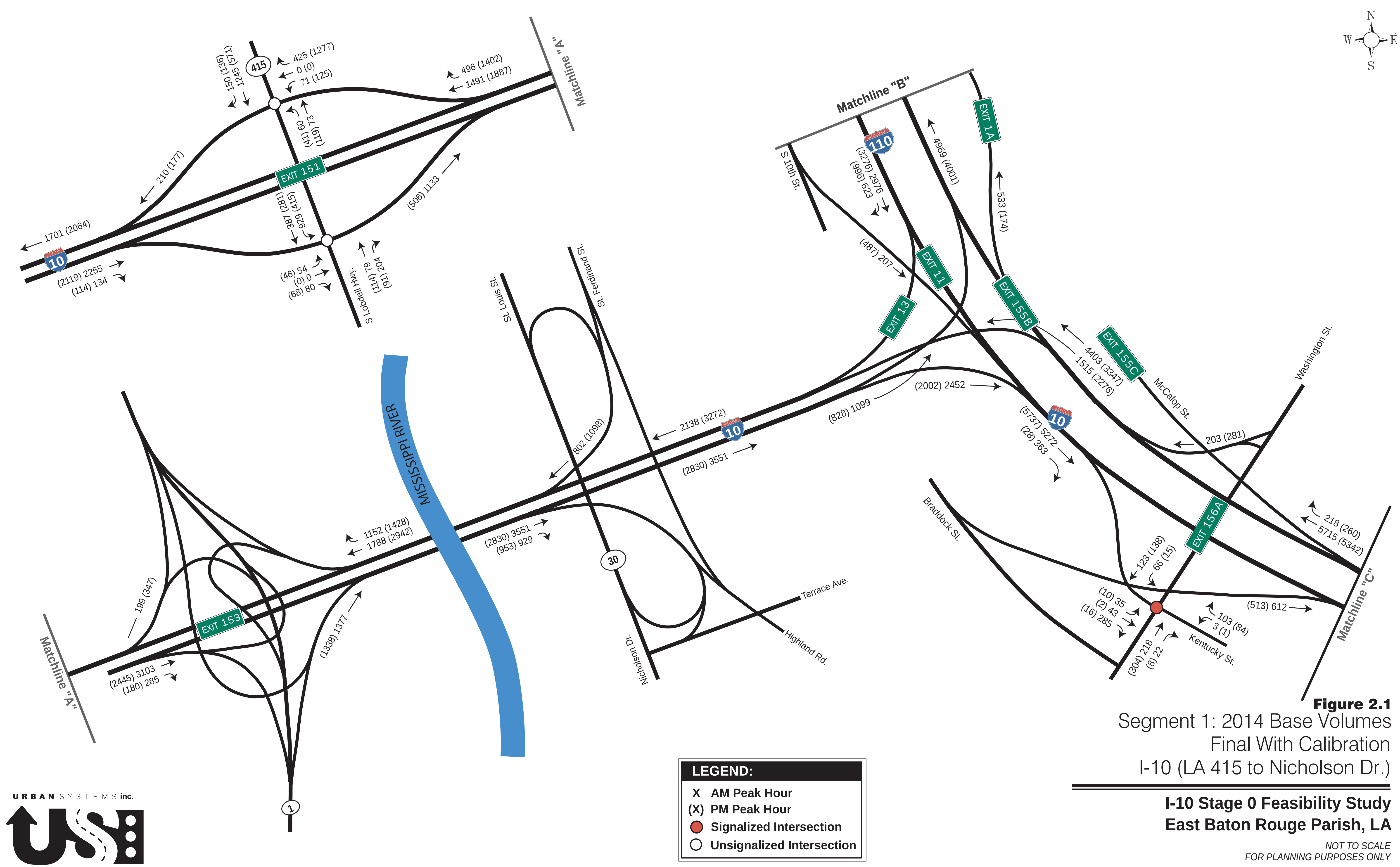


Figure 2.1
Segment 1: 2014 Base Volumes
Final With Calibration
I-10 (LA 415 to Nicholson Dr.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

Project # 10-085

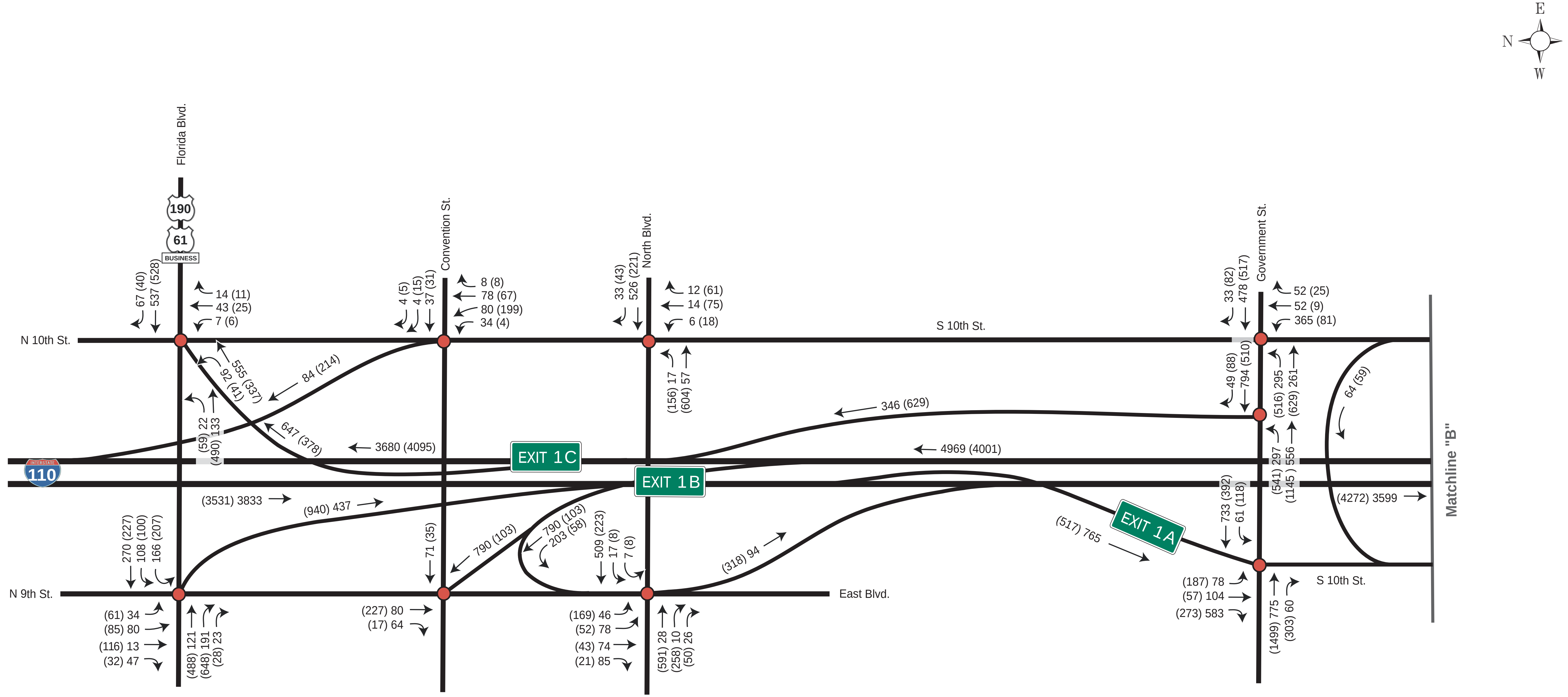


Figure 2.2

Segment 2: 2014 Base Volumes
Final With Calibration
I-110 (Florida Blvd. to Goverment St.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:

- **X** AM Peak Hour
- **(X)** PM Peak Hour
- ● Signalized Intersection
- ○ Unsignalized Intersection

URBAN SYSTEMS inc.

Project # 10-085

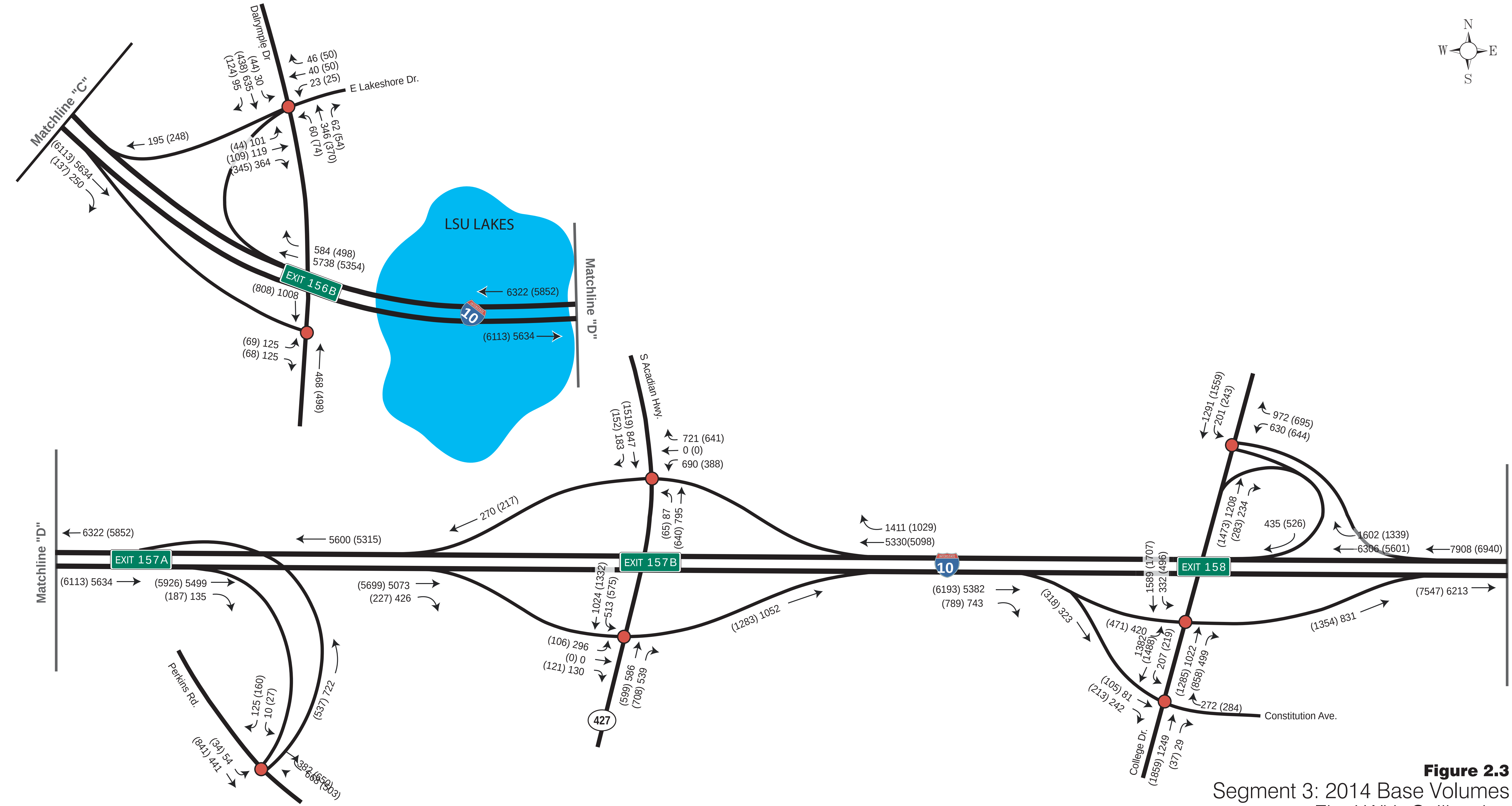


Figure 2.3

Segment 3: 2014 Base Volumes Final With Calibration I-10 (Perkins Rd. to College Dr.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:

- **X** AM Peak Hour
- **(X)** PM Peak Hour
- ● Signalized Intersection
- ○ Unsignalized Intersection

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Project # 10-085

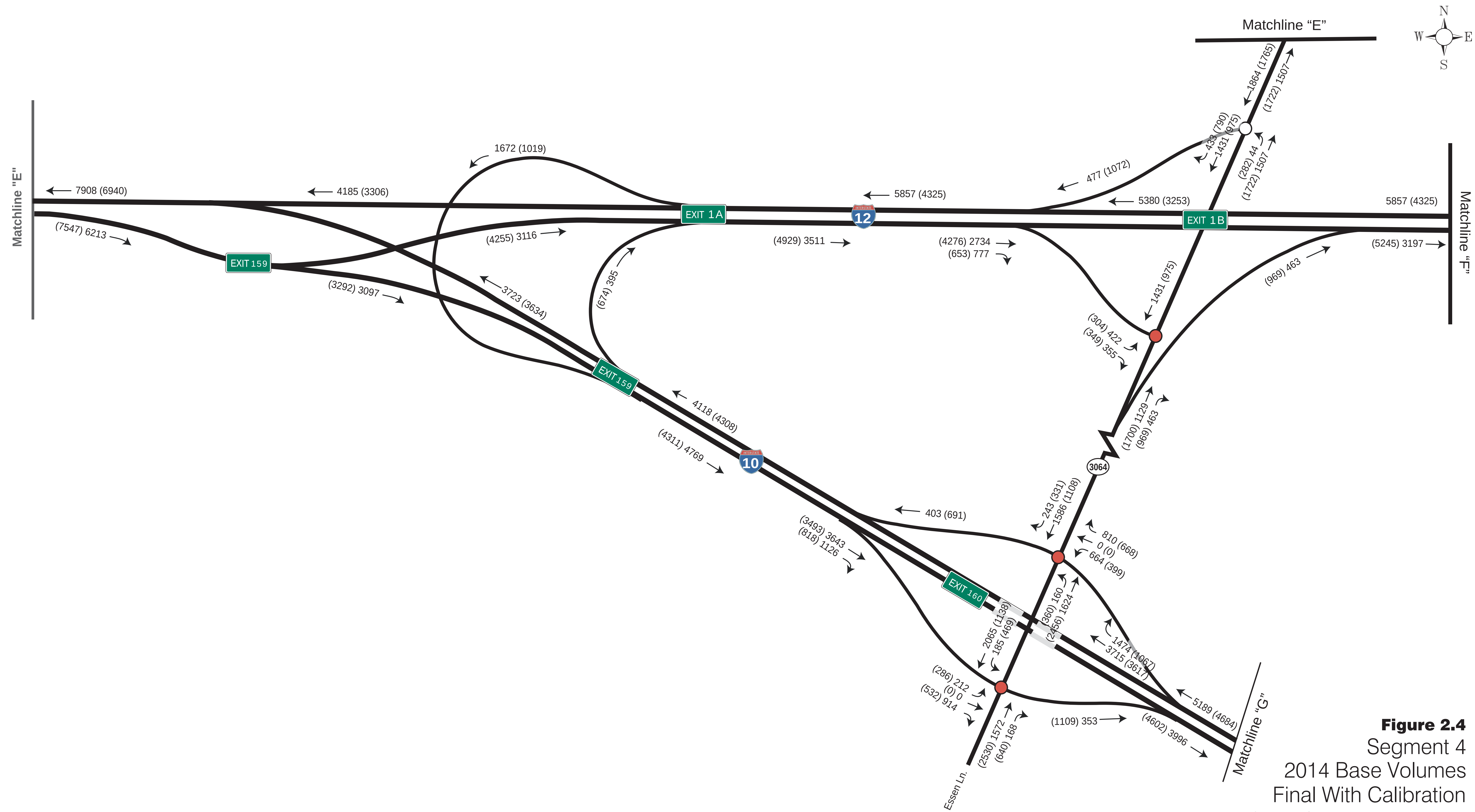

Figure 2.4
Segment 4
2014 Base Volumes
Final With Calibration
I-10/I-12 (Split to Essen Ln.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
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LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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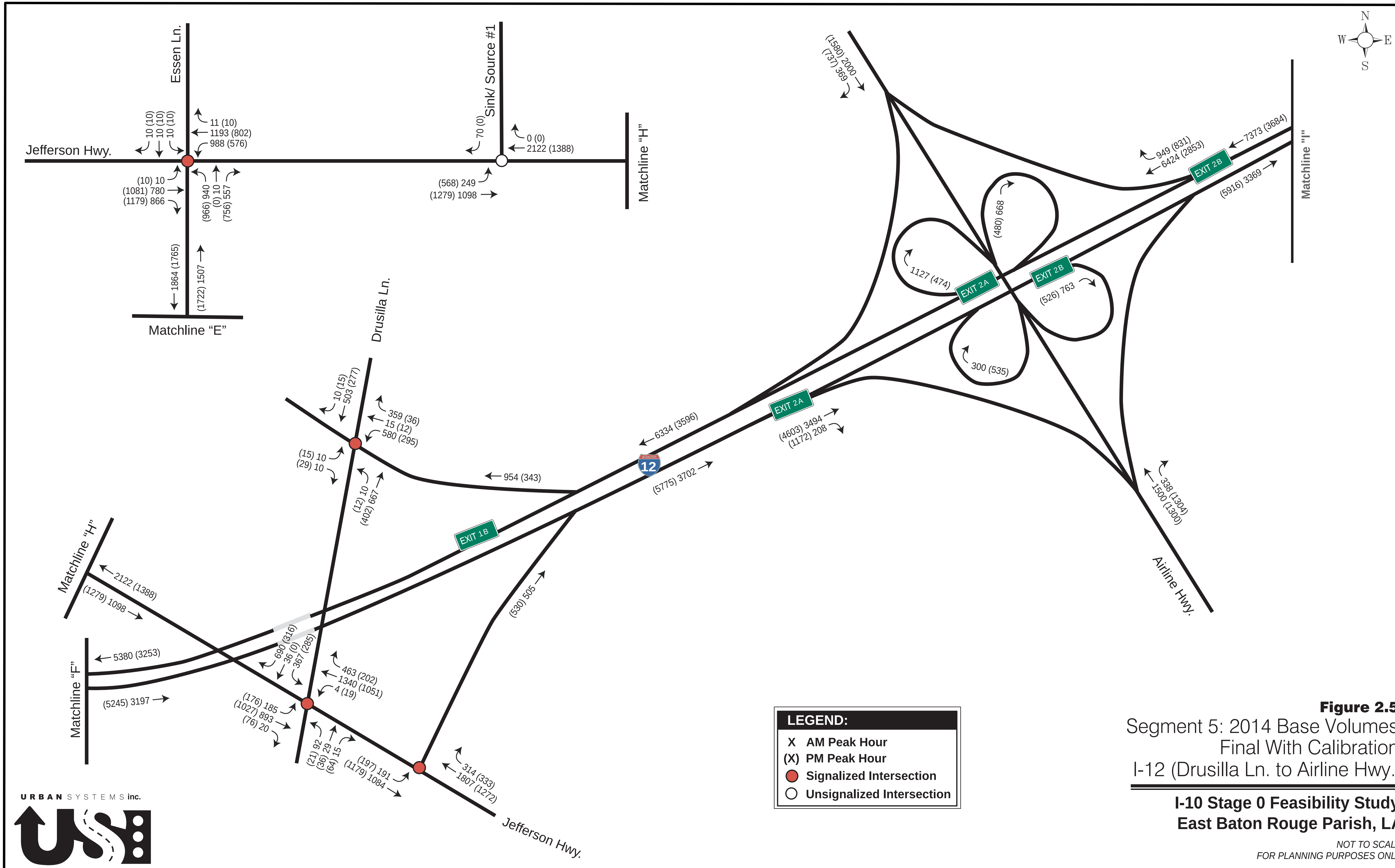

Figure 2.5
Segment 5: 2014 Base Volumes
Final With Calibration
I-12 (Drusilla Ln. to Airline Hwy.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONL

Project # 10-085

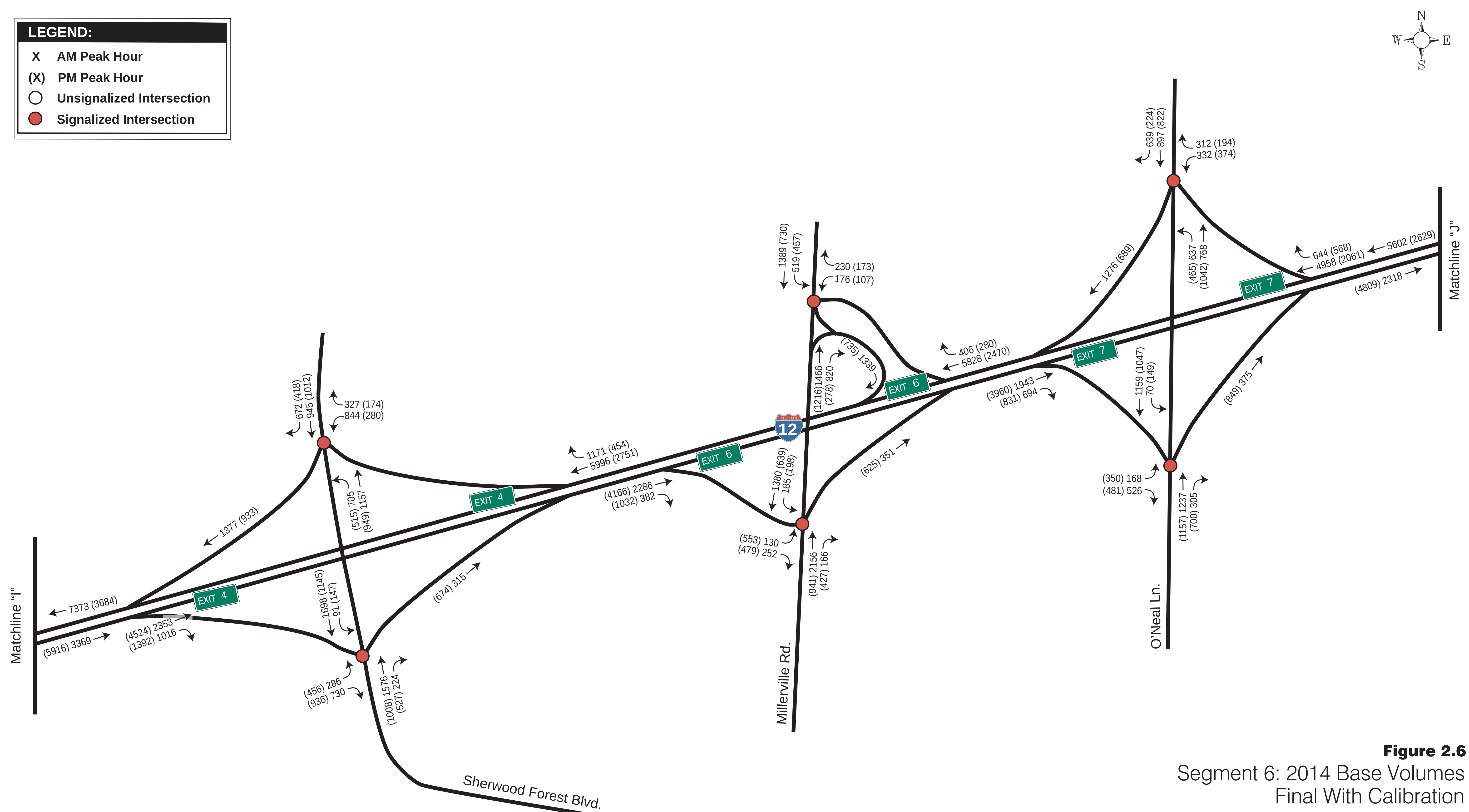

Figure 2.6

Segment 6: 2014 Base Volumes
Final With Calibration
I-12 (Sherwood Forest Blvd. to O'Neal Ln.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

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Project # 10-085

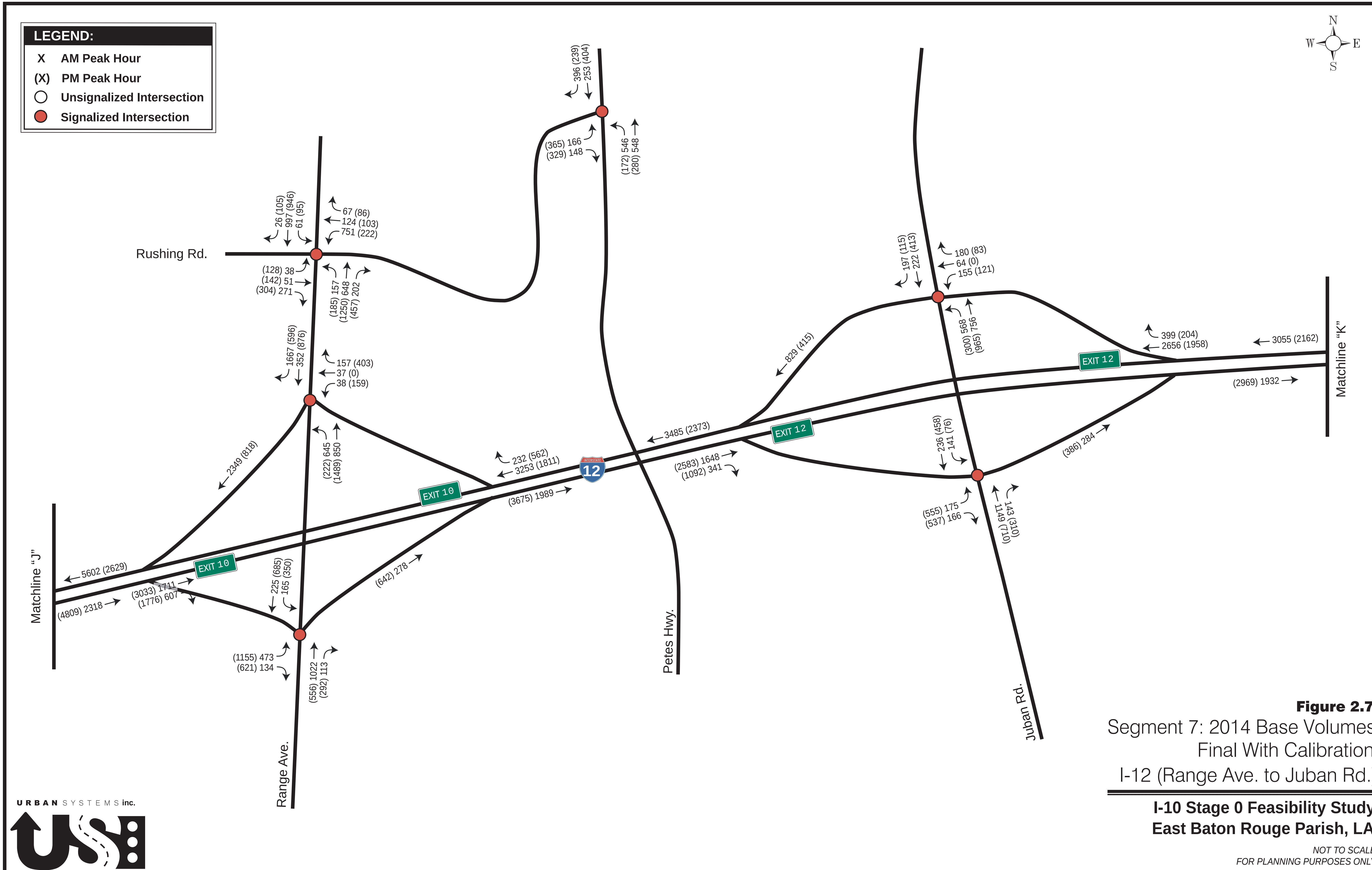

Figure 2.7

Segment 7: 2014 Base Volumes Final With Calibration

I-12 (Range Ave. to Juban Rd.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

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Project # 10-085

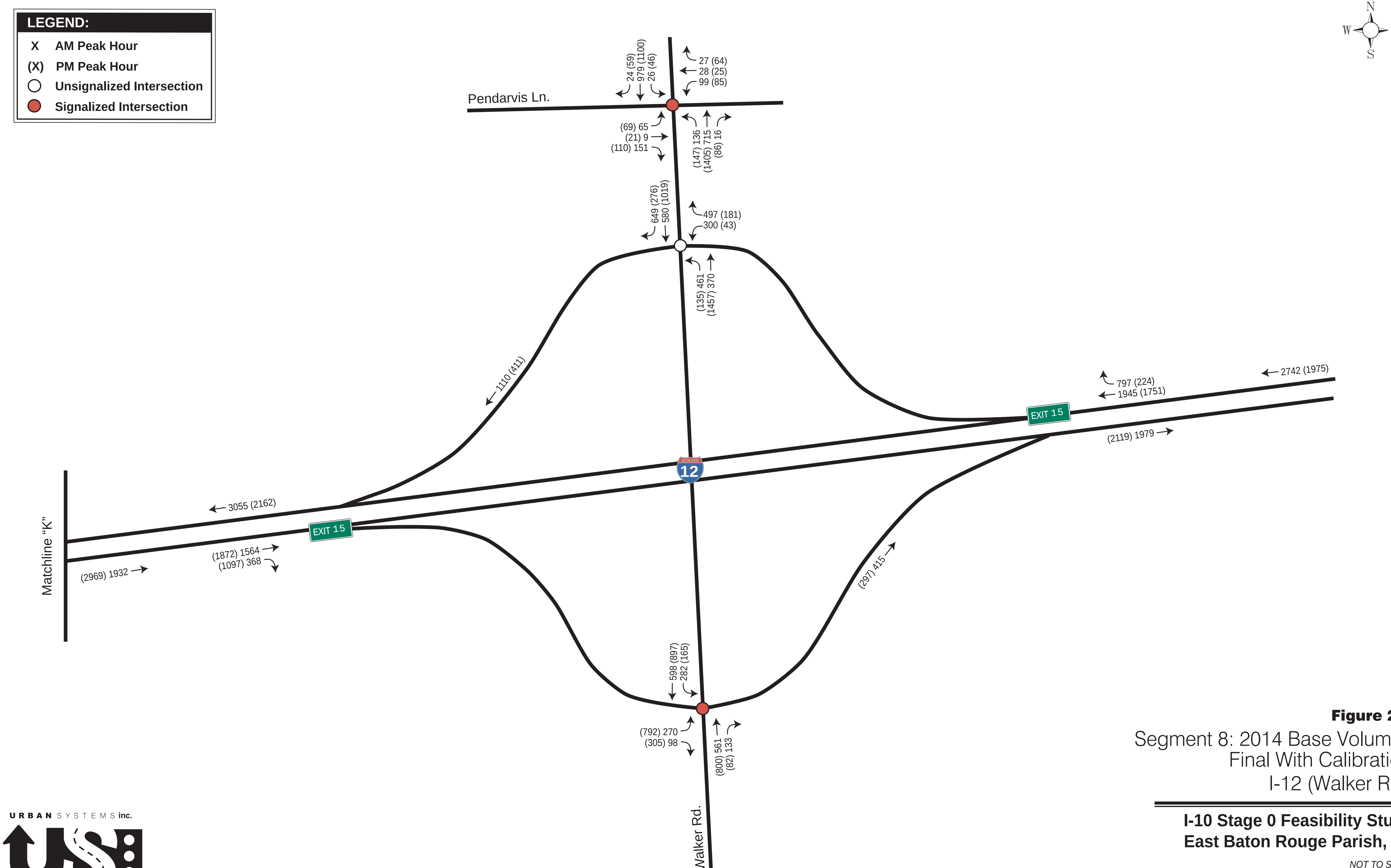

Figure 2.8

Segment 8: 2014 Base Volumes
Final With Calibration
I-12 (Walker Rd.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

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Project # 10-085

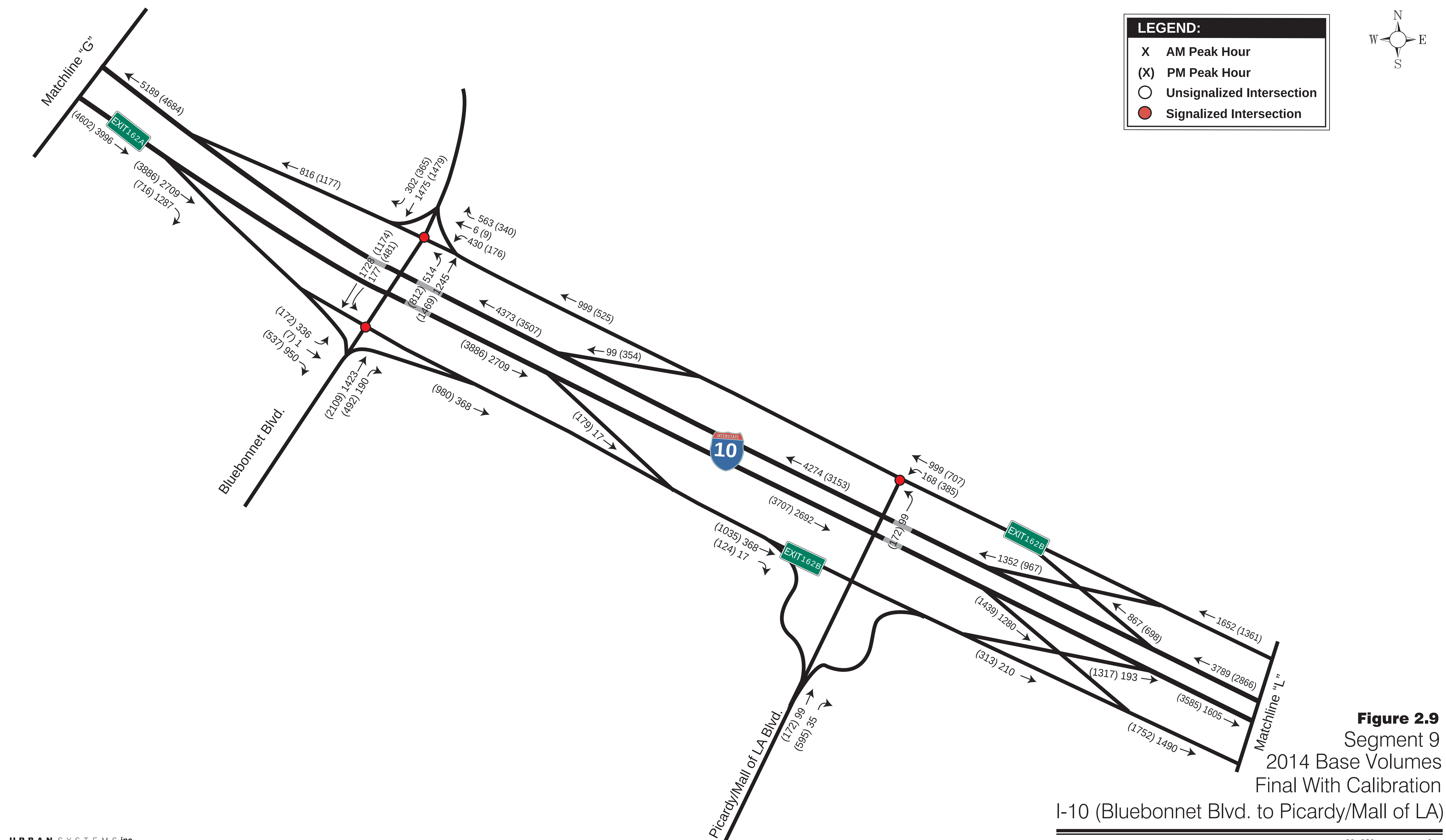


Figure 2.9
Segment 9
2014 Base Volumes
Final With Calibration
I-10 (Bluebonnet Blvd. to Picardy/Mall of LA)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

URBAN SYSTEMS inc.

Project # 10-085

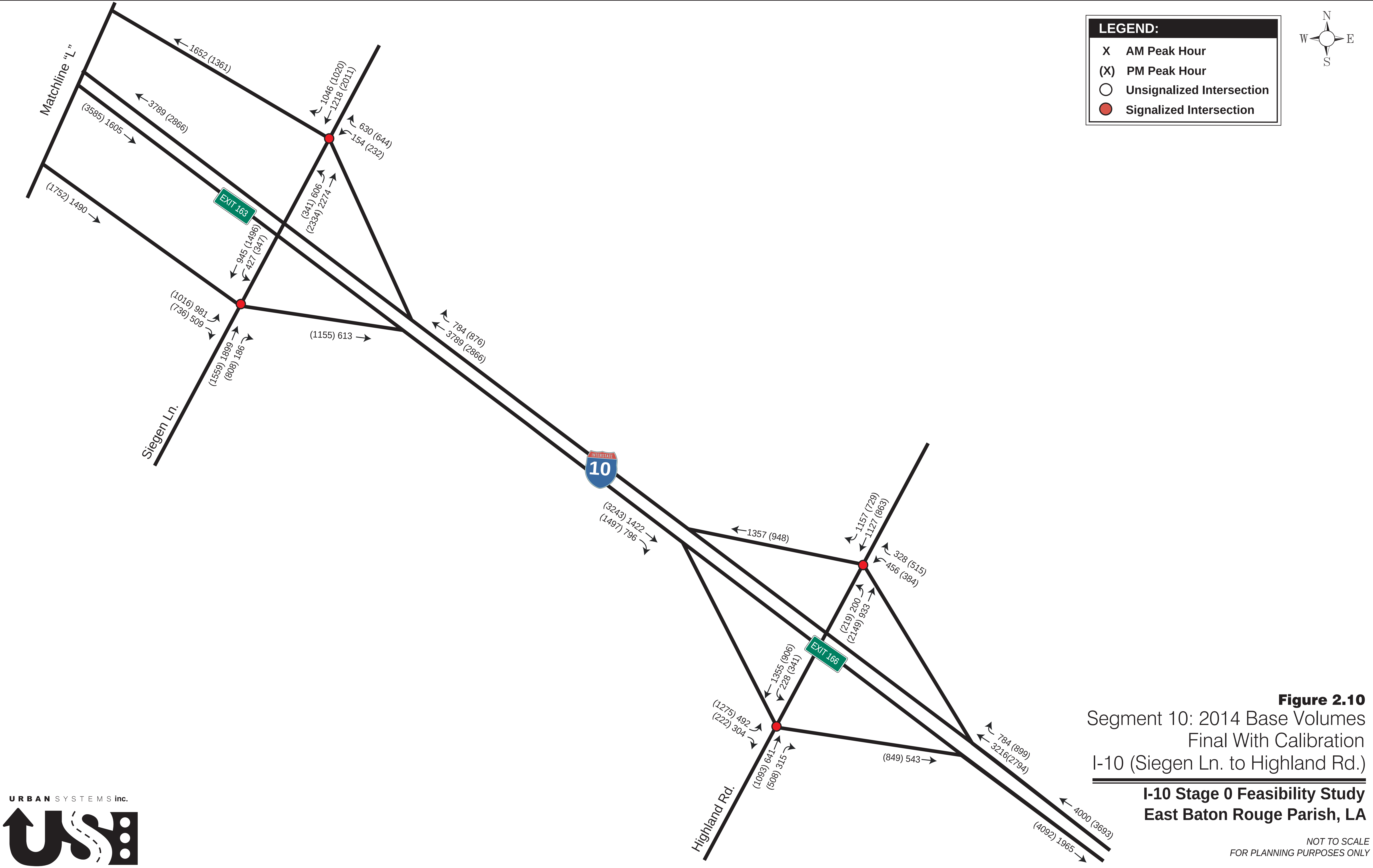


Figure 2.10

Segment 10: 2014 Base Volumes
Final With Calibration
I-10 (Siegen Ln. to Highland Rd.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

Project # 10-085

Vissim Modeling

Aerial photography provided by DOTD and Google Earth was used to create a new background image for the expanded Vissim model to include the entire area. It was scaled as close as possible to the existing models already created, and adjustments were made as required to match the new aerial.

The I-12 model provided by DOTD was incorporated into the PM calibrated base year model. The geometry and control were modified to incorporate recent construction activities including ramp metering, widening of I-10 and widening of I-12. The volume inputs and routes were also modified to reflect the approved PM peak hour volumes. Existing Traffic Signal Inventory (TSI) forms were provided by DOTD and/or others to determine existing operation of existing traffic signals and ramp meters within the study area.

The PM peak model was calibrated based on the same FHWA procedure utilized in the original study. The draft PM calibrated model with expanded study area was submitted electronically to DOTD for review with a technical memorandum summarizing the calibration procedure and results for review.

The draft AM model was created based on the PM peak calibrated model and changing the vehicle, speed and signal inputs accordingly. The AM model was calibrated and submitted with a technical memorandum summarizing the calibration procedure and results. When the AM calibration was complete, it was combined with the PM calibration report for the *Final Phase 2 Expanded Limits AM and PM Calibrations Report and Vissim Models – May 2015.*

The following list the major Vissim Model related submittals which are included in Appendix 2B:

- ***Final Phase 1 PM Calibrated Vissim Model (original Essen limits) – February 2013***. This was task was from the original Phase 1 but was completed in Phase 2. This model would become the base for the expansion.
- ***Updated PM Peak Traffic Volumes for expanded Phase 2 limits – January 2014***. This volume submittal included hand notes of the original volumes with the new data and volume sources for the expanded limits included. All sources were considered, with priority given to data that was more recent or accurate. All volumes were re-balanced. At the time of the PM submittal, data was incomplete for the AM peak.
- ***Draft Phase 2 Calibrated PM Vissim Model and Draft Calibration Report – July 2014.*** This submittal included the expanded limits and was calibrated based on throughput and travel time runs conducted for the project limits in October 2013.
- ***Updated AM Peak Traffic Volumes – October 2014.*** The PM data was submitted and approved first so that the PM model could be coded and calibrated. The AM volumes were submitted and approved during the coding of the PM model to be used in the AM calibrated model.

I-110 SB Reconfiguration Modeling

A separate Vissim model was created at the request of DOTD to analyze a proposed reconfiguration of the merge between I-110 southbound and I-10 eastbound. The analysis used the Vissim model to compare operations during a typical PM peak period with and without the proposed reconfiguration to taper I-110 southbound to one lane prior to the merge with I-10 eastbound. With the reconfiguration, I-10 eastbound would have two continuous lanes. The study indicated that while the reconfiguration would be expected to increase throughput and reduce travel times on I-10 EB, the LA 1 interchange may still be a source of congestion due to the high volume, high truck percentage and downstream interchange and split. With the reconfiguration, operations will deteriorate on I-110 SB and I-110 would be expected to operate with excessive delays and queues. The results are presented in the ***Technical Memorandum for I-110 SB Reconfiguration – February 2014*** which is included in Appendix 2C.

Alternative Route Selection for Stage 0 Analysis

A comparison of twenty-four (24) different parameters was conducted and summarized in matrix format to determine which of the alternative routes to I-10 should be analyzed for potential improvements. The following criteria was established by DOTD for inclusion in the high level analysis that was summarized in matrix format:

- Segment (From/To)
- Segment Length
- Functional Classification
- State Route or City Street
- Right of Way or Apparent Right of Way Width
- Relative cost of Right of Way
- Typical Section
- Speed Limit
- Number of Signals and their connection to the Baton Rouge Fiber Network
- Major Roadway Crossings
- Railroad Crossings
- Bridges/Overpasses
- V/C ratio (AM/PM/off peak for both existing and design year)
- 2017 and 2037 ADT
- 2017 and 2037 AM peak period volumes
- 2017 and 2037 PM peak period volumes
- 2017 and 2037 Midday period volumes
- 2017 and 2037 Off peak period volumes
- Crash Rate
- Route Ranking (based on v/c and crash rate)
- Projects Included in the TIP
- Potential Improvement Projects
- Preliminary Cost Estimate for Potential Improvement Projects
- Project Ranking of Potential Improvements (based on potential capacity improvement vs total costs)

The CRPC TDM output files for both the 2017 and 2037 models were provided by DOTD to Urban Systems through their consultant Neel-Schaffer. Urban Systems extracted and compiled the volume and v/c data for inclusion in the matrix. The data from the CRPC TDM was extensive, therefore a condensing method was used to combine sections of similar section type, speed limit and comparable v/c ratios into one segment for analysis. Safety data was provided by DOTD for inclusion in the matrix and Providence researched and provided portions of the data not related to the CRPC TDM output.

The routes in the matrix included the following:

- US 61 (Airline Hwy) from LA 1 to Highland Rd
- LA 30 (Nicholson Dr) from Terrace Ave to I-10 interchange in Gonzales
- LA 427 (Perkins Road) at the I-10 interchange near Acadian to the LA 42 (Highland Road)
- Highland Road from LA 427 (Perkins Road) to US 61 (Airline Highway)
- LA 42 (Burbank Dr) from LA 30 (Nicholson Dr) to LA 42 (Highland Road/Siegen Ln)
- LA 3002 (Range Ave) from I-12 interchange to LA 3003 (Rushing Rd)
- LA 3003 (Rushing Rd) from LA 3002 (Range Ave) to US 190 (Florida Boulevard)
- US 190 (Florida Blvd) from LA 3003 (Rushing Road) to I-110/US 190 (Florida Blvd) interchange
- LA 426 (Old Hammond) from US 190 (Florida Blvd) to LA 73 (Jefferson Hwy)
- Corporate Boulevard from LA 73 (Jefferson Hwy) to College Drive
- LA 73 (Government Street) from Lobdell Ave to I-110/LA 73 (Government St) interchange
- LA 3246 (Siegen Lane) from LA 42 (Highland) to US 61 (Airline Hwy)
- Bluebonnet Blvd. from LA 30 (Nicholson) to I-10
- College Drive from Jefferson Hwy to LA 427 (Perkins Road)
- Acadian Blvd. from I-10 to LA 427 (Perkins Road)
- Lee Drive from Perkins Road to Burbank Blvd
- W. Lee Drive from Burbank Blvd to Nicholson Drive
- Staring Lane from Perkins Road to Highland Road

Meetings were held with DOTD and the project team in January and February of 2014 to present and discuss the matrix results and to define potential projects for Stage 0 analysis. A key decision was to use the following five (5) categories for route selection:

- V/C ratio
- Volume
- Safety
- Cost for capacity improvements
- Cost for traffic safety management improvements

The resulting matrices and the minutes from these meetings are included in Appendix 2D.

Incident Management Route Selection

The incident management route selection matrix was developed based on the 2017 CRPC TDM output provided. Approximately 46 model data files were generated to represent the potential incidents on I-10. The following criteria was utilized for the incident management matrix:

- Segment (From/To)
- Segment Length
- Functional Classification
- State Route or City Street
- Right of Way or Apparent Right of Way Width
- Relative cost of Right of Way
- Typical Section
- Speed Limit
- Number of Critical Intersections
- 2017 No Incident V/C ratio (AM/PM) vs With Incident
- Frequency of V/C > 1 with incident
- 2017 ADT with incident for each incident location
- 2017 AM peak period volumes with incident for each incident location
- 2017 PM peak period volumes with incident for each incident location
- 2017 Midday period volumes with incident for each incident location
- 2017 Off peak period volumes with incident for each incident location
- LOS

The CRPC TDM was conducted by Neel-Schaffer under contract to DOTD. The modeling included a systematic removal of links to simulate complete closures of the interstate system. The purpose was to provide an estimate of the effect of the closure on the surface street system. A total of forty-six (46) scenarios were run. A matrix of segments and categories was used to develop a method of comparison for v/c ratio, volume and ADT. Before the tasks associated with the Incident Management Route Selection were completed, the project focus shifted.

While the matrices exercises identified eight (8) potential projects, several were eliminated for reasons such as being studied by others and/or already included in other projects. The following routes were identified for Stage 0 analysis:

- College Drive
- Perkins Road
- US 61 (Airline Hwy)
- Florida Blvd

Prior to submitting the calibrations report, during the scope development for the Stage 0 studies, and before the Incident Management Selection matrix was completed, the focus shifted to the original objectives to improve I-10. The draft scopes for the Stage 0 studies are included in Appendix 2E, the draft matrices for the incident management analysis are included in Appendix 2F.

Section 3. Project Justification and Mainline/Interchange Improvement Tier 1 Analysis

The objectives of this phase were to complete the expanded Vissim model, to perform No Build analysis and a comparative evaluation of various regional projects, to aid in the development of potential I-10 mainline corridor and interchange improvements, and to evaluate the potential improvements based on safety and operations to provide input for a Tier 1 analysis.

Expanded Vissim Model Completion

After the PM peak model was approved by DOTD, it was used as a base to create the AM. The signal timing, vehicles inputs, routes and all other peak-specific criteria were updated. The model was calibrated based on throughput and travel time runs conducted in October 2013. The final report was a continuation of the PM calibration report and included the AM calibration as well. The ***Final Phase 2 Expanded Limits AM and PM Calibrations Report and Vissim Models was submitted in May 2015*** and is included in Appendix 3A.

Project Justification

Assess and Describe Current Deficiencies

A variety of traffic analysis tools were utilized to identify existing and future capacity constraints. Capacity analyses were conducted using HCS+ software for freeway segments, ramp junctions, weave sections and intersections. CAP-X in MS Excel was used to estimate interchange operations. CRPC TDM was used to develop traffic projections and Vissim was used to create microsimulation models.

LOS/Delay Criteria

Levels of Service (LOS) represent a qualitative and quantitative evaluation of the traffic operation of a roadway and/or intersection using procedures developed by the Transportation Research Board and contained in the Highway Capacity Manual Special Report 209.

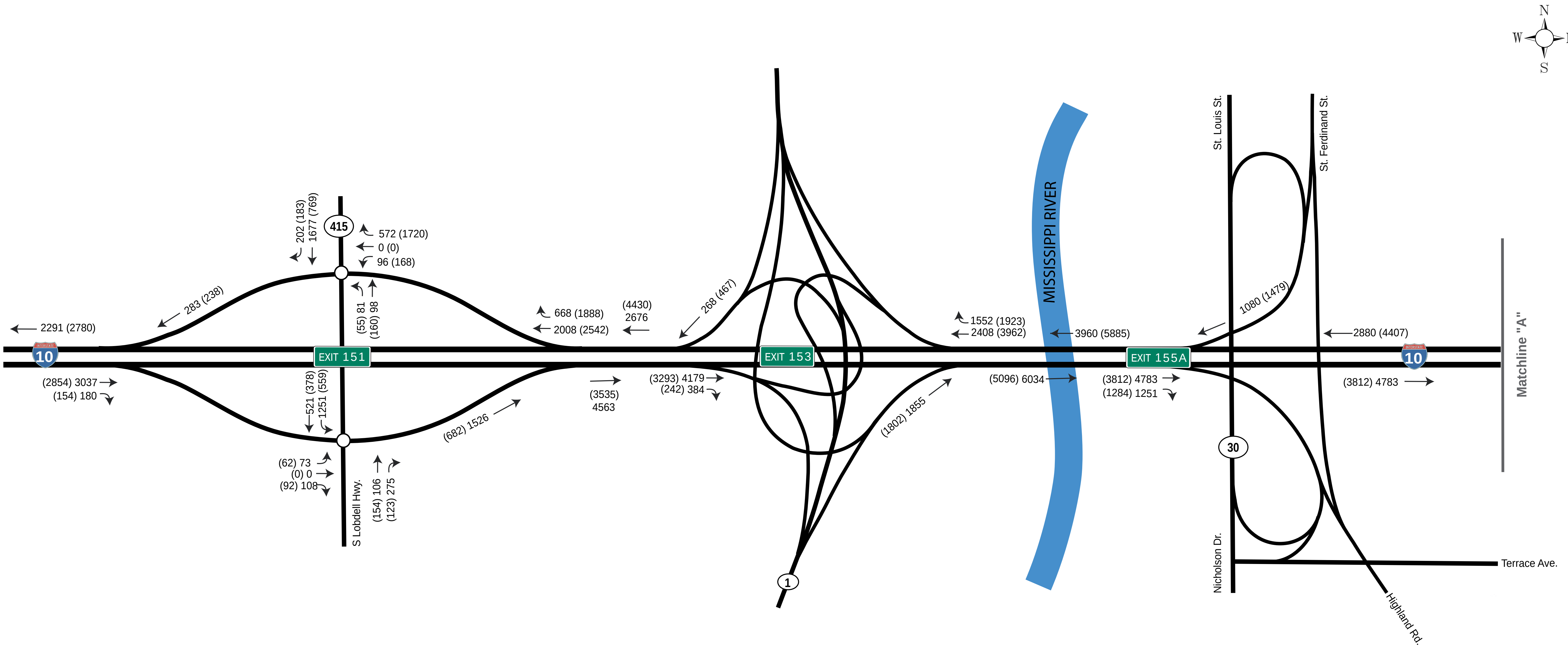
The Highway Capacity Manual (HCM) procedures have been adapted to computer-based analysis packages, which include modules for freeway segments, freeway merge and diverge ramp junctions, freeway weaving segments, signalized intersections, and unsignalized intersections. Highway Capacity Software (HCS+) version 5.4 was used to analyze the roadway segments, ramp junctions, weaving segments, signalized intersections, and stop-controlled intersections. For freeway segments, ramp junctions, and weaving segments, the HCM bases LOS quality on density (in terms of passenger cars per mile per lane).

Base and No Build Capacity Analysis Results

The Base conditions traffic volumes were approved in May 2012 and the heavy vehicle percentages in September 2012. The existing conditions capacity analysis was completed to identify deficiencies along the corridor. 2032 No Build traffic volumes developed using the 1.5% per year growth rate as approved by DOTD were analyzed to identify potential future deficiencies.

Figures 3.1 to 3.5 present the 2032 No Build traffic volumes used for the capacity analysis. The capacity analysis results and comparison tables were submitted to DOTD in April 2015. The results of the analysis are presented in Tables 3.1 to 3.6.

The tables are organized with the eastbound interstate related analysis AM and PM, followed by westbound interstate related analysis AM and PM with the intersection related analysis results AM and PM last. A summary of the results is provided after the tables, the analyses output documentation is included in Appendix 3B.



LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

URBAN SYSTEMS inc.

Figure 3.1

Segment 1: Projected Volumes
2032 No Build

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

Project # 10-085

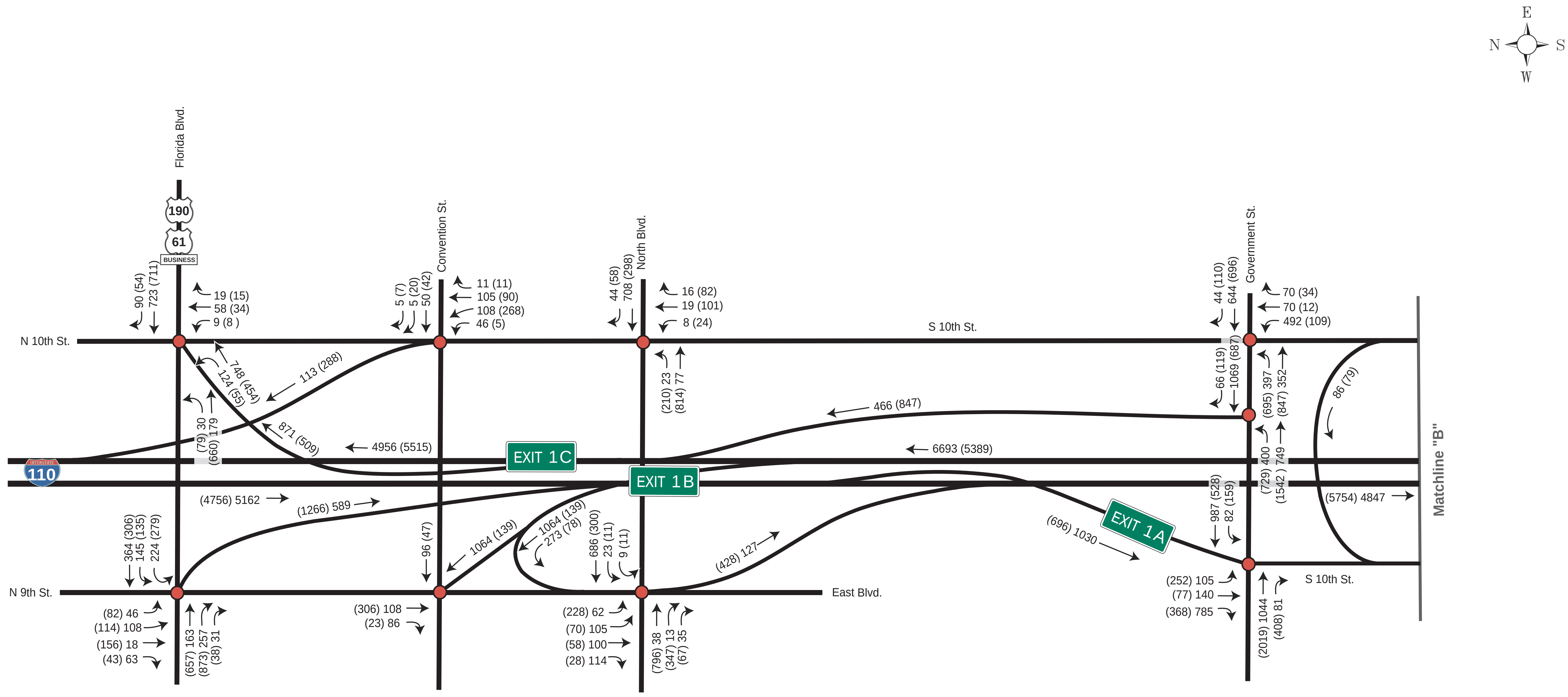


Figure 3.2

Segment 2: Projected Volumes
2032 No Build

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

URBAN SYSTEMS inc.

Project # 10-085

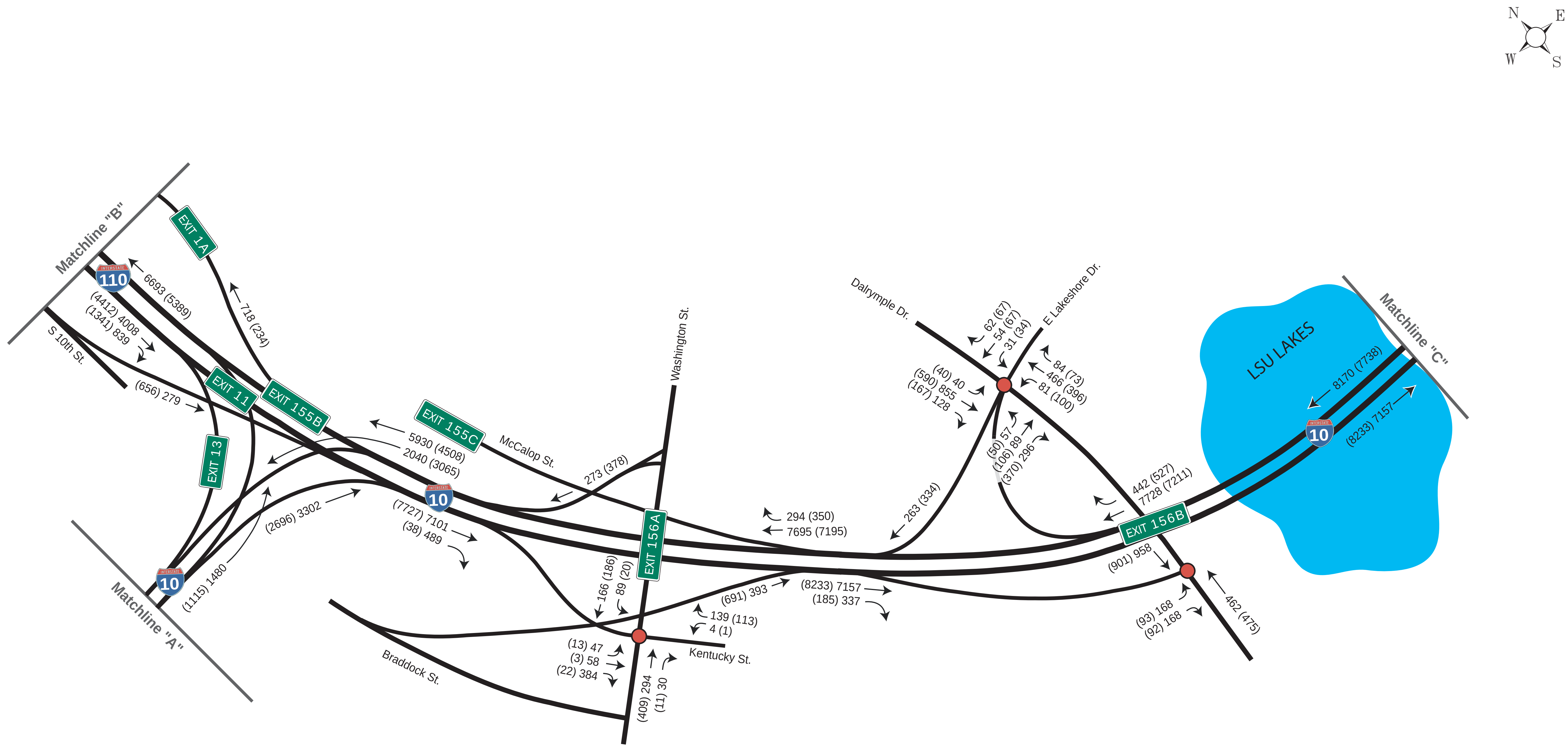


Figure 3.3

Segment 3: Projected Volumes
2032 No Build

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

URBAN SYSTEMS inc.

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

Project # 10-085

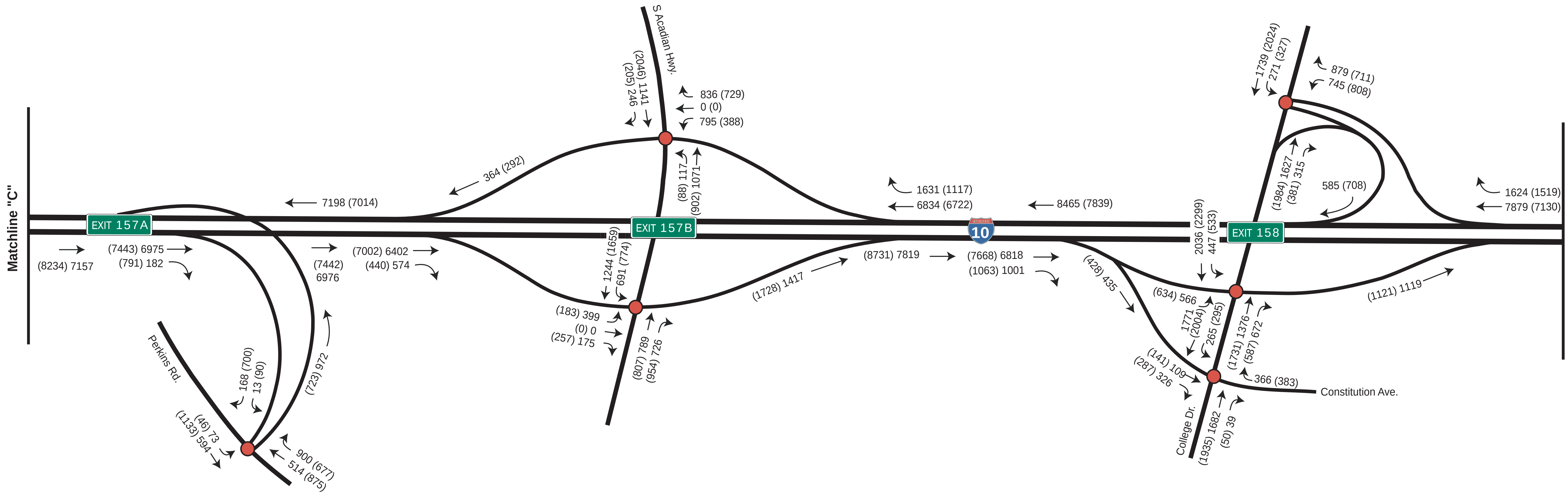


Figure 3.4

Segment 4: Projected Volumes
2032 No Build

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

URBAN SYSTEMS inc.

Project # 10-085

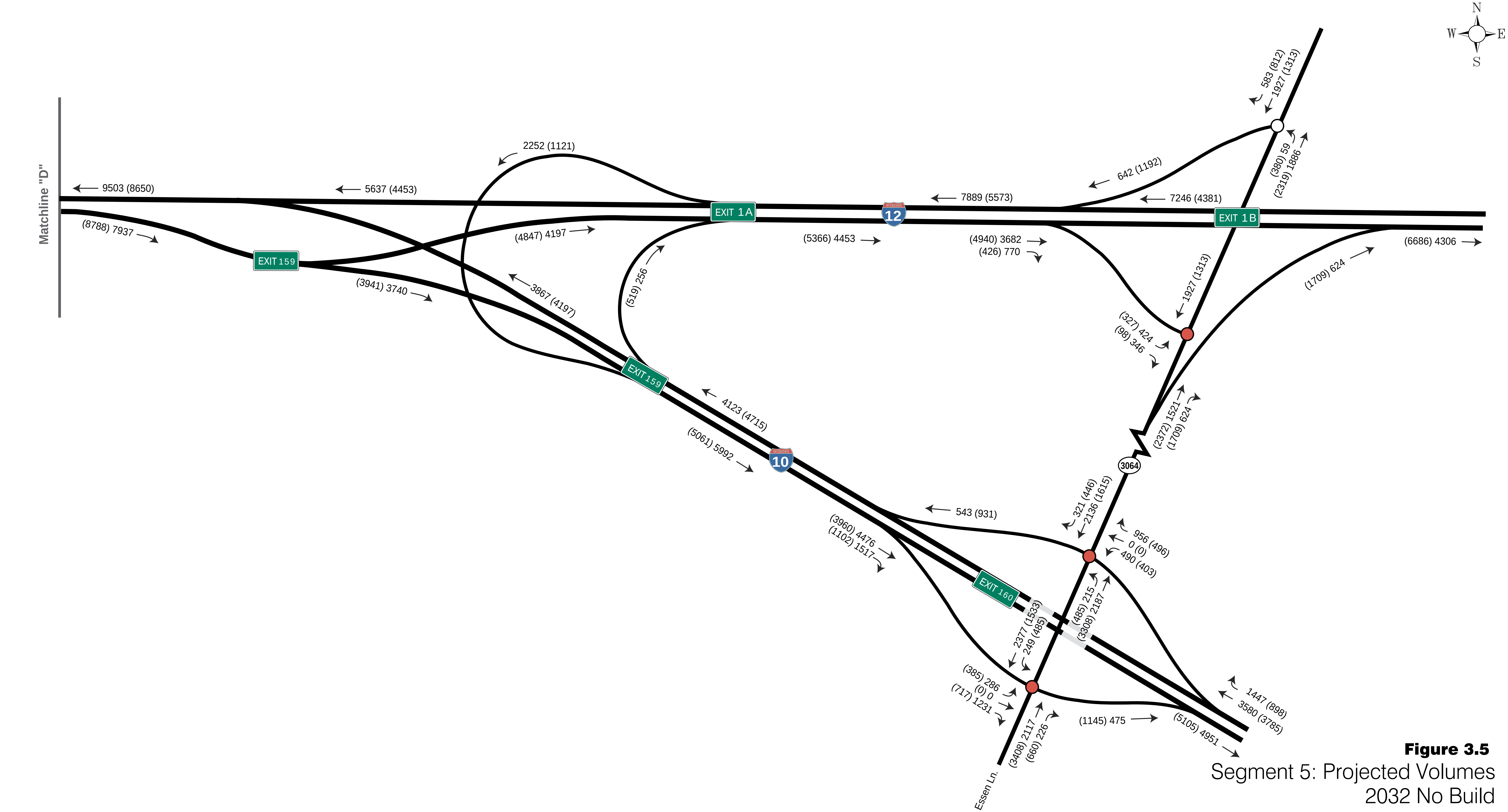


Figure 3.5

Segment 5: Projected Volumes
2032 No Build

I-10 (LA 415 to Essen Ln on I-10 and I-12)
Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

URBAN SYSTEMS inc.

Project # 10-085

Table 3.1
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Eastbound, I-12 Eastbound, and I-110 Southbound
AM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 EB west of LA 415	Freeway	C	22.2	D	31.4
I-10 EB off ramp to LA 415	Diverge	C	26.6	E	35.2
I-10 EB on ramp from LA 415	Merge	D	34.4	F	45.1
I-10 EB b/t LA 415 and LA 1	Freeway	D	34.4	F	--
I-10 EB off ramp to LA 1	Diverge	E	37.2	F	49.5
I-10 EB b/t off ramp to LA 1 and on ramp from LA 1	Freeway	D	31.7	F	--
I-10 EB on ramp from LA 1	Merge	F	44.6	F	58.9
I-10 EB b/t LA 1 and Nicholson Dr/Highland Rd	Freeway	D	29.2	F	--
I-10 EB off ramp to Nicholson Dr/Highland Rd	Diverge	E	37.3	F	49.0
I-10 b/t Nicholson Dr/Highland Rd and I-110	Freeway	C	23.4	D	32.4
I-10 EB ramp to I-110 NB	Freeway	A	10.6	B	14.2
I-10 EB ramp to I-10 EB (at I-110)	Freeway	C	23.9	D	32.7
I-10 EB b/t on ramp from I-110 SB and off ramp to Washington St	Weaving	F	44.0	F	66.5
I-10 EB b/t I-110 and Washington St	Freeway	C	25.4	E	38.4
I-10 EB on ramp from Braddock St	Merge	E	35.7	F	50.1
I-10 EB b/t Washington St and Dalrymple Dr	Freeway	E	37.6	F	--
I-10 EB off ramp to Dalrymple Dr	Diverge	E	39.8	F	54.2
I-10 EB b/t Dalrymple Dr and Perkins Rd	Freeway	E	35.4	F	--
I-10 EB off ramp to Perkins Rd	Diverge	D	35.0	F	50.5
I-10 EB b/t Perkins Rd and Acadian	Freeway	D	33.7	F	--
I-10 EB off ramp to Acadian	Diverge	E	35.2	F	49.1
I-10 EB b/t on ramp from Acadian and off ramp to College Dr	Weaving	E	36.0	F	53.3
I-10 EB b/t Acadian and College Dr	Freeway	E	40.9	F	--
I-10 EB b/t off ramp to College Dr and on ramp from College Dr	Freeway	D	31.9	F	--
I-10 EB on ramp from College Dr	Merge	E	48.4	F	66.6
I-10 EB b/t College Dr and I-12	Freeway	D	26.2	E	41.8
I-10 EB ramp to I-12 EB	Freeway	C	18.5	C	25.0
I-10 EB ramp to I-10 EB (at I-12)	Freeway	D	26.1	E	38.6
I-10 EB b/t on ramp from I-12 WB and off ramp to LA 3064	Weaving	D	34.8	F	50.6

Table 3.1 Continued
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Eastbound, I-12 Eastbound, and I-110 Southbound
AM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 EB b/t I-12 and LA 3064	Freeway	F	--	F	--
I-10 EB on ramp from LA 3064	Merge	D	32.6	F	44.0
I-10 EB east of LA 3064	Freeway	E	36.2	D	30.1
I-12 EB b/t I-10 and LA 3064	Freeway	C	19.7	D	26.7
I-12 EB b/t on ramp from I-10 WB and off ramp to LA 3064	Weaving	B	15.9	C	22.6
I-12 EB b/t off ramp to LA 3064 and on ramp from LA 3064	Freeway	B	16.3	C	21.9
I-12 EB on ramp from LA 3064	Merge	B	13.9	C	20.1
I-12 EB east of LA 3064	Freeway	B	13.8	C	18.5
I-110 SB north of North Blvd	Freeway	C	25.4	E	35.0
I-110 SB on ramp from US 61 Business	Merge	E	41.8	E	55.0
I-110 SB off ramp to Government St	Diverge	E	47.5	E	62.9
I-110 SB on ramp from North Blvd	Merge	D	29.1	E	41.3
I-110 SB b/t North Blvd and I-10	Freeway	C	23.2	D	31.6
I-110 SB off ramp to I-10 WB	Freeway	A	6.7	A	8.4
I-110 SB on ramp from 10th St	Merge	C	21.2	C	27.2

-- Freeway segment demand exceeded capacity.

Table 3.2
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Eastbound, I-12 Eastbound, and I-110 Southbound
PM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 EB west of LA 415	Freeway	C	21.0	D	29.0
I-10 EB off ramp to LA 415	Diverge	C	25.1	D	33.3
I-10 EB on ramp from LA 415	Merge	D	28.1	E	36.6
I-10 EB b/t LA 415 and LA 1	Freeway	C	25.0	E	37.8
I-10 EB off ramp to LA 1	Diverge	D	29.5	E	39.1
I-10 EB b/t off ramp to LA 1 and on ramp from LA 1	Freeway	C	24.8	D	34.9
I-10 EB on ramp from LA 1	Merge	E	38.3	F	50.3
I-10 EB b/t LA 1 and Nicholson Dr/Highland Rd	Freeway	C	24.5	E	35.6
I-10 EB off ramp to Nicholson Dr/Highland Rd	Diverge	D	33.4	E	44.2
I-10 b/t Nicholson Dr/Highland Rd and I-110	Freeway	C	18.8	C	25.3
I-10 EB ramp to I-110 NB	Freeway	A	8.1	A	10.9
I-10 EB ramp to I-10 EB (at I-110)	Freeway	C	19.9	D	26.8
I-10 EB b/t on ramp from I-110 SB and off ramp to Washington St	Weaving	E	40.3	F	60.0
I-10 EB b/t I-110 and Washington St	Freeway	D	26.6	E	42.1
I-10 EB on ramp from Braddock St	Merge	F	40.0	F	59.5
I-10 EB b/t Washington St and Dalrymple Dr	Freeway	F	--	F	--
I-10 EB off ramp to Dalrymple Dr	Diverge	F	50.7	F	68.0
I-10 EB b/t Dalrymple Dr and Perkins Rd	Freeway	F	--	F	--
I-10 EB off ramp to Perkins Rd	Diverge	F	41.4	F	62.8
I-10 EB b/t Perkins Rd and Acadian	Freeway	E	38.7	F	--
I-10 EB off ramp to Acadian	Diverge	E	37.0	F	55.1
I-10 EB b/t on ramp from Acadian and off ramp to College Dr	Weaving	F	44.3	F	64.7
I-10 EB b/t Acadian and College Dr	Freeway	F	--	F	--
I-10 EB b/t off ramp to College Dr and on ramp from College Dr	Freeway	E	40.5	F	--
I-10 EB on ramp from College Dr	Merge	F	55.1	F	75.6
I-10 EB b/t College Dr and I-12	Freeway	D	30.5	F	--
I-10 EB ramp to I-12 EB	Freeway	C	21.8	D	30.3
I-10 EB ramp to I-10 EB (at I-12)	Freeway	D	28.2	F	--
I-10 EB b/t on ramp from I-12 WB and off ramp to LA 3064	Weaving	C	26.1	E	37.4

Table 3.2 Continued
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Eastbound, I-12 Eastbound, and I-110 Southbound
PM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 EB b/t I-12 and LA 3064	Freeway	E	39.6	F	--
I-10 EB on ramp from LA 3064	Merge	D	33.8	F	45.6
I-10 EB east of LA 3064	Freeway	E	39.9	F	--
I-12 EB b/t I-10 and LA 3064	Freeway	C	24.2	E	35.4
I-12 EB b/t on ramp from I-10 WB and off ramp to LA 3064	Weaving	B	19.6	C	27.9
I-12 EB b/t off ramp to LA 3064 and on ramp from LA 3064	Freeway	C	22.2	D	31.1
I-12 EB on ramp from LA 3064	Merge	C	25.8	F	36.1
I-12 EB east of LA 3064	Freeway	C	21.8	D	32.4
I-110 SB north of North Blvd	Freeway	C	23.9	D	32.3
I-110 SB on ramp from US 61 Business	Merge	E	41.9	F	57.8
I-110 SB off ramp to Government St	Diverge	E	50.5	F	66.9
I-110 SB on ramp from North Blvd	Merge	E	39.4	E	56.0
I-110 SB b/t North Blvd and I-10	Freeway	D	28.1	E	43.0
I-110 SB off ramp to I-10 WB	Freeway	A	10.6	B	13.8
I-110 SB on ramp from 10th St	Merge	C	25.4	D	32.9

-- Freeway segment demand exceeded capacity.

Table 3.3
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Westbound, I-12 Westbound, and I-110 Northbound
AM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 WB west of LA 415	Freeway	B	16.1	C	21.7
I-10 WB on ramp from LA 415	Merge	B	15.2	C	20.8
I-10 WB off ramp to LA 415	Diverge	C	23.0	D	30.4
I-10 WB b/t LA 415 and LA 1	Freeway	C	19.1	C	25.8
I-10 WB on ramp from LA 1	Merge	B	17.9	C	24.5
I-10 WB b/t on ramp from LA 1 and off ramp to LA 1	Freeway	C	18.3	C	24.6
I-10 WB off ramp to LA 1	Diverge	B	15.4	C	23.5
I-10 WB b/t LA 1 and St. Louis St/St. Ferdinand St	Freeway	C	19.2	C	25.9
I-10 WB on ramp from St. Louis St/St. Ferdinand St	Merge	C	22.0	D	29.3
I-10 b/t St. Louis St/St. Ferdinand St and I-110	Freeway	B	14.3	C	19.3
I-10 WB ramp from I-110 SB	Freeway	A	6.7	A	9.1
I-10 WB ramp from I-10 WB (at I-110)	Freeway	B	15.3	C	20.6
I-10 WB b/t off ramp to I-110 NB and on ramp from Washington St	Weaving	F	57.5	F	84.2
I-10 WB b/t I-110 and Washington St	Freeway	E	43.2	F	--
I-10 WB off ramp to McCalop St	Diverge	E	38.2	F	58.7
I-10 WB b/t Washington St and Dalrymple Dr	Freeway	E	43.4	F	--
I-10 WB on ramp from Dalrymple Dr	Merge	E	35.3	F	53.3
I-10 WB b/t Dalrymple Dr and Perkins Rd	Freeway	F	--	F	--
I-10 WB on ramp from Perkins Rd	Merge	F	37.1	F	54.7
I-10 WB b/t Perkins Rd and Acadian	Freeway	E	35.6	F	--
I-10 WB on ramp from Acadian	Merge	D	33.0	F	47.6
I-10 WB b/t off ramp to Acadian and on ramp from College Dr	Weaving	E	37.0	F	54.1
I-10 WB b/t Acadian and College Dr	Freeway	F	--	F	--
I-10 WB on ramp from College Dr	Merge	C	20.8	F	29.4
I-10 WB b/t on ramp from College Dr and off ramp to College Dr	Freeway	D	26.4	E	41.9
I-10 WB off ramp to College Dr	Diverge	C	21.9	D	32.6
I-10 WB b/t College Dr and I-12	Freeway	C	24.6	E	37.8
I-10 WB ramp from I-12 WB	Freeway	C	25.1	E	37.8

Table 3.3 Continued
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Westbound, I-12 Westbound, and I-110 Northbound
AM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 WB ramp from I-10 WB (at I-12)	Freeway	D	26.7	E	41.1
I-10 WB b/t off ramp to I-12 EB and on ramp from LA 3064	Weaving	C	20.8	D	29.9
I-10 WB b/t I-12 and LA 3064	Freeway	D	28.4	F	--
I-10 WB off ramp to LA 3064	Diverge	E	38.9	F	51.8
I-10 WB east of LA 3064	Freeway	E	37.6	D	30.9
I-12 WB b/t I-10 and LA 3064	Freeway	E	41.0	F	--
I-12 WB b/t off ramp to I-10 EB and on ramp from LA 3064	Weaving	E	36.5	F	53.6
I-12 WB east of LA 3064	Freeway	D	34.4	F	--
I-110 NB north of US 61 Business	Freeway	C	24.7	D	34.0
I-110 NB b/t US 61 Business and North Blvd	Freeway	C	24.2	D	33.0
I-110 NB off ramp to US 61 Business	Diverge	E	47.5	E	63.2
I-110 NB on ramp from Government St	Merge	F	66.6	F	88.2
I-110 NB b/t off ramp to Convention St/ North Blvd and on ramp from I-10 EB	Weaving	E	35.3	F	50.1
I-110 NB b/t North Blvd and I-10	Freeway	D	33.1	F	-
I-110 NB off ramp to 10th St/ Government St	Diverge	D	30.9	E	39.3

-- Freeway segment demand exceeded capacity.

Table 3.4
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Westbound, I-12 Westbound, and I-110 Northbound
PM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 WB west of LA 415	Freeway	C	19.1	C	25.9
I-10 WB on ramp from LA 415	Merge	B	18.3	C	25.0
I-10 WB off ramp to LA 415	Diverge	E	36.2	F	48.1
I-10 WB b/t LA 415 and LA 1	Freeway	D	32.6	F	--
I-10 WB on ramp from LA 1	Merge	D	29.7	F	40.3
I-10 WB b/t on ramp from LA 1 and off ramp to LA 1	Freeway	D	29.6	F	--
I-10 WB off ramp to LA 1	Diverge	C	24.9	F	35.5
I-10 WB b/t LA 1 and St. Louis St/St. Ferdinand St	Freeway	D	28.2	F	--
I-10 WB on ramp from St. Louis St/St. Ferdinand St	Merge	D	31.2	F	42.0
I-10 b/t St. Louis St/St. Ferdinand St and I-110	Freeway	C	21.4	D	29.1
I-10 WB ramp from I-110 SB	Freeway	A	10.6	B	14.2
I-10 WB ramp from I-10 WB (at I-110)	Freeway	C	22.5	D	30.7
I-10 WB b/t off ramp to I-110 NB and on ramp from Washington St	Weaving	F	45.5	F	67.8
I-10 WB b/t I-110 and Washington St	Freeway	E	39.9	F	--
I-10 WB off ramp to McCalop St	Diverge	E	37.3	F	55.5
I-10 WB b/t Washington St and Dalrymple Dr	Freeway	E	39.6	F	--
I-10 WB on ramp from Dalrymple Dr	Merge	D	34.6	F	50.3
I-10 WB b/t Dalrymple Dr and Perkins Rd	Freeway	E	42.4	F	--
I-10 WB on ramp from Perkins Rd	Merge	E	35.3	F	52.0
I-10 WB b/t Perkins Rd and Acadian	Freeway	E	35.1	F	--
I-10 WB on ramp from Acadian	Merge	D	32.5	F	47.0
I-10 WB b/t off ramp to Acadian and on ramp from College Dr	Weaving	D	32.5	F	47.7
I-10 WB b/t Acadian and College Dr	Freeway	E	43.2	F	--
I-10 WB on ramp from College Dr	Merge	B	19.9	D	28.1
I-10 WB b/t on ramp from College Dr and off ramp to College Dr	Freeway	C	24.2	E	35.4
I-10 WB off ramp to College Dr	Diverge	B	19.6	D	29.6
I-10 WB b/t College Dr and I-12	Freeway	C	22.7	D	32.8
I-10 WB ramp from I-12 WB	Freeway	C	20.1	D	27.3

Table 3.4 Continued
Freeway Segment, Ramp Junction, and Weaving Segment
Level of Service and Capacity Analysis Results from HCS
I-10 Westbound, I-12 Westbound, and I-110 Northbound
PM Peak: Base and No Build

Location	Analysis Type	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 WB ramp from I-10 WB (at I-12)	Freeway	D	29.9	F	--
I-10 WB b/t off ramp to I-12 EB and on ramp from LA 3064	Weaving	C	24.7	D	34.8
I-10 WB b/t I-12 and LA 3064	Freeway	D	34.8	F	--
I-10 WB off ramp to LA 3064	Diverge	E	36.9	F	49.1
I-10 WB east of LA 3064	Freeway	D	34.1	D	28.7
I-12 WB b/t I-10 and LA 3064	Freeway	C	25.2	E	38.2
I-12 WB b/t off ramp to I-10 EB and on ramp from LA 3064	Weaving	C	25.4	E	36.8
I-12 WB east of LA 3064	Freeway	C	19.5	D	26.5
I-110 NB north of US 61 Business	Freeway	D	28.8	E	44.4
I-110 NB b/t US 61 Business and North Blvd	Freeway	D	27.3	E	39.9
I-110 NB off ramp to US 61 Business	Diverge	E	49.8	F	66.2
I-110 NB on ramp from Government St	Merge	F	65.5	F	95.6
I-110 NB b/t off ramp to Convention St/ North Blvd and on ramp from I-10 EB	Weaving	C	24.4	E	35.6
I-110 NB b/t North Blvd and I-10	Freeway	D	26.7	E	38.2
I-110 NB off ramp to 10th St/ Government St	Diverge	C	25.0	D	31.3

-- Freeway segment demand exceeded capacity.

Table 3.5
Intersection Level of Service and Capacity Analysis Results from HCS
AM Peak: Base and No Build

Intersection	Approach	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
I-10 EB at LA 415	Overall	*	*	*	*
	Northbound	B	11.1	B	14.1
	Eastbound	B	10.0	B	10.7
I-10 WB at LA 415	Overall	*	*	*	*
	Northbound	C	15.2	D	26.1
	Westbound	F	71.6	F	*
I-10 EB at Washington St	Overall	**B**	**12.3**	**B**	**13.6**
	Northbound	B	13.0	B	14.6
	Southbound	B	11.0	B	11.6
	Eastbound	B	13.0	B	14.7
	Westbound	B	11.1	B	11.5
I-10 EB at Dalrymple Dr	Overall	**B**	**10.9**	**B**	**12.6**
	Northbound	A	8.4	A	8.9
	Southbound	B	10.2	B	12.0
	Eastbound	B	17.3	C	20.1
I-10 WB at Dalrymple Dr	Overall	**D**	**36.2**	**E**	**73.7**
	Northbound	A	3.6	A	4.1
	Southbound	B	15.2	C	21.3
	Eastbound	F	144.3	F	330.1
	Westbound	C	32.4	D	49.7
I-10 EB at Perkins Rd	Overall	**B**	**17.7**	**D**	**44.5**
	Northbound	C	21.2	E	64.8
	Southbound	A	9.3	B	10.0
	Westbound	C	30.0	C	31.0
I-10 EB at Acadian	Overall	F	164.9	**F**	**294.9**
	Northbound	F	412.9	F	695.3
	Southbound	C	20.4	D	51.8
	Eastbound	D	53.8	F	149.6
I-10 WB at Acadian	Overall	**E**	**74.4**	**F**	**150.7**
	Northbound	B	12.7	B	15.6
	Southbound	C	23.2	D	40.5
	Westbound	F	171.1	F	361.1
I-10 EB at College Dr	Overall	**C**	**28.1**	**D**	**57.8**
	Northbound	C	31.4	E	68.0
	Southbound	C	23.1	C	52.9
	Eastbound	D	39.6	D	44.7

Table 3.5 Continued
Intersection Level of Service and Capacity Analysis Results from HCS
AM Peak: Base and No Build

Intersection	Approach	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
I-10 EB/Constitution Ave at College Dr	Overall	**C**	**23.4**	**C**	**33.7**
	Northbound	C	29.2	D	40.1
	Southbound	B	16.1	C	28.1
	Eastbound	D	39.0	D	44.9
	Westbound	C	20.1	C	21.6
I-10 WB at College Dr	Overall	**C**	**31.5**	**E**	**80.9**
	Northbound	D	44.4	F	145.0
	Southbound	B	14.6	C	21.7
	Westbound	D	45.6	D	78.8
I-10 EB at Essen Ln	Overall	**C**	**29.2**	**D**	**49.7**
	Northbound	B	17.5	C	24.2
	Southbound	A	9.0	B	19.5
	Eastbound	F	308.3	F	446.1
I-10 WB at Essen Ln	Overall	**D**	**52.0**	**F**	**173.0**
	Northbound	C	21.1	E	63.3
	Southbound	D	52.4	F	156.5
	Westbound	F	121.0	F	414.3
I-12 EB at Essen Ln	Overall	**B**	**16.9**	**D**	**47.9**
	Northbound	B	11.4	B	17.3
	Southbound	B	15.2	E	63.2
	Eastbound	C	33.6	E	71.9
I-12 WB at Essen Ln	Overall	*	*	*	*
	Northbound left	C	22.4	F	56.9
I-110 NB/10th St at US 61 Business	Overall	**D**	**38.4**	**F**	**96.9**
	Northbound	D	37.2	D	37.3
	Eastbound (US 61B)	C	30.3	C	32.3
	Eastbound (off ramp)	D	38.7	F	134.3
	Westbound	D	40.3	E	78.9
I-110 SB/9th St at US 61 Business	Overall	**B**	**12.3**	**B**	**13.2**
	Southbound	D	36.0	D	36.6
	Eastbound	B	11.1	B	11.3
	Westbound	A	5.8	A	7.2
10th St at Convention St	Overall	**A**	**9.5**	**A**	**9.6**
	Northbound	A	9.5	A	9.6
	Westbound	A	9.4	A	9.6
I-110 SB/9th St at Convention St	Overall	**B**	**10.1**	**B**	**11.2**
	Southbound	C	33.6	C	34.0
	Westbound	A	6.6	A	7.7

Table 3.5 Continued
Intersection Level of Service and Capacity Analysis Results from HCS
AM Peak: Base and No Build

Intersection	Approach	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
10th St at North Blvd	Overall	**B**	**14.7**	**B**	**15.9**
	Northbound	C	32.2	C	32.2
	Eastbound	A	5.1	A	5.6
	Westbound	B	15.4	B	16.7
I-110 SB/9th St at North Blvd	Overall	**B**	**16.2**	**B**	**17.2**
	Southbound	D	35.7	D	38.0
	Eastbound	B	12.8	B	12.8
	Westbound	A	6.9	A	7.3
10th St at Government St	Overall	**C**	**23.8**	**D**	**39.6**
	Northbound	D	46.3	F	89.1
	Eastbound	A	9.0	B	15.5
	Westbound	B	19.6	C	21.2
I-110 NB at Government St	Overall	**C**	**23.2**	**D**	**49.0**
	Eastbound	D	38.8	F	88.8
	Westbound	A	7.1	A	8.3
I-110 SB at Government St	Overall	**F**	**85.5**	**F**	**141.2**
	Southbound	F	269.9	F	459.2
	Eastbound	B	16.0	B	19.2
	Westbound	A	6.8	A	7.9

* Overall LOS not available for two-way stop-controlled intersections.

Table 3.6
Intersection Level of Service and Capacity Analysis Results from HCS
PM Peak: Base and No Build

Intersection	Approach	2011 Base Conditions LOS	2011 Base Conditions Delay (s/veh)	2032 No Build Future Conditions LOS	2032 No Build Future Conditions Delay (s/veh)
I-10 EB at LA 415	Overall	*	*	*	*
	Northbound	A	9.4	B	11.1
	Eastbound	A	9.3	B	10.2
I-10 WB at LA 415	Overall	*	*	*	*
	Northbound	A	9.6	B	11.1
	Westbound	C	20.9	F	50.0
I-10 EB at Washington St	Overall	**B**	**12.7**	**B**	**14.4**
	Northbound	B	14.3	B	17.1
	Southbound	B	10.8	B	11.1
	Eastbound	B	10.1	B	10.2
	Westbound	B	10.9	B	11.2
I-10 EB at Dalrymple Dr	Overall	**A**	**10.0**	**B**	**11.2**
	Northbound	A	8.4	A	8.9
	Southbound	A	9.9	B	11.5
	Eastbound	B	14.8	B	15.7
I-10 WB at Dalrymple Dr	Overall	**E**	**61.7**	**F**	**122.3**
	Northbound	A	3.5	A	3.9
	Southbound	B	13.4	B	16.0
	Eastbound	F	222.5	F	462.7
	Westbound	D	38.7	E	74.5
I-10 EB at Perkins Rd	Overall	**D**	**46.3**	**F**	**103.1**
	Northbound	C	28.5	E	77.6
	Southbound	B	11.1	B	13.1
	Westbound	F	145.4	F	321.9
I-10 EB at Acadian	Overall	F	165.6	**F**	**302.7**
	Northbound	F	344.5	F	603.9
	Southbound	E	72.2	F	150.8
	Eastbound	C	28.2	D	35.6
I-10 WB at Acadian	Overall	**F**	**104.8**	**F**	**226.1**
	Northbound	B	15.6	B	17.2
	Southbound	F	172.3	F	373.3
	Westbound	D	41.9	F	104.1
I-10 EB at College Dr	Overall	**C**	**31.8**	**E**	**72.5**
	Northbound	C	31.9	E	76.2
	Southbound	C	23.0	D	53.0
	Eastbound	E	70.7	F	146.7

Table 3.6 Continued
Intersection Level of Service and Capacity Analysis Results from HCS
PM Peak: Base and No Build

Intersection	Approach	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
I-10 EB/Constitution Ave at College Dr	Overall	**C**	**28.2**	**D**	**49.6**
	Northbound	D	39.4	E	79.3
	Southbound	B	14.1	B	22.8
	Eastbound	E	59.7	E	77.5
	Westbound	C	23.5	C	25.3
I-10 WB at College Dr	Overall	**C**	**39.0**	**F**	**104.5**
	Northbound	D	39.4	F	131.7
	Southbound	B	17.7	C	32.9
	Westbound	E	99.7	F	235.9
I-10 EB at Essen Ln	Overall	**F**	**97.9**	**F**	**229.3**
	Northbound	F	88.5	F	258.0
	Southbound	C	22.2	D	45.8
	Eastbound	F	590.7	F	839.3
I-10 WB at Essen Ln	Overall	**E**	**59.4**	**F**	**175.1**
	Northbound	D	35.9	F	162.8
	Southbound	D	45.7	E	62.6
	Westbound	F	224.8	F	510.4
I-12 EB at Essen Ln	Overall	**B**	**17.7**	**E**	**78.1**
	Northbound	C	20.3	F	122.6
	Southbound	A	9.0	B	11.3
	Eastbound	C	30.3	C	34.1
I-12 WB at Essen Ln	Overall	*	*	*	*
	Northbound left	F	65.7	F	579.6
I-110 NB/10th St at US 61 Business	Overall	**C**	**33.1**	**E**	**58.2**
	Northbound	D	37.0	D	37.1
	Eastbound (US 61B)	C	27.2	D	51.9
	Eastbound (off ramp)	C	34.0	E	61.9
	Westbound	D	38.0	E	63.4
I-110 SB/9th St at US 61 Business	Overall	**C**	**27.6**	**D**	**50.4**
	Southbound	D	35.4	D	36.4
	Eastbound	C	26.4	D	45.7
	Westbound	C	25.9	E	67.0
10th St at Convention St	Overall	**A**	**9.6**	**A**	**9.9**
	Northbound	A	9.7	A	9.9
	Westbound	A	9.5	A	9.7
I-110 SB/9th St at Convention St	Overall	**A**	**10.0**	**B**	**10.2**
	Southbound	B	10.1	B	10.4
	Westbound	A	9.8	A	10.0

Table 3.6 Continued
Intersection Level of Service and Capacity Analysis Results from HCS
PM Peak: Base and No Build

Intersection	Approach	2011 Base Conditions		2032 No Build Future Conditions	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
10th St at North Blvd	Overall	**A**	**9.8**	**B**	**10.4**
	Northbound	C	32.8	C	33.1
	Eastbound	A	5.6	A	6.3
	Westbound	B	13.7	B	14.2
I-110 SB/9th St at North Blvd	Overall	**B**	**18.4**	**B**	**19.7**
	Southbound	D	35.9	D	38.6
	Eastbound	B	15.9	B	17.0
	Westbound	A	7.0	A	7.1
10th St at Government St	Overall	**C**	**23.7**	**D**	**45.4**
	Northbound	C	32.6	C	33.1
	Eastbound	B	15.1	C	31.0
	Westbound	D	38.9	E	75.9
I-110 NB at Government St	Overall	**C**	**20.3**	**D**	**51.7**
	Eastbound	C	22.1	E	63.9
	Westbound	B	15.0	B	16.4
I-110 SB at Government St	Overall	**E**	**66.9**	**F**	**181.6**
	Southbound	D	36.3	D	50.5
	Eastbound	F	89.2	F	258.7
	Westbound	B	18.4	D	37.9

* Overall LOS not available for two-way stop-controlled intersections.

Based on the capacity analysis results, failing LOS is anticipated by the design year at the following locations:

Mainline/Ramp Junctions:

- The entire I-10 corridor within the study area, I-10 eastbound and westbound between LA 415 (Lobdell) and LA 3064 (Essen)
- I-110 southbound ramps at US 61 and Government Street
- I-110 northbound between I-10 and Convention St
- I-110 northbound between US 61 and Government Street
- I-12 westbound east of LA 3064 (Essen) to I-10

Ramp Terminal Intersections:

- I-10 westbound at LA 415 - westbound approach
- I-10 westbound at Dalrymple - eastbound approach
- I-10 at Perkins - westbound approach
- I-10 westbound and eastbound at Acadian Thwy
- I-10 westbound at College Drive
- I-10 westbound and eastbound at Essen Ln
- I-12 westbound and eastbound at Essen Ln
- I-110 northbound at US 61 Business - eastbound off-ramp
- I-110 northbound and southbound at Government St

Based on knowledge of the corridor the following deficiencies were also identified:

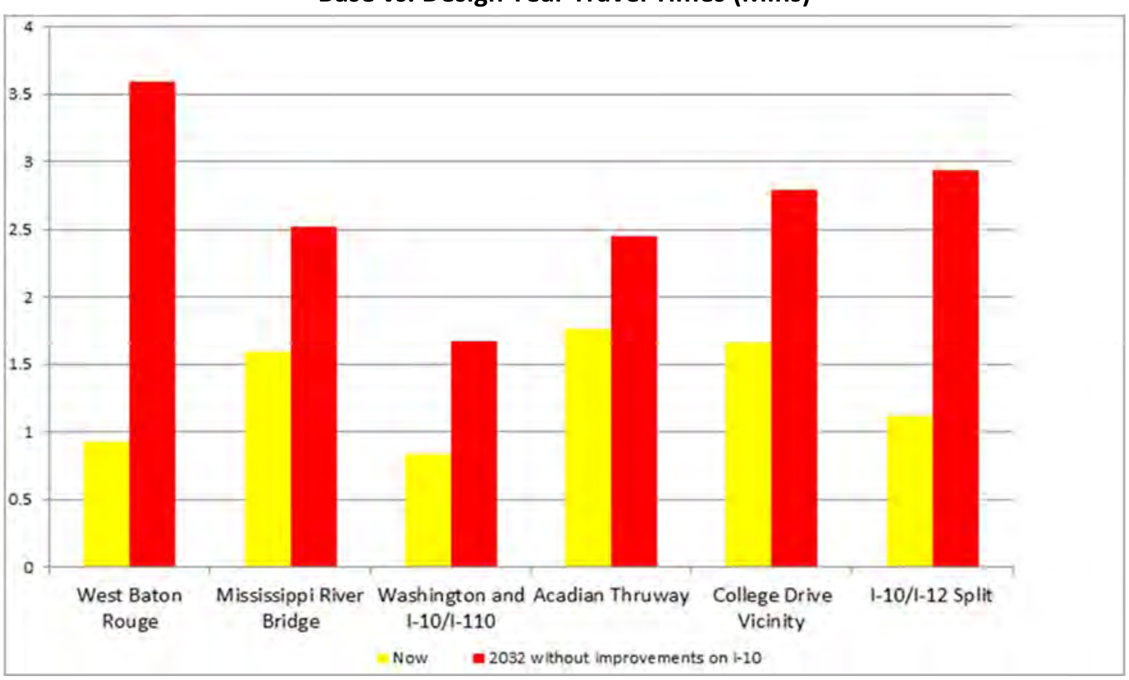
- Lack of shoulders on I-10
- I-10/I-110 eastbound merge and Washington Street Exit
- High density of entrance/exit ramps along I-110
- Lack of surface road connectivity.
- Weave locations (College/I-12, College/Acadian, I-110/Washington)

Vissim Model – 2032 Design Year No Build

The results of the Vissim modeling indicated that without improvements, travel times are estimated to greatly increase by the year 2032. The graph below presents the expected average increases in travel times in the various areas of concern in the year 2032 as compared to the base. The data is for a ½ mile trip on I-10 in the vicinity of the area of concern.

Graph 3.1

Base vs. Design Year Travel Times (Mins)



The 2032 No Build Vissim modeling supported the results of the capacity analysis and indicated that improvements would be needed.

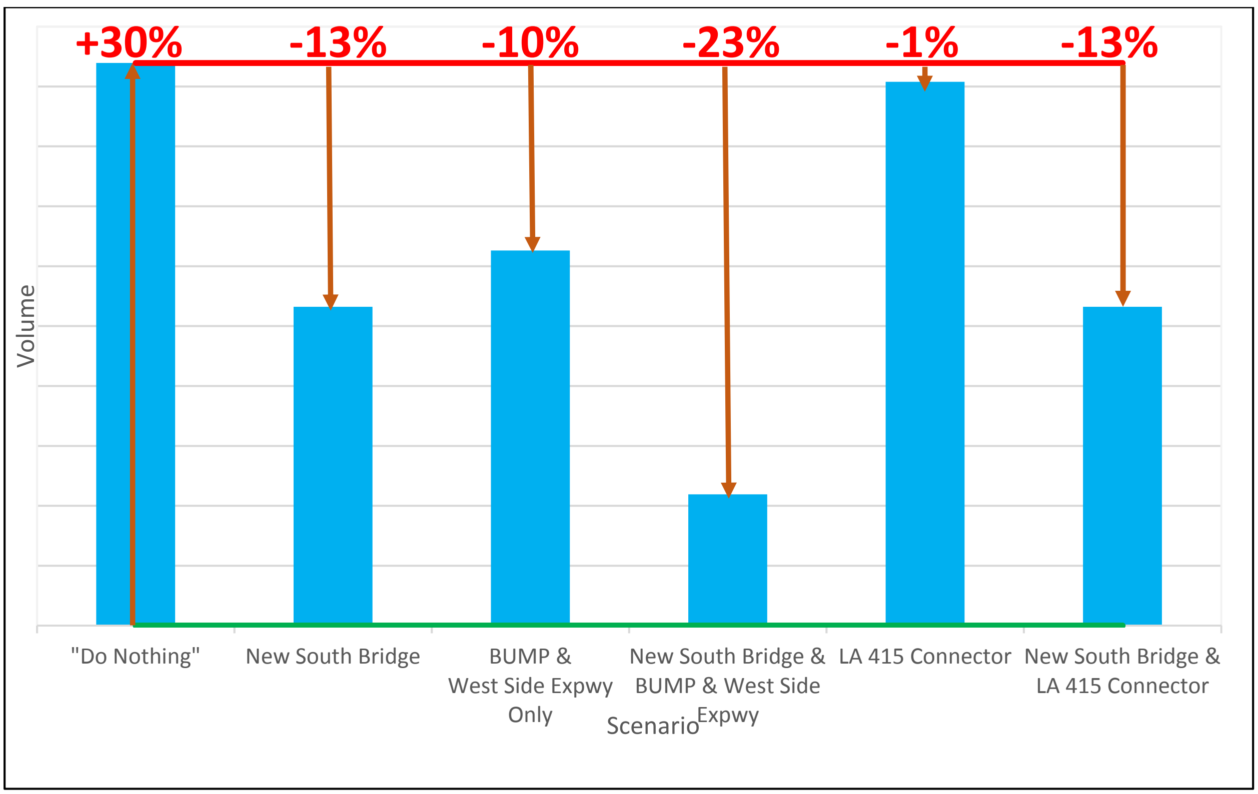
Other Potential Projects

An evaluation was performed to determine if various regional projects could be expected to attract enough traffic that improvements would not be required on I-10. Results from previous studies and the CRPC TDM were used to estimate the effect that various regional projects would have on the traffic volumes on the I-10 bridge. The following projects were considered:

- Baton Rouge Urban Renewal and Mobility Plan (BUMP)
- LA 1 to LA 415 Connector
- Westside Expressway
- Southern Mississippi River Bridge Crossing
- Baton Rouge Loop
- Northern Bypass

As part of the LA 1 to LA 30 Connector Study dated January 2016, the CRPC TDM was utilized to determine the amount of traffic that would divert from the existing I-10 bridge crossing with a new bridge to the south, the BUMP and Westside Expressway, the LA 1 to LA 415 Connector and combinations of these. The results are presented in Graph 3.2.

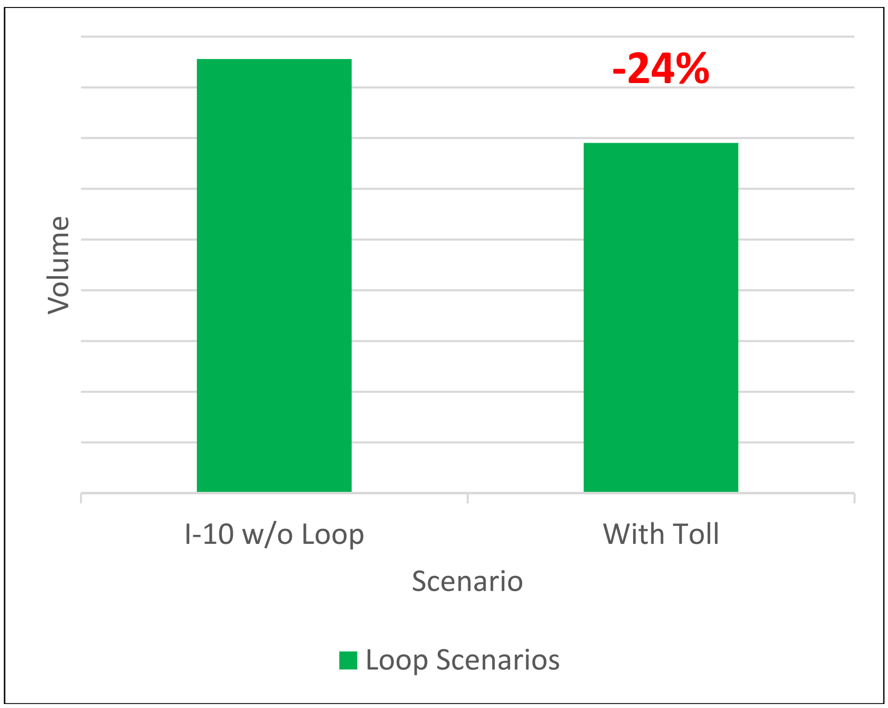
Graph 3.2
2032 Daily Volumes - Without Improvements to I-10



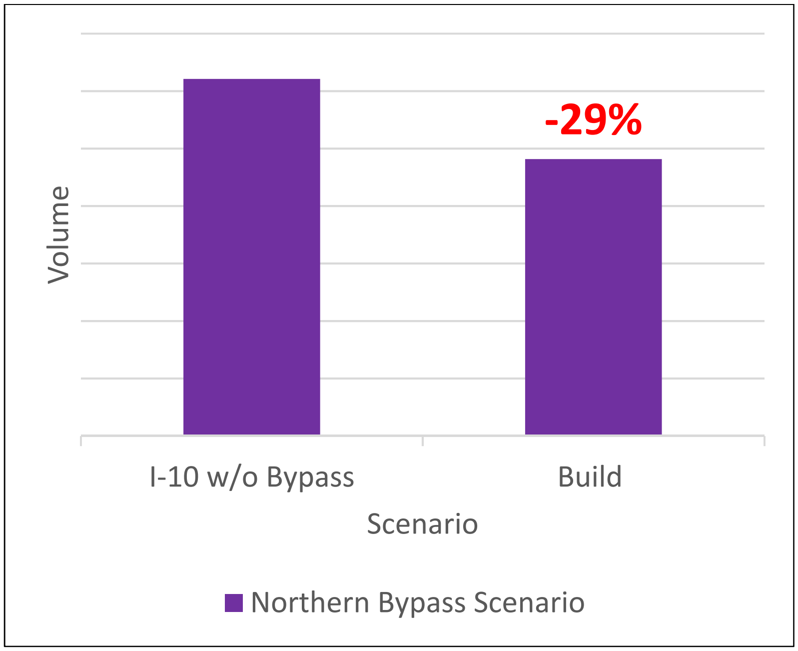
A new bridge to the south is expected to reduce daily traffic volumes on the I-10 bridge by 13%. With the Bump and the Westside Expressway, 10% of traffic is expected to re-route. Even with all three, only 23% of I-10 bridge traffic is expected to divert which is still more traffic than today on the bridge. On I-10 between College Drive and the split, less of an impact is expected with these other projects. Even with all three, a bridge, the BUMP and the Westside expressway, a maximum of 18% decrease in traffic demand from the Do Nothing is expected. The LA 1 to LA 415 Connector is expected to only decrease the traffic on I-10 approximately 1%.

Studies for the Baton Rouge Loop (*Baton Rouge Loop – Tier 1 Draft Final Environmental Impact Statement)* and the Northern Bypass (*Feasibility Study for the Northern Bypass)* were completed in September 2012 and November 2004, respectively. The expected effect on the I-10 bridge traffic is presented in Graphs 3.3 and 3.4.

Graph 3.3
Baton Rouge Loop Study Results
2032 Design Year



Graph 3.4
Northern Bypass Study Results
2029 Design Year



The results of these studies also indicated that traffic volumes on the I-10 bridge would still be higher than today's volumes. While both of these will remove much of the demand on the bridge, the studies indicated little impact on traffic volumes on I-10 between College and the split.

While many potential regional solutions have been studied over the years, they all indicated that improvements to I-10 will still be needed. The results indicate that none of these other solutions or even combinations of solutions are expected to reduce the design year traffic to current conditions. As current traffic conditions are unacceptable, the conclusion is that improvements to add capacity to I-10 must be part of an overall strategy to handle the traffic demand.

This information was presented at the initial round of Public Meetings in late August, early September 2015. Video clips of the Vissim Base Model and the 2032 No Build Model at key locations along the corridor were also presented side-by-side for comparison. The public meeting presentation is included in the Appendix 3C.

Mainline/Interchange Improvement Development and Analysis

Threshold Analysis

As an initial step in determining potential improvements, a freeway segment threshold analysis was performed for the I-10 corridor to determine the number of lanes that would adequately service the expected traffic demand on the interstate in the design year of 2032. HCS Freeway Segment analysis was performed for 3, 4 and 5 lanes to determine the vehicle volume thresholds at which each are expected to operate at LOS D, E and F. The thresholds were compared to the 2032 No Build conditions traffic volumes for each segment to estimate the number of lanes required to achieve LOS D and E. Lane balancing was also taken into account. Based on the threshold analysis, it was determined that multiple locations would require 2 additional lanes in each direction to achieve LOS D; however, LOS E could be achieved with only 1 additional lane in each direction.

CAP-X Interchange Analysis

Capacity Analysis for Planning of Junctions (CAP-X) software, obtained from the FHWA website, is a planning software developed in Microsoft Excel which provides expected volume to capacity (v/c) ratios for various interchange types including standard diamond, partial cloverleaf, displaced left turn, double crossover diamond and single point urban interchanges. The CAP-X was utilized to evaluate the various interchange types for the at-grade, standard diamond interchanges at Acadian Thwy, College Dr and LA 415. The traffic volumes, vehicle percentages and lane configuration information was input into the spreadsheet. The following table presents the results of the CAP-X analysis. The CAP-X output documentation is included in Appendix 3B.

Table 3.7
CAP-X Interchange Analysis Results (V/C Ratios)

Interchange	Peak Period	Interchange Type				
		Diamond	Partial Cloverleaf	Displaced Lefts	Double Crossover	Single Point
College Drive	AM	1.14	0.58	1.39	1.39	1.32
	PM	1.34	0.79	1.25	1.27	1.12
Acadian Thwy	AM	1.01	0.61	1.04	0.99	0.95
	PM	0.98	0.67	0.85	0.99	0.94
LA 415	AM	0.97	0.84	0.88	0.58	0.94
	PM	0.49	0.40	1.21	1.21	1.33

The results presented in Table 3.7 were used to complete the Traffic Operations column in the Tier 1 Matrix for these three interchanges. Additional factors such as ROW constraints, cost and socioeconomic impacts will be considered when determining the proposed interchange configurations.

Public Meeting Input

During the first round of Public Meetings the public was asked to participate in a table top exercise to provide ideas and opinions on potential improvements. The following lists the most common responses:

- Adding one additional lane to I-10 in each direction
- Adding multiple lanes to I-10 in each direction
- Improve surface streets
- Construct a bypass
- Double deck the interstate, also referred to as a highpass
- Construct a new bridge, either adjacent to the existing I-10 bridge or in another southern location
- Move or remove the Washington Street exit

This information was taken into account when developing potential improvements.

Washington St Exit Data Collection

With all the interest and concern regarding the Washington Street exit, additional data was needed to properly assess what is occurring at this location. A seven (7) day – 24 hour count was collected when all schools, including LSU and Southern, were in session, during a non-holiday week using video cameras at the following locations:

- I-10/ I-110 SB at Merge
- Washington Street off ramp

The count data indicated that only 1%-6% of the total traffic volume traveling along I-10 in the vicinity of Washington Street exits. The video was reviewed to also determine if vehicles exiting at Washington Street originated from I-110 SB or I-10 EB. The resulting data is presented in Table 3.8.

Table 3.8
Washington Exit Origin Summary

Time	Day	From (%)	
		I-110	I-10
6:30-7:30 AM	TUES	76.2%	23.8%
	WED	81.2%	18.8%
12:15-1:15 PM	TUES	92.6%	7.4%
	WED	93.3%	6.7%
2:00-3:00 PM	TUES	83.2%	16.8%
	WED	90.4%	9.6%
6:00-7:00 PM	TUES	91.2%	8.8%
	WED	93.8%	6.2%

A review of the data indicates that the majority of motorists exiting at Washington Street are coming from I-110. On average, 88% of the traffic exiting Washington originated from I-110 southbound with only 12% coming from I-10 eastbound. This creates a significant weave as exiting motorists coming from I-110 must cross I-10 traffic coming from the bridge that is merging into the left lane because the right lane is exit only. This information was used for analysis and calibration of the Vissim Models. This data supports the potential relocation, or addition, of a Washington Street left exit from I-110.

Improvement Development

In addition to widening I-10, a list of improvements were developed based on analysis results, public input and additional data. Monthly meetings were held with the Project Team and DOTD to discuss potential improvements and continually refine the list.

To aid in determining the impact of the potential improvements CRPC TDM were used to evaluate the effect each improvement would be expected to have on the surrounding network traffic volumes and patterns. CRPC TDM were provided for each of the following scenarios:

- One additional lane in each direction on I-10
- College and Acadian service roads with braided ramps
- Dedicated ramps to College from I-10 and I-12
- Modifications to Dalrymple/Washington Street interchanges
- Terrace/Washington Street left exit from I-110 southbound
- Multi-lane, restricted access Highpass (tolled and untolled)
- Frontage roads from Government to Dalrymple
- Separate bridge dedicated for I-110 traffic
- LA 1 to LA 30 direct connection
- Mutli-lane addition with parallel bridge
- LA 1 to LA 415 Connector

<u>Alternative Analysis</u>

CRPRC TDM were provided for each of these scenarios and were reviewed for accuracy. ADTs and AM/PM peak period volumes were data mined for ramp junctions expected to be affected by the proposed modification. The output volumes were compared to the Design Year No Build model volumes to determine the relative effect each scenario would have on I-10 capacity.

Select improvements were analyzed at critical locations to evaluate their feasibility. The following capacity analyses were performed using HCS+ Software and the results are presented in the corresponding tables:

- Additional Lane on I-10 – Critical Peak, Critical Direction (AM & PM) – Tables 3.9 & 3.10
- Highpass Entrance and Exit Ramps (AM & PM) – Table 3.11
- LA 1 to LA 30 Direct Connection Junctions (PM only) – Table 3.12

The capacity analysis output is included in Appendix 3B.

Table 3.9
I-10 Westbound
Additional Lane (Critical Locations)

Location	Analysis Type	Westbound			
		AM Peak		PM Peak	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 off ramp to LA 415	Diverge			C	23.1
I-10 on ramp from LA 1	Merge			C	22.4
I-10 off ramp to LA 1	Diverge			B	16.4
I-10 b/t LA 1 and St. Louis St/St. Ferdinand St	Freeway			E	44.1
I-10 on ramp from St. Louis St/St. Ferdinand St	Merge			D	34.1
I-10 on ramp from Washington St	Merge	D	30.8		
I-10 b/t Washington St and Dalrymple Dr	Weaving	D	30.4	D	29.0
I-10 off ramp to Dalrymple	Diverge	F	35.1		
I-10 b/t Dalrymple Dr and Perkins Rd	Freeway	F	--		
I-10 on ramp from Perkins Rd	Merge	F	37.0		
I-10 on ramp from Acadian	Merge	D	30.4		
I-10 b/t off ramp to Acadian and on ramp from College Dr	Weaving	F	43.6		
I-10 off ramp to College Dr	Diverge	F	20.4		
I-10 WB b/t College Dr and I-12	Freeway	D	31.9		
I-10 WB ramp from I-10 WB (at I-12)	Freeway	D	30.3		

-- Freeway segment demand exceeded capacity.

Table 3.10
I-10 Eastbound
Additional Lane (Critical Locations)

Location	Analysis Type	Eastbound			
		AM Peak		PM Peak	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 on ramp from LA 415	Merge	F	36.5		
I-10 b/t LA 415 and LA 1	Freeway	D	27.8		
I-10 off ramp to LA 1	Diverge	C	20.3		
I-10 on ramp from LA 1	Merge	F	49.7		
I-10 b/t LA 1 and Nicholson Dr/Highland Rd	Freeway	F	--		
I-10 off ramp to Nicholson Dr/Highland Rd	Diverge	F	26.4		
I-10 off ramp to Washington St	Diverge			E	35.7
I-10 b/t Washington and Dalrymple	Weaving	D	32.0	D	33.1
I-10 off ramp to Perkins Rd	Diverge			F	39.2
I-10 off ramp to Acadian	Diverge			E	38.1
I-10 b/t on ramp from Acadian and off ramp to College Dr	Weaving			F	45.0
I-10 on ramp from College Dr	Merge			D	32.7
I-10 b/t College Dr and I-12	Freeway			E	42.7
I-10 ramp to I-10 EB (at I-12)	Freeway			D	26.6

-- Freeway segment demand exceeded capacity.

The results in Tables 3.9 and 3.10 indicate that interchange improvements are still required in addition to the widening on I-10. Proposed lengthening of acceleration/deceleration lanes to meet current standards is expected to improve operations at ramp junctions.

A detailed review of the analysis for the eastbound I-10 freeway segment between Dalrymple and Perkins indicates the LOS F is borderline with the estimated design year traffic volumes. Widening to provide two additional lanes is not justified as it would have significant ROW and environmental impacts. The westbound I-10 freeway segment between Highland and LA 1 is expected to operate at LOS F as the additional lane does not extend across the bridge span. The capacity analysis does not recognize the increased capacity the proposed downstream improvements will provide due to better distribution of traffic in the three lanes on the bridge.

Table 3.11
Level of Service and Capacity Analysis Results
LA 1 to LA 30 Direct Connection
PM Peak

Location	Analysis Type	LOS	Density (pc/mi/ln)
I-10 EB on ramp from LA 1	Merge	F	37.1
I-10 EB b/t LA 1 and Nicholson Dr/Highland Rd	Freeway	D	29.1
I-10 EB off ramp to Nicholson Dr/Highland Rd	Diverge	A	0.0
I-10 off ramp to LA 1	Diverge	B	18.8
I-10 b/t LA 1 and St. Louis St/St. Ferdinand St	Freeway	D	30.9
I-10 on ramp from St. Louis St/St. Ferdinand St	Merge	C	25.7

The results in Table 3.11 indicate that the LA 1 to LA 30 direct connections are not expected to completely relieve the congestion on LA 1 northbound approaching the interstate.

Table 3.12
Level of Service and Capacity Analysis Results
Highpass
AM and PM Peak

Location	Analysis Type	AM Peak		PM Peak	
		LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
I-10 EB on ramp from Highpass	Merge	C	23.9	C	27.3
I-10 EB off ramp to Highpass	Diverge	C	23.5	B	17.7
I-10 WB on ramp from Highpass	Merge	C	25.2	D	30.9
I-10 WB off ramp to Highpass	Diverge	C	24.4	C	23.4
I-12 EB on ramp from Highpass	Merge	C	23.9	D	33.0
I-12 WB off ramp to Highpass	Diverge	C	27.3	C	21.4

The results of Table 3.12 indicate that each of the proposed ramp junctions for the Highpass are expected to operate acceptably.

Vissim Modeling

To complete the Tier 1 Matrix for the second round of public meetings held in February and March 2016, alternatives were analyzed using Vissim modeling to determine the effects on traffic operations. The base model was cropped and recalibrated to represent 2015/2016 conditions, particularly to replicate the unique lane selection behavior that occurs on I-10 EB near the Bridge/merge I-110 SB. Modifications to the I-10 at Essen Lane interchange were also coded into the future year models. CRPC TDM output was used to develop revised base and projected traffic volumes for the various improvement scenarios for use in the following Vissim models:

- ***Recalibrated AM and PM Model cropped at Essen Lane*** (2015 Base and 2032 No Build)- The original model, which extended to Walker on I-12 and Highland on I-10, was cropped at Essen Lane. The models were then calibrated to capture the unique traffic patterns caused by having effectively one continuous through lane on I-10 eastbound. Under the current conditions the middle lane of the bridge is often queued over the span of the bridge while the left and right lanes are less congested. The model was coded for a higher portion of traffic to choose the middle lane on I-10 EB, with some making lane changes at the last minute, as was observed in the field. CRPC TDM was used to estimate demand data on I-10 EB and LA 1, and other locations. Improvements to the Essen Lane interchange that were under construction at the time of these efforts were coded into the 2032 No Build models.

- ***Initial Concept*** – One Additional Lane on I-10 (2015 base and 2032)- This model included one additional lane in each direction on I-10 except over the bridge. The additional lane was not added over the main bridge span as the anticipated cost to modify the bridge structure would be excessive. This was the initial concept presented in the first round of public meetings. For the second round of public meetings, this concept was presented as the base concept.

- ***Initial Concept - One Additional Lane on I-10 with Washington St Left Exit and College Directional Ramps*** (2015 base and 2032)- As the alternative was refined, it was determined that the Washington Street left exit from I-110 and directional ramps from I-10 and I-12 to College Drive were to be included with the initial concept. This concept was presented at the second round of public meetings.

- ***Direct Connection to/from LA 1 and LA 30*** (2015 PM Only)- This model included a directional ramp from LA 1 to Nicholson and from St Louis Street to LA 1. The additional lanes across the bridge were assumed to hang outside of the main structure and not have access to the mainline I-10.

- ***Four-lane Highpass between LA 415 and I-12*** (2015 AM & PM)- A highpass model was created as an alternative to the Additional Lane concept. The highpass was modeled with two lanes in each direction and with the only access points from I-10/I-12 west of Essen Lane to west of LA 1. The highpass would require an additional structure to cross the Mississippi River. Traffic demand on the highpass was estimated using the CRPC TRM.

Projected traffic volumes for these alternatives/scenarios are presented in Figures 3.6 to 3.27 and the results are presented in Graphs 3.5-3.8

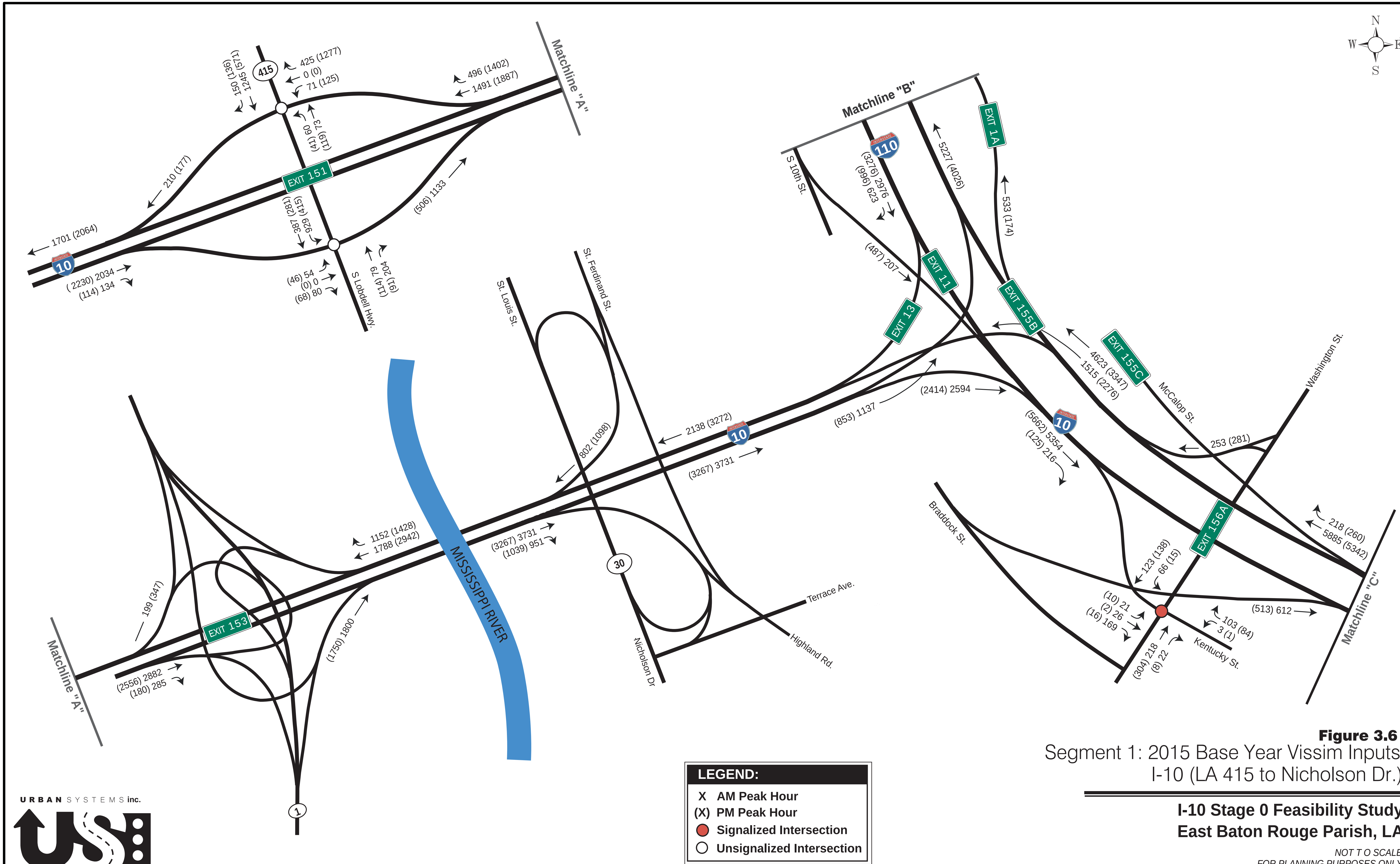


Figure 3.6
Segment 1: 2015 Base Year Vissim Inputs
I-10 (LA 415 to Nicholson Dr.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

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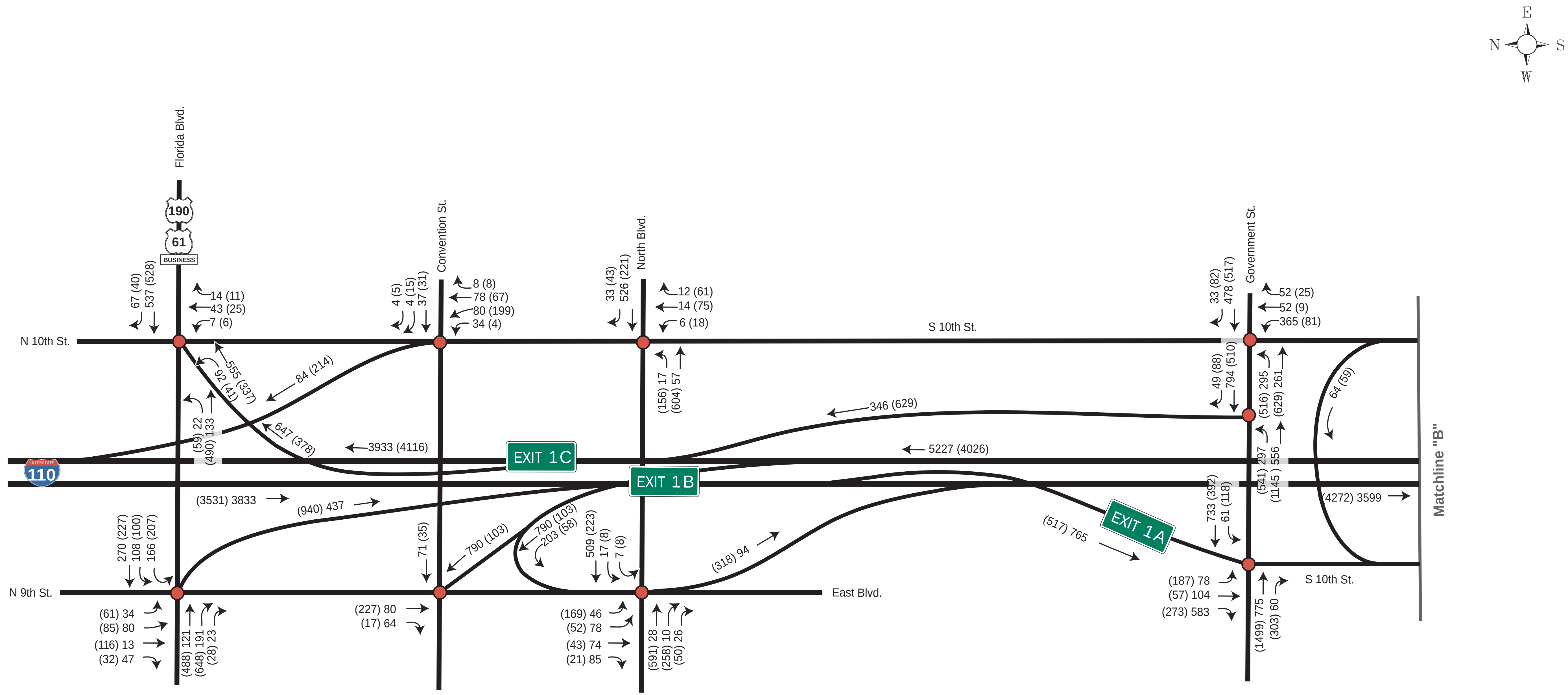

Figure 3.7

Segment 2: 2015 Base Year Vissim Inputs
I-110 (Florida Blvd. to Goverment St.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

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LEGEND:

- **X AM Peak Hour**
- **(X) PM Peak Hour**
- **Signalized Intersection**
- **Unsignalized Intersection**

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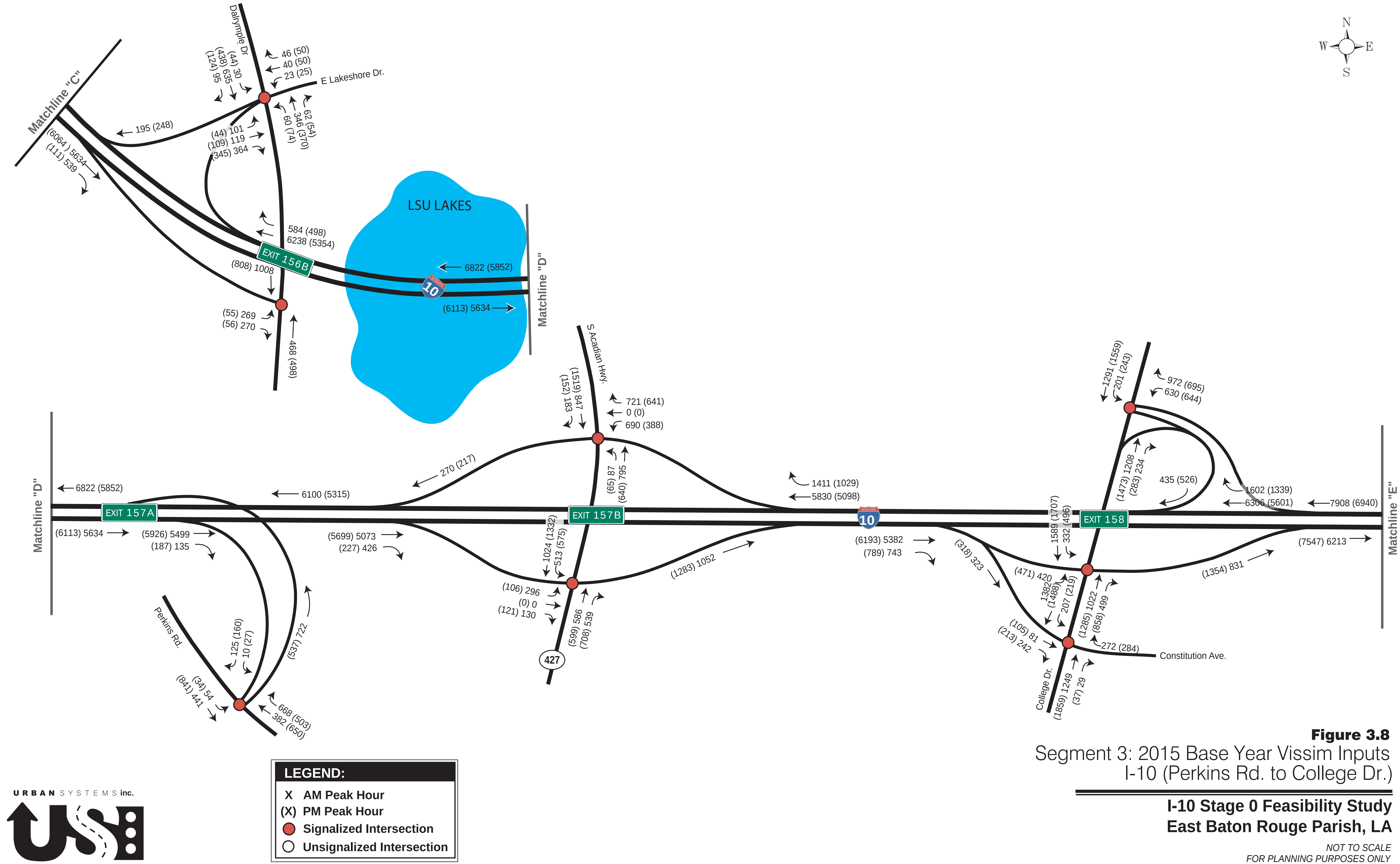

Figure 3.8

Segment 3: 2015 Base Year Vissim Inputs
I-10 (Perkins Rd. to College Dr.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

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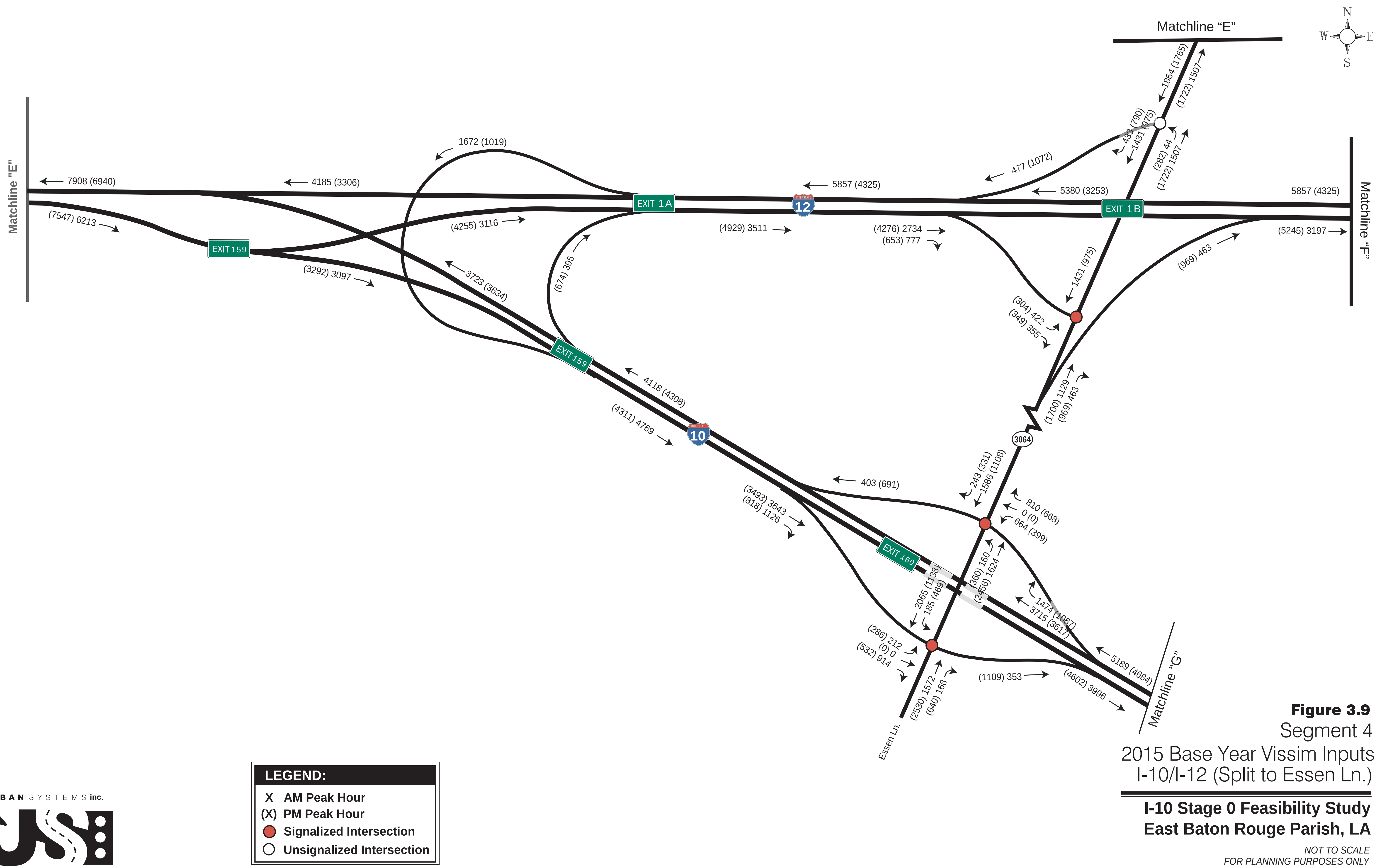

Figure 3.9

Segment 4

2015 Base Year Vissim Inputs

I-10/I-12 (Split to Essen Ln.)

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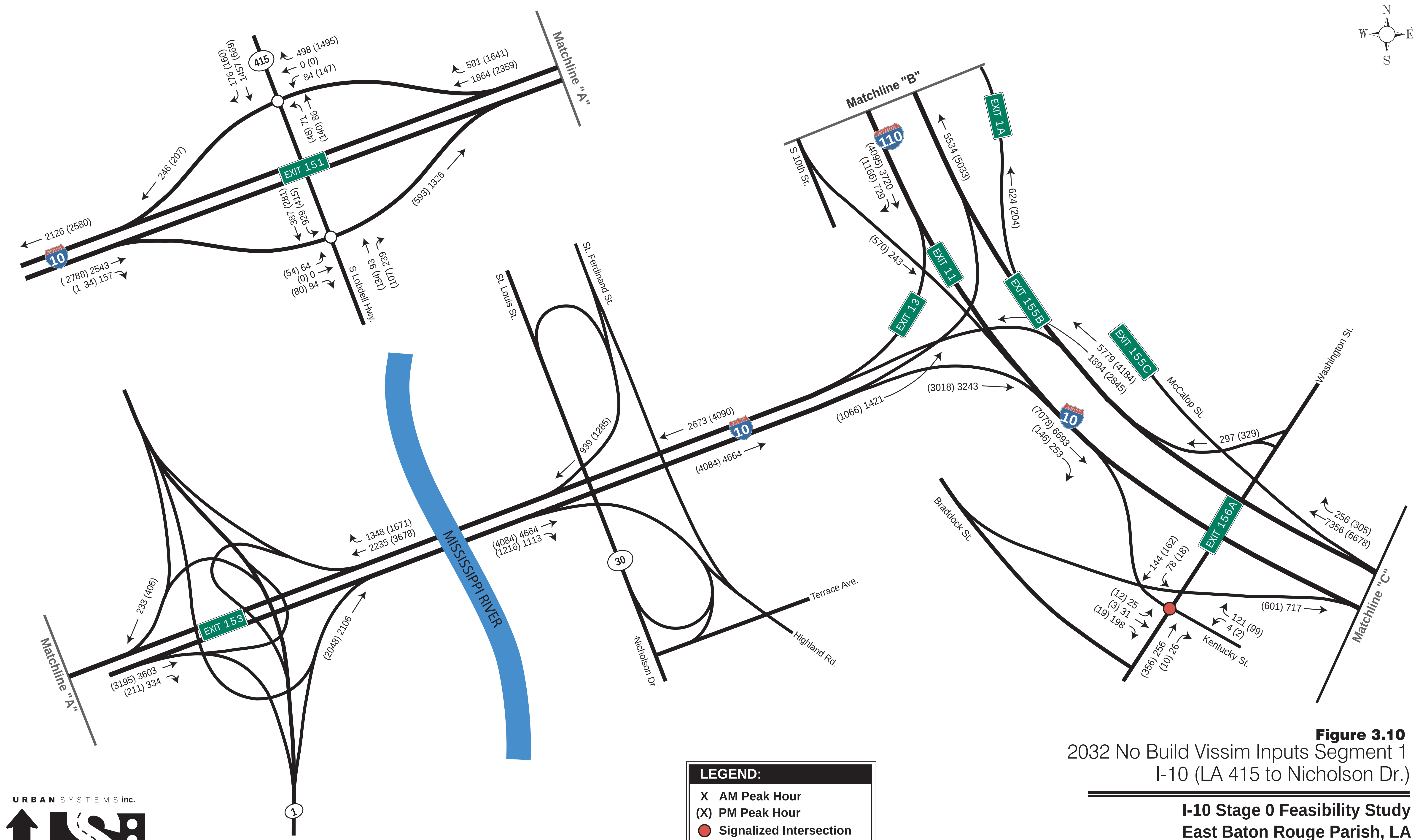

Figure 3.10
2032 No Build Vissim Inputs Segment 1
I-10 (LA 415 to Nicholson Dr.)

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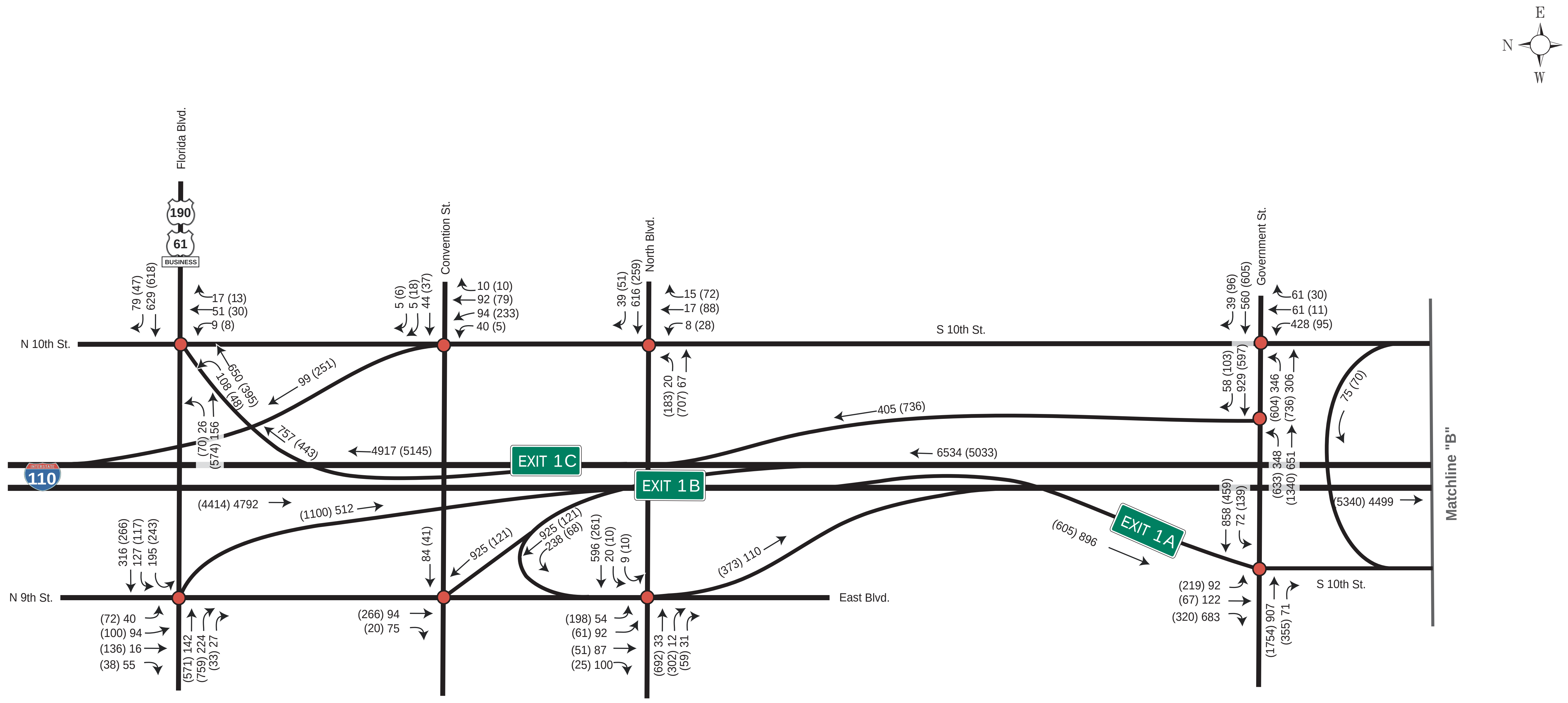

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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Figure 3.11

2032 No Build Vissm Inputs Segment 2
I-110 (Florida Blvd. to Goverment St.)

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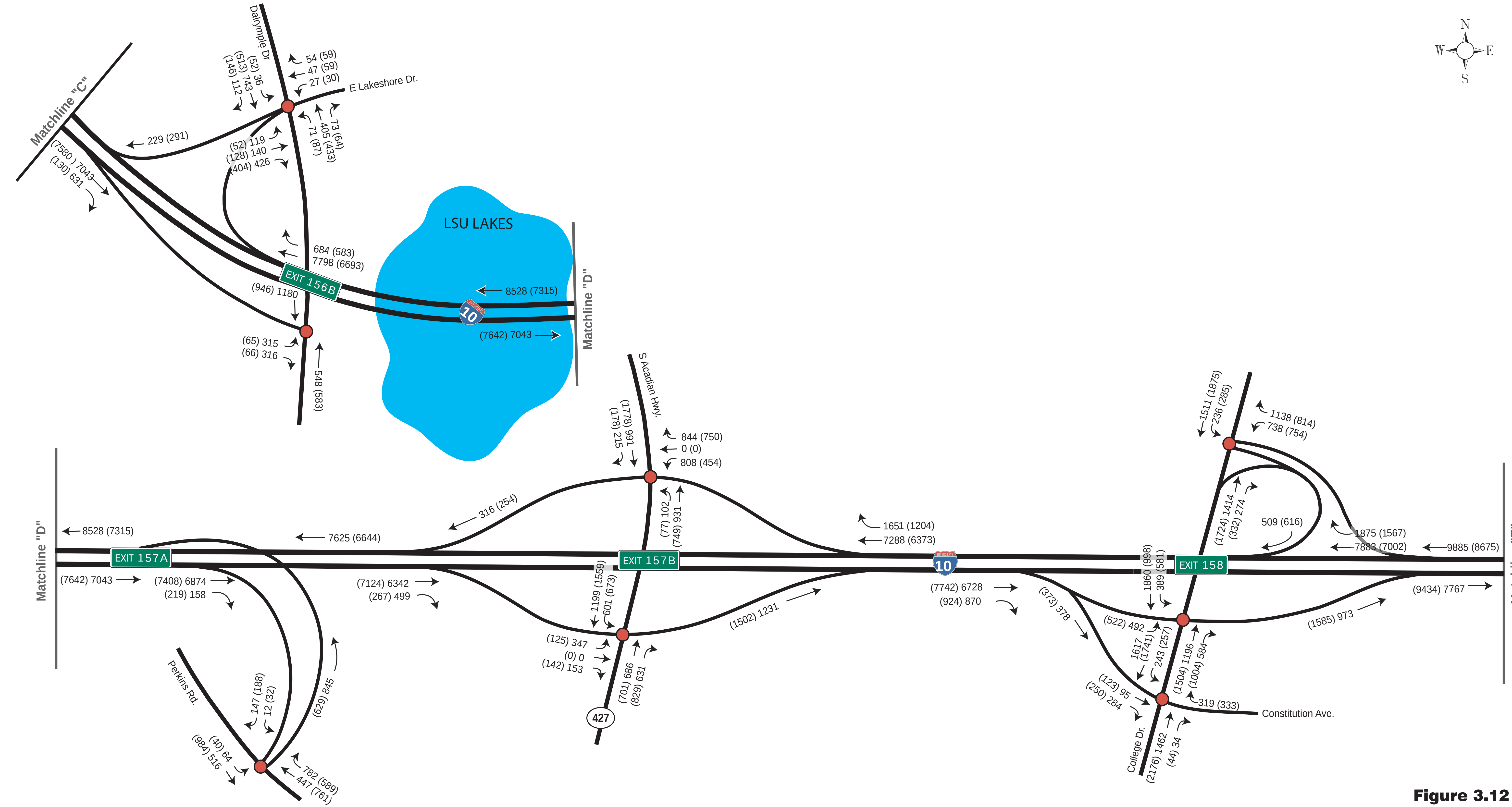

Figure 3.12
2032 No Build Vissim Inputs Segment 3
I-10 (Perkins Rd. to College Dr.)

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LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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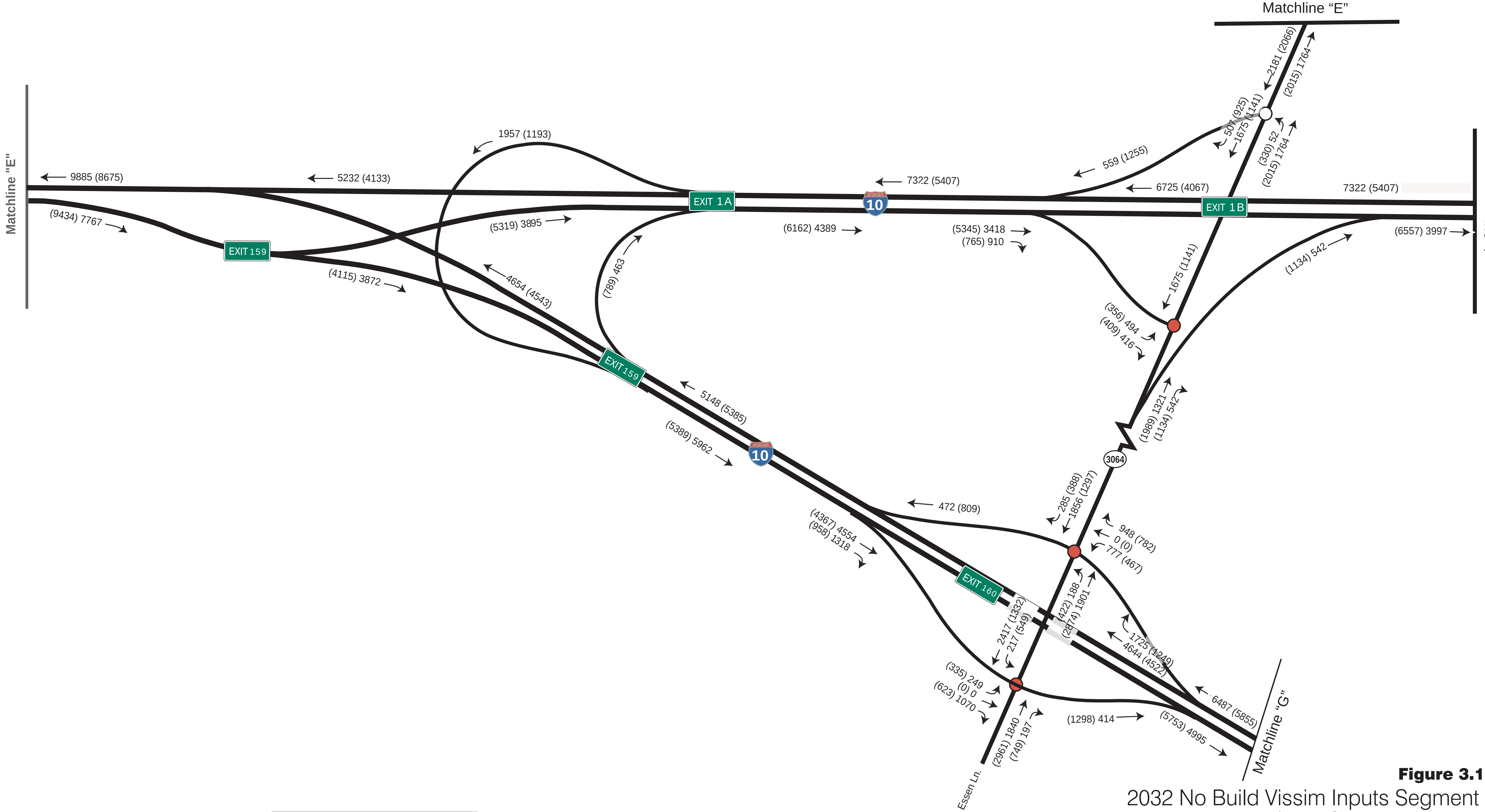

Figure 3.13

2032 No Build Vissim Inputs Segment 4
I-10/I-12 (Split to Essen Ln.)

LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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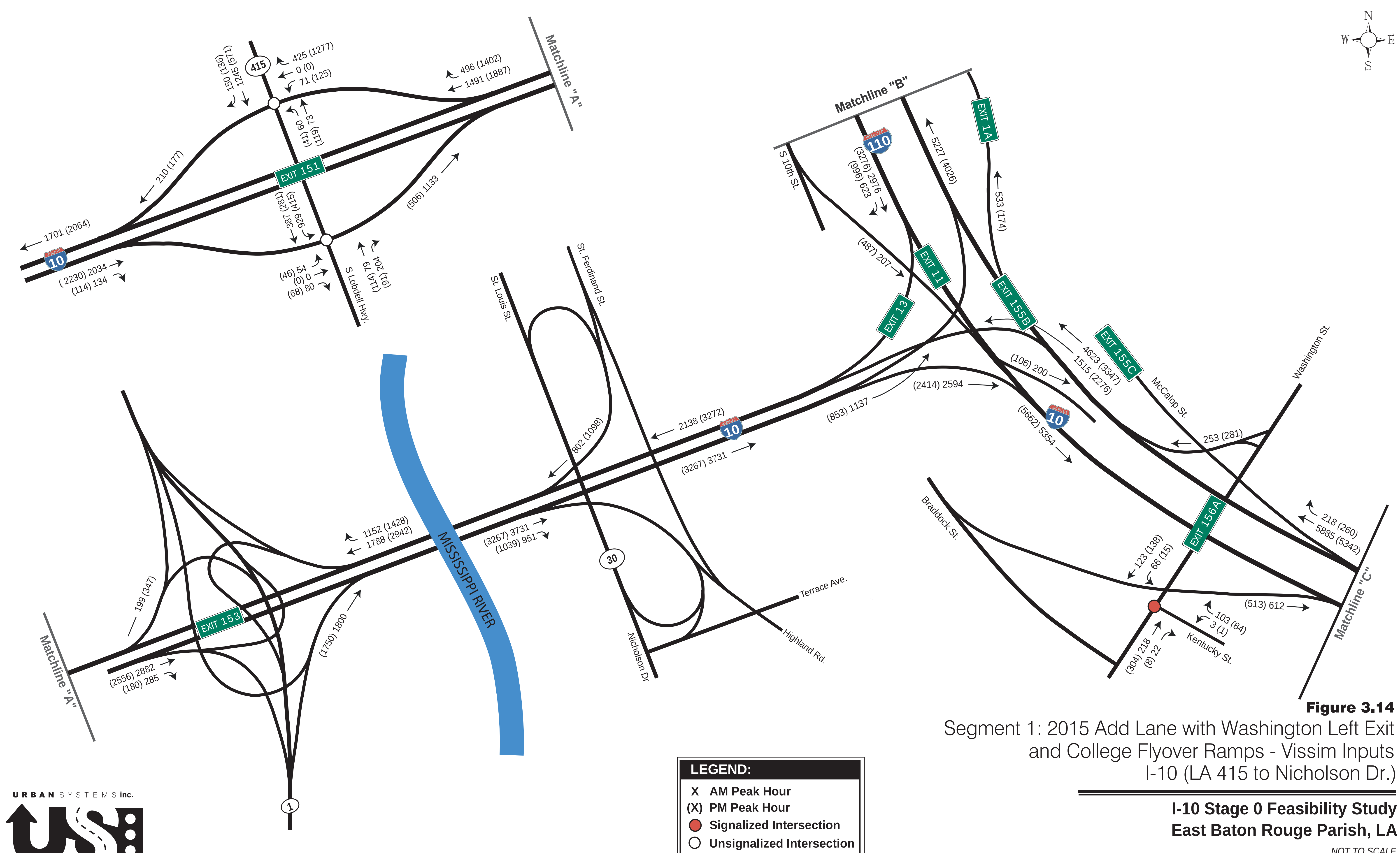

Figure 3.14

Segment 1: 2015 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs
I-10 (LA 415 to Nicholson Dr.)

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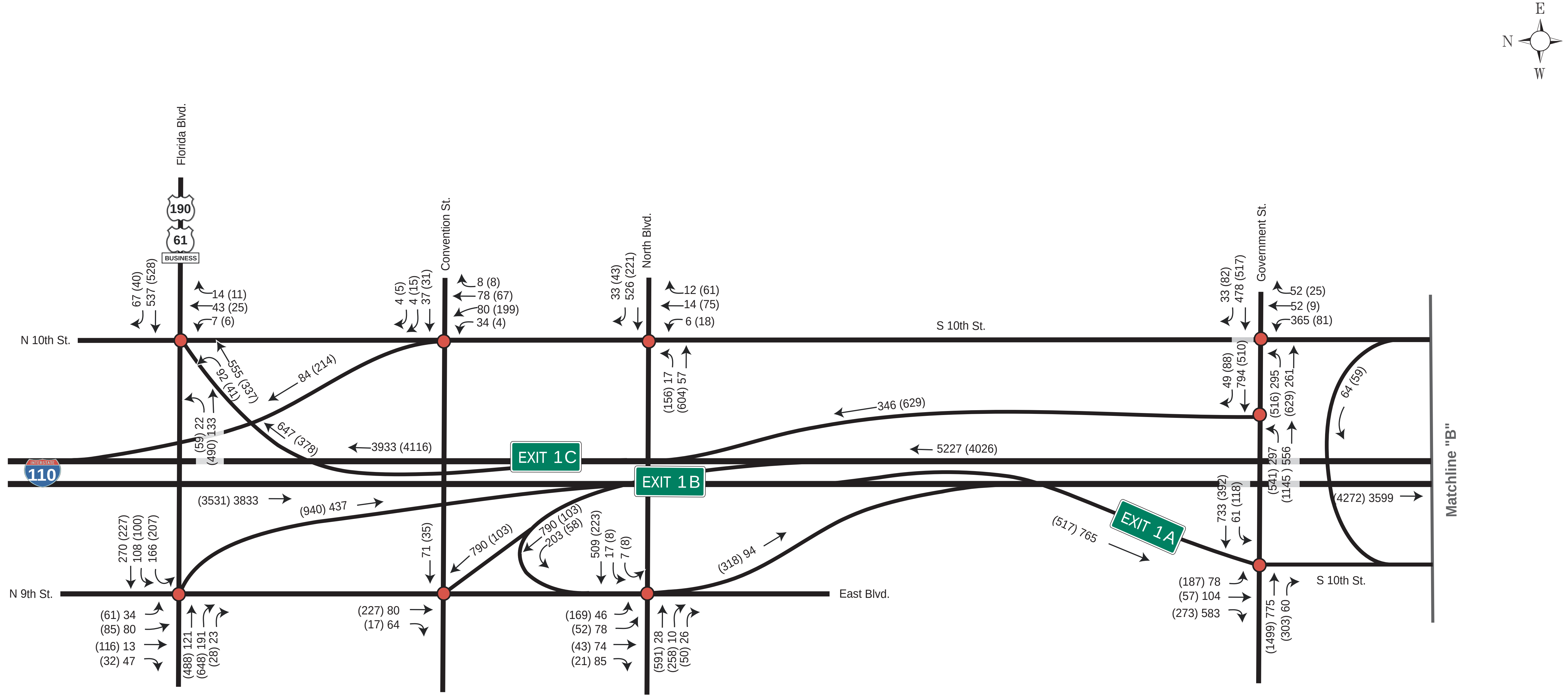

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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Figure 3.15

Segment 2: 2015 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs
I-110 (Florida Blvd. to Goverment St.)

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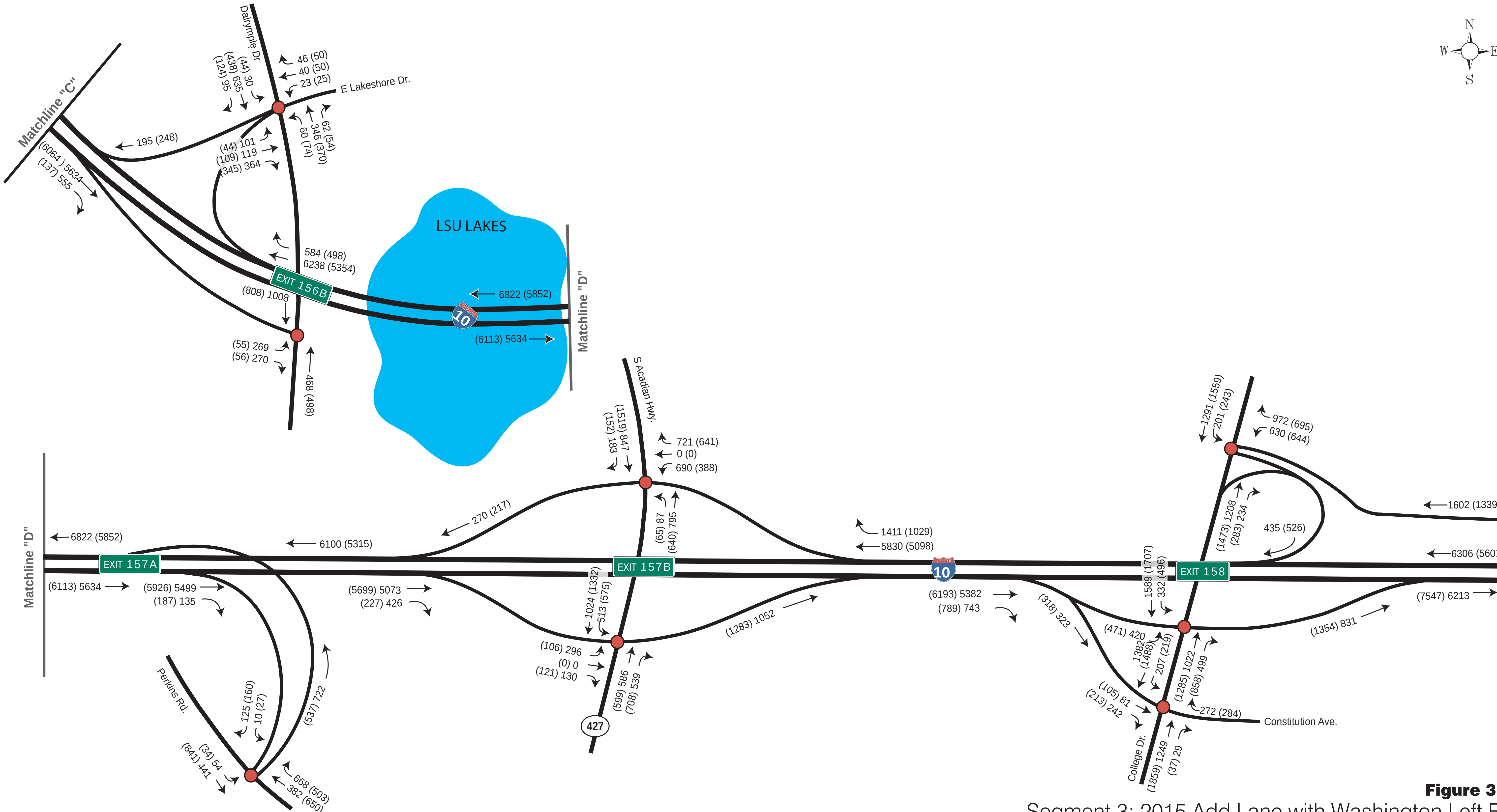

Figure 3.16

Segment 3: 2015 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs I-10 (Perkins Rd. to College Dr.)

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LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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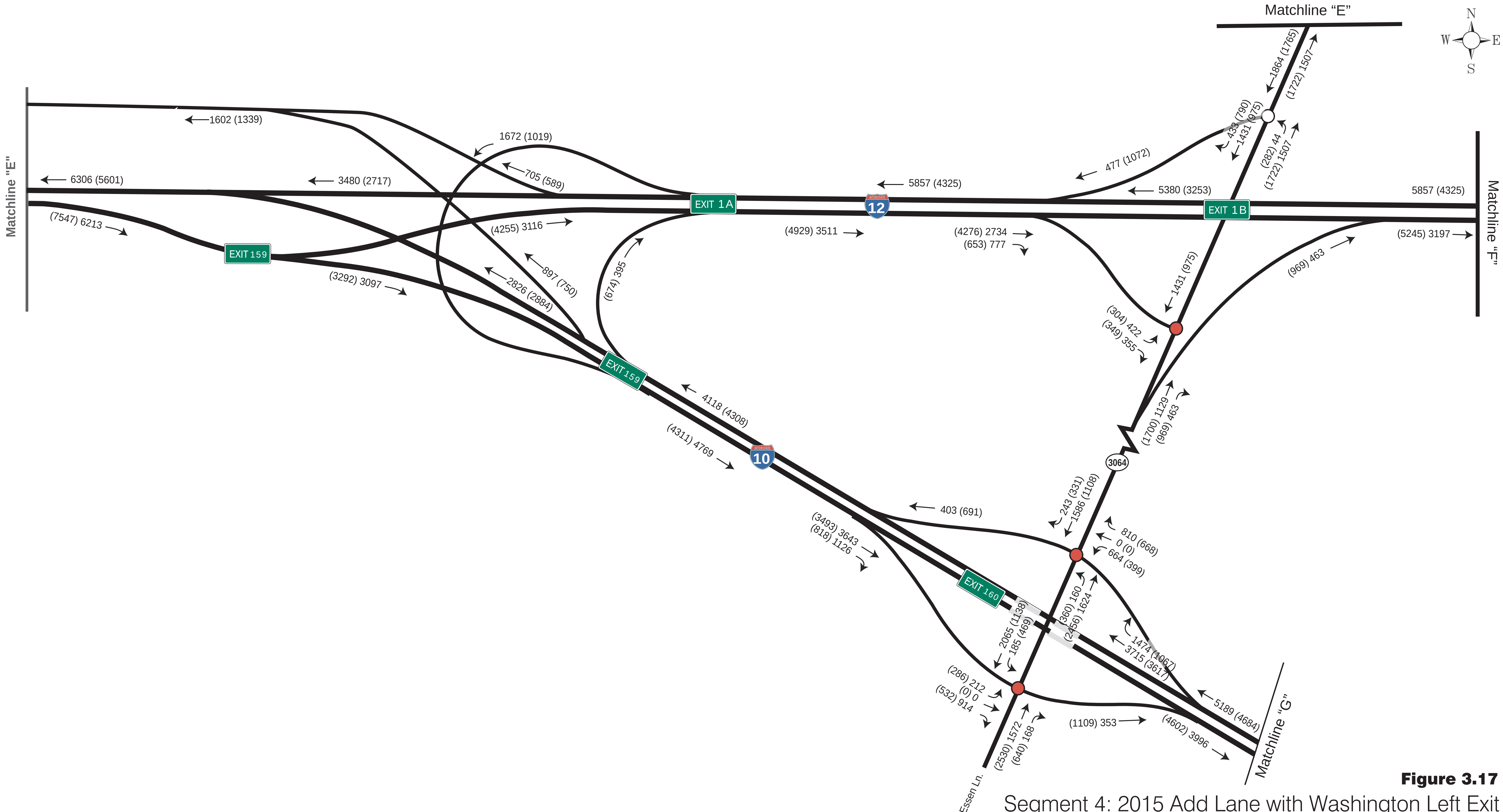

Figure 3.17

Segment 4: 2015 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs
I-10/I-12 (Split to Essen Ln.)

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LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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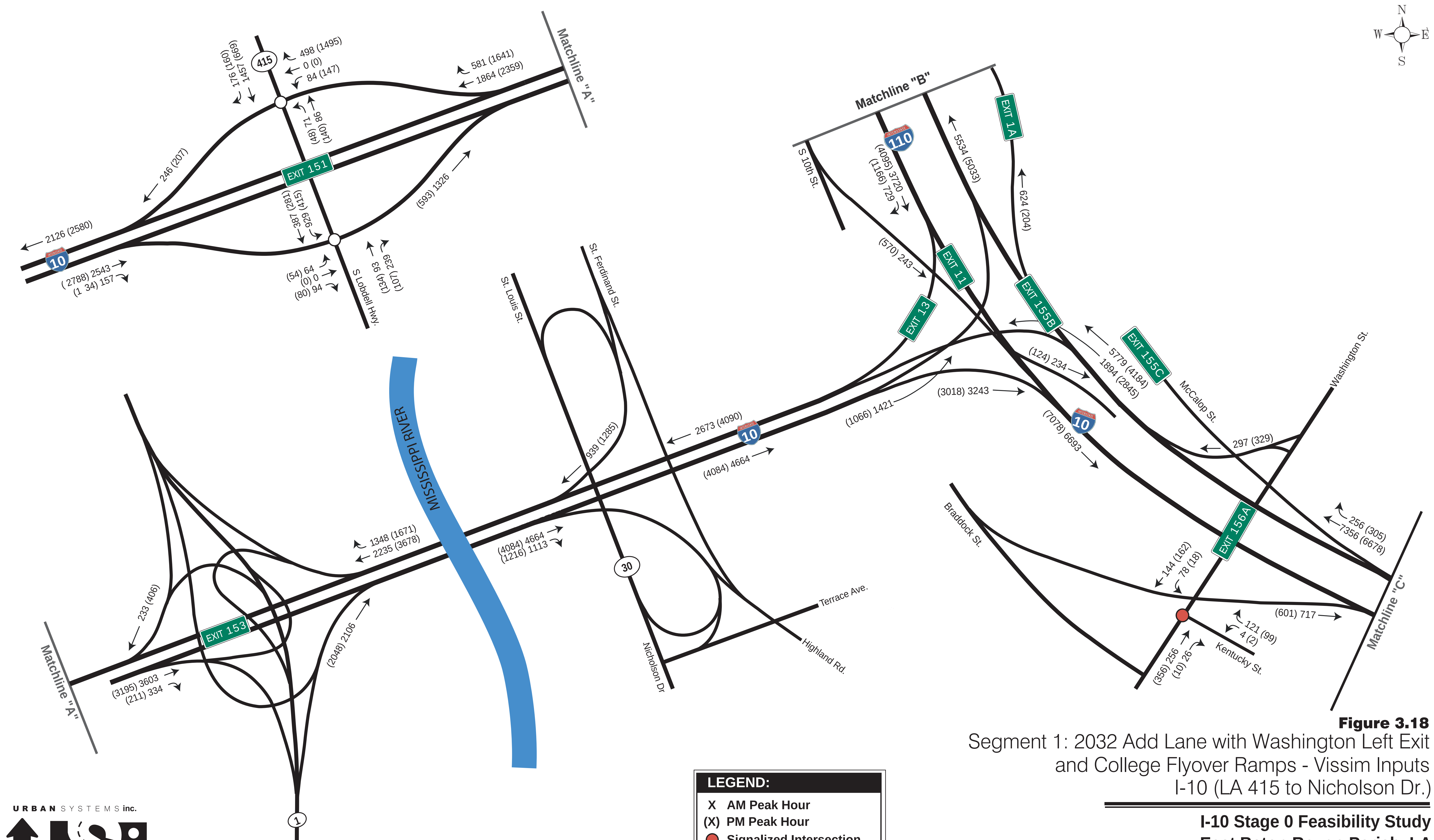

LEGEND:

X AM Peak Hour
(X) PM Peak Hour
Signalized Intersection
Unsignalized Intersection

Figure 3.18

Segment 1: 2032 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs
I-10 (LA 415 to Nicholson Dr.)

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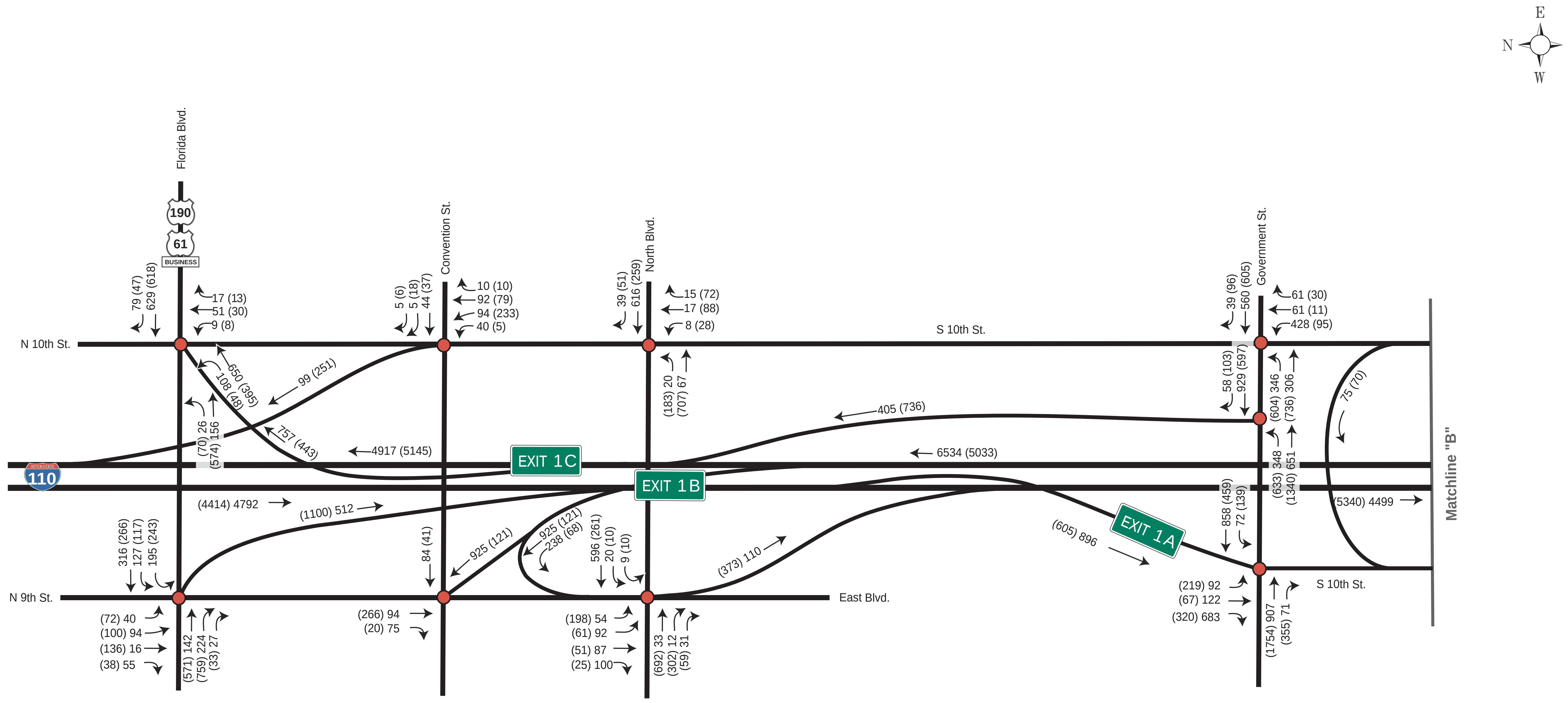

Figure 3.19

Segment 2: 2032 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs

I-110 (Florida Blvd. to Goverment St.)

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LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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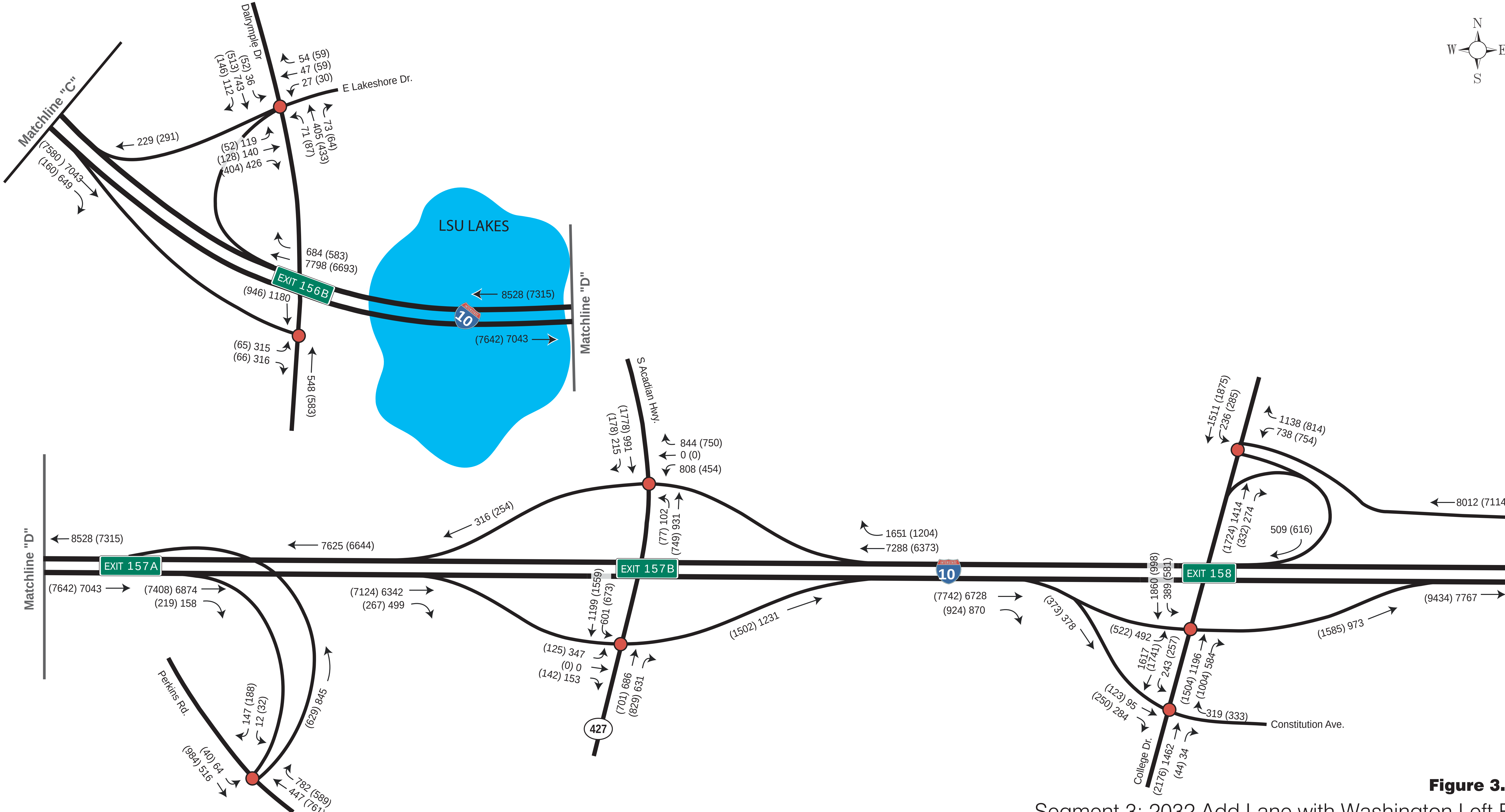

Figure 3.20

Segment 3: 2032 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs I-10 (Perkins Rd. to College Dr.)

LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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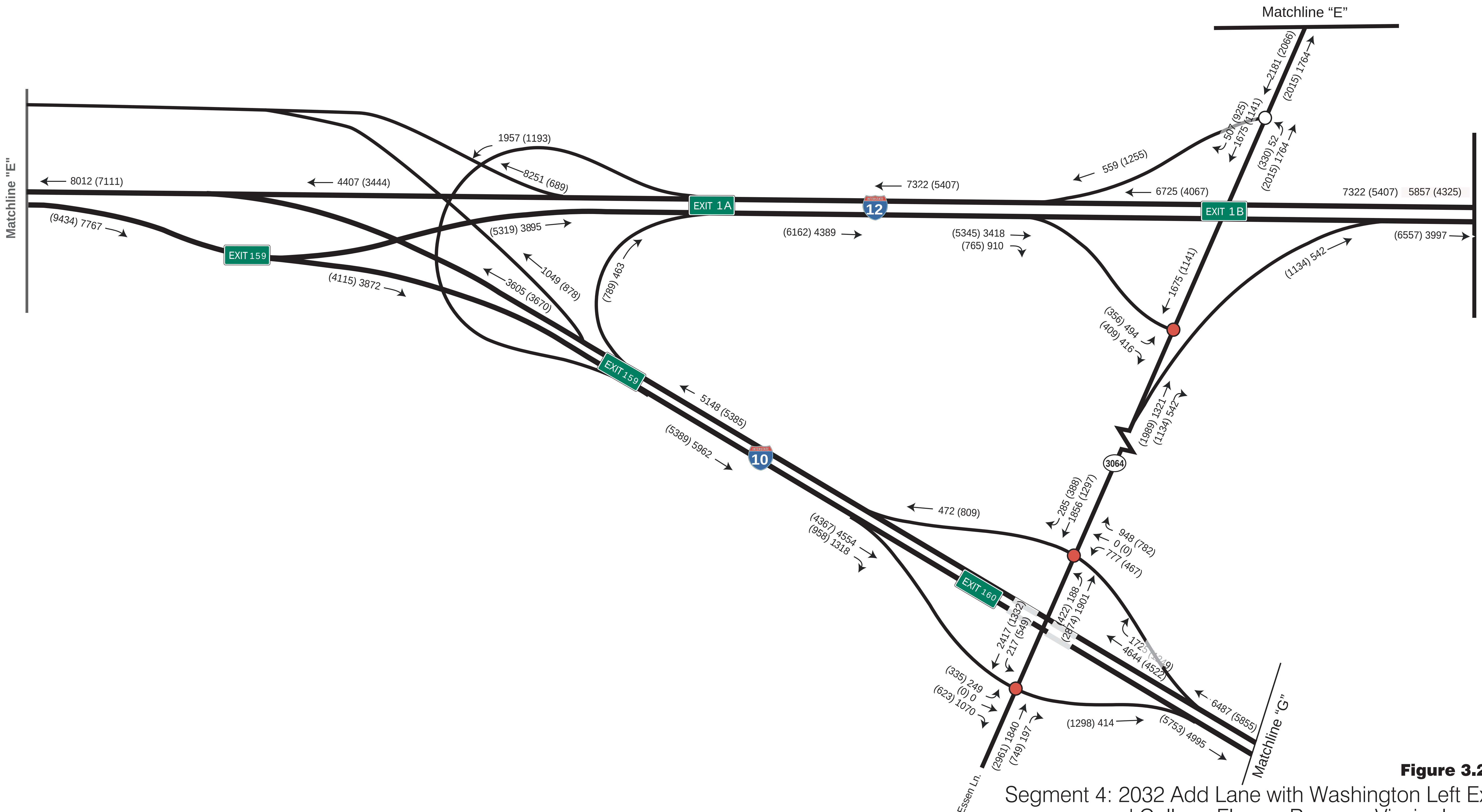

Figure 3.21

Segment 4: 2032 Add Lane with Washington Left Exit and College Flyover Ramps - Vissim Inputs I-10/I-12 (Split to Essen Ln.)

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LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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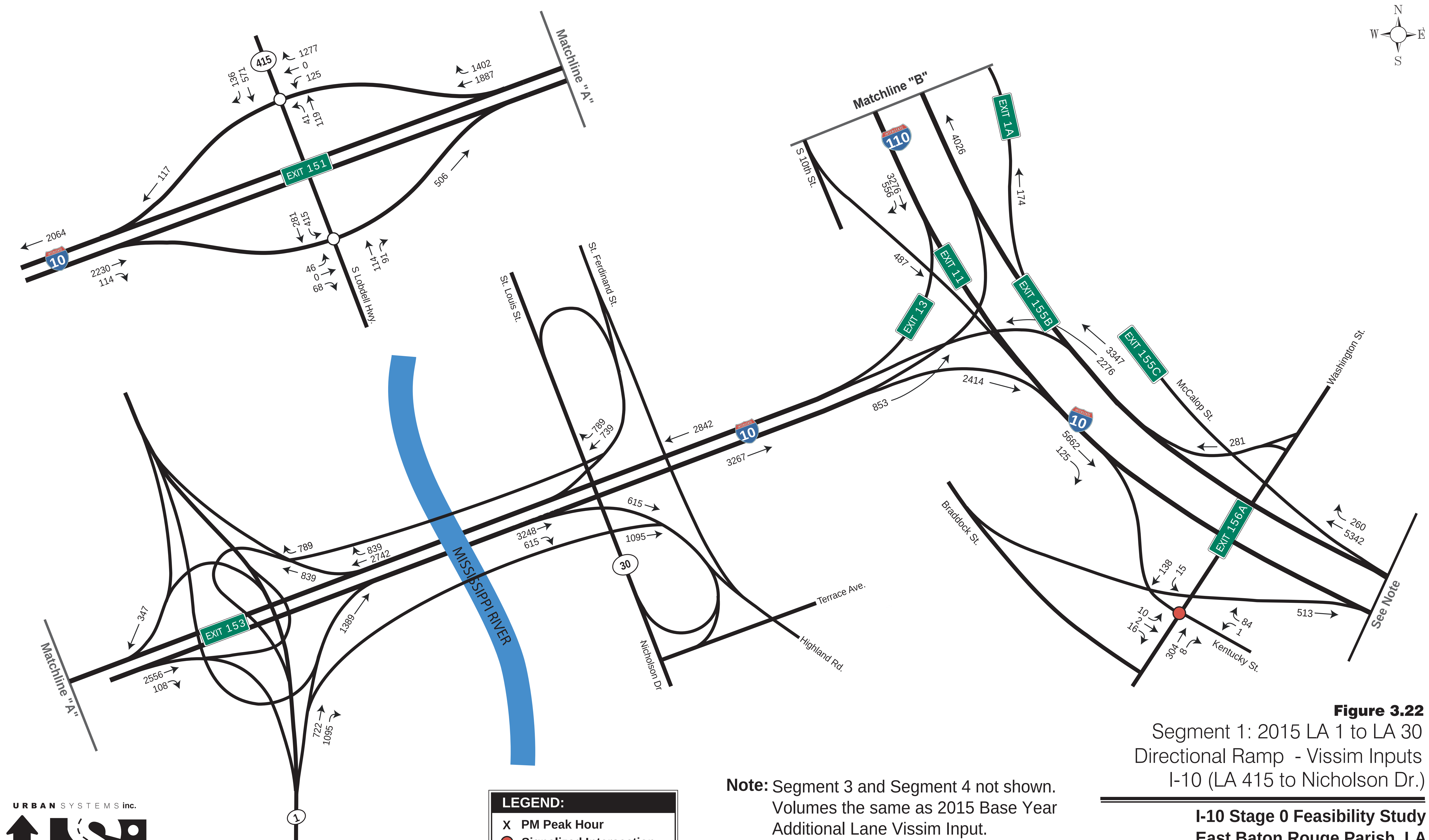

Figure 3.22

Segment 1: 2015 LA 1 to LA 30
Directional Ramp - Vissim Inputs
I-10 (LA 415 to Nicholson Dr.)

Note: Segment 3 and Segment 4 not shown. Volumes the same as 2015 Base Year Additional Lane Vissim Input.

LEGEND:
- X PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

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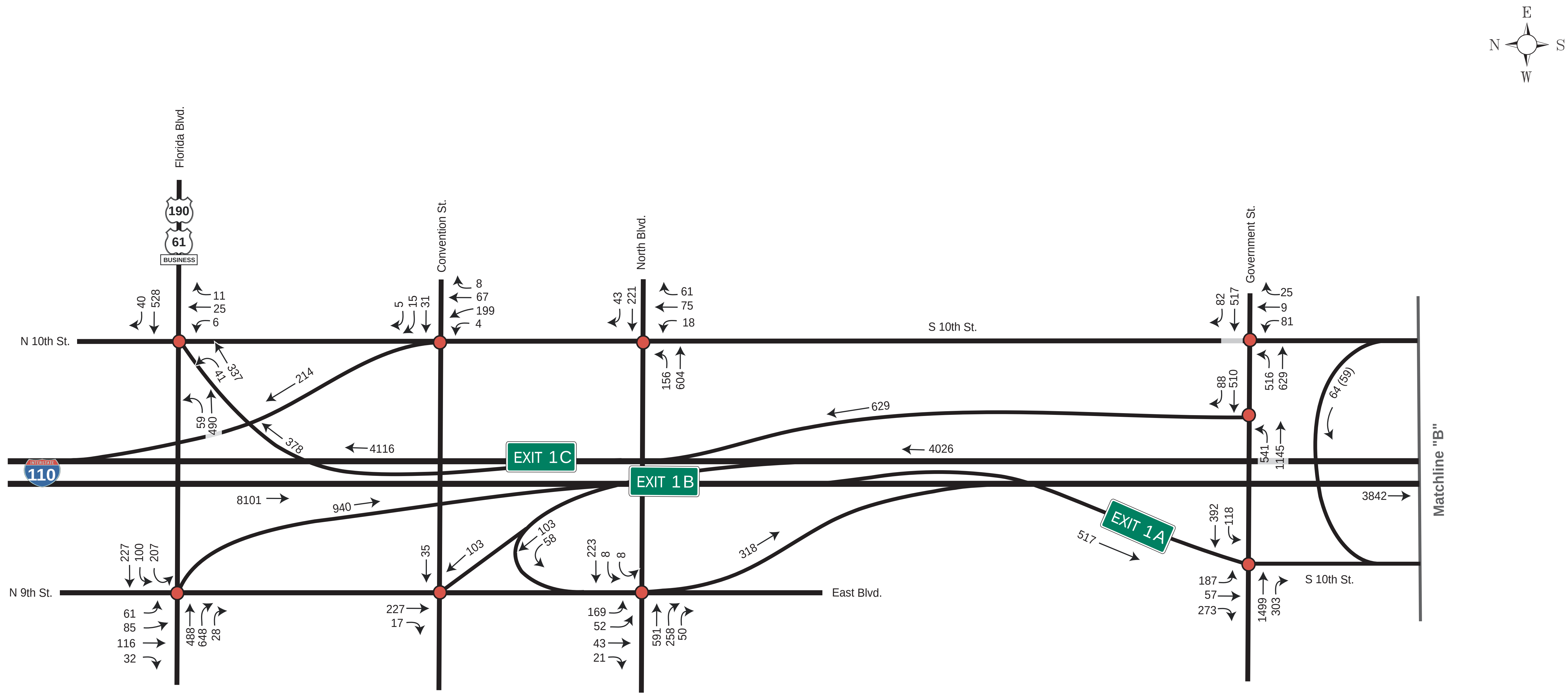

LEGEND:

X PM Peak Hour

● Signalized Intersection

○ Unsignalized Intersection

Figure 3.23

Segment 2: 2015 LA 1 to LA 30
Directional Ramp - Vissim Inputs
I-110 (Florida Blvd. to Goverment St.)

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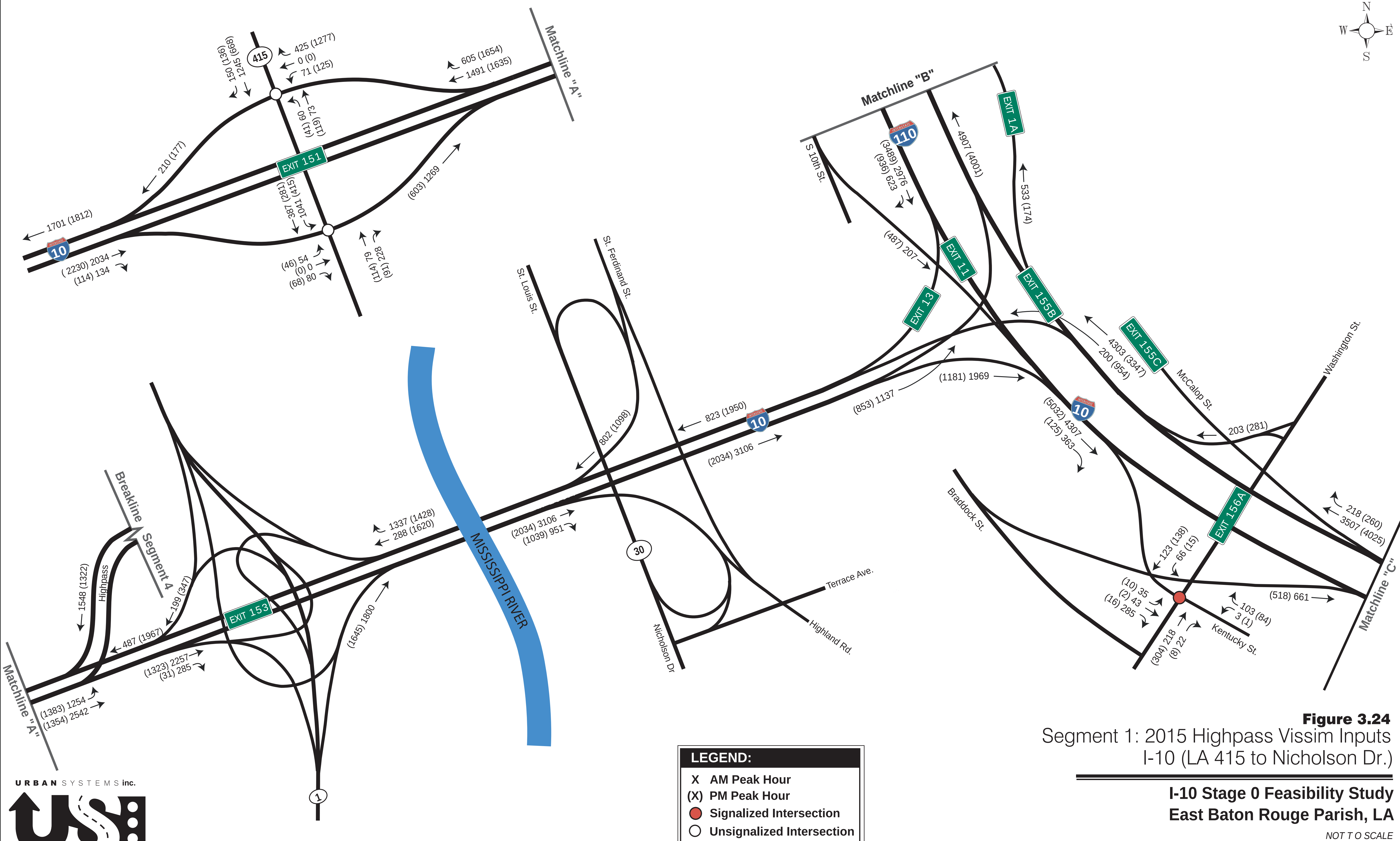

Figure 3.24
Segment 1: 2015 Highpass Vissim Inputs
I-10 (LA 415 to Nicholson Dr.)

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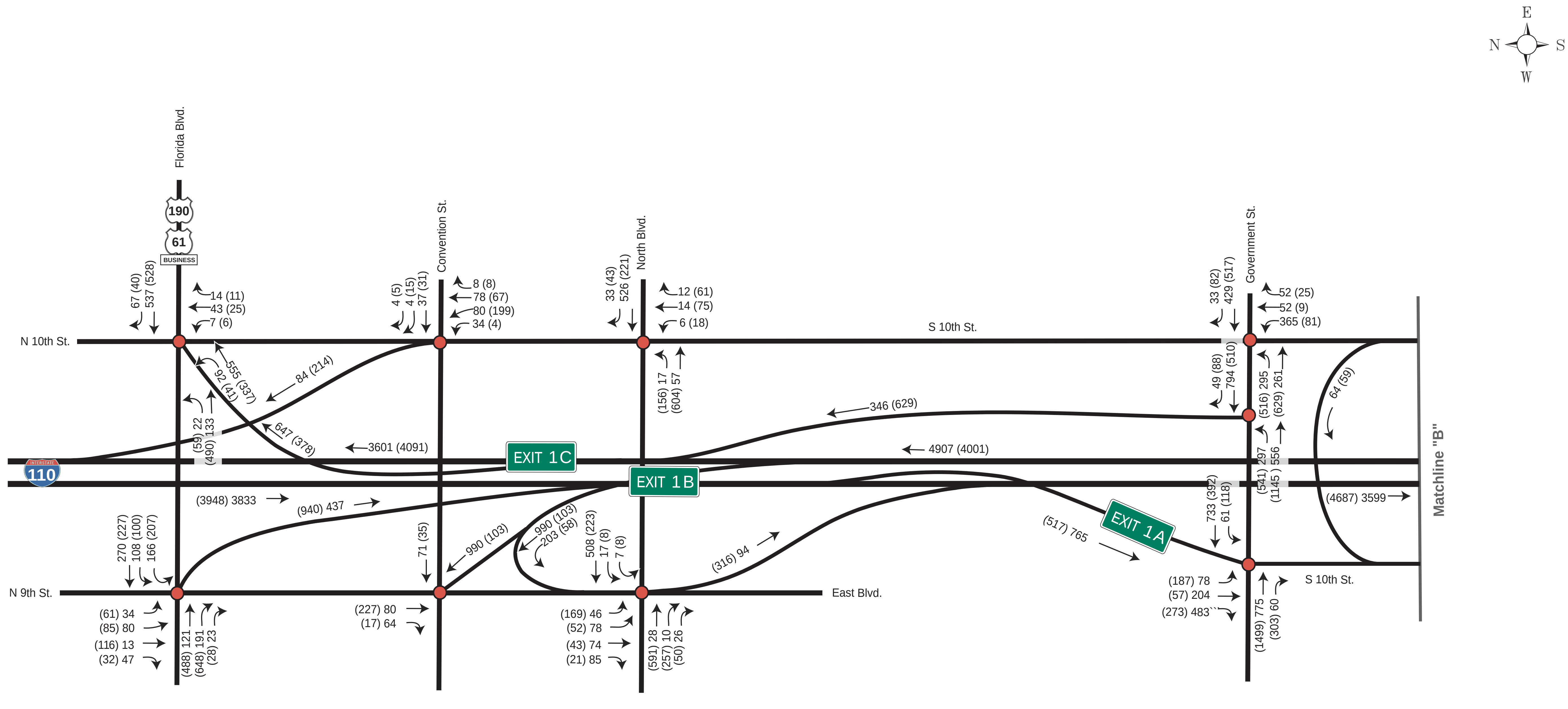

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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Figure 3.25

Segment 2: 2015 Highpass Vissim Inputs
I-110 (Florida Blvd. to Goverment St.)

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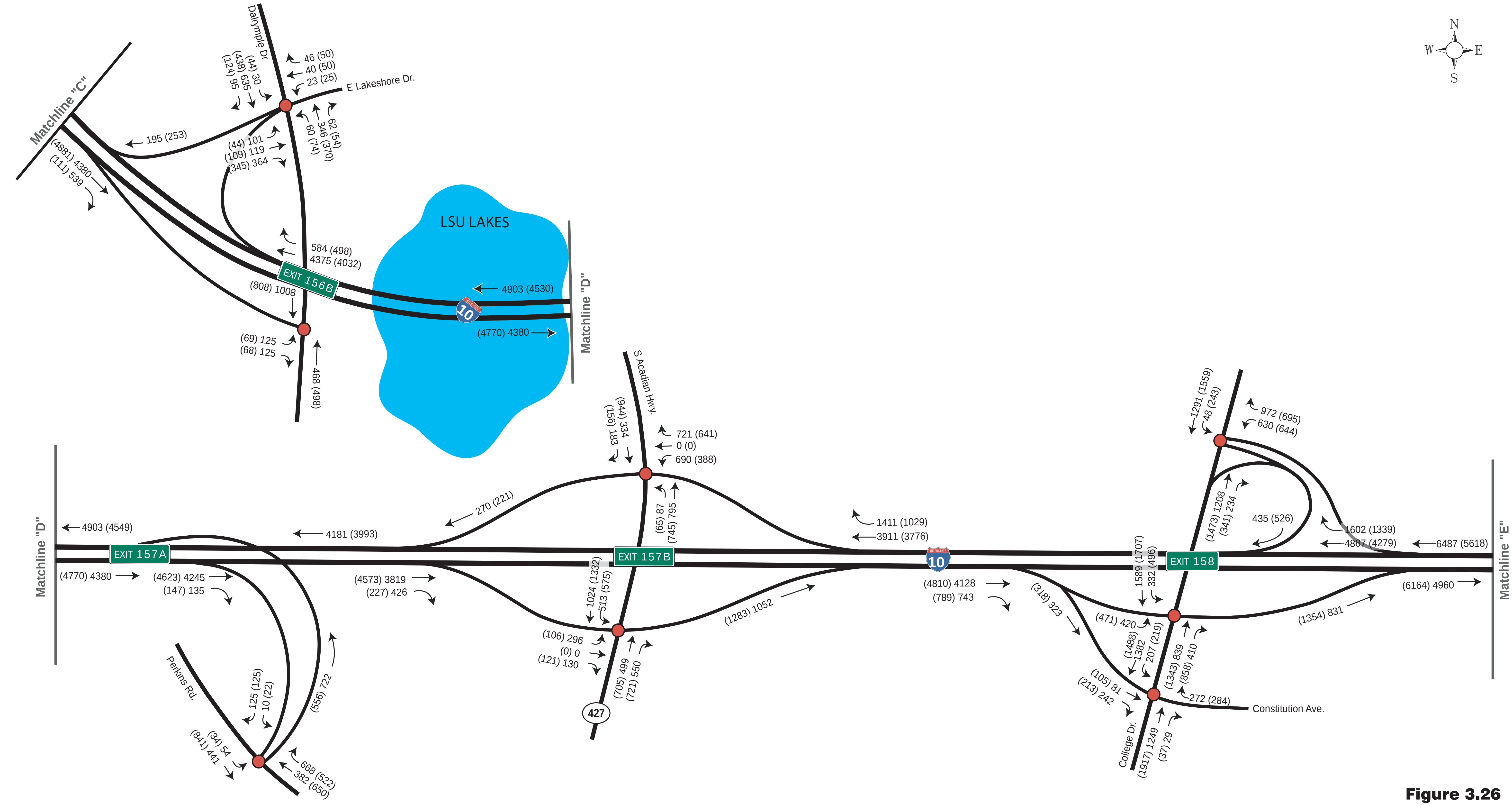

LEGEND:

- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

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Figure 3.26

Segment 3: 2015 Highpass Vissim Inputs
I-10 (Perkins Rd. to College Dr.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

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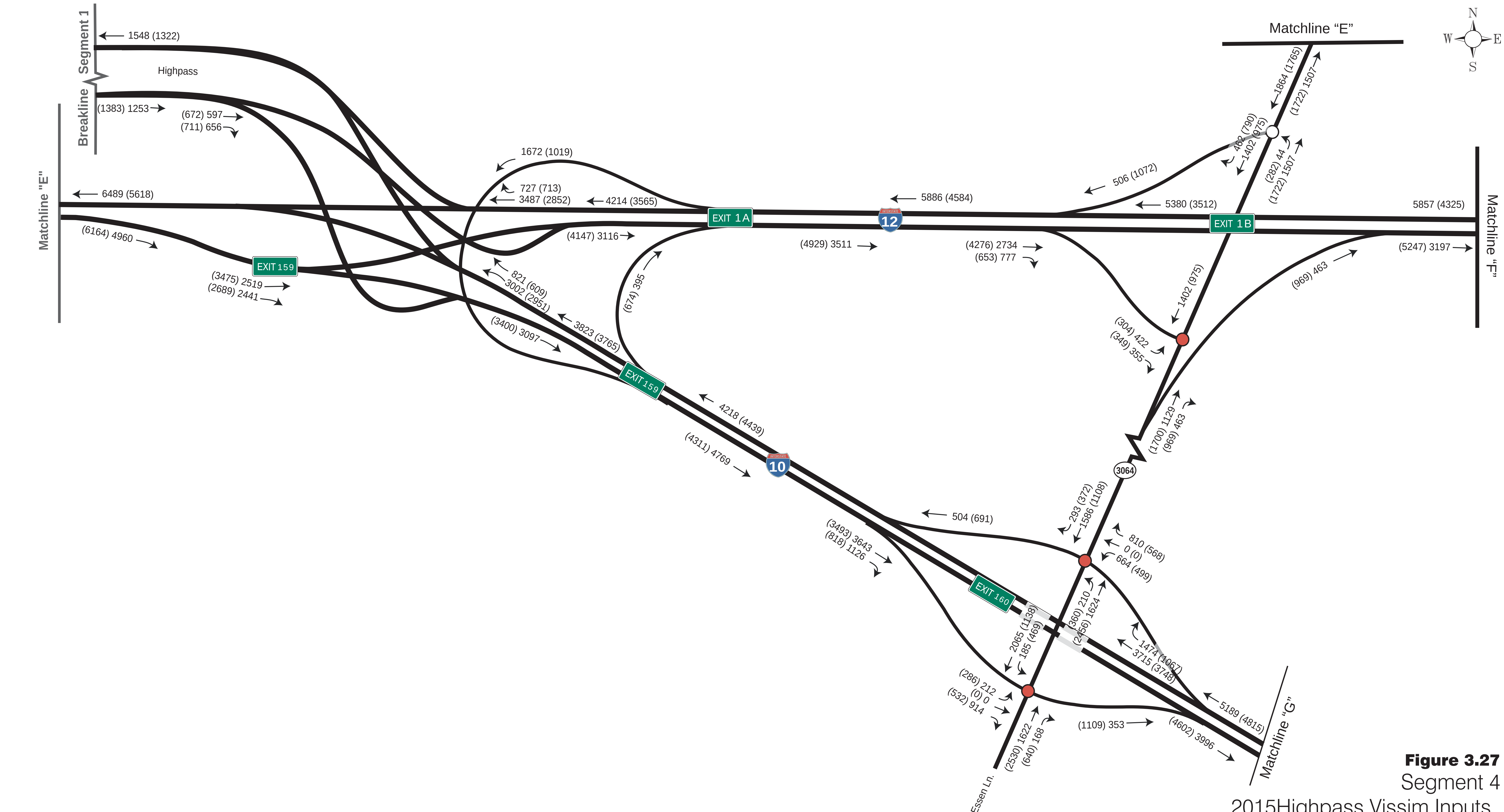


Figure 3.27

Segment 4

2015Highpass Vissim Inputs

I-10/I-12 (Split to Essen Ln.)

I-10 Stage 0 Feasibility Study
East Baton Rouge Parish, LA

NOT TO SCALE
FOR PLANNING PURPOSES ONLY

LEGEND:
- X AM Peak Hour
- (X) PM Peak Hour
- Signalized Intersection
- Unsignalized Intersection

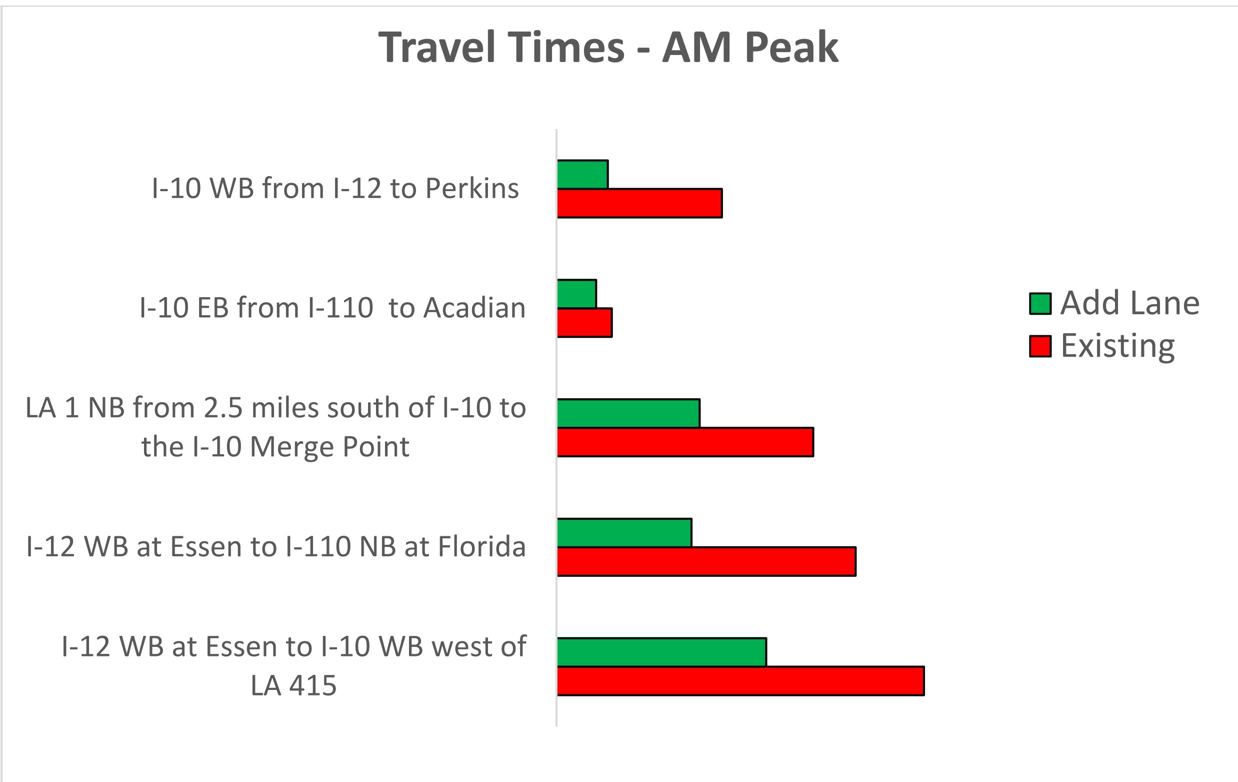
URBAN SYSTEMS inc.

Project # 10-085

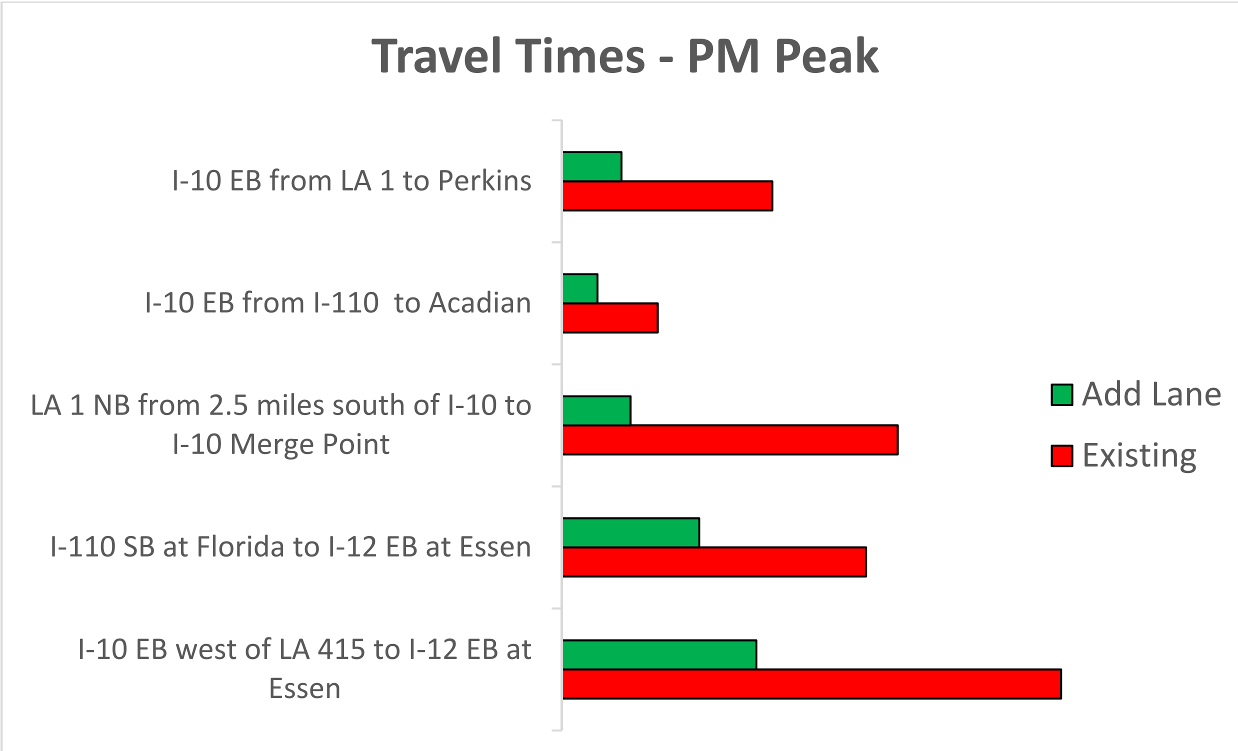
Measures of Effectiveness (MOEs) were not evaluated for the Direct Connection to/from LA 1 to LA 30 or the Highpass models. Visual inspection indicated only moderate improvements with the direct connection to/from LA 1 to LA 30. Visual inspection indicated that the operations are expected to be much improved from No Build conditions with the Highpass. If this alternative remains after screening for environmental impacts in the next stage of the project, the MOEs will be evaluated.

For the additional lane concept, MOEs from Vissim modeling using existing traffic volumes indicates average travel times in the AM peak period could be reduced as shown. Travel times do and will continue to vary depending on the time of day and route chosen. Graphs 3.5 and 3.6 presents a comparison of average travel times in the existing year for the AM and PM respectively.

Graph 3.5
AM Peak Travel Times
Existing Conditions vs Add Lane



Graph 3.6
PM Peak Travel Times
Existing Conditions vs Add Lane

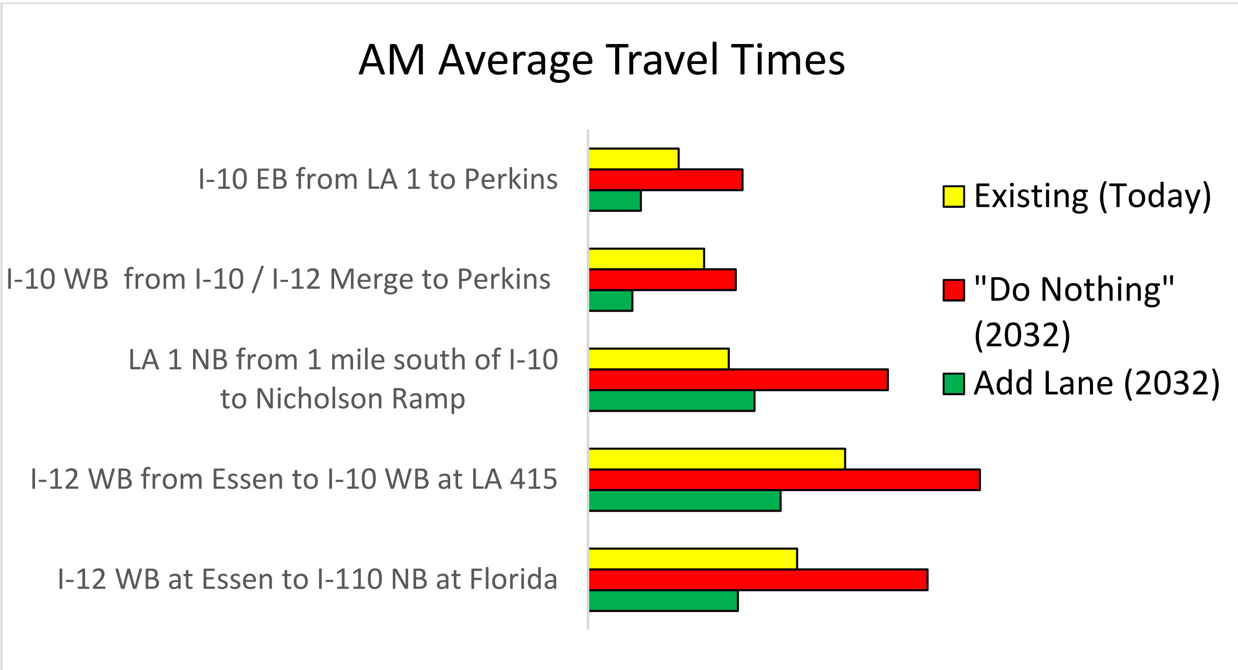


As shown in Graphs 3.5 and 3.6, notable reductions in travel times can be expected as a result of the proposed improvements. However just building these improvements alone will not provide enough capacity / relief forever.

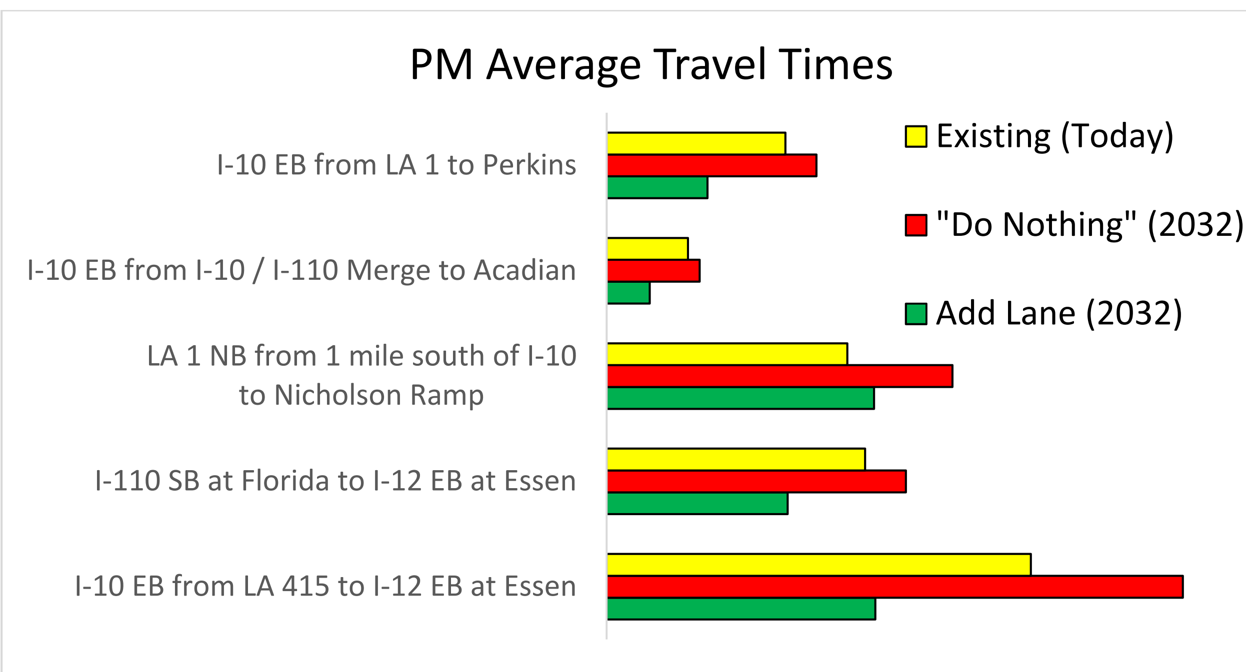
Traffic volumes are expected to increase over time. Traffic demand is expected to increase and without improvements, the duration of congestion is expected to double by the year 2032. As traffic volumes increase, the improvement each driver could expect from the additional lane concept will vary by location along the study corridor.

Travel times in the design year models were compared to the existing travel times, and the results for the critical routes in the AM and PM peaks are presented in Graphs 3.7 and 3.8 respectively

Graph 3.7
AM Peak Travel Times
Existing Conditions vs No Build vs Add Lane



Graph 3.8
PM Peak Travel Times
Existing Conditions vs No Build vs Add Lane



The traffic analysis indicates the additional lane will provide notable improvement, but over time the increased traffic demand will require improving access from the westbank to the eastbank.

While travel times provide a good indication of the expected improvements, they don't always tell the whole story. Other measures of effectiveness are used in conjunction with travel times to evaluate the impacts of improvements. For example, with the additional lane, the throughput or number of vehicles that could get on I-10 from LA 1 is expected to increase by 30-45% in the peak hours. Tables presenting the through-put results for existing and design year are provided in Appendix 3C. Therefore, although in the future travel times may be slightly worse than the current conditions, it will be far better than doing nothing. This supports that the I-10 project is a necessary component, but not the only component, in an overall plan for the region.

In addition to this information, a Tier 1 Matrix was presented at the second round of public meetings in February-March of 2016. The public meeting presentation is included in the Appendix 3D.

Tier 1 Matrix Input

CRPC TDM results, capacity analysis, CAP-X analysis, Vissim Modeling results and engineering judgment was used to estimate the effect each improvement would have on operations based on the following criteria:

Traffic Operations

- High – Expected to improve operations at major bottleneck points and throughout the entire project area
- Moderate – Expected to improve operations though a portion of the area
- Low – Expected to improve operations in spot location only

Based on the results of the various analysis, the safety improvement and traffic operations criteria were determined for each potential improvement/alternative and were input into the Tier 1 Matrix which was used to determine which mainline and interchange improvements should move forward to the Stage 1 process. Table 3.13 presents a comprehensive list of each improvement/alternative that was considered with the traffic operations criteria results.

Table 3.13
Tier 1 Traffic Operations and Safety Improvement Input

ALTERNATIVE CONCEPT	INTERCHANGE TYPE	INTERCHANGE FORM	TRAFFIC OPERATIONS
I-10 Mainline Alternatives			
One Additional Lane			MODERATE CAPACITY
Multi-Lane Addition			HIGH CAPACITY
New Adjacent Bridge			HIGH CAPACITY
High Pass			HIGH CAPACITY
Movable Barrier			LOW CAPACITY
I-110 Westbank Connection			MODERATE CAPACITY
LA1/LA30 Direct Connection			LOW CAPACITY
Frontage Roads			MODERATE CAPACITY
Interchange Specific Alternatives			
LA 415	T and Y		N/A
LA 415	Diamond		LOW CAPACITY
LA 415	Cloverleaf		HIGH CAPACITY
LA 415	Partial Cloverleaf	PAR CLO-A	HIGH CAPACITY
LA 415	Directional		HIGH CAPACITY
Hwy. 1	T and Y		N/A
Hwy. 1	Diamond		LOW CAPACITY
Hwy. 1	Partial Cloverleaf		MODERATE CAPACITY
Hwy. 1	Cloverleaf	CLOVERLEAF WITH C-D ROADS	MODERATE CAPACITY
Hwy. 1	Directional	ALL-DIRECTIONAL	HIGH CAPACITY
Highland - Nicholson	T and Y		N/A
Highland - Nicholson	Diamond		LOW CAPACITY
Highland - Nicholson	Partial Cloverleaf		MODERATE CAPACITY
Highland - Nicholson	Cloverleaf		HIGH CAPACITY
Highland - Nicholson	Directional		HIGH CAPACITY
Highland – Nicholson Closure			N/A
Highland – Nicholson Ramp Modification			MODERATE CAPACITY
I-110 -Flatten Curves	T and Y	DIRECTIONAL-Y	HIGH CAPACITY

Table 3.13 Continued

Tier 1 Traffic Operations and Safety Improvement Input

ALTERNATIVE CONCEPT	INTERCHANGE TYPE	INTERCHANGE FORM	TRAFFIC OPERATIONS
Interchange Specific Alternatives			
Washington Modification 1			MODERATE CAPACITY
Washington Modification 2	T and Y		N/A
Washington Modification 2	Diamond		LOW CAPACITY
Washington Modification 2	Partial Cloverleaf		MODERATE CAPACITY
Washington Modification 2	Cloverleaf		HIGH CAPACITY
Washington Modification 2	Directional		HIGH CAPACITY
Dalrymple Modification Direct	Diamond	TIGHT URBAN	MODERATE CAPACITY
Dalrymple Modification	T and Y		N/A
Dalrymple Modification	Partial Cloverleaf		MODERATE CAPACITY
Dalrymple Modification	Cloverleaf		HIGH CAPACITY
Dalrymple Modification	Directional		HIGH CAPACITY
Dalrymple Modification Braided	Diamond	SPLIT DIAMOND	HIGH CAPACITY
Dalrymple Modification Braided - No Frontage	Diamond	SPLIT DIAMOND	HIGH CAPACITY
Dalrymple/Washington Consolidated Interchange	Diamond	SPLIT DIAMOND	HIGH CAPACITY
Perkins Closure			N/A
Perkins Full Access Interchange	T and Y		N/A
Perkins	Diamond		LOW CAPACITY
Perkins	Partial Cloverleaf		MODERATE CAPACITY
Perkins	Cloverleaf		HIGH CAPACITY
Perkins	Directional		HIGH CAPACITY

Table 3.13 Continued

Tier 1 Traffic Operations and Safety Improvement Input

ALTERNATIVE CONCEPT	INTERCHANGE TYPE	INTERCHANGE FORM	TRAFFIC OPERATIONS
Interchange Specific Alternatives			
Perkins	Directional		HIGH CAPACITY
Acadian Modification	T and Y	N/A	N/A
Acadian Modification	Diamond	TIGHT URBAN DIAMOND	MODERATE CAPACITY
Acadian Modification – Ramp Lengthening	Diamond	TIGHT URBAN DIAMOND	MODERATE CAPACITY
Acadian Modification	Diamond	SINGLE-POINT DIAMOND	MODERATE CAPACITY
Acadian Modification	Diamond	DDI	HIGH CAPACITY
Acadian Modification	Diamond	Displaced Left	HIGH CAPACITY
Acadian Modification	Partial Cloverleaf	PAR CLO-A	HIGH CAPACITY
Acadian Modification	Cloverleaf	N/A	HIGH CAPACITY
Acadian Modification	Directional	N/A	HIGH CAPACITY
College Modification	T and Y	N/A	N/A
College Modification	Diamond	TIGHT URBAN DIAMOND - 1	MODERATE CAPACITY
College Modification	Diamond	TIGHT URBAN DIAMOND - 2	MODERATE CAPACITY
College Modification	Diamond	SINGLE-POINT DIAMOND	LOW CAPACITY
College Modification	Diamond	DDI	LOW CAPACITY
College Modification	Diamond	Displaced Left	MODERATE CAPACITY
College Modification	Partial Cloverleaf	PAR CLO-A	HIGH CAPACITY
College Modification	Cloverleaf		HIGH CAPACITY
College Modification	Directional		HIGH CAPACITY
College/Acadian Frontage	Diamond	TIGHT URBAN DIAMOND	HIGH CAPACITY
I-10 I-12 Split College Directional Ramps	N/A	N/A	HIGH CAPACITY

Conclusions

Based on traffic operations only, the following lists each of the potential improvements that should be considered for further study:

I-10 Mainline Improvements

- One Additional Lane in each direction on I-10 (except across the bridge span)
- Mutli-lane Addition on I-10 with a new adjacent bridge
- Multi-lane, restricted access Highpass (tolled and untolled)

While these alternatives were feasible based on expected traffic operations the multi-lane addition with a new bridge and the multi-lane highpass alternatives were eliminated based on other factors.

The mainline improvements are expected to be accompanied by various interchange improvements. The LA 415, Acadian Thwy and College Dr interchanges are recommended to be further studied for potential conversion to Single Point Urban Interchange (SPUI) or Diverging Diamond Interchange (DDI). The following lists additional interchange modifications that should be considered for further study:

- Addition of Washington St left exit from I-110
- Washington/Dalrymple Service Roads with modifications to existing ramp placement
- Removal of Perkins Rd ramps
- Extension of Washington/Dalrymple service roads along I-110 to Government Street
- College and Acadian Service Roads with braided ramps eastbound and an auxiliary lane westbound
- Dedicated ramps to College from I-10 and I-12

Potential improvements to be analyzed further will be selected based on both traffic operations and safety as well as other criteria such as geometry, social and environmental impacts and cost.