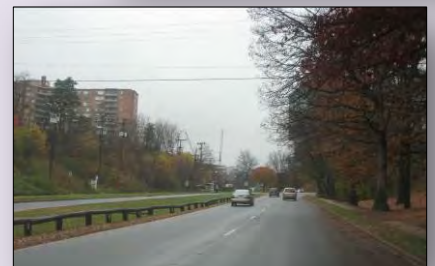
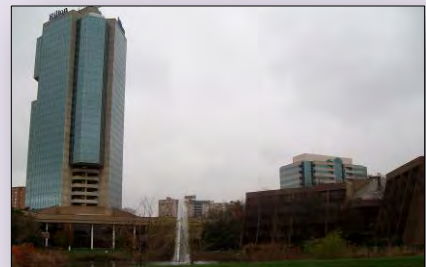


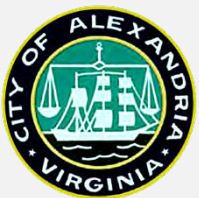
Beauregard Corridor Small Area Plan Transportation Analysis

January 18, 2012

Volume I: Technical Report



Prepared For



By

RK&K
AECOM

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1 Executive Summary

The Beauregard Corridor is located in the City of Alexandria's West End and extends from Little River Turnpike (Route 236) in Fairfax County to the city's northern boundary at King Street (Route 7). The core study area for the plan is roughly defined by Holmes Run to the south, I-395 and Kenmore Avenue to the east, the city line and edge of the existing Dowden Terrace residential neighborhood to the west, and the edge of the Southern Towers complex to the north. However, portions of Beauregard Street and Seminary Road located in Fairfax County were also evaluated for this study. Four (4) development/transportation network scenarios were analyzed:

- Existing (Year 2010) Conditions
- Year 2035 Baseline (Without Development) Conditions
- Year 2035 Conditions with Development
- Year 2020 Conditions with Interim Development

Traffic operations were evaluated using VISSIM for intersections and Synchro for corridor travel time analysis. Traffic data was collected in the field for use in calibrating the traffic models. The existing conditions analysis shows that one (1) intersection currently operates at LOS F overall during either the AM or PM peak hours (Beauregard Street at Little River Turnpike, in Fairfax County). However, there are six (6) different intersections that have individual approaches that operate at LOS F during one or both of the AM/PM peak hours.

Travel demand forecasts for the Beauregard Corridor Small Area Plan were prepared using version 2.2 of the regional travel demand model developed by the Washington Metropolitan Area Council of Governments (COG). At the commencement of this study, the most recent approved regional land use projections for use with this model were from Round 7.2a of COG's Cooperative Forecasting Program. The Baseline (Without Development) Conditions are primarily based on the Round 7.2a COG land use outside the City of Alexandria. However, the land use assumptions for the recently adopted Plan Amendment for the Baileys Crossroads section of Fairfax County were used instead of the Round 7.2a land use, due to its close proximity to the Beauregard Corridor Plan area. The Baseline (Without Development) Conditions include all approved and un-built development within the City of Alexandria, as shown in the City's draft Year 2035 land use forecasts (dated July 2010) for inclusion in Round 8.0 of COG's Cooperative Forecasting Program. For the Year 2035 Conditions with Development, the proposed redevelopment within the Beauregard Corridor Plan study area will be mixed-use, with apartments and townhouses, retail space, office space, and hotels. Some of the new development will be infill development, whereas other new development will replace existing development. The redevelopment of properties located within the study area is expected to occur in six (6) phases through 2040. Changes in land use, and the corresponding changes in trip generation and distribution, were projected for two distinct build-out intervals: An Interim Build-Out condition in Year 2020, and a Build-Out condition in Year 2035 (the sixth development phase is relatively minor and was excluded from this study).

The transportation network assumed to be in place by Year 2035 for the baseline conditions would include several key additions to the existing Year 2011 network. These improvements were included in the analysis of traffic operations for the Year 2035 baseline condition. According to these analysis results, there would be three (3) intersections operating at LOS F during the AM peak hour, but none would operate at LOS F during the PM peak hour. Compared to the Existing 2010 conditions, this is an increase of two (2) intersections performing at an overall LOS F.

Several new roadways and other transportation improvements are being proposed as part of the 2035 build-out of the planned redevelopment in the study area. The analysis of the Year 2035 conditions with development assumes these improvements would be in place to handle the additional trips that would be generated by the proposed changes in area land uses. These are not traffic impact mitigation options, but are roadway network enhancements that are inherent to the proposed redevelopment. These changes include, but are not limited to, reconfiguring the Beauregard/Seminary intersection as an unconventional ellipse-shaped at-grade intersection, a new street west of and parallel to Beauregard Street, the relocation of a portion of Sanger Avenue, new local streets parallel to the relocated Sanger Avenue, the relocation of Kenmore Avenue and Library Lane Extended, and a new local "Main Street" on the Southern Towers property. According to the analysis results for the Year 2035 Conditions with Development, each of the key intersections within the study area would operate at an overall LOS E or better during the AM or PM peak hours. Therefore, the roadway network enhancements described in this report

would accommodate the projected traffic growth resulting from the planned redevelopment. However, there are several intersections at which one or more individual approaches would operate at LOS F.

The proposed redevelopment within the Beauregard Corridor study area would likely occur in phases between 2011 and 2035. The Year 2020 was selected by the City and the redevelopment team as a interim milestone at which traffic operations should be evaluated. Most of the improvements that are assumed built by 2035 will also be needed by 2020 and were included in the 2020 traffic model. The VISSIM analyses for this scenario indicated that most intersections would perform at LOS D or better during both the AM and PM peak hours, and no intersections would operate at LOS F.

The findings of this transportation study indicate with build-out of the proposed redevelopment in 2035 and the transportation improvements identified for the Year 2035 Conditions With Development scenario in the report, traffic operations would be at an acceptable level (i.e., peak hour intersection LOS E or better). The improvements needed for acceptable network performance under the Year 2035 With Development scenario are summarized in **Table 1.1** and **Figure 1.1**. Without these improvements, there would be a significant degradation of traffic operations in 2035. Although this study did not evaluate a scenario with the proposed redevelopment occurring in 2035 without these recommended transportation improvements, the levels of service and delays associated with that scenario would be worse than the analysis results for the 2035 Baseline conditions. The 2035 With Development scenario would generate more trips than the 2035 Baseline scenario, but with only the 2035 Baseline transportation network in place.

Table 1.1: Transportation Improvements Required by Year 2035 With Development

No.	Location	2035 Improvements	Source of Improvement
D1	Beauregard St at Seminary Rd	Construct an ellipse configuration at the intersection of Seminary Road / Beauregard Street. The conventional 8 phase traffic signal is replaced with a pair of interconnected, coordinated 3-phase signals along Seminary Road located about 300 feet apart. Left turns would be prohibited in the eastbound and westbound directions of Seminary Road.	Beauregard Planning Study Assumed Improvement
D2		Add a new road through Southern Towers, parallel to Seminary, that would connect from the I-395 off-ramp into Southern Towers. The road would extend west, across Beauregard Street connecting to the future Hekemian development. The intersection with the new road and Beauregard would be signalized (Part of ellipse project above), and shared with a future transitway (Project B4). The existing driveway from the Hermitage apartments at Beauregard would be closed, and adequate improvements to allow for access into and out of the Hermitage apartments.	Beauregard Planning Study Assumed Improvement
B3		Add a separate right turn lane along westbound Seminary Road extending back to Mark Center Drive.	Beauregard Planning Study Assumed Improvement
B4	Beauregard Street	Construct a dedicated transitway in each direction along Beauregard Street heading southbound from King Street, turning east into Southern Towers, south and west onto Mark Center Drive and south onto Beauregard to Sanger Avenue. (See Appendix A for transit corridor assumptions).	Transitway Feasibility Study
B5	Beauregard Street at	Provide a separate right-turn lane along NB Beauregard Street	Beauregard Planning Study Assumed Improvement
B6	Mark Center Drive	Reconfigure westbound approach as three lanes - 1 left, 1 thru and 1 right.	Beauregard Planning Study Assumed Improvement
B7	Beauregard St at Existing Sanger Ave	Reconfigure the Sanger Ave approaches to consist of a separate left turn lane, a thru lane, and a separate right turn lane in both the eastbound and westbound directions. The portion of Beauregard Street between Roanoke and existing Sanger will be mixed operations. southbound transit will transition from median runningway on Beauregard Street to curbside running along existing Sanger Avenue.	Beauregard Planning Study Assumed Improvement
B8		Provide protected/permissive left-turn phasing for the Sanger Avenue left turns.	Beauregard Planning Study Assumed Improvement
B9		Provide permissive/overlap right turn phasing for westbound Sanger Avenue.	Beauregard Planning Study Assumed Improvement

No.	Location	2035 Improvements	Source of Improvement
B10	Seminary Rd at Echols Ave	Add separate left turn lanes along eastbound and westbound Seminary Rd, with protected/permissive left turn phasing.	Beauregard Planning Study Assumed Improvement
B11	Seminary Road at Mark Center Drive	Widen the Seminary Road westbound approach and gore area from the rotary back to the Mark Center Drive intersection from one to two lanes and provide a dedicated right-turn lane into Southern Towers. Restripe the westbound Seminary Road flyover to allow one through lane on Seminary Road and one left-turn lane into Mark Center Drive. Provide a physical separation between the two lanes from the rotary and the left-turn lane at Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B12		Redesign eastbound Seminary Road approach to Mark Center Drive to allow three through lanes, and to align with new lane on Seminary east of Mark Center Drive accessing I-395.	BRAC / VDOT Short-Mid Term Improvement
B13		Add lanes at Southern Towers approach to separate the existing shared through/left turn lanes. The approach would include dual left turn lanes, one thru lane and one right turn lane.	Beauregard Planning Study Assumed Improvement
B14		Widen northbound Mark Center Dr to allow for a third right turn onto EB Seminary. This approach would be a left turn, thru/right, and dual right turn lanes.	BRAC / VDOT Short-Mid Term Improvement
B15		Construct a pedestrian bridge across Seminary Road west of Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B16	EB Seminary Rd Off-Ramp to I-395 Rotary	Widen eastbound Seminary Road and the southbound I-395 on-ramp by one lane from Mark Center Drive to the ramp meter signal to provide a continuous two-lane ramp from Seminary Road to the ramp meter. Restripe the southbound ramp connection from the rotary to provide a merge into the two-lane ramp from eastbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvement
B17	I-395 at the Seminary Rotary	Widen the northbound I-395 off-ramp from two to three lanes and provide two through lanes and one right turn lane.	BRAC / VDOT Short-Mid Term Improvement
B18		On the eastbound rotary (toward onramp), restripe the pavement to provide a separate left turn lane, a shared thru/left turn lane, and a thru lane. Requires removal of the island at westbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvements
B19		Restripe the rotary to provide dual lefts for the eastbound-to-northbound movements.	BRAC / VDOT Short-Mid Term Improvement
B20		Restripe the westbound approach at the I-395 southbound off-ramp intersection to provide two through lanes and one left turn lane.	BRAC / VDOT Short-Mid Term Improvement
B21	I-395 at Seminary Road	Construct a new HOV ramp at Seminary Road and I-395 to and from the north, connecting to the upper bridge of Seminary.	VDOT project (Subject to EA)
B22	Van Dorn St at Braddock Rd	Replace the shared thru/left turn lanes along northbound and southbound Van Dorn St with separate left turn lanes	Beauregard Planning Study Assumed Improvements
B23		Add protected/permissive left turn phasing along northbound and southbound Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B24	Existing Sanger Avenue	Remove on-street parking in both directions and provide dedicated transit lane (one transit lane and one GP lane each direction)	Transitway Feasibility Study
B25	Van Dorn St at Sanger Ave / Richenbacher Ave	Reconfigure eastbound Sanger Ave to consist of a right turn lane, and a left/thru/right lane approaching Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B26		Restripe the westbound approach along Richenbacher Ave to consist of a separate left turn lane and a shared thru/right turn lane.	Beauregard Planning Study Assumed Improvements
B27	Beauregard St at Braddock Rd	Change dual left to single left on westbound Braddock Road and replace the left-turn lane with a thru lane.	Beauregard Planning Study Assumed Improvements
B28	Beauregard St at Route 236	Add a third through lane on westbound Route 236.	Beauregard Planning Study Assumed Improvements
B29		Add a third through lane on eastbound Route 236.	Beauregard Planning Study Assumed Improvements

No.	Location	2035 Improvements	Source of Improvement
D3	New Parallel Road to Beauregard	Construct new parallel road from a relocated Sanger Avenue in the south, and connect to Mark Center Drive. It would be a collector roadway consisting of one through lane per direction for general traffic use plus left turn lanes at intersections with cross streets that link to Beauregard to the east.	Beauregard Planning Study Assumed Improvement
D4	Relocated Sanger Avenue	The segment of existing Sanger Avenue between Sheffield Court and Beauregard Street would be relocated such that it intersects with Beauregard Street approximately 400 feet north of the existing Sanger Avenue intersection. The relocated Sanger Avenue would extend across Beauregard Street and directly connect to the new street west of and parallel to Beauregard Street. The relocated Sanger Avenue would include a transitway in the westbound direction from Beauregard to Van Dorn, and in the eastbound direction from Sheffield to Van Dorn. Left turns would be prohibited at the westbound approach to Beauregard, the WB approach to Sheffield, and at the southbound approach to the relocated Sanger.	Beauregard Planning Study Assumed Improvement
D5	New Local Streets Parallel to Relocated Sanger Avenue	A new local street south of Sanger Avenue would intersect Beauregard Street at the approximate location of the existing Sanger Ave intersection. This intersection is anticipated to be signalized, and allow for southbound left turns from Beauregard Street. This new street would tie into relocated Sanger further east. North of relocated Sanger Avenue, Roanoke Avenue would be reconfigured to loop around newly planned development in the area and also tie into relocated Sanger Avenue near the existing intersection of Bradford and Sheffield Court. The intersection at Beauregard Street would allow for southbound left turns. The new street would tie into the relocated Sanger Avenue.	Beauregard Planning Study Assumed Improvement
D6	Relocated Kenmore Avenue and Library Lane Extended	Kenmore Avenue currently connects Van Dorn St. to Seminary Rd. via an unsignalized intersection along Seminary Road that restricts movements to right turns only. To support the redevelopment of this area, and improve traffic flow, the plan proposes to relocate a portion of Kenmore Avenue south to Seminary Road such that it aligns with the Library Lane intersection at Seminary Road.	Beauregard Planning Study Assumed Improvement
D7	Seminary at Mark Center Drive	Widen Mark Center Drive to allow for a third right turn onto eastbound Seminary Road. This approach would be a left turn, one thru lane and three right turn lanes.	Beauregard Planning Study Improvement
D8	Seminary Rd at Library Lane	Change pedestrian signal phase at Seminary / Library to concurrent phasing with advanced pedestrian signal. (See Appendix B for detailed analysis of signal operations at this location).	Beauregard Planning Study Assumed Improvements

The Year 2020 interim development would consist of an additional 2,157 residential units, 273,000 square feet of retail space, and approximately 2.2 million square feet of office space, compared to existing (Year 2010) conditions (the additional office space by 2020 includes the BRAC-133 facility). Traffic operations under the growth associated with this interim redevelopment by Year 2020 would also be acceptable, with no intersections operating at an overall LOS F during the peak hours, as long as the improvements described in **Table 1.2** are phased in by 2020.

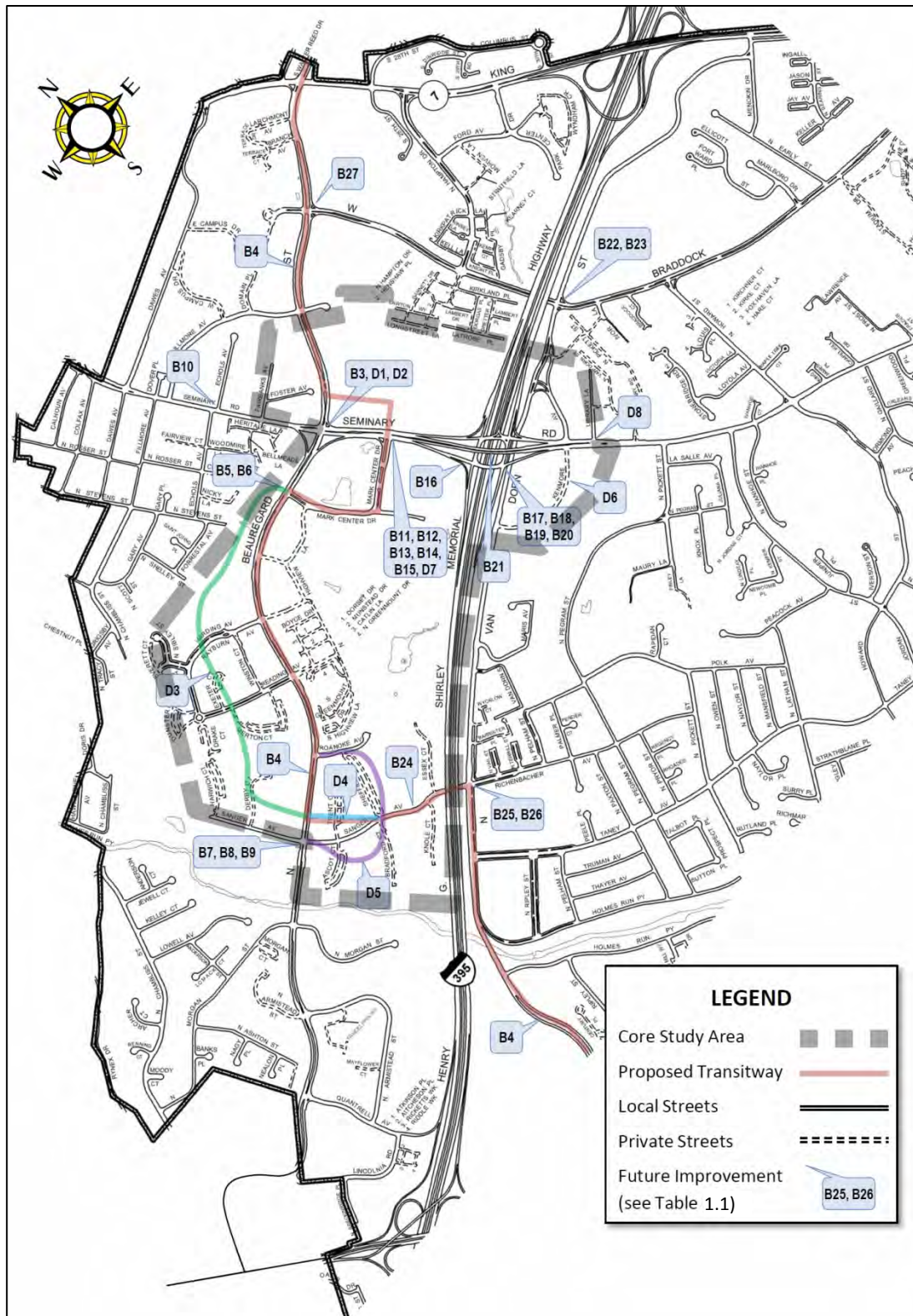


Figure 1.1: Map of Transportation Improvements Required for 2035 Conditions With Development

Table 1.2: Transportation Improvements Required by Year 2020 With Interim Development

No.	Location	Interim Development Scenario Improvements by 2020	Source of Improvement
B3	Beauregard St at Seminary Rd	Add a separate right turn lane along westbound Seminary Road extending back to Mark Center Drive.	Beauregard Planning Study Assumed Improvement
D1		Construct an ellipse configuration at the intersection of Seminary / Beauregard. The conventional 8 phase traffic signal is replaced with a pair of interconnected, coordinated 3-phase signals along Seminary Road located about 300 feet apart. Left turns would be prohibited in the eastbound and westbound directions of Seminary Road. This project replaces 2035 Baseline projects numbers B1 and B2.	Beauregard Planning Study Assumed Improvement
D2		Add a new road through Southern Towers, parallel to Seminary, that would connect from the I-395 off-ramp into Southern Towers. The road would extend west, across Beauregard Street connecting to the future Hekemian development. The intersection with the new road and Beauregard Street would be signalized, and shared with a future transitway. The existing driveway from the Hermitage apartments at Beauregard Street would be closed, and adequate improvements to allow for access into and out of the Hermitage apartments.	Beauregard Planning Study Assumed Improvement
B4	Beauregard Street	Construct a dedicated transitway in each direction along Beauregard Street heading southbound from King Street, turning east into Southern Towers, south and west onto Mark Center Drive and south onto Beauregard to Sanger Avenue. (See Appendix A for transit corridor assumptions).	Transitway Feasibility Study
B5	Beauregard Street at Mark Center Drive	Provide a separate right turn lane along NB Beauregard Street. Provide an additional southbound left turn lane onto Mark Center Drive.	Beauregard Planning Study Assumed Improvement
B6		Reconfigure westbound approach as three lanes - 1 left, 1 thru and 1 right	Beauregard Planning Study Assumed Improvement
B7	Beauregard St at Existing Sanger Ave	Reconfigure the Sanger Ave approaches to consist of a separate left turn lane, a thru lane, and a separate right turn lane in both the eastbound and westbound directions. The portion of Beauregard Street between Roanoke and existing Sanger will be mixed operations. SB transit will transition from median runningway on Beauregard Street to curbside running along existing Sanger Avenue.	Beauregard Planning Study Assumed Improvement
B8		Provide permissive left-turn phasing for the Sanger Ave left turns	Beauregard Planning Study Assumed Improvement
B9		Provide permissive right turn phasing for WB Sanger Ave	Beauregard Planning Study Assumed Improvement
B10	Seminary Rd at Echols Ave	Add separate left turn lanes along EB and WB Seminary Rd, with protected/permissive left turn phasing	Beauregard Planning Study Assumed Improvement
B11	Seminary Road at Mark Center Drive	Widen the Seminary Road westbound approach and gore area from the rotary back to the Mark Center Drive intersection from one to two lanes and provide a dedicated right-turn lane into Southern Towers. Restripe the westbound Seminary Road flyover to allow one through lane on Seminary Road and one left-turn lane into Mark Center Drive. Provide a physical separation between the two lanes from the rotary and the left-turn lane at Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B12		Redesign eastbound Seminary Road approach to Mark Center Drive to allow three through lanes, and to align with new lane on Seminary east of Mark Center Drive accessing I-395.	BRAC / VDOT Short-Mid Term Improvement
B13		Add lanes at Southern Towers approach to separate the existing shared through/left turn lanes. The approach would include dual left turn lanes, one thru lane and one right turn lane.	Beauregard Planning Study Assumed Improvement
B14		Widen northbound Mark Center Drive to allow for a third right turn onto eastbound Seminary. This approach would be a left turn, thru/right, and dual right turn lanes.	BRAC / VDOT Short-Mid Term Improvement
B15		Construct a pedestrian bridge across Seminary Road west of Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
D7		Widen Mark Center Dr to allow for a third right turn onto EB Seminary. This approach would be a left turn, one thru lane and three right turn lanes.	Beauregard Planning Study Assumed Improvement

No.	Location	Interim Development Scenario Improvements by 2020	Source of Improvement
B16	EB Seminary Rd Off-ramp to I-395 Rotary	Widen eastbound Seminary Road and the southbound I-395 on-ramp by one lane from Mark Center Drive to the ramp meter signal to provide a continuous two-lane ramp from Seminary Road to the ramp meter. Restripe the southbound ramp connection from the rotary to provide a merge into the two-lane ramp from eastbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvement
B17	I-395 at the Seminary rotary	Widen the northbound I-395 off-ramp from two to three lanes and provide two through lanes and one right turn lane.	BRAC / VDOT Short-Mid Term Improvement
B18		On the eastbound rotary (toward onramp), restripe the pavement to provide a separate left turn lane, a shared thru/left turn lane, and a thru lane. Requires removal of the island at westbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvements
B19		Restripe the rotary to provide dual lefts for the eastbound-to-northbound movements.	BRAC / VDOT Short-Mid Term Improvement
B20		Restripe the westbound approach at the I-395 southbound off-ramp intersection to provide two through lanes and one left turn lane.	BRAC / VDOT Short-Mid Term Improvement
B21	I-395 at Seminary Road	Construct a new HOV ramp at Seminary Road and I-395 to and from the north, connecting to the upper bridge of Seminary Road.	VDOT project (Subject to EA)
B22	Van Dorn St at Braddock Rd	Replace the shared thru/left turn lanes along NB and SB Van Dorn St with separate left turn lanes	Beauregard Planning Study Assumed Improvements
B23		Add protected/permissive left turn phasing along northbound and southbound Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B24	Existing Sanger Avenue	Remove on-street parking in both directions and provide dedicated transit lane (one transit lane and one GP lane each direction).	Transitway Feasibility Study
B25	Van Dorn St at Sanger Ave / Richenbacher Ave	Reconfigure eastbound Sanger Avenue to consist of a right turn lane, and a left/thru/right lane approaching Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B26		Restripe the westbound approach along Richenbacher Avenue to consist of a separate left turn lane and a shared thru/right turn lane.	Beauregard Planning Study Assumed Improvements
B27	Beauregard St at Braddock Rd	Change dual left to single left on westbound Braddock Road and replace the left-turn lane with a thru lane.	Beauregard Planning Study Assumed Improvements
D6	Relocated Kenmore Avenue and Library Lane Extended	Kenmore Avenue currently connects Van Dorn St. to Seminary Rd. via an unsignalized intersection along Seminary Road that restricts movements to right turns only. To support the redevelopment of this area, and improve traffic flow, the plan proposes to relocate a portion of Kenmore Avenue south of Seminary Road such that it aligns with the Library Lane intersection at Seminary Road.	Beauregard Planning Study Assumed Improvement
D8	Seminary Rd at Library Lane	Change pedestrian signal phase at Seminary / Library to concurrent phasing with advanced pedestrian signal. (See Appendix B for detailed analysis of signal operations at this location).	Beauregard Planning Study Assumed Improvements

2 Introduction

The Beauregard Corridor is located in Alexandria's West End and extends from Little River Turnpike (Route 236) in Fairfax County to the city's northern boundary at King Street (Route 7). Although the scope of this transportation analysis includes this entire corridor, the core study area for the plan is roughly defined by Holmes Run to the south, I-395 and Kenmore Avenue to the east, the city line and edge of the existing Dowden Terrace residential neighborhood to the west, and the edge of the Southern Towers complex to the north. A map of the core study area in relation to the rest of the city is shown in **Figure 2.1**.



Figure 2.1: Map of the Beauregard Corridor Study Area

The transportation analysis examines the recent Year 2010 traffic performance (referred to in this report as the Existing Conditions), the projected Year 2035 traffic operations for a baseline land use scenario, and proposed land use alternatives based on the projected market demand potential for new residential, retail, office and hotel development within the study area by Year 2020 and Year 2035. The land use and transportation network assumptions, travel forecasting and traffic analysis methodology, and traffic simulation results are summarized in this report.

3 The Existing Transportation System

The existing transportation system in the Beauregard Corridor Small Area Plan study area is characterized by relatively high traffic volumes with a significant amount of pedestrian activity. The area is served by several DASH and WMATA bus routes. The Existing Conditions did not include two recently constructed projects, including the additional (third) left turn lane along westbound Seminary Road onto southbound Beauregard Street, and the additional (second) left turn lane along southbound Beauregard Street onto Mark Center Drive. These improvements were not completed at the time of the existing conditions analysis in 2010.

Roadway Classification

The City of Alexandria uses five (5) categories of functional classification for its roadways: Expressways, Arterials, Primary Collectors, Residential Collectors, and Local Streets. The study area includes all five street types. Expressways are the highest level of functional classification and are typically high-speed facilities that mainly carry traffic traveling long distances (i.e., greater than 3 miles). Arterials provide access to the gateways to the city, including expressway interchanges, Metrorail stations, and routes crossing into adjacent municipalities, carrying pass-through traffic as well as local trips. Arterials may provide direct access to adjacent properties via driveways on a limited basis. They also provide access to the Primary Collectors. Primary Collectors provide access to neighborhood hubs, such as local shopping centers and schools. They may also provide routes for transit vehicles into the neighborhoods. Residential Collectors are utilized by mostly residential traffic, and provide links between the local streets and higher-classification roadways. These streets are generally designed for lower speeds and may have fewer lanes for carrying traffic. There may be access to adjacent properties via driveways along Primary and Residential Collectors. Local streets generally do not carry through traffic, and provide direct access to individual homes and businesses. They are designed for the slowest speeds, and may have driveways and on-street parking along them. Often, local streets do not have marked lanes. **Figure 3.1** is a map showing the functional classification of roadways within the study area.

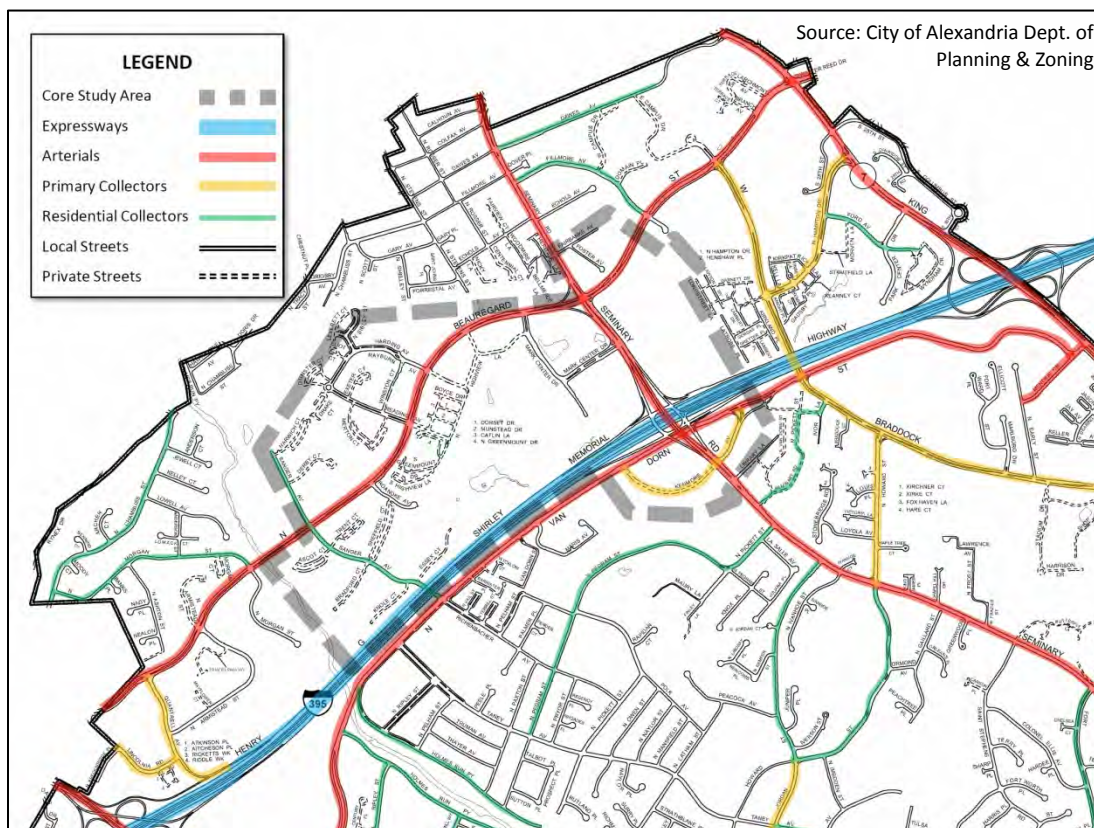


Figure 3.1: Functional Classification of Streets in the Study Area

Traffic Volumes

Intersection turning movement volume and pedestrian volume data was collected in December 2009 and January 2010. Counts were performed during the following periods on a weekday:

- From 7:00 AM to 9:00 AM
- From 11:00 AM to 1:00 PM
- From 4:00 PM to 6:00 PM or 5:00 PM to 7:00 PM, depending on the intersection location

Traffic data for some intersections were obtained from the Mark Center (BRAC 133) Transportation Study dated November 2, 2009. Prior year volumes were adjusted to 2010 levels using an annual growth rate of 1.1 percent. This growth rate was determined using Year 2008 and Year 2010 volumes generated using the travel demand model. Figure 3.2 provides a map of the 32 existing intersections that were evaluated.

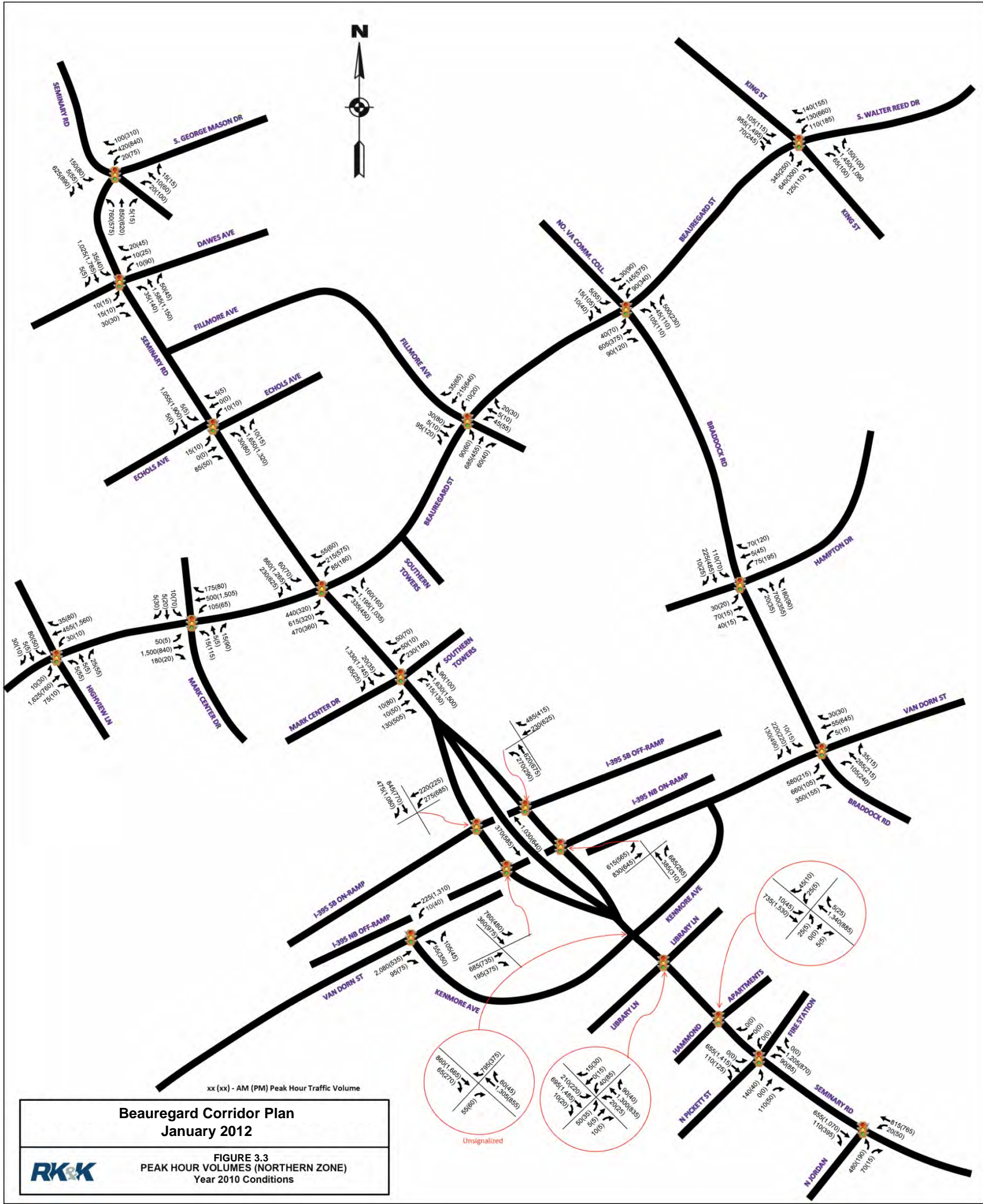


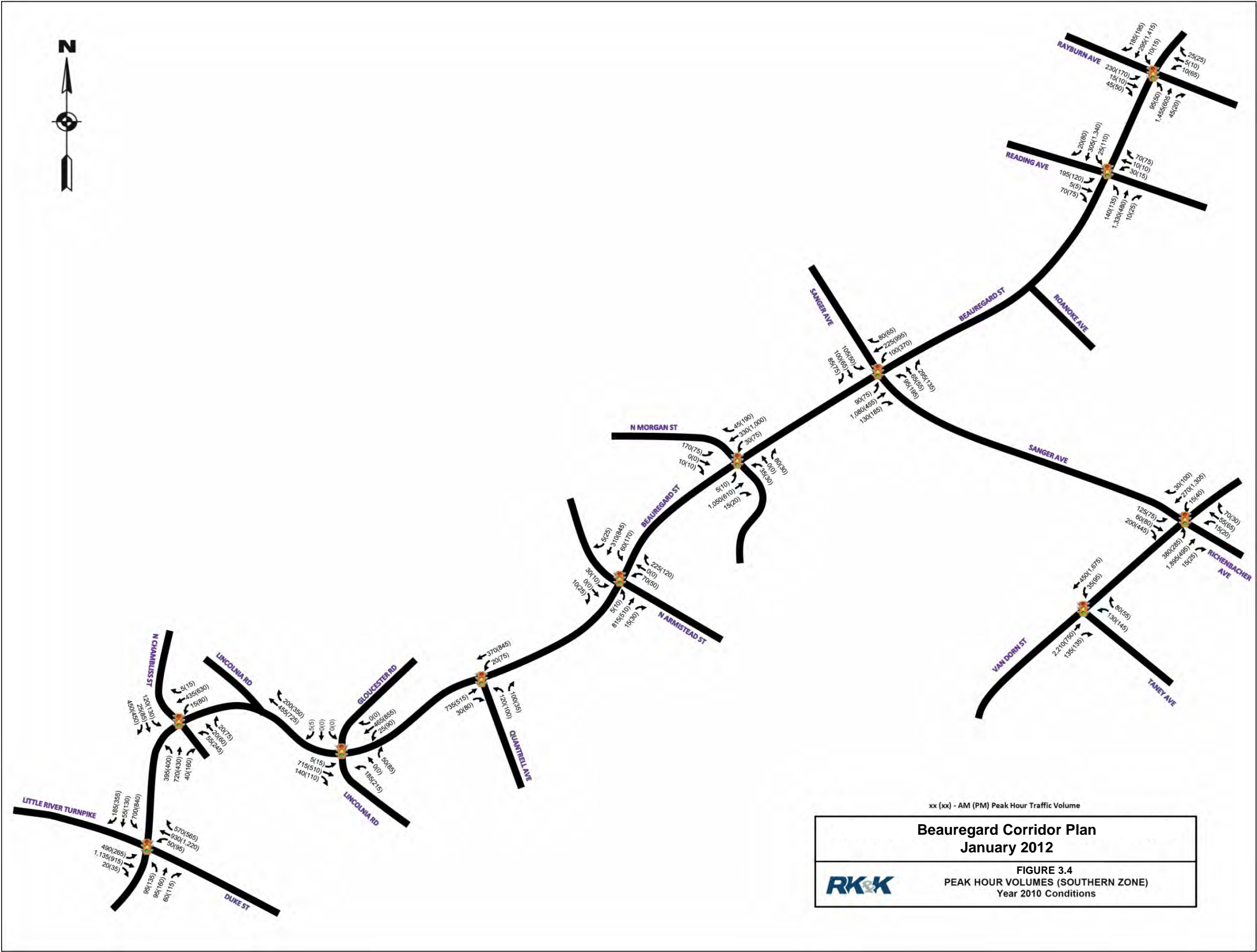
Figure 3.2: Locations of Existing Intersections Analyzed (Signalized Only)

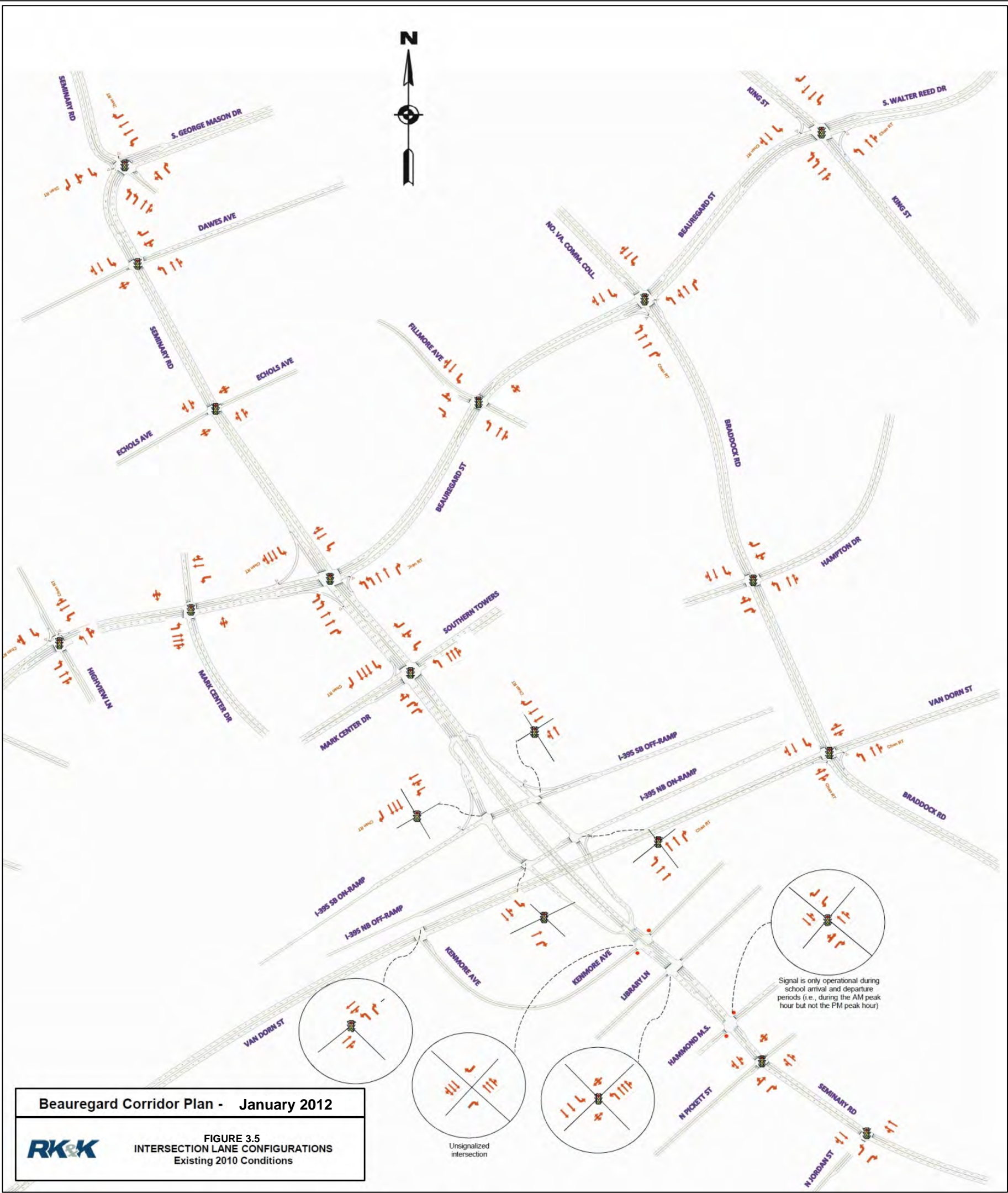
Peak Hour Volumes

The AM peak hour is defined as 7:30 AM to 8:30 AM, and the PM peak hour is defined as 5:00 PM to 6:00 PM. The Existing 2010 AM and PM peak hour traffic volumes at each intersection are shown on Figures 3.3 and 3.4. The existing intersection lane configurations are shown in Figures 3.5 and 3.6. The midday peak period volumes were collected at some intersections for the purpose of comparison but were not used in the analysis of existing traffic operations.

Ten (10) study area intersections maintained by the City of Alexandria have left or right turning volumes that currently exceed 300 vehicles per hour during the AM or PM peaks. This is relevant because the VDOT Road Design manual recommends dual left turn lanes when the left turning volume exceeds 300 vehicles per hour (vph). The highest minimum volume to justify a separate right turn lane is only 120 vph, but varies based on the total approach volume. These intersections are listed in Table 3.1, along with the specific turning movements that carry the heaviest volumes during the AM and PM peak hours.







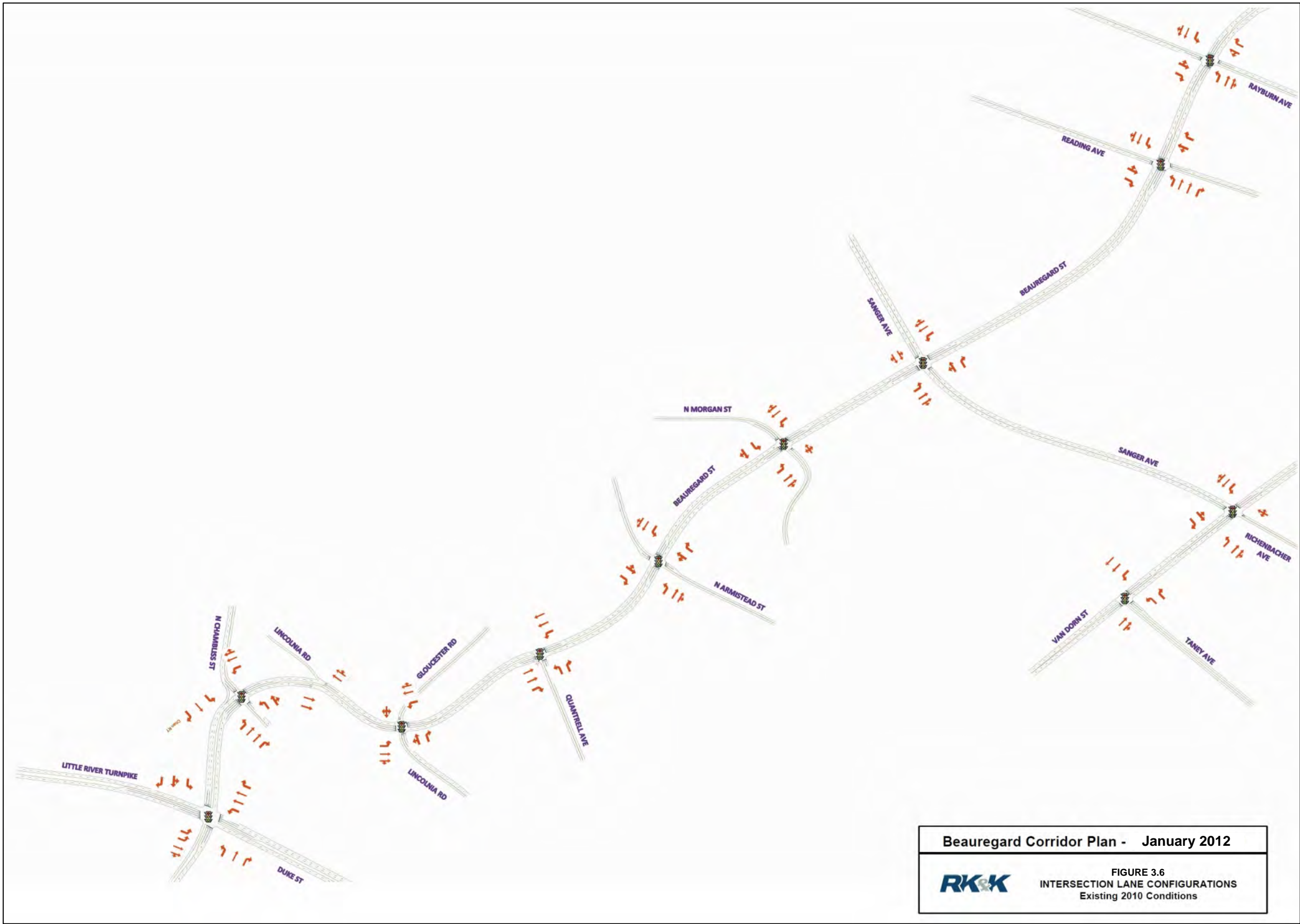


Table 3.1 – Intersections with Heavy Left and/or Right Turn Volumes, with Predominant Turns

	AM Peak Hour	PM Peak Hour
#7-Beauregard St & Sanger Avenue	WB Right	SB Left
#12-Beauregard St & Seminary Rd	NB Left & Right, WB Left	NB Left & Right, EB Right, WB Left
#14-Beauregard St & W. Braddock Rd	WB Right	SB Left
#15-Beauregard St & King St	NB Left	---
#19-Seminary Rd & Mark Center Dr	WB Left	NB Right
Seminary Rd & Kenmore Ave (no signal)	SB Right	EB Right
#27-Seminary Rd & N. Jordan St	NB Left	EB Right
#29-Van Dorn St & Sanger Ave	NB Left	EB Right
#30-Van Dorn St & Kenmore Ave	---	WB Left
#31-Van Dorn St & W. Braddock Rd	NB Left & Right	EB Right

Note: Beauregard Street and Van Dorn Street are north-south roadways. Seminary Road is an east-west roadway.

Two (2) intersections currently have pedestrian volumes greater than 60 persons crossing per hour. These intersections are listed in **Table 3.2**, along with the specific legs of the intersection with the predominant pedestrian crossing volume during the AM and PM peak hours.

Table 3.2 – Intersections with Heavy Pedestrian Volumes, with Predominant Crossings

	AM Peak Hour		PM Peak Hour	
	Major Crossings	Peds	Major Crossings	Peds
#7-Beauregard St & Sanger Ave	South , North, West	226	South , North	59
#9-Beauregard St & Rayburn Ave	South , East	61	South , East, North, West	53

Notes: Beauregard Street is a north-south roadway. The leg with the heaviest pedestrian crossing volume is shown first, in **bold**.

The Sanger Avenue intersection, which is located near the William Ramsay Elementary School, has approximately 225 pedestrians crossing during the AM peak hour and about 60 during the PM peak hour. Nearly 60 percent of the pedestrians crossing at this intersection during the peak periods (7-9 AM and 4-6 PM) are school children. The school operating hours are 7:50 AM to 2:55 PM. The morning arrival time for students coincides with the AM peak hour for vehicular traffic at the intersection of Beauregard Street and Sanger Avenue. However, the PM departure time for students precedes the PM peak hour for vehicular traffic. The traffic signal at this intersection provides a dedicated pedestrian crossing phase due to the high number of school-aged pedestrians present.

Daily Volumes

In addition to the intersection turning movement volumes, mainline traffic volume data was collected at four (4) locations and vehicle classification count data was collected at two (2) additional locations. The volume count locations are:

1. Beauregard Street between Lincolnia Road and Quantrell Avenue
2. Beauregard Street between Braddock Road and King Street
3. Seminary Road between Kenmore Avenue and Library Lane
4. N. Van Dorn Street between Sanger Avenue and Maris Avenue

The vehicle classification count locations are:

1. Beauregard Street between Sanger Avenue and Roanoke Avenue
2. Seminary Road between Dawes Avenue and Fillmore Avenue

Table 3.3 shows the Existing 2010 AM peak hour, PM peak hour, and daily traffic volumes at the six locations listed above, by direction of travel. These volumes indicate that the peak travel direction on Beauregard Street is northbound during the AM

peak hour and southbound during the PM peak hour. On Seminary Road, the peak travel direction is westbound during the AM peak hour and eastbound during the PM peak hour. Along Van Dorn Street, the peak travel direction is northbound during the AM peak hour and southbound during the PM peak hour.

Table 3.3 – Existing (2010) Arterial Roadway Traffic Volumes

Roadway Segment		AM Peak Hour	PM Peak Hour	24-Hour Total
Beauregard Street: Between Lincolnia Rd & Quantrell Ave	NB	755	585	8,400
	SB	435	955	8,700
	Total	1,190	1,540	17,100
Beauregard Street: Between Sanger Ave & Roanoke Ave	NB	1,430	655	12,000
	SB	335	1,200	10,900
	Total	1,765	2,855	22,900
Beauregard Street: Between Braddock Rd & King St	NB	1,135	575	9,400
	SB	280	1,040	8,200
	Total	1,415	1,615	17,700
Seminary Road: Between Dawes Ave & Fillmore Ave	EB	835	925	16,500
	WB	1,490	1,140	17,900
	Total	2,325	2,065	34,400
Seminary Road: Between Kenmore Ave & Library Lane	EB	890	1,425	16,000
	WB	1,345	775	12,900
	Total	2,235	2,200	28,900
N. Van Dorn Street: Between Sanger Ave & Maris Ave	NB	1,900	585	11,400
	SB	310	1,560	9,400
	Total	2,210	2,145	20,800

Note: Data was collected at six (6) mid-block locations.

According to the vehicle classification data, approximately 3 percent of the total daily traffic on Beauregard Street is trucks. On Seminary Road near Dawes Avenue, the daily truck percentage is nearly 4 percent.

4 Calibration of the Traffic Simulations

VISSIM was used to perform the traffic operations analysis for the Existing 2010, 2035 Baseline (Without Development), 2035 Conditions with Development, and 2020 with Interim Development scenarios. Although preliminary analyses were conducted using Synchro and SimTraffic to refine the roadway network for importing into VISSIM, VISSIM allows the evaluation of the proposed dedicated transit lanes and transit stops combined with the general purpose travel lanes throughout the study area.

Existing travel time and queue length measurements were taken along Beauregard Street, Seminary Road, and Van Dorn Street during the peak hours. This data was compared to the travel time estimates for existing conditions as calculated by the traffic operations analysis software (Synchro version 7 and VISSIM). The existing conditions traffic analysis models were then calibrated based on these results. The Synchro model was calibrated by modifying the Lost Time Adjustment factor to minimize discrepancies between the observed queue lengths and the lengths calculated by Synchro. The VISSIM model calibration objectives were as follows:

- Perform five (5) VISSIM model runs
- Calibrate capacity to be within 10% of field-measured flow rates between intersections
- Modeled corridor travel times to be within 15% (or one minute, if higher) of the field-measured times
- Visually acceptable queue lengths observed at intersections and on/off ramps
- Visually acceptable utilization of the lanes at lane drop locations

The following VISSIM parameters were adjusted to achieve the objectives listed above:

- Desired Speed
- Lane changing behavior (Urban driver)
 - Emergency stop distance
 - Lane change distance
- Car following behavior (Urban driver)
 - Average standstill distance
 - Additive part of safety distance
 - Multiplicative part of safety distance

The VISSIM parameters that were adjusted to calibrate the existing conditions model were held constant for the future conditions analyses.

Tables 4.1 and 4.2 show comparisons between the actual field-measured volumes and travel times, respectively, and the conditions simulated using the calibrated VISSIM model. The simulated values for throughput and travel times meet the calibration objectives described above..

Table 4.1 – Comparison of Observed and VISSIM-Simulated Existing (2010) Travel Times

Arterial	AM Peak				PM Peak			
	Observed Travel Time (s)	VISSIM Output Travel Time (s)	Difference (s)	Difference (%)	Observed Travel Time (s)	VISSIM Output Travel Time (s)	Difference (s)	Difference (%)
Beauregard NB	491	501	-10	2%	537	544	-7	1%
Beauregard SB	510	554	-44	9%	639	648	-9	1%
Seminary NB	303	267	36	-12%	309	280	29	-9%
Seminary SB	281	263	18	-6%	353	357	-4	1%
Van Dorn NB	197	203	-6	3%	151	161	-10	7%
Van Dorn SB	154	144	10	-6%	167	165	2	-1%

Note: Beauregard St was traveled between Rt. 236 and King St; Seminary Rd was traveled between Jordan St and George Mason Dr, and Van Dorn St was traveled between Taney Ave and Braddock Rd.

Table 4.2 – Comparison of Observed Traffic Demand and VISSIM-Simulated Existing (2010) Volume Throughput

Section	Dir	AM Peak			PM Peak		
		Input Volume	VISSIM Output	Difference (%)	Input Volume	VISSIM Output	Difference (%)
Beauregard St between Lincolnia Rd & Quantrell Ave	NB	765	735	-4%	595	565	-5%
	SB	490	480	-2%	945	927	-2%
Beauregard St between Sanger Ave & Roanoke Ave	NB	1,480	1,440	-3%	640	629	-2%
	SB	405	399	-1%	1,430	1,413	-1%
Beauregard St between Braddock Rd & King St	NB	1,110	1,069	-4%	660	636	-4%
	SB	265	272	2%	1,005	999	-1%
Seminary Rd between Dawes Ave & Filmore Ave	NB	1,670	1,596	-4%	1,335	1,302	-2%
	SB	1,065	1,077	1%	1,905	1,891	-1%
Seminary Rd between Kenmore Ave & Library Ln	NB	1,365	1,338	-2%	900	869	-3%
	SB	915	852	-7%	1,725	1,718	0%
Van Dorn St between Maris Ave & Sanger Ave	NB	2,090	1,963	-6%	600	601	0%
	SB	315	306	-3%	1,445	1,313	-9%

5 Traffic Simulation Measures of Effectiveness

The performance of the roadway network was measured in terms of delay per vehicle and level of service at signalized intersections, and travel time for specific roadway segments. The level of service, or LOS, is a simplified method of describing the degree of congestion at an intersection or along a roadway segment. LOS is a letter grade ranging from A to F, with LOS A representing ideal, free-flowing traffic conditions or a negligible amount of delay, and LOS F representing traffic conditions under which vehicles often encounter long queues approaching an intersection, wait through multiple cycles of a traffic signal before proceeding through an intersection, and travel at very slow speeds.

LOS F conditions are often the result of inadequate progression of traffic through multiple adjacent signalized intersections, cycle lengths that are longer than optimal, and most common of all, high traffic volumes that exceed the capacity of the available lanes. It is usually most critical to identify locations that operate at LOS D, LOS E, or LOS F, because LOS D is the stage at which the delays and queue lengths first become noticeable to most drivers.

For intersections, the Highway Capacity Manual (HCM) provides thresholds for LOS corresponding to different ranges of delay. For arterial roadway segments, the HCM relates LOS to the average travel speed along a defined route. In urban and inner suburban areas such as the Beauregard Corridor, achieving LOS E or better is generally the goal for future traffic operations. However, it can be difficult to reach this goal in these areas without sacrificing features that make a pedestrian-friendly community, such as narrower streets. Therefore, some of the analysis results described below indicate LOS F conditions for certain movements at intersections and along some roadway segments, even with the implementation of capacity improvements.

6 Existing (2010) Traffic Analysis

Tables 6.1 and 6.2 summarize the Existing (2010) delay per vehicle and levels of service during the AM and PM peak hours at each of the intersections within the study area, by approach and for the overall intersection. **Figures 6.1 and 6.2** show the Existing (2010) approach levels of service on a diagram of the study area roadway network. The Existing (2010) roadway network used for these analyses has the lane configurations shown previously in **Figures 3.5 and 3.6**, and excludes any VDOT capacity improvements completed within the study area since 2010. Specifically, the Existing Conditions analysis did not include two recently constructed projects, including the additional (third) left turn lane along westbound Seminary Road onto southbound Beauregard Street, and the additional (second) left turn lane along southbound Beauregard Street onto eastbound Mark Center Drive. These improvements were not completed at the time of the existing conditions analysis in 2010.

The results of the VISSIM analysis shows that only one (1) of the intersections currently operates at LOS F overall during either the AM or PM peak hours (Beauregard Street at Little River Turnpike, in Fairfax County). However, there are six (6) different intersections that have individual approaches that operate at LOS F during one or both of the AM/PM peak hours.

The Existing (2010) AM and PM peak hour levels of service on the roadway links along Beauregard Street and along Seminary Road are summarized in **Tables 6.3 and 6.4**. These levels of service were calculated using the Highway Capacity Manual (HCM) methodology for arterial LOS. See **Appendix C** for the Synchro-based lanes, signal timing and phasing that were used in the VISSIM simulations.

Table 6.1 – Existing (2010) AM Peak Hour Delay and Level of Service (LOS) by Approach

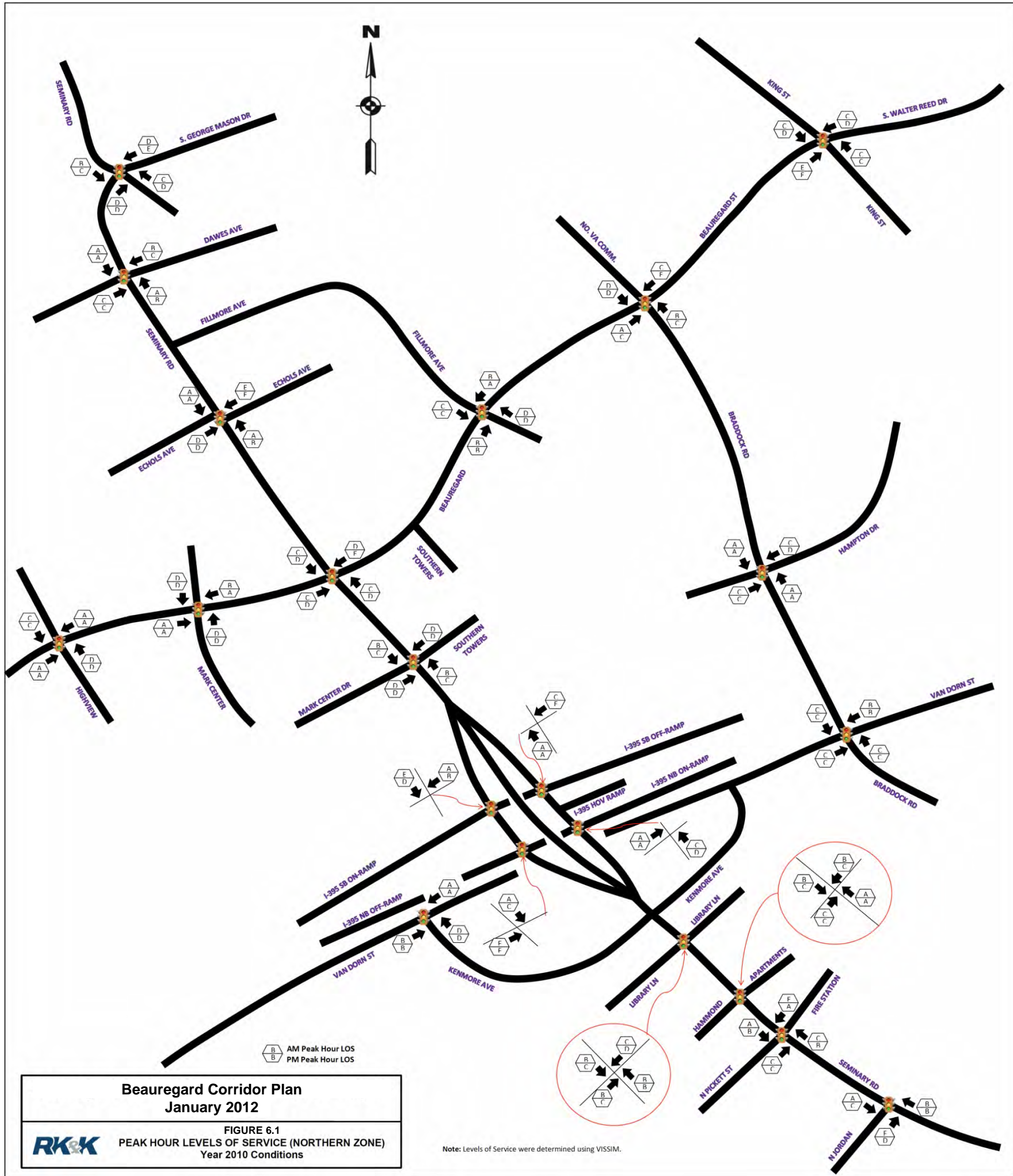
Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	77.0	E	70.3	E	142.0	F	37.2	D	83.3	F
2	Beauregard St / N Chambliss St	7.7	A	19.8	B	14.0	B	51.4	D	13.8	B
3	Beauregard St / Lincolnia Rd	10.0	B	8.2	A	25.4	C	17.5	B	10.6	B
4	Beauregard St / Quantrell Ave	5.8	A	5.1	A	-	-	38.1	D	11.0	B
5	Beauregard St / N Armistead St	6.5	A	5.4	A	5.6	A	7.6	A	6.4	A
6	Beauregard St / N Morgan St	12.7	B	9.3	A	27.5	C	21.1	C	13.9	B
7	Beauregard St / Sanger Ave	42.2	D	29.6	C	80.1	F	34.1	C	43.3	D
8	Beauregard St / Reading Ave	11.7	B	12.9	B	43.6	D	38.5	D	17.3	B
9	Beauregard St / Rayburn Ave	8.1	A	7.0	A	47.0	D	37.9	D	13.2	B
10	Beauregard St / Highview Ln	7.8	A	3.5	A	29.6	C	36.4	D	8.5	A
11	Beauregard St / Mark Center Dr	8.4	A	11.1	B	50.4	D	47.1	D	10.0	B
12	Beauregard St / Seminary Rd	32.2	C	49.2	D	34.1	C	34.5	C	34.7	C
13	Beauregard St / Fillmore Ave	11.6	B	12.0	B	32.8	C	40.5	D	15.3	B
14	Beauregard St / W Braddock Rd	9.6	A	27.4	C	40.9	D	14.2	B	14.8	B
15	Beauregard St / King St	55.9	E	34.4	C	22.9	C	30.3	C	35.1	D
16	Seminary Rd / S. George Mason Dr	36.0	D	38.7	D	13.2	B	29.4	C	30.3	C
17	Seminary Rd / Dawes Ave	29.7	C	16.1	B	4.2	A	9.2	A	7.8	A
18	Seminary Rd / Echols Ave	48.4	D	56.6	E	7.7	A	8.9	A	10.0	A
19	Seminary Rd / Mark Center Dr	44.3	D	40.9	D	16.7	B	19.0	B	21.1	C
20	Seminary Rd / Ramp to I-395 South	-	-	0.9	A	66.7	E	-	-	48.0	D
21	Seminary Rd / Ramp from I-395 South	-	-	24.5	C	-	-	3.0	A	13.0	B
22	Seminary Rd / Ramp from I-395 North	130.8	F	-	-	2.7	A	-	-	25.4	C
23	Seminary Rd / Ramp to I-395 North	2.1	A	-	-	-	-	27.4	C	8.5	A
24	Seminary Rd / Library Ln	19.6	B	33.5	C	16.0	B	19.9	B	18.8	B
25	Seminary Rd / Hammond M.S.	34.4	C	16.9	B	11.8	B	6.7	A	9.3	A
26	Seminary Rd / N Pickett St	26.3	C	55.3	E	7.5	A	28.6	C	21.2	C
27	Seminary Rd / N Jordan St	81.1	F	-	-	6.3	A	10.8	B	26.5	C
28	N Van Dorn St / Taney Ave	49.9	D	10.4	B	-	-	59.7	E	44.3	D
29	N Van Dorn St / Sanger Ave	35.1	D	29.5	C	41.0	D	51.1	D	36.1	D
30	N Van Dorn St / Kenmore Ave	14.5	B	4.8	A	-	-	50.6	D	15.7	B
31	N Van Dorn St / W Braddock Rd	24.3	C	13.0	B	26.4	C	23.1	C	23.9	C
32	W Braddock Rd / Hampton Dr	28.8	C	31.7	C	5.4	A	5.1	A	9.8	A

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.

Table 6.2 – Existing (2010) PM Peak Hour Delay and Level of Service (LOS) by Approach

Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	69.4	E	95.9	F	58.6	E	52.0	D	66.3	E
2	Beauregard St / N Chambliss St	18.8	B	84.1	F	44.2	D	222.4	F	62.1	E
3	Beauregard St / Lincolnia Rd	10.9	B	12.5	B	39.3	D	21.2	C	13.5	B
4	Beauregard St / Quantrell Ave	3.5	A	4.3	A	-	-	36.2	D	6.7	A
5	Beauregard St / N Armistead St	6.3	A	5.5	A	3.7	A	8.2	A	5.9	A
6	Beauregard St / N Morgan St	9.7	A	15.4	B	24.6	C	16.1	B	14.0	B
7	Beauregard St / Sanger Ave	41.3	D	45.6	D	86.1	F	58.6	E	49.2	D
8	Beauregard St / Reading Ave	13.8	B	4.9	A	40.3	D	37.3	D	11.7	B
9	Beauregard St / Rayburn Ave	6.3	A	5.3	A	47.0	D	41.0	D	10.8	B
10	Beauregard St / Highview Ln	4.0	A	6.2	A	34.9	C	37.2	D	7.7	A
11	Beauregard St / Mark Center Dr	9.5	A	4.7	A	43.3	D	46.0	D	10.8	B
12	Beauregard St / Seminary Rd	40.6	D	58.2	E	41.3	D	35.6	D	42.1	D
13	Beauregard St / Fillmore Ave	13.7	B	6.2	A	31.7	C	35.2	D	13.9	B
14	Beauregard St / W Braddock Rd	20.3	C	71.8	E	35.1	D	26.1	C	46.4	D
15	Beauregard St / King St	58.3	E	51.4	D	42.8	D	25.0	C	41.8	D
16	Seminary Rd / S. George Mason Dr	51.7	D	71.5	E	24.6	C	42.2	D	50.4	D
17	Seminary Rd / Dawes Ave	32.4	C	27.6	C	7.5	A	10.4	B	10.0	A
18	Seminary Rd / Echols Ave	52.0	D	57.0	E	7.2	A	13.3	B	10.6	B
19	Seminary Rd / Mark Center Dr	50.6	D	37.5	D	22.1	C	23.9	C	28.0	C
20	Seminary Rd / Ramp to I-395 South	-	-	16.1	B	49.2	D	-	-	37.9	D
21	Seminary Rd / Ramp from I-395 South	-	-	65.1	E	-	-	6.2	A	36.9	D
22	Seminary Rd / Ramp from I-395 North	164.2	F	-	-	31.0	C	-	-	46.6	D
23	Seminary Rd / Ramp to I-395 North	1.4	A	-	-	-	-	42.9	D	7.4	A
24	Seminary Rd / Library Ln	31.5	C	40.5	D	24.5	C	18.9	B	23.6	C
25	Seminary Rd / Hammond M.S.	26.8	C	22.1	C	20.0	C	0.7	A	13.3	B
26	Seminary Rd / N Pickett St	27.9	C	1.0	A	12.7	B	10.7	B	12.5	B
27	Seminary Rd / N Jordan St	38.5	D	-	-	33.4	C	10.5	B	26.4	C
28	N Van Dorn St / Taney Ave	11.4	B	4.5	A	-	-	42.9	D	9.7	A
29	N Van Dorn St / Sanger Ave	34.2	C	42.7	D	210.4	F	54.6	D	73.2	E
30	N Van Dorn St / Kenmore Ave	14.4	B	5.6	A	-	-	44.9	D	12.5	B
31	N Van Dorn St / W Braddock Rd	33.3	C	18.3	B	31.4	C	24.8	C	26.5	C
32	W Braddock Rd / Hampton Dr	26.0	C	36.8	D	6.5	A	5.4	A	14.3	B

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.



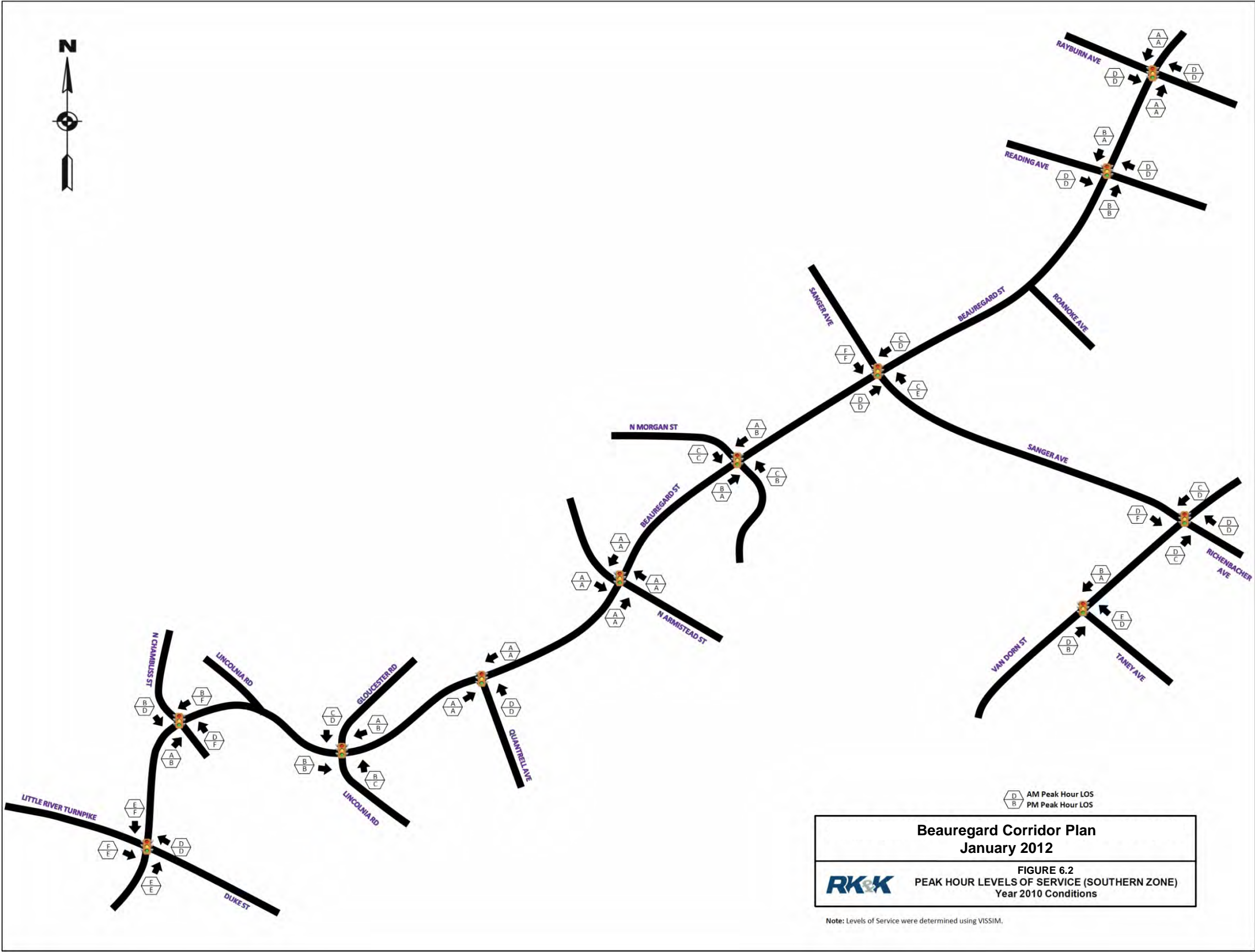


Table 6.3: Existing (2010) AM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	36	18	D	25	25	B
N Armistead St	N Morgan St	39	19	C	30	24	B
N Morgan St	Sanger Ave	67	10	F	48	13	E
Sanger Ave	Reading Ave	59	22	C	69	19	C
Reading Ave	Rayburn Ave	26	20	C	31	17	D
Rayburn Ave	Highview Lane	22	22	C	26	19	C
Highview Lane	Mark Center Dr	21	25	B	20	27	B
Mark Center Dr	Seminary Rd	58	10	F	24	23	C
Seminary Rd	Fillmore Ave	34	28	B	71	14	E
Fillmore Ave	W Braddock Rd	33	24	C	30	26	B
W Braddock Rd	King St	76	13	E	42	24	C
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	34	20	C	28	25	B
Echols Ave	Beauregard St	73	12	E	36	24	C
Beauregard St	Mark Center Dr	35	15	D	46	11	E
Library Lane	N Pickett St	32	6	F	9	23	C
N Pickett St	N Jordan St	22	23	C	34	15	D

Table 6.4: Existing (2010) PM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	35	18	C	26	25	B
N Armistead St	N Morgan St	32	23	C	31	24	C
N Morgan St	Sanger Ave	52	12	E	44	15	D
Sanger Ave	Reading Ave	53	25	B	74	18	D
Reading Ave	Rayburn Ave	25	20	C	23	22	C
Rayburn Ave	Highview Lane	19	25	B	31	16	D
Highview Lane	Mark Center Dr	30	18	C	24	22	C
Mark Center Dr	Seminary Rd	71	8	F	27	21	C
Seminary Rd	Fillmore Ave	36	27	B	92	11	E
Fillmore Ave	W Braddock Rd	41	19	C	31	25	B
W Braddock Rd	King St	64	16	D	44	23	C
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	39	18	D	35	20	C
Echols Ave	Beauregard St	102	8	F	57	15	D
Beauregard St	Mark Center Dr	34	15	D	36	14	D
Library Lane	N Pickett St	137	4	F	40	13	E
N Pickett St	N Jordan St	43	12	E	25	21	C

Ramp Metering Operations

Ramps to/from I-395 at Seminary Road are controlled by ramp meters during peak hours—northbound in the AM peak and southbound in the PM peak. To ensure that the future VISSIM models reflect realistic ramp-metering operations, it is important to assume appropriate model parameters that affect the operations at the ramp. This section summarizes the results obtained from the ramp-meter parameter re-calibration process.

a) Field data collection

A site visit was conducted on a weekday in March, 2011 during the AM peak (7:30 – 8:30 AM) and PM peak (4:30 – 5:30 PM). During the AM peak, no queues along the I-395 northbound on-ramp were observed. The maximum observed queues on the I-395 northbound ramp were four vehicles and the downstream average merging speed was observed to be around 20 mph. According to VDOT, the ramp metering signals operate on a four (4) second cycle, with a two (2) second green interval followed by a two (2) second red interval. The ramp metering signals are operational Monday through Friday from 6:30 AM to 9:00 AM and from 3:30 PM to 6:30 PM. Field observations of the ramp metering signal operations confirmed the timing information provided by VDOT.

During the PM peak, saturated conditions were observed along the I-395 southbound on-ramp. The average green and red time for the ramp-meter was observed to be 2 seconds. While queues were observed on this ramp, they did not extend beyond the intersection of Seminary Road and Mark Center Drive. Field observations for the PM peak are summarized in Table 6.5.

Table 6.5: Field Observations at the I-395 SB Ramp (4:30 PM - 5:30 PM)

Average Merging Speed	10 mph
Traffic Flow at Ramp-meter	1,100 vehicles/hour (based on 15-minute counts)
Observed Queues from the Ramp	Max Queue up to Mark Center Drive (around 1,600 feet)
Green time/Red time for Ramp-meter	2 seconds/2 seconds

b) Existing Conditions VISSIM model for Re-calibration

In order to calibrate the PM Peak ramp-meter parameters (merge speeds, green/red time for the ramp-meter), an Existing model in VISSIM was generated, as shown in Figure 2. This existing model included the I-395 Ramps, Seminary Road segment between Mark Center Road in the west and Library Lane in the east. Lane configuration, traffic volumes and signal timing/phasing corresponding to existing conditions were coded in VISSIM.

c) Re-calibration process

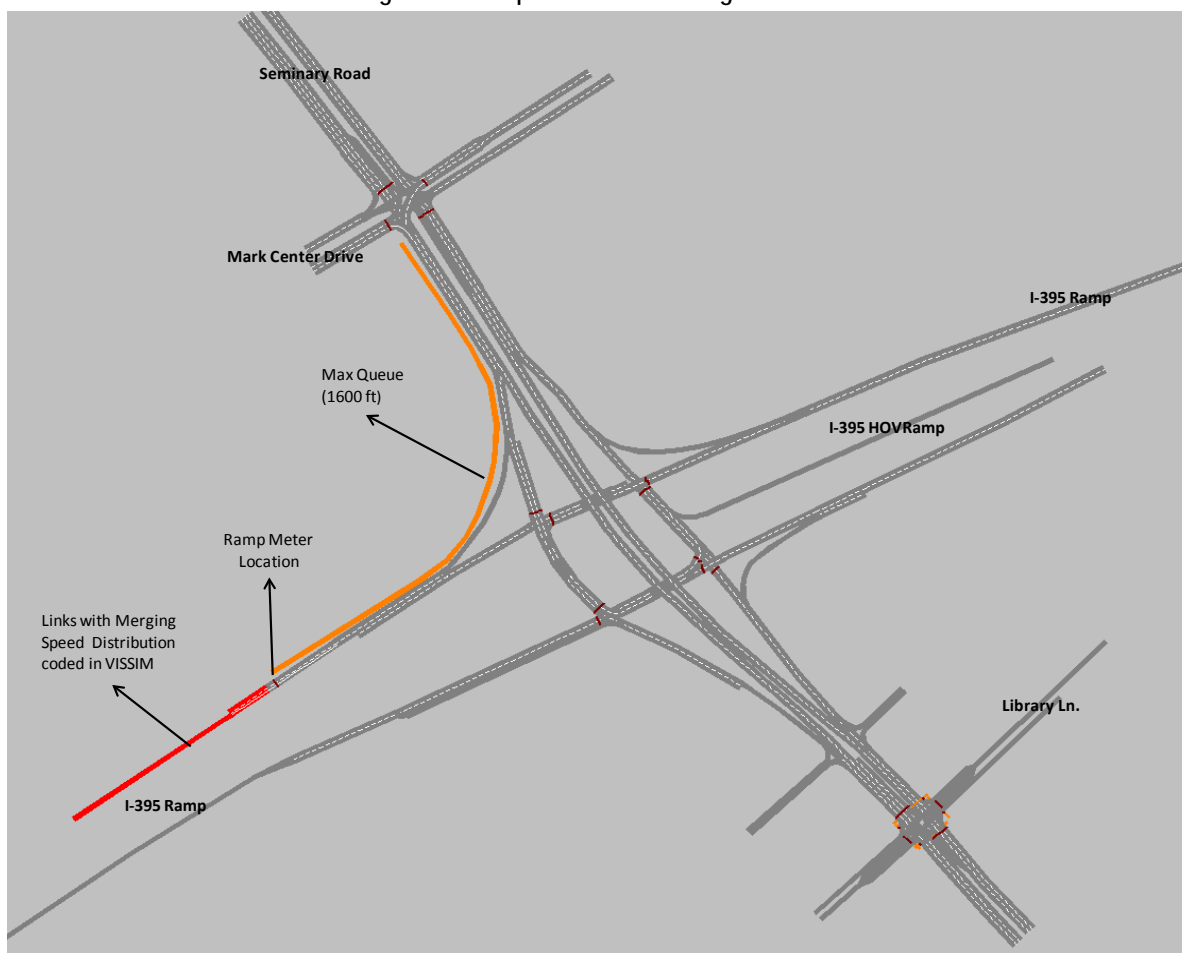
During the parameter calibration three different merging speed distributions (13-17 mph; 8-12 mph; 5-10 mph) were assumed and tested for the section downstream of the I-395 southbound ramp-meter. Traffic speed, delay and queue as well as the throughput at the ramp meter were collected from VISSIM. Table 6.6 summarizes VISSIM outputs from the Existing PM model relevant to the I-395 southbound ramp. Figure 6.3 depicts the extent of the model generated for this re-calibration effort.

Table 6.6: Simulation Results at the I-395 SB Ramp Meter - Existing PM Peak Conditions

Model Input: Speed Distribution	Speed (mph)	Traffic Flow (veh./hr)	Average Queue (ft)	Maximum Queue (ft)
13 - 17 mph	12.7	1,311	209	786
8 - 12 mph	6.1	1,142	1,034	1,648
5 - 10 mph	4.0	831	1,223	1,649

Note: Input speed distribution reflects merging traffic speed (speeds of vehicles downstream of the I-395 SB ramp-meter); I-395 SB Ramp Demand (as input in the model): 1,320 vehs/hr.

Figure 6.3: Snapshot of the Existing PM model



The observed maximum queue of 1,600 feet (from field, Refer to Table 6.6) is close to the maximum queue of 1,648 feet (from VISSIM, Refer to Table 6.7) that corresponds to the VISSIM model with assumed merging speed distribution of 8 - 12 mph. Furthermore, the observed discharge rate at the ramp meter of 1,100 vehicles per hour is close to 1,142 vehicles per hour from VISSIM.

Assuming merging speed distributions of 15 - 20 mph for the northbound on-ramp in the AM peak and 8 - 12 mph for the southbound on-ramp in the PM peak hour, VISSIM model reproduces the existing northbound and southbound ramp metering operations. Same assumptions are used for future year analysis. **Table 6.7** summarizes ramp-metering parameters assumed for all of the future analysis year VISSIM models.

Table 6.7: Ramp-metering parameters

Parameters	AM Peak (I-395 NB Ramp)	PM Peak (I-395 SB Ramp)
Merge Speed Distribution	15 - 20 mph	8 - 12 mph
Green time/Red time	2 seconds/2 seconds	2 seconds/2 seconds

7 Future Year Land Use Forecasts

2035 Baseline Conditions (Without Development)

Travel demand forecasts for the Beauregard Corridor Plan were prepared using version 2.2 of the regional travel demand model developed by the Washington Metropolitan Area Council of Governments (COG). At the commencement of this study, the most recent approved regional land use projections for use with this model were from Round 7.2a of COG's Cooperative Forecasting Program.

The Washington Metropolitan Area is divided into 2,191 traffic analysis zones (TAZs). The COG land use projections are grouped by TAZ. The study area for the Beauregard Corridor Plan is located within six (6) TAZs in the COG model. **Figure 7.1** shows the location of the study area relative to the boundaries of these TAZs.

The Baseline (Without Development) conditions are primarily based on the Round 7.2a COG land use outside the City of Alexandria. However, the land use assumptions for the recently adopted Plan Amendment for the Baileys Crossroads section of Fairfax County were used instead of the Round 7.2a land use, due to its close proximity to the Beauregard Corridor Plan area. The Baseline (Without Development) conditions include all approved and un-built development within the City of Alexandria, as shown in the City's draft Year 2035 land use forecasts (dated July 2010) for inclusion in Round 8.0 of COG's Cooperative Forecasting Program. This development is primarily related to the BRAC-133 facility. It should be noted that:

- No additional redevelopment by the JBG Companies, Duke Realty, Home Properties, or Hekemian is assumed beyond Year 2010 levels.
- No additional redevelopment is assumed on the Washington Real Estate Investment Trust (WRIT) property along Kenmore Avenue (i.e., the Kenmore Medical Center).

The effect of the proposed additional redevelopment by the parties listed above is included in the analysis of Year 2035 Conditions **With** Development described later in this section.

Figure 7.2 shows several of the existing major developments and features located within the study area, along with the TAZ boundaries. **Table 7.1** shows the net change in land use assumptions for the Year 2035 Baseline (Without Development) compared to the Existing (2010) Conditions.

**Table 7.1: Land Use Assumptions (Approved & Unbuilt) for Year 2035 Baseline (Without Development) Conditions
Net Change vs. Existing (2010)**

TAZ No.	TAZ Description	Residential Units	Retail Space (sq. ft.)	Office Space (sq. ft.)	Hotel Rooms	Industrial (sq. ft.)	Other (sq. ft.)
1387/1556	Mark Center (JBG East)	+0	+0	+1,743,537	+0	+0	+0
1372/1558	Pegram (Home Properties)	+58	+0	+0	+0	+0	+0
1384/1563	JBG West / Duke	+0	+0	+0	+0	+0	+0
1383/1564	Shirley Gardens / NVCC	+0	+0	+0	+0	+0	+0
1386/1566	Southern Towers	+0	+0	+0	+0	+0	+0
1362/1568	Seminary Hill	+0	+0	+0	+0	+0	+0
Total		+58	+0	+1,743,537	+0	+0	+0

Figure 7.1: Study Area and Traffic Analysis Zone (TAZ) Boundaries

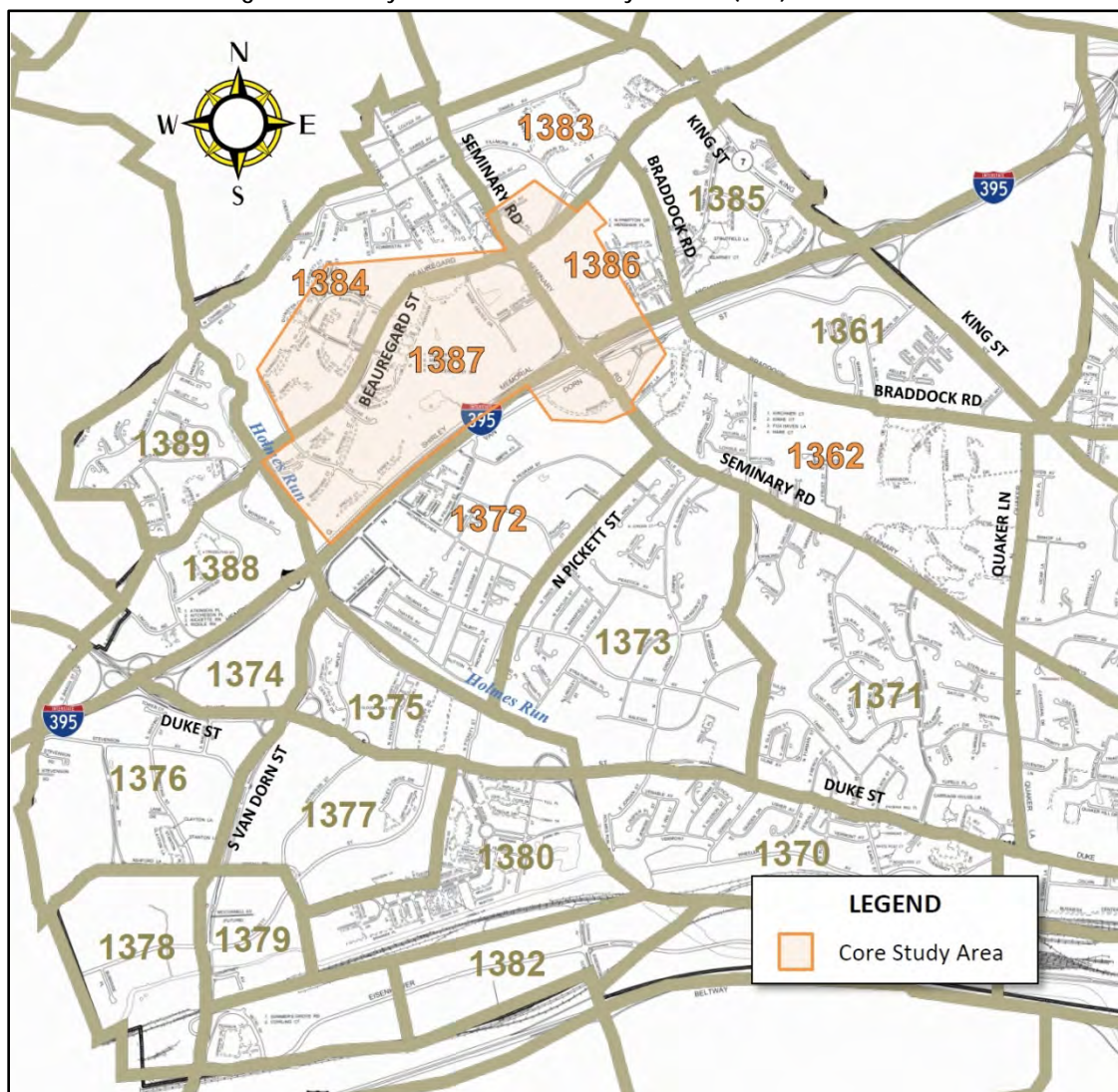
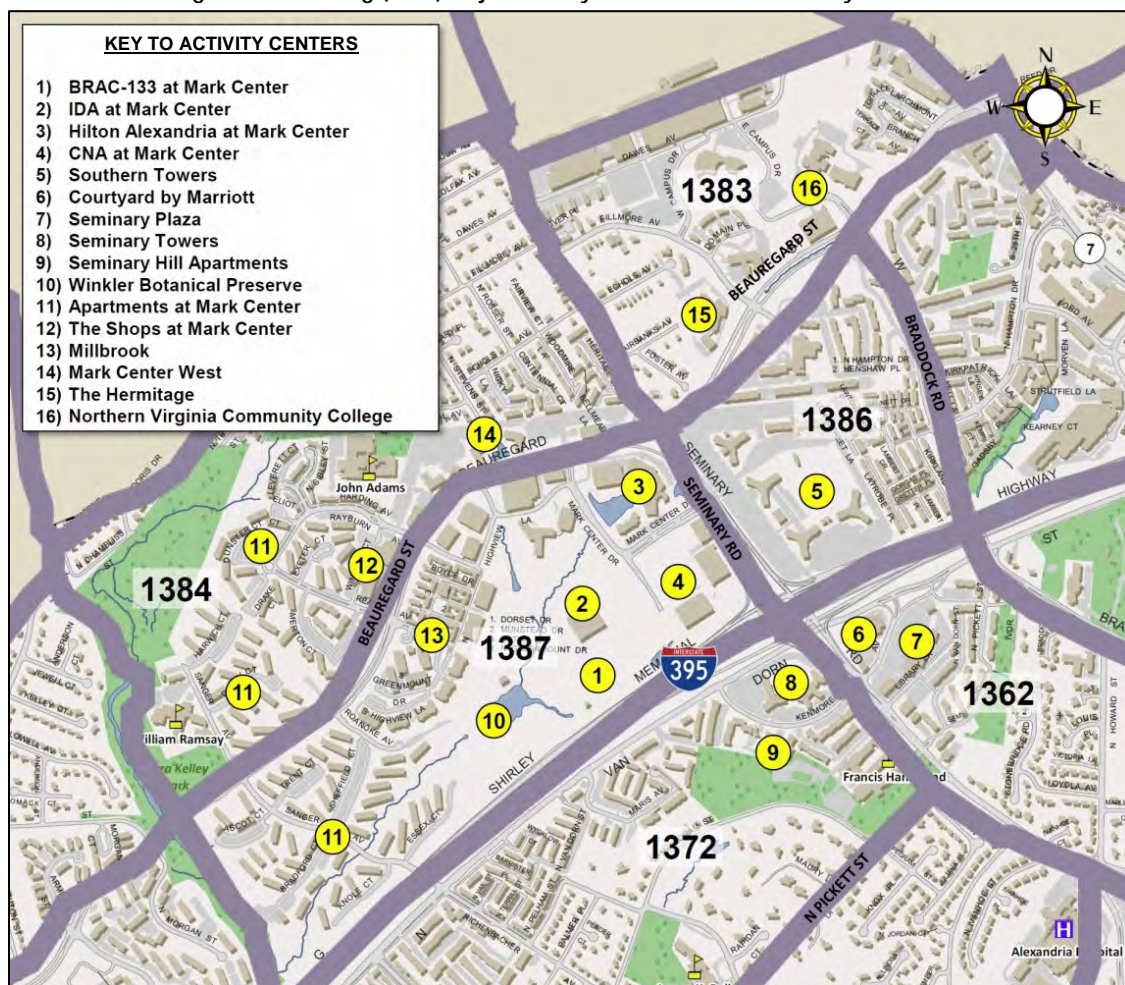


Figure 7.2: Existing (2010) Major Activity Centers within the Study Area TAZs



Future Conditions With Development

The proposed redevelopment within the Beauregard Corridor Plan study area will be mixed-use, with apartments and townhouses, retail space, office space, and hotels. Some of the new development will be infill development, whereas other new development will replace existing development. The proposed development will have a higher density than the existing development, incorporating features such as structured parking and ground level retail with upper level residential and/or office, which encourage non-motorized trips between the different land uses.

The redevelopment of properties located within the study area is expected to occur in six (6) phases through 2040. Changes in land use, and the corresponding changes in trip generation and distribution, were projected for two distinct build-out intervals: An Interim Build-Out condition in Year 2020, and a Build-Out condition in Year 2035. The 2035 Build-Out condition excludes approximately 320,000 sq. ft. of net new residential development that would occur during the sixth phase (2036-2040). The year 2035 was used because it required less extrapolation from the regional model's 2030 horizon year, thus preserving the accuracy of the COG Round 7.2a forecasts. To determine the network-wide traffic volumes associated with the 2020 interim and 2035 full development, the land use components of the development were input into the COG travel demand model. These components are categorized as follows:

- Number of residential units
- Retail development floor area (in square feet)
- Number of hotel rooms
- Office development floor area (in square feet)
- Industrial development floor area (in square feet)
- Other development floor area (in square feet) not fitting these categories

The categories listed above are different from the data categories that are used by the COG model, and must be converted. The components used by the model are as follows:

- Number of households
- Population corresponding to the number of households
- Group quarters population
- Industrial employment
- Retail employment
- Office employment
- Other employment
- Ratio of TAZ household income to regional household income

The following factors provided by the City planning staff were used to convert the proposed land use data into the categories that are used by the COG model:

- 7.5% vacancy rate for residential units
- 2.05 occupants per household in Year 2035
- 2 employees per 1,000 square feet of retail space
- 3.5 employees per 1,000 square feet of office space
- 0.71 employees per 1,000 square feet of industrial space
- 1 employee per 1,000 square feet of "other" development space
- 0.5 employees per 1 hotel room

**Table 7.2: Land Use Assumptions for Year 2035 Conditions With Development
Net Change vs. Year 2035 Baseline Conditions**

TAZ No.	TAZ Description	Residential Units	Retail Space (sq. ft.)	Office Space (sq. ft.)	Hotel Rooms	Industrial (sq. ft.)	Other (sq. ft.)
1387/1556	Mark Center (JBG East)	+379	+12,000	+0	+0	+0	+0
1372/1558	Pegram (Home Properties)	+629	+0	+0	+0	+0	+0
1384/1563	JBG West / Duke	+2,266	+294,680	+1,156,850	+420	+0	+0
1383/1564	Shirley Gardens / NVCC	+520	+16,000	+78,469	+140	+0	+0
1386/1566	Southern Towers	+0	+105,000	+195,000	+140	+0	+0
1362/1568	Seminary Hill	+0	-6,853	+105,000	+0	+0	+0
Total		+3,794	+420,827	+1,535,319	+700	+0	+0

**Table 7.3: Land Use Assumptions for Year 2020 Conditions With Interim Development
Net Change vs. Existing (2010)**

TAZ No.	TAZ Description	Residential Units	Retail Space (sq. ft.)	Office Space (sq. ft.)	Hotel Rooms	Industrial (sq. ft.)	Other (sq. ft.)
1387/1556	Mark Center (JBG East)	+0	+0	+1,743,537	+0	+0	+0
1372/1558	Pegram (Home Properties)	+687	+0	+0	+0	+0	+0
1384/1563	JBG West / Duke	+950	+217,600	+213,000	+0	+0	+0
1383/1564	Shirley Gardens / NVCC	+520	+16,000	+78,469	+140	+0	+0
1386/1566	Southern Towers	+0	+45,900	+75,000	+0	+0	+0
1362/1568	Seminary Hill	+0	-6,853	+105,000	+0	+0	+0
Total		+2,157	+272,647	+2,215,006	+140	+0	+0

Note: TAZ 1387/1556 includes the BRAC-133 facility.

**Table 7.4: Land Use Assumptions for Year 2020 Conditions With Interim Development
Net Difference vs. Year 2035 Baseline Conditions**

TAZ No.	TAZ Description	Residential Units	Retail Space (sq. ft.)	Office Space (sq. ft.)	Hotel Rooms	Industrial (sq. ft.)	Other (sq. ft.)
1387/1556	Mark Center (JBG East)	+0	+0	+0	+0	+0	+0
1372/1558	Pegram (Home Properties)	+629	+0	+0	+0	+0	+0
1384/1563	JBG West / Duke	+950	+217,600	+213,000	+0	+0	+0
1383/1564	Shirley Gardens / NVCC	+520	+16,000	+78,469	+140	+0	+0
1386/1566	Southern Towers	+0	+45,900	+75,000	+0	+0	+0
1362/1568	Seminary Hill	+0	-6,853	+105,000	+0	+0	+0
Total		+2,099	+272,647	+471,469	+140	+0	+0

The traffic volumes and analyses for the Future Conditions With Development (for both the Year 2020 Interim Development and Year 2035 Development) are based on trip generation and distribution using the COG travel demand model. **Table 7.2** shows the net changes in residential dwelling units, retail and office gross floor area, and hotel rooms for each TAZ in the study area based on comparing the Year 2035 Conditions With Development with the Year 2035 Baseline Without Development. **Table 7.3** shows the net changes in these same land use types based on comparing the Year 2020 Conditions With Interim Development to the Existing (2010) Conditions. These are the changes in land use that were input into the COG travel demand model to generate trips for this study. **Table 7.4** shows the land use differences between the Year 2020 Conditions With Interim Development and the Year 2035 Baseline (Without Development).

8 Travel Demand Forecasting Methodology

AM and PM peak hour turning movement volumes from counts conducted by others in 2008 and 2009 were provided by the City planning staff. RK&K supplemented this count data from prior studies with new traffic counts performed in December 2009 and January 2010. The 2008 and 2009 counts selected for use in this study were within a reasonable comparison to the 2010 counts. The traffic data from 2008 and 2009 was adjusted to Year 2010 levels using a growth rate calculated using roadway link volumes from the Year 2008 and Year 2010 COG travel demand model runs.

The screenline refinement process from National Cooperative Highway Research Program (NCHRP) Report 255 was used to adjust the projected Year 2035 roadway link volumes from the model by comparing the Year 2010 model run volumes to the actual 2010 traffic counts. This refinement process adjusts the future volumes to be higher at locations where the model has underestimated the existing traffic, and it adjusts the future volumes to be lower at locations where the model has overestimated the existing traffic. The difference between the actual existing traffic volumes and the modeled Year 2035 volumes was used to determine traffic growth rates for specific roadway segments throughout the study area. These growth rates were applied to the Year 2010 turning movement volumes at 32 existing intersections in the greater study area, listed in Table 8.1, to estimate the Year 2035 intersection turning movement volumes.

Table 8.1 – List of Existing Intersections Included in the Transportation Analysis

Beauregard Street & Little River Tpk. (Route 236)	Seminary Road & S. George Mason Drive
Beauregard Street & N. Chambliss Street	Seminary Road & Dawes Avenue
Beauregard Street & Lincolnia Road	Seminary Road & Echols Avenue
Beauregard Street & Quantrell Avenue	Seminary Road & Mark Center Drive
Beauregard Street & N. Armistead Street	Seminary Road & Four (4) Interstate 395 Ramps
Beauregard Street & N. Morgan Street	Seminary Road & Kenmore Avenue
Beauregard Street & Sanger Avenue	Seminary Road & Library Lane
Beauregard Street & Reading Avenue	Seminary Road & Hammond Middle School
Beauregard Street & Rayburn Avenue	Seminary Road & N. Pickett Street
Beauregard Street & Highview Lane	Seminary Road & N. Jordan Street
Beauregard Street & Mark Center Drive	N. Van Dorn Street & Taney Avenue
Beauregard Street & Seminary Road	N. Van Dorn Street & Sanger / Richenbacher Avenues
Beauregard Street & Fillmore Ave	N. Van Dorn Street & Kenmore Avenue
Beauregard Street & Braddock Road	N. Van Dorn Street & Braddock Road
Beauregard Street & King Street (Route 7)	Braddock Road & Hampton Drive

The process described above was used to estimate the traffic volumes for both the 2035 Baseline (Without Development) and 2035 Conditions with Development land use alternatives. However, the traffic projections for the 2035 Conditions with Development transportation network required an additional step to estimate the volume of traffic that would use a proposed new north-south roadway located west of Beauregard Street between Sanger Avenue and Mark Center Drive. The travel demand model showed a 26 percent decrease in traffic along portions of Beauregard Street with this new parallel roadway in-place. The 2035 Conditions with Development intersection turning movement volumes along Beauregard Street were adjusted to reflect this traffic diversion.

9 Year 2035 Traffic Analysis for Baseline (Without Development)

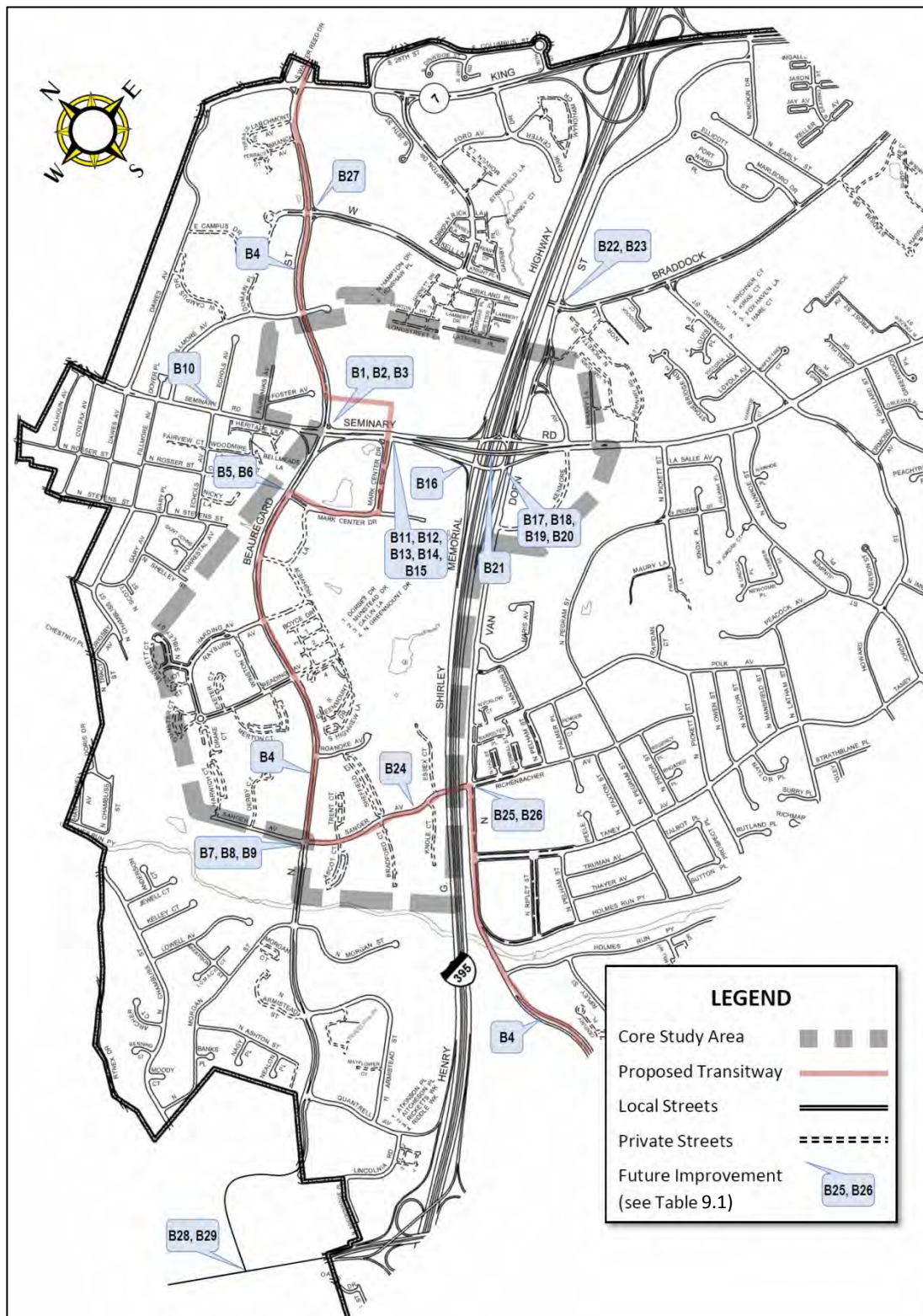
The transportation network assumed to be in place by Year 2035 Baseline (Without Development), would include several key additions to the existing Year 2010 network, including, but not limited to, a new HOV ramp to and from the south at the I-395/Seminary Road interchange, intersection improvements at King Street and Beauregard Street that are currently under design, roadway widening along Route 236 at Beauregard Street that is listed in the latest MWCOC Constrained Long-Range Plan, an additional left turn lane along westbound Seminary Road at Beauregard Street and along southbound Beauregard Street at Mark Center Drive to accommodate new BRAC-133 facility traffic, and high-capacity north-south transit service through the Beauregard Corridor Plan study area with 10-minute headways and dedicated transit lanes on Van Dorn Street, Sanger Avenue, Mark Center Drive and Beauregard Street (see **Appendix A** for transit corridor assumptions). These improvements, plus additional 2035 baseline network improvements, are summarized in **Table 9.1**, with their locations shown in **Figure 9.1**. **Figures 9.2 and 9.3** show the AM and PM peak hour turning movement volumes, respectively, for the Year 2035 Baseline Conditions (Future Conditions Without Development) at each of the key intersections within the study area.

Table 9.1: Transportation Improvements Assumed by Year 2035 Baseline (Without Development)

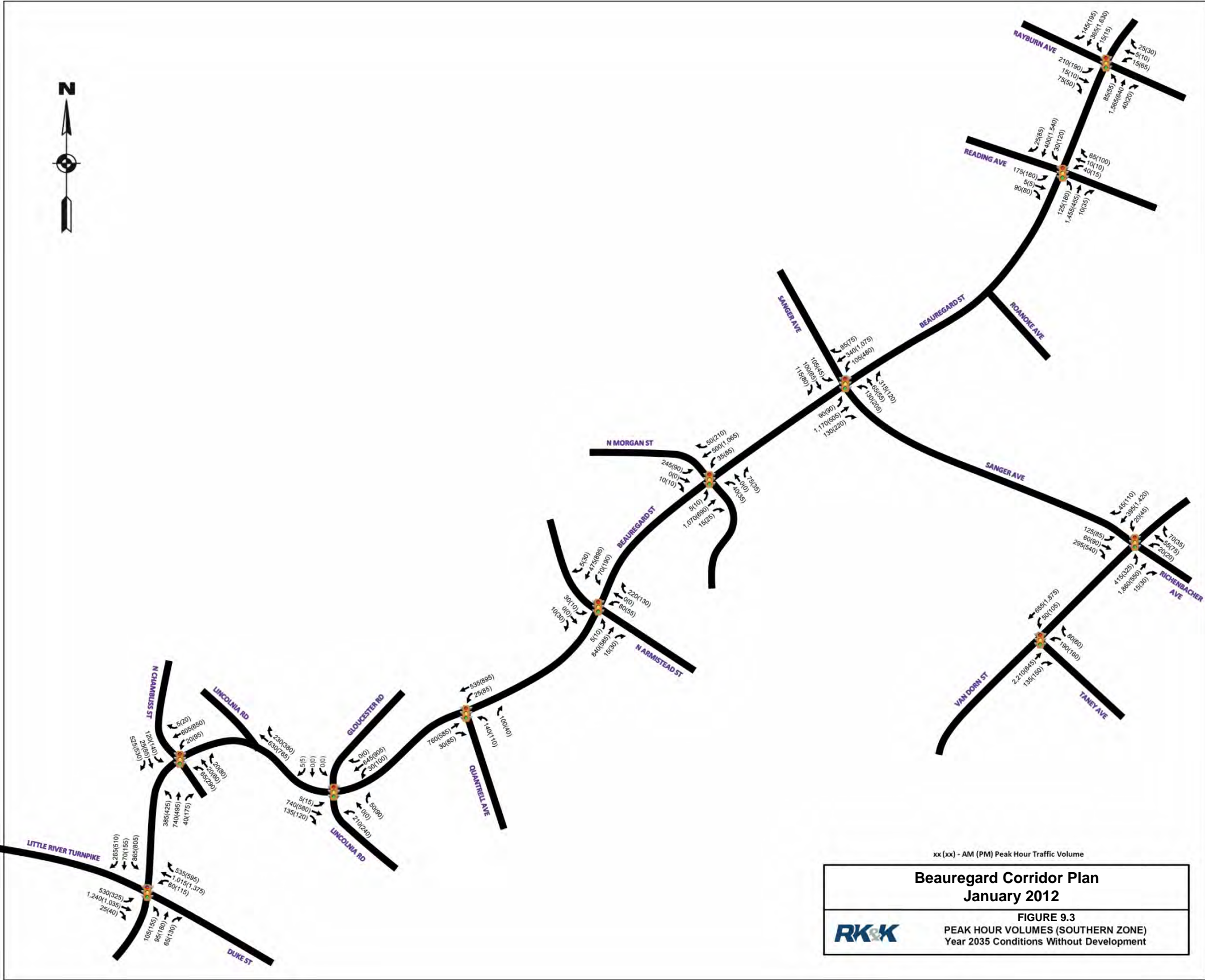
No.	Location	2035 Baseline (Without Development) Improvements	Source of Improvement
B1	Beauregard St at Seminary Rd	Widen northbound Beauregard Street between Mark Center Drive and Seminary Road to provide a dedicated right-turn lane at the northbound approach to Seminary Road after the direct connect ramp from northbound Beauregard Street to Eastbound Seminary Road. Reconfigure the intersection to allow the three-to-two through-lane drop at the new dedicated left-turn lanes. The new dedicated right-turn lane will be signed for Seminary Road eastbound to allow eastbound Seminary Road traffic to avoid the weave condition between the direct connect ramp exit and Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B2		Widen westbound Seminary Road to provide a deceleration lane and widen northbound Beauregard Street to provide an acceleration lane for the westbound-to-northbound right-turn lane. Provide an additional westbound left turn lane from Seminary Road onto southbound Beauregard Street.	BRAC / VDOT Short-Mid Term Improvement
B3		Add a separate right turn lane along westbound Seminary Road extending back to Mark Center Drive.	Beauregard Planning Study Assumed Improvement
B4	Beauregard Street	Construct a dedicated transitway in each direction along Beauregard Street heading southbound from King Street, turning east into Southern Towers, south and west onto Mark Center Drive and south onto Beauregard to Sanger Avenue. (See Appendix A for transit corridor assumptions).	Transitway Feasibility Study
B5	Beauregard Street at Mark Center Drive	Provide a separate right-turn lane along NB Beauregard Street. Provide an additional southbound left turn to Mark Center Drive.	Beauregard Planning Study Assumed Improvement
B6		Reconfigure westbound approach as three lanes - 1 left, 1 thru and 1 right.	Beauregard Planning Study Assumed Improvement
B7	Beauregard St at Existing Sanger Ave	Reconfigure the Sanger Ave approaches to consist of a separate left turn lane, a thru lane, and a separate right turn lane in both the eastbound and westbound directions. The portion of Beauregard Street between Roanoke and existing Sanger will be mixed operations. southbound transit will transition from median runningway on Beauregard Street to curbside running along existing Sanger Avenue.	Beauregard Planning Study Assumed Improvement
B8		Provide protected/permissive left-turn phasing for the Sanger Avenue left turns.	Beauregard Planning Study Assumed Improvement
B9		Provide permissive/overlap right turn phasing for westbound Sanger Avenue.	Beauregard Planning Study Assumed Improvement
B10	Seminary Rd at Echols Ave	Add separate left turn lanes along eastbound and westbound Seminary Rd, with protected/permissive left turn phasing.	Beauregard Planning Study Assumed Improvement

No.	Location	2035 Baseline (Without Development) Improvements	Source of Improvement
B11	Seminary Road at Mark Center Drive	Widen the Seminary Road westbound approach and gore area from the rotary back to the Mark Center Drive intersection from one to two lanes and provide a dedicated right-turn lane into Southern Towers. Restripe the westbound Seminary Road flyover to allow one through lane on Seminary Road and one left-turn lane into Mark Center Drive. Provide a physical separation between the two lanes from the rotary and the left-turn lane at Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B12		Redesign eastbound Seminary Road approach to Mark Center Drive to allow three through lanes, and to align with new lane on Seminary east of Mark Center Drive accessing I-395.	BRAC / VDOT Short-Mid Term Improvement
B13		Add lanes at Southern Towers approach to separate the existing shared through/left turn lanes. The approach would include dual left turn lanes, one thru lane and one right turn lane.	Beauregard Planning Study Assumed Improvement
B14		Widen northbound Mark Center Dr to allow for a third right turn onto EB Seminary. This approach would be a left turn, thru/right, and dual right turn lanes.	BRAC / VDOT Short-Mid Term Improvement
B15		Construct a pedestrian bridge across Seminary Road west of Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B16	EB Seminary Rd Off-ramp to I-395 Rotary	Widen eastbound Seminary Road and the southbound I-395 on-ramp by one lane from Mark Center Drive to the ramp meter signal to provide a continuous two-lane ramp from Seminary Road to the ramp meter. Restripe the southbound ramp connection from the rotary to provide a merge into the two-lane ramp from eastbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvement
B17	I-395 at the Seminary Rotary	Widen the northbound I-395 off-ramp from two to three lanes and provide two through lanes and one right turn lane.	BRAC / VDOT Short-Mid Term Improvement
B18		On the eastbound rotary (toward onramp), restripe the pavement to provide a separate left turn lane, a shared thru/left turn lane, and a thru lane. Requires removal of the island at westbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvements
B19		Restripe the rotary to provide dual lefts for the eastbound-to-northbound movements.	BRAC / VDOT Short-Mid Term Improvement
B20		Restripe the westbound approach at the I-395 southbound off-ramp intersection to provide two through lanes and one left turn lane.	BRAC / VDOT Short-Mid Term Improvement
B21	I-395 at Seminary Road	Construct a new HOV ramp at Seminary Road and I-395 to and from the north, connecting to the upper bridge of Seminary.	VDOT project (Subject to EA)
B22	Van Dorn St at Braddock Rd	Replace the shared thru/left turn lanes along northbound and southbound Van Dorn St with separate left turn lanes	Beauregard Planning Study Assumed Improvements
B23		Add protected/permissive left turn phasing along northbound and southbound Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B24	Existing Sanger Avenue	Remove on-street parking in both directions and provide dedicated transit lane (one transit lane and one GP lane each direction). See Appendix A .	Transitway Feasibility Study
B25	Van Dorn St at Sanger Ave / Richenbacher Ave	Reconfigure eastbound Sanger Ave to consist of a right turn lane, and a left/thru/right lane approaching Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B26		Restripe the westbound approach along Richenbacher Ave to consist of a separate left turn lane and a shared thru/right turn lane.	Beauregard Planning Study Assumed Improvements
B27	Beauregard St at Braddock Rd	Change dual left to single left on westbound Braddock Road and replace the left-turn lane with a thru lane.	Beauregard Planning Study Assumed Improvements
B28	Beauregard St at Route 236	Add a third through lane on westbound Route 236.	Beauregard Planning Study Assumed Improvements
B29		Add a third through lane on eastbound Route 236.	Beauregard Planning Study Assumed Improvements

Figure 9.1: Map of Transportation Improvements Assumed for 2035 Baseline (Without Development)







a) Transit Alignment:

The Transitway Corridor Feasibility Study (performed by others) assumes a dedicated corridor transit service along Van Dorn Street, Sanger Avenue and Beauregard Street. The assumed transitway alignments relevant to the study area include:

- Median running dedicated transit lane along Beauregard Street between King Street and Main Street (within Southern Towers)
- Mixed operations along Main Street (within Southern Towers), Mark Center Drive between Main Street and Beauregard Street (serving BRAC)
- Median running dedicated transit lane along Beauregard Street between Mark Center Drive and Sanger Avenue
- Median running dedicated transit lane along Sanger Avenue between Beauregard Street and existing Knole Court
- Mixed operations along eastbound Sanger Avenue between existing Knole Court and Van Dorn Street (about 400 feet). Eastbound Sanger Avenue approaching Van Dorn Street consists of a right-turn lane, a shared right-through-left lane with transit turning right from the median lane.
- Median running dedicated transit lane along westbound Sanger Avenue between Van Dorn Street and Beauregard Street.

Transit stops within the Small Area Plan boundary were assumed at the following locations:

- Sanger Avenue at Beauregard Street
- Beauregard Street at Rayburn Avenue
- Mark Center
- Southern Towers

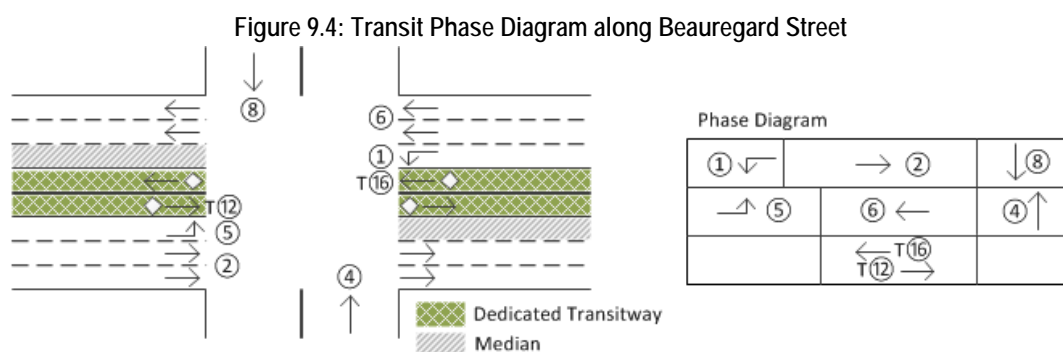
A dwell time of 20 seconds was used at each stop location and headway of five minutes was assumed for the transit service. See **Appendix A** for a discussion of the transit corridor assumptions.

b) Signal Timing/Phasing Assumptions:

Cycle lengths similar or equal to the existing cycle lengths were used for all the signalized intersections along:

- (a) Beauregard Street from Chambliss Street (south-end) to Braddock Road (north-end)
- (b) Seminary Road from Dawes Avenue (north-end) to Jordan Street (south-end)

Signal timing/phasing was also designed to accommodate the transit service along Van Dorn and Beauregard corridor at relevant intersections. At signalized intersections where the median running transit vehicle makes a through movement along Beauregard Street, the transit signal phase is designed to get a green indication along with the corresponding auto/vehicle through phase. At these intersections, the auto/vehicle turning left on the permissive phase from northbound and southbound Beauregard Street conflict with the transit vehicle going through. Hence the left turns along Beauregard Street are designed as protected (only) left turns. **Figure 9.4** shows a prototype of intersection configuration along Beauregard Street and phase diagram. Please note the transit phase starts only when both left-turn phases end.



At signalized intersections where the transit vehicle makes a right or a left turn from the median lane, a separate transit signal phase is designed. The corresponding transit phase is only activated with a transit vehicle presence.

To reflect realistic future conditions, intersection splits and offsets were optimized based on the turning movement projections for the 2035 baseline scenario. Initial signal timing optimization for the study intersections was performed using Synchro. Signal timing information was further fine-tuned in VISSIM based on the simulation observations.

c) Reduced Speed Areas/Distributions:

To model realistic vehicle slow-downs at turns, reduced speed areas were defined in VISSIM. For right turns a speed distribution of 8 mph - 12 mph was used while for left turns a distribution of 13 mph - 17 mph was used.

d) Simulation Results

Traffic operations under the Year 2035 Baseline (Without Development) scenario were evaluated using VISSIM. **Table 9.2** and **Table 9.3** summarize the LOS and vehicle delay results for 2035 Baseline AM and PM traffic analysis. Approaches with performance worse than LOS C are highlighted. The levels of service by approach are also shown on **Figures 9.5 and 9.6**, which are diagrams of the study area roadway network. **Table 9.4** shows the queue length results at critical intersections. Maximum queues that exceed the storage length are highlighted in the table. For these highlighted approaches, the queues would back up beyond their upstream intersections at least once during the one hour analysis period.

According to these analysis results, there would be three (3) intersections operating at LOS F during the AM peak hour, but none would operate at LOS F during the PM peak hour. Compared to the Existing 2010 conditions, this is an increase of two (2) intersections performing at LOS F. As shown in **Table 9.2**, the intersections at Beauregard Street and Sanger Avenue, Beauregard Street and Morgan Street would experience LOS F during the AM peak period. The northbound queues would spill beyond Morgan Street and Armistead Street. In existing conditions, an exclusive pedestrian phase is provided at the intersection of Beauregard Street and Sanger Avenue. To maintain consistency with the existing conditions, this operation has been assumed in the 2035 Baseline conditions as well. Given this exclusive pedestrian phase, the green time that can be provided to vehicular traffic is limited, leading to high delays and long queues on Beauregard Street especially on northbound approach.

During the AM peak, the intersection at Beauregard Street and Seminary Road intersection would also operate at LOS F. Westbound vehicles would experience the longest delays at the intersection. The westbound queue on Seminary Road would extend beyond the Mark Center Drive and further to the I-395 HOV Ramp, as indicated in the LOS table. The queue would block the ramp exit during the AM and delayed vehicles coming from the ramp, getting onto Seminary Road. The results indicate that the roadway configuration at this intersection would not be capable of handling the growing traffic in the future years under the baseline condition, especially on the westbound approaches.

For the PM period, all the intersections would operate at LOS E or better. In the simulation, long delays were observed on the northbound and eastbound approaches at the intersection of Beauregard Street and Sanger Avenue, with southbound queues spilling beyond the downstream intersection. This indicates that the roadway configuration at this intersection would not be sufficient to accommodate growing traffic in the future years under the baseline condition.

The 2035 Baseline AM and PM peak hour levels of service on the roadway links along Beauregard Street and along Seminary Road are summarized in **Tables 9.5 and 9.6**. These levels of service were calculated using the Highway Capacity Manual (HCM) methodology for arterial LOS. See **Appendix D** for the Synchro-based lanes, signal timing and phasing, which were used in the VISSIM simulations..

Table 9.2: Year 2035 Baseline (Without Development) AM Peak Hour Delay and Level of Service (LOS) by Approach

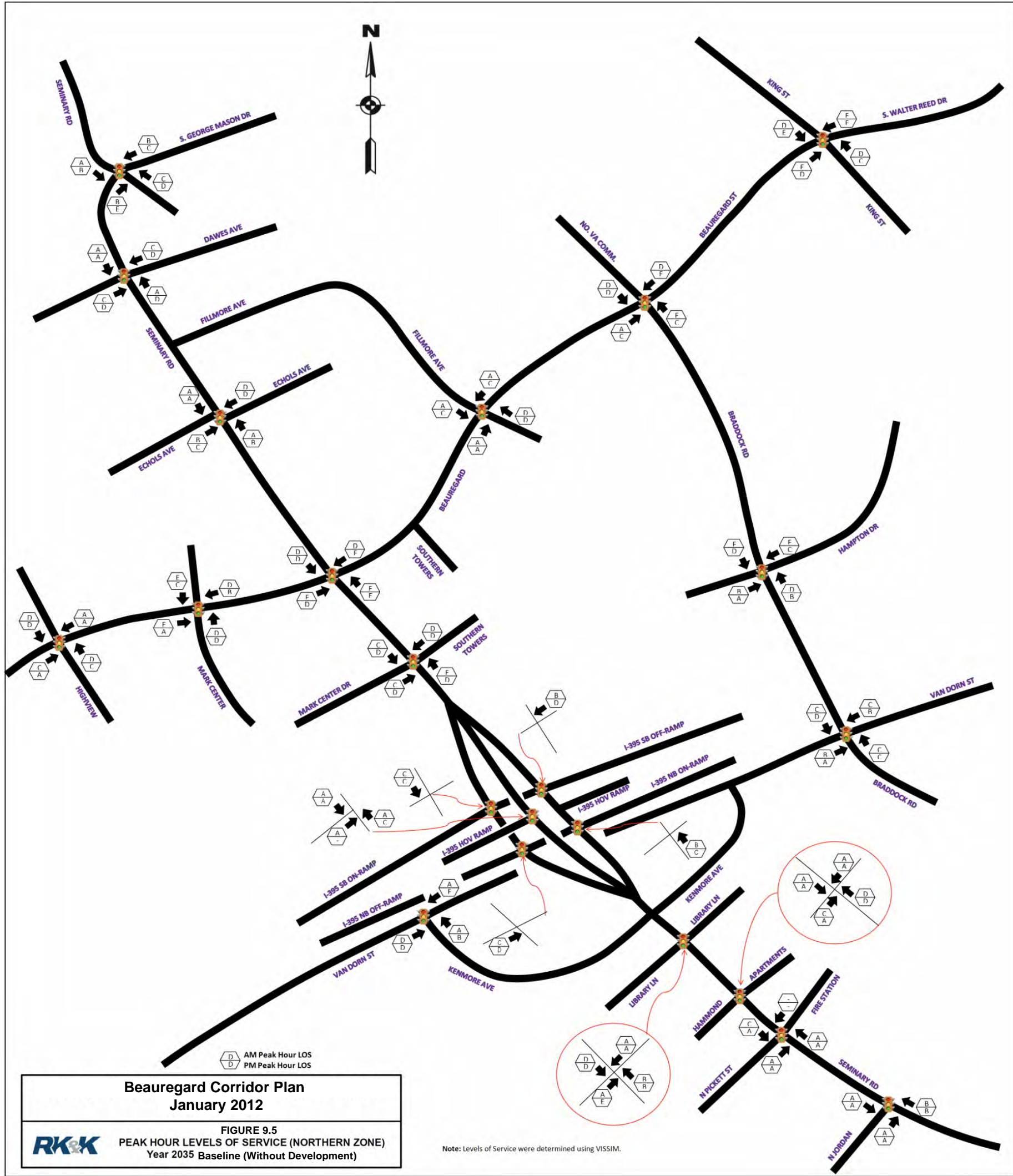
Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	66.4	E	47.7	D	123.2	F	32.7	C	70.7	E
2	Beauregard St / N Chambliss St	10.6	B	14.1	B	24.7	C	46.1	D	16.7	B
3	Beauregard St / Lincolnia Rd	17.9	B	4.4	A	0.9	A	45.1	D	16.8	B
4	Beauregard St / Quantrell Ave	37.4	D	8.3	A	-	-	55.9	E	29.6	C
5	Beauregard St / N Armistead St	93.8	F	9.4	A	52.1	D	97.7	F	64.8	E
6	Beauregard St / N Morgan St	127.5	F	8.9	A	84.8	F	56.3	E	81.1	F
7	Beauregard St / Sanger Ave	118.6	F	28.8	C	66.9	E	56.0	E	81.3	F
8	Beauregard St / Reading Ave	32.0	C	10.7	B	42.6	D	29.1	C	28.8	C
9	Beauregard St / Rayburn Ave	25.2	C	10.4	B	49.5	D	28.9	C	25.0	C
10	Beauregard St / Highview Ln	28.1	C	7.8	A	48.1	D	38.9	D	24.4	C
11	Beauregard St / Mark Center Dr	62.5	E	51.2	D	62.7	E	53.2	D	57.5	E
12	Beauregard St / Seminary Rd	82.5	F	52.5	D	46.4	D	121.0	F	84.5	F
13	Beauregard St / Fillmore Ave	8.3	A	6.8	A	9.9	A	48.6	D	10.5	B
14	Beauregard St / W Braddock Rd	5.7	A	44.3	D	52.7	D	157.3	F	78.4	E
15	Beauregard St / King St	57.6	E	94.4	F	40.2	D	37.9	D	49.4	D
16	Seminary Rd / S. George Mason Dr	18.1	B	19.1	B	9.0	A	29.8	C	15.8	B
17	Seminary Rd / Dawes Ave	32.9	C	24.7	C	2.6	A	2.4	A	3.4	A
18	Seminary Rd / Echols Ave	19.1	B	46.0	D	4.8	A	2.1	A	4.1	A
19	Seminary Rd / Mark Center Dr	22.1	C	45.8	D	30.5	C	63.1	E	48.7	D
20-23	Seminary Rd / I-395 Rotary	34.0	C	14.3	B	25.2	C	15.9	B	22.0	C
24	Seminary Rd / I-395 HOV Ramp	91.2	F	-	-	14.9	B	80.2	F	71.3	E
25	Seminary Rd / Library Ln	56.5	E	59.0	E	36.7	D	18.8	B	25.8	C
26	Seminary Rd / Hammond M.S.	24.8	C	14.0	B	1.7	A	2.6	A	3.2	A
27	Seminary Rd / N Pickett St	47.0	D	-	-	3.2	A	5.1	A	8.9	A
28	Seminary Rd / N Jordan St	37.4	D	-	-	14.6	B	15.1	B	20.8	C
29	N Van Dorn St / Taney Ave	10.5	B	2.4	A	-	-	41.5	D	11.4	B
30	N Van Dorn St / Sanger Ave	29.9	C	16.7	B	55.8	E	40.8	D	32.2	C
31	N Van Dorn St / Kenmore Ave	9.8	A	8.3	A	-	-	52.9	D	12.5	B
32	N Van Dorn St / W Braddock Rd	21.9	C	26.4	C	61.7	E	38.1	D	33.1	C
33	W Braddock Rd / Hampton Dr	102.7	F	55.5	E	11.9	B	50.4	D	43.8	D

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.

Table 9.3: Year 2035 Baseline (Without Development) PM Peak Hour Delay and Level of Service (LOS) by Approach

Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	60.2	E	41.7	D	111.0	F	36.6	D	59.1	E
2	Beauregard St / N Chambliss St	12.5	B	26.4	C	24.0	C	110.3	F	31.8	C
3	Beauregard St / Lincolnia Rd	7.4	A	9.6	A	2.7	A	38.8	D	13.5	B
4	Beauregard St / Quantrell Ave	1.1	A	0.8	A	-	-	43.6	D	4.5	A
5	Beauregard St / N Armistead St	8.1	A	4.6	A	15.0	B	18.5	B	7.2	A
6	Beauregard St / N Morgan St	20.7	C	4.9	A	57.7	E	40.6	D	13.3	B
7	Beauregard St / Sanger Ave	108.3	F	48.3	D	87.1	F	62.9	E	68.4	E
8	Beauregard St / Reading Ave	26.3	C	19.9	B	35.7	D	10.2	B	22.4	C
9	Beauregard St / Rayburn Ave	10.8	B	16.1	B	44.8	D	34.2	C	17.9	B
10	Beauregard St / Highview Ln	6.8	A	6.1	A	46.2	D	29.7	C	8.3	A
11	Beauregard St / Mark Center Dr	7.5	A	13.4	B	34.2	C	35.0	D	15.6	B
12	Beauregard St / Seminary Rd	44.5	D	99.3	F	48.5	D	58.7	E	58.3	E
13	Beauregard St / Fillmore Ave	9.8	A	26.6	C	28.1	C	49.3	D	20.9	C
14	Beauregard St / W Braddock Rd	23.6	C	68.3	E	46.2	D	25.0	C	45.7	D
15	Beauregard St / King St	54.8	D	82.7	F	55.6	E	34.3	C	56.6	E
16	Seminary Rd / S. George Mason Dr	57.0	E	28.9	C	19.4	B	52.8	D	38.1	D
17	Seminary Rd / Dawes Ave	35.2	D	36.0	D	7.5	A	35.0	D	21.1	C
18	Seminary Rd / Echols Ave	22.2	C	50.1	D	9.3	A	16.1	B	12.9	B
19	Seminary Rd / Mark Center Dr	43.1	D	42.6	D	38.8	D	49.4	D	43.9	D
20-23	Seminary Rd / I-395 Rotary	36.6	D	49.4	D	31.2	C	30.3	C	35.3	D
24	Seminary Rd / I-395 HOV Ramp	-	-	-	-	6.3	A	30.3	C	7.0	A
25	Seminary Rd / Library Ln	21.6	C	58.3	E	21.3	C	12.9	B	20.5	C
26	Seminary Rd / Hammond M.S.	26.4	C	20.9	C	2.1	A	0.8	A	1.9	A
27	Seminary Rd / N Pickett St	27.9	C	-	-	2.2	A	4.1	A	4.0	A
28	Seminary Rd / N Jordan St	47.5	D	-	-	14.0	B	7.4	A	15.3	B
29	N Van Dorn St / Taney Ave	9.2	A	12.3	B	-	-	40.2	D	13.2	B
30	N Van Dorn St / Sanger Ave	33.2	C	97.6	F	74.2	E	58.5	E	73.0	E
31	N Van Dorn St / Kenmore Ave	8.4	A	15.3	B	-	-	48.9	D	18.6	B
32	N Van Dorn St / W Braddock Rd	30.6	C	40.8	D	31.1	C	28.2	C	33.3	C
33	W Braddock Rd / Hampton Dr	24.7	C	37.0	D	4.0	A	9.6	A	13.2	B

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.



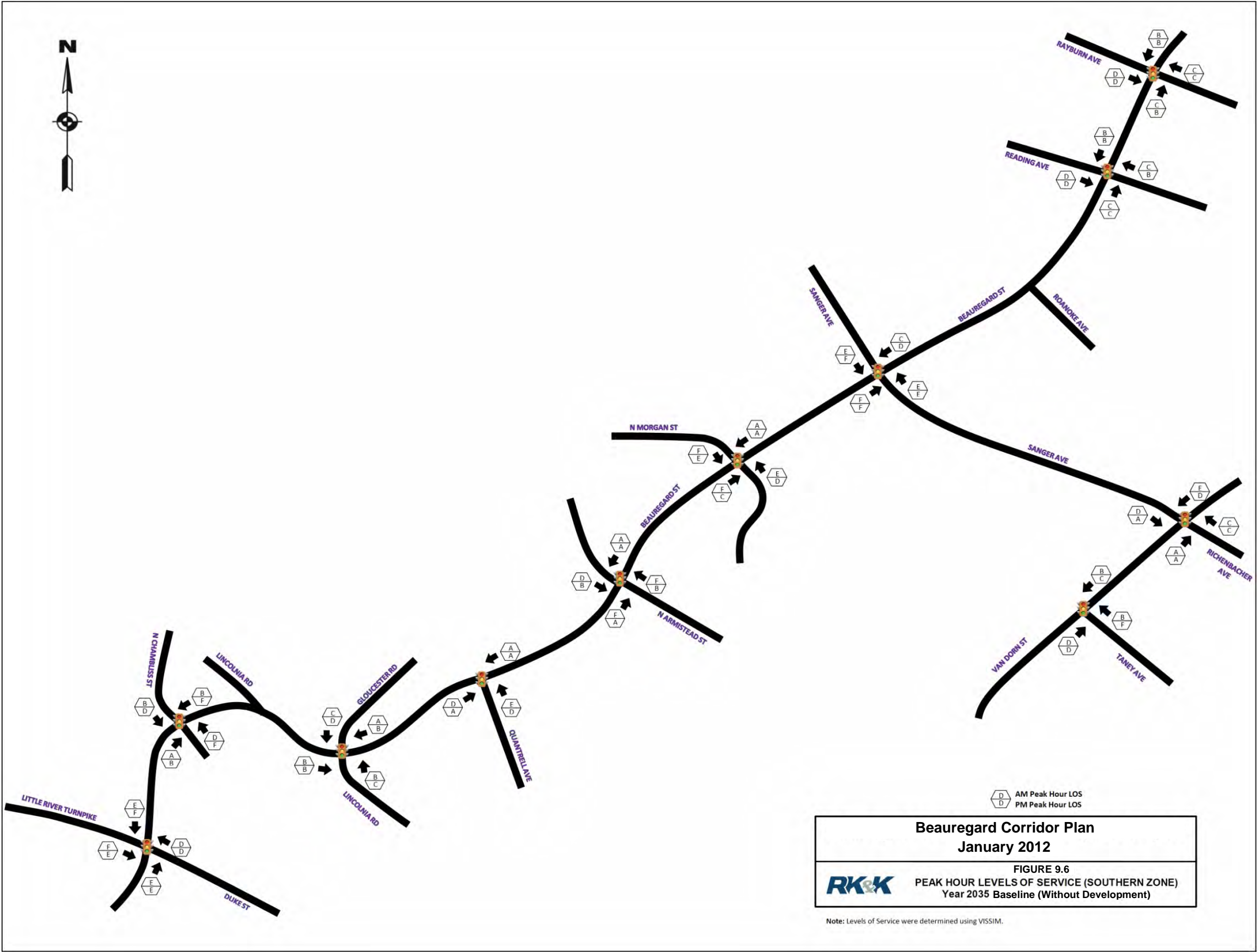


Table 9.4: 2035 Baseline (Without Development) - Average and Maximum Queue Lengths (VISSIM)

Intersection	Approach	Road	AM		PM		Storage Length (ft)
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	
Seminary Rd @ I-395 Rotary	WB	I-395 NB On-Ramp	41	255	68	244	580
	SB	I-395 SB Off-Ramp	29	128	95	344	1830
	EBTH	I-395 SB On-Ramp	81	413	141	537	870
	EBRT ¹	I-395 SB On-Ramp	-	-	70	393	1700
	NB	I-395 NB Off-Ramp	60	264	130	546	1110
Seminary Rd @ Mark Center Dr	WBLT	Seminary Rd	291	424	74	357	1100
	WBTH	Seminary Rd	246	423	179	419	960
	WBRT	Seminary Rd	139	220	54	214	960
	EBLT	Seminary Rd	7	56	11	72	570
	EBTH	Seminary Rd	122	577	176	585	570
	EBRT	Seminary Rd	20	350	28	359	570
	NBLT	Mark Center Dr	19	121	304	635	760
	NBTH	Mark Center Dr	19	121	304	635	760
	NBRT	Mark Center Dr	19	121	304	635	760
	SBLT	Mark Center Dr	46	164	33	129	490
	SBTH	Mark Center Dr	46	164	33	129	490
	SBRT	Mark Center Dr	46	164	33	129	490
Beauregard St @ Mark Center Dr	WBLT	Mark Center Dr	19	115	84	373	920
	WBTH	Mark Center Dr	19	115	84	373	920
	WBRT	Mark Center Dr	0	2	16	240	920
	EBLT	Mark Center Dr	3	43	17	102	275
	EBTH	Mark Center Dr	3	43	17	102	275
	EBRT	Mark Center Dr	0	0	0	0	275
	NBLT	Beauregard St	313	763	21	221	690
	NBTH	Beauregard St	313	763	21	221	690
	NBRT	Beauregard St	313	763	21	221	690
	SBLT	Beauregard St	224	588	13	111	670
	SBTH	Beauregard St	5	117	56	412	670
	SBRT	Beauregard St	0	0	3	168	670
Seminary Rd @ Echols Ave	WBLT	Seminary Rd	9	73	45	567	840
	WBTH	Seminary Rd	2	190	80	674	840
	WBRT	Seminary Rd	1	154	64	610	840
	EBLT	Seminary Rd	1	24	1	27	940
	EBTH	Seminary Rd	15	265	59	652	940
	EBRT	Seminary Rd	3	178	36	576	940
	NBLT	Echols Ave	9	121	5	82	435
	NBRT	Echols Ave	0	40	0	6	435
	SBLT	Echols Ave	3	50	4	48	390
	SBRT	Echols Ave	0	0	0	0	390

Table 9.4 (cont'd.): 2035 Baseline (Without Development) - Average and Maximum Queue Lengths (VISSIM)

Seminary @ Library Ln	WBLT	Seminary Rd	1	120	2	83	370
	WBTH	Seminary Rd	68	447	22	198	370
	WBRT	Seminary Rd	68	447	22	198	370
	EBLT	Seminary Rd	81	348	133	428	950
	EBTH	Seminary Rd	81	348	133	428	950
	EBRT	Seminary Rd	74	353	40	242	950
	NBLT	Library Ln	19	122	4	79	330
	NBTH	Library Ln	19	122	4	79	330
	NBRT	Library Ln	15	122	3	81	330
	SBLT	Library Ln	7	64	31	149	650
	SBTH	Library Ln	7	64	31	149	650
	SBRT	Library Ln	4	46	9	78	650
Seminary Rd @ Beauregard St	WBLT	Seminary Rd	530	769	160	289	550
	WBTH	Seminary Rd	134	704	159	750	550
	WBRT	Seminary Rd	1	69	1	61	550
	EBLT	Seminary Rd	15	101	25	141	920
	EBTH	Seminary Rd	126	544	284	1030	920
	EBRT	Seminary Rd	3	143	59	971	920
	NBLT	Beauregard St	514	777	126	432	430
	NBTH	Beauregard St	36	272	28	168	430
	NBRT	Beauregard St	36	279	2	104	430
	SBLT	Beauregard St	32	176	366	786	1106
	SBTH	Beauregard St	54	220	305	740	1106
	SBRT	Beauregard St	55	223	305	740	1106
Beauregard St @ Highview Ln	WBLT	Mark Center Dr	2	49	14	92	235
	WBTH	Mark Center Dr	2	49	14	92	235
	WBRT	Mark Center Dr	0	0	0	10	235
	EBLT	Mark Center Dr	17	82	15	83	430
	EBTH	Mark Center Dr	17	82	15	83	430
	EBRT	Mark Center Dr	0	0	0	4	430
	NBLT	Beauregard St	142	608	17	152	610
	NBTH	Beauregard St	142	608	17	152	610
	NBRT	Beauregard St	65	369	0	24	610
	SBLT	Beauregard St	14	98	24	401	690
	SBTH	Beauregard St	14	98	24	401	690
	SBRT	Beauregard St	0	14	1	172	690
Beauregard St @ Rayburn Ave	WBLT	Rayburn Ave	5	56	17	98	470
	WBTH	Rayburn Ave	5	56	17	98	470
	WBRT	Rayburn Ave	0	0	0	16	470
	EBLT	Rayburn Ave	49	198	45	189	910
	EBTH	Rayburn Ave	49	198	45	189	910
	EBRT	Rayburn Ave	4	96	2	85	910
	NBLT	Beauregard St	120	519	24	169	625
	NBTH	Beauregard St	120	519	24	169	625
	NBRT	Beauregard St	55	413	0	38	625
	SBLT	Beauregard St	15	144	83	595	610
	SBTH	Beauregard St	15	144	83	595	610
	SBRT	Beauregard St	0	1	5	276	610

Table 9.4 (cont'd.): 2035 Baseline (Without Development) - Average and Maximum Queue Lengths (VISSIM)

Beauregard St @Reading Ave	WBLT	Reading Ave	11	80	5	57	470
	WBTH	Reading Ave	11	80	5	57	470
	WBRT	Reading Ave	8	83	2	57	470
	EBLT	Reading Ave	38	177	34	161	1020
	EBTH	Reading Ave	38	177	34	161	1020
	EBRT	Reading Ave	35	176	31	161	1020
	NBLT	Beauregard St	180	940	77	407	850
	NBTH	Beauregard St	180	940	77	407	850
	NBRT	Beauregard St	155	941	25	382	850
	SBLT	Beauregard St	16	97	105	605	625
	SBTH	Beauregard St	16	97	105	605	625
	SBRT	Beauregard St	7	101	95	606	625
Beauregard St @ Old Sanger Ave	WBLT	Old Sanger Ave	140	609	99	323	840
	WBTH	Old Sanger Ave	140	609	99	323	840
	WBRT	Old Sanger Ave	140	609	99	323	840
	EBLT	Old Sanger Ave	91	280	72	248	540
	EBTH	Old Sanger Ave	91	280	72	248	540
	EBRT	Old Sanger Ave	91	280	72	248	540
	NBLT	Beauregard St	12	96	15	160	860
	NBTH	Beauregard St	647	999	301	843	860
	NBRT	Beauregard St	647	999	301	843	860
	SBLT	Beauregard St	46	206	367	1110	910
	SBTH	Beauregard St	46	206	367	1110	910
	SBRT	Beauregard St	46	206	367	1110	910

Note: I-395 SB Ramp is metered in the PM Peak. The queue results are obtained from a Queue Counter placed at the ramp meter in VISSIM.

Table 9.5: 2035 Baseline (Without Development) AM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	25	26	B	23	27	B
N Armistead St	N Morgan St	33	22	C	26	28	B
N Morgan St	Sanger Ave	40	16	D	33	20	C
Sanger Ave	Reading Ave	53	25	B	57	23	C
Reading Ave	Rayburn Ave	27	19	C	27	19	C
Rayburn Ave	Highview Lane	21	23	C	19	26	B
Highview Lane	Mark Center Dr	38	14	E	20	27	B
Mark Center Dr	Seminary Rd	36	15	D	27	21	C
Seminary Rd	Fillmore Ave	36	27	B	84	12	E
Fillmore Ave	W Braddock Rd	40	20	C	41	19	C
W Braddock Rd	King St	83	12	E	39	26	B
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	31	22	C	28	25	B
Echols Ave	Beauregard St	63	14	E	38	23	C
Beauregard St	Mark Center Dr	35	14	D	39	13	E
Library Lane	N Pickett St	34	6	F	9	23	C
N Pickett St	N Jordan St	24	21	C	98	5	F

Table 9.6: 2035 Baseline (Without Development) PM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	35	18	C	24	27	B
N Armistead St	N Morgan St	31	23	C	27	27	B
N Morgan St	Sanger Ave	44	15	D	26	25	B
Sanger Ave	Reading Ave	46	30	B	46	29	B
Reading Ave	Rayburn Ave	24	21	C	29	17	D
Rayburn Ave	Highview Lane	20	25	B	30	16	D
Highview Lane	Mark Center Dr	31	17	D	23	23	C
Mark Center Dr	Seminary Rd	60	10	F	34	16	D
Seminary Rd	Fillmore Ave	34	28	B	85	11	E
Fillmore Ave	W Braddock Rd	48	16	D	29	27	B
W Braddock Rd	King St	66	15	D	41	24	B
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	37	19	C	30	23	C
Echols Ave	Beauregard St	60	14	D	45	19	C
Beauregard St	Mark Center Dr	130	4	F	39	13	E
Library Lane	N Pickett St	45	5	F	9	24	C
N Pickett St	N Jordan St	20	27	B	27	20	C

10 Year 2035 Traffic Analysis with Development

Several new roadways are being proposed as part of the 2035 planned redevelopment in the study area. The analysis of the Year 2035 conditions with development assumes these roadways would be in place to handle the additional trips that would be generated by the changes in land uses shown in **Table 7.2**. These are not traffic impact mitigation options, but are roadway network enhancements that are inherent to the planned redevelopment. These new streets are described below:

Ellipse at Seminary Road and Beauregard Street

The intersection of Beauregard Street and Seminary Road is proposed to be reconfigured in the form of an unconventional at-grade intersection, referred to in this study as an “ellipse” due to its geometric layout. The proposed ellipse would eliminate left turns from both directions along Seminary Road and redirect those movements as right turns, which would subsequently circulate around part of the ellipse to continue in the desired direction. Although the traffic circulation pattern of the ellipse would be very similar to that of a modern roundabout, through traffic movements along Seminary Road would be allowed to pass straight through the center island of the ellipse. Therefore, several traffic signals will be required around the ellipse to alternate the right-of-way among the various movements. The primary benefit of the elliptical configuration is the reduction of potential vehicle conflict points due to the elimination of the left turn movements along Seminary Road. This reduces the number of signal phases required at the Beauregard/Seminary intersection, and may also reduce the likelihood of certain types of crashes (such as those involving through vehicles colliding with left-turning vehicles). The current design concept for the ellipse shows the proposed intersection of Beauregard Street at Main Street (from Southern Towers) located at the northern end of the ellipse (see **Figure 10.1**). The improvements described above are summarized in **Table 10.1**, with their locations shown in **Figure 10.2**.

New Street West of and Parallel to Beauregard Street:

This planned new street would extend from a relocated Sanger Avenue in the south (see description below) and extend north to the intersection of Beauregard Street and Mark Center Drive. It would be a collector roadway consisting of one through lane per direction for general traffic use. This street is expected to carry a significant portion of traffic that would ordinarily travel north and south along Beauregard Street. As a result, the 2035 Conditions With Development traffic volumes shown along the adjacent segment of Beauregard Street in the following tables and figures are generally lower than the volumes on the same portion of Beauregard Street under the 2035 Baseline (Without Development).

Relocated Sanger Avenue:

The segment of existing Sanger Avenue between Sheffield Court and Beauregard Street would be relocated such that it intersects with Beauregard Street approximately 400 feet north of the existing Sanger Avenue intersection. The relocated Sanger Ave would extend across Beauregard Street and directly connect to the new street west of and parallel to Beauregard Street. The relocated Sanger Avenue would include a transitway in a dedicated lane in the westbound direction from Beauregard to Van Dorn Street, and in the eastbound direction from Sheffield to Van Dorn (see **Appendix A** for transit corridor assumptions). Left turns would be prohibited at the westbound approach to Beauregard, the westbound approach to Sheffield, and at the southbound approach to the relocated Sanger Avenue.

New Local Streets Parallel to Relocated Sanger Avenue:

A new local street south of the Relocated Sanger Avenue would intersect Beauregard Street at the approximate location of the existing Sanger Avenue intersection. This intersection is anticipated to be signalized, and allow for southbound left turns from Beauregard. This new street would tie into relocated Sanger Avenue further east.

North of relocated Sanger Avenue, Roanoke Avenue would be reconfigured to loop around newly planned development in the area and also tie into relocated Sanger Ave near the existing intersection of Bradford and Sheffield Court. The intersection at Beauregard would allow for southbound left turns. The new street would tie into the relocated Sanger Avenue.

Relocated Kenmore Avenue and Library Lane:

Kenmore Avenue currently connects Van Dorn Street to Seminary Road via an unsignalized intersection along Seminary Road that restricts movements to right turns only. To support the redevelopment in this area and improve traffic flow, the plan proposes to relocate a portion of Kenmore Avenue south of Seminary Road such that it aligns with the Library Lane intersection at Seminary Road. Library Lane would then be extended northward to connect to Van Dorn Street. These changes would provide a continuous loop around the planned development in this part of the study area with signalized connections at Seminary Road and at Van Dorn Street.

Main Street (Southern Towers):

A new local street would travel east-west across the Southern Towers property, linking the off-ramp from southbound I-395 to Beauregard Street. The intersection of this new street at Beauregard Street would be signalized. There would be a new internal intersection on the Southern Towers property where Mark Center Drive meets this new east-west street.

These roadway network enhancements may require new traffic signals to be installed at certain locations throughout the study area. Although a Manual on Uniform Traffic Control Devices (MUTCD) signal warrant analysis has not been performed, the following is a list of locations that will likely require signalization, based on a desire to maintain network connectivity. In the future, an MUTCD signal warrant analysis will be required to determine if signals would actually be justified at each location. For simulation and operational analysis purposes, signals were assumed at each of these locations:

- Beauregard Street at Relocated Sanger Avenue
- Beauregard Street at Roanoke Avenue
- Beauregard Street at Proposed Main Street (Southern Towers)
- Sanger Avenue at Relocated Sanger Avenue (East of Beauregard Street)
- Van Dorn Street at Library Lane Extended (South of Braddock Road)

Table 10.1: Transportation Improvements Required by Year 2035 Conditions With Development

No.	Location	2035 Development Scenario Improvements	Source of Improvement
D1	Beauregard St at Seminary Rd	Construct an ellipse configuration at the intersection of Seminary Road / Beauregard Street. The conventional 8 phase traffic signal is replaced with a pair of interconnected, coordinated 3-phase signals along Seminary Road located about 300 feet apart. Left turns would be prohibited in the eastbound and westbound directions of Seminary Road. This project replaces 2035 Baseline projects numbers B1 and B2.	Beauregard Planning Study Assumed Improvement
D2		Add a new road through Southern Towers, parallel to Seminary, that would connect from the I-395 off-ramp into Southern Towers. The road would extend west, across Beauregard Street connecting to the future Hekemian development. The intersection with the new road and Beauregard would be signalized (Part of ellipse project above), and shared with a future transitway (Project B4). The existing driveway from the Hermitage apartments at Beauregard would be closed, and adequate improvements to allow for access into and out of the Hermitage apartments.	Beauregard Planning Study Assumed Improvement
D3	New Parallel Road to Beauregard	Construct new parallel road from a relocated Sanger Avenue in the south, and connect to Mark Center Drive. It would be a collector roadway consisting of one through lane per direction for general traffic use plus left turn lanes at intersections with cross streets that link to Beauregard to the east.	Beauregard Planning Study Assumed Improvement
D4	Relocated Sanger	The segment of existing Sanger Avenue between Sheffield Court and Beauregard Street would be relocated such that it intersects with Beauregard Street approximately 400 feet north of the existing Sanger Avenue intersection. The relocated Sanger Avenue would extend across Beauregard Street and directly connect to the new street west of and parallel to Beauregard Street. The relocated Sanger Avenue would include a transitway in the westbound direction from Beauregard to Van Dorn, and in the eastbound direction from Sheffield to Van Dorn. Left turns would be prohibited at the westbound approach to Beauregard, the WB approach to Sheffield, and at the southbound approach to the relocated Sanger.	Beauregard Planning Study Assumed Improvement

No.	Location	2035 Development Scenario Improvements	Source of Improvement
D5	New Local Streets Parallel to Relocated Sanger	A new local street south of Sanger Avenue would intersect Beauregard Street at the approximate location of the existing Sanger Ave intersection. This intersection is anticipated to be signalized, and allow for southbound left turns from Beauregard Street. This new street would tie into relocated Sanger further east. North of relocated Sanger Avenue, Roanoke Avenue would be reconfigured to loop around newly planned development in the area and also tie into relocated Sanger Avenue near the existing intersection of Bradford and Sheffield Court. The intersection at Beauregard Street would allow for southbound left turns. The new street would tie into the relocated Sanger Avenue.	Beauregard Planning Study Assumed Improvement
D6	Relocated Kenmore Avenue and Library Lane Extended	Kenmore Avenue currently connects Van Dorn St. to Seminary Rd. via an unsignalized intersection along Seminary Road that restricts movements to right turns only. To support the redevelopment of this area, and improve traffic flow, the plan proposes to relocate a portion of Kenmore Avenue south to Seminary Road such that it aligns with the Library Lane intersection at Seminary Road.	Beauregard Planning Study Assumed Improvement
D7	Seminary at Mark Center Drive	Widen Mark Center Drive to allow for a third right turn onto eastbound Seminary Road. This approach would be a left turn, one thru lane and three right turn lanes.	Beauregard Planning Study Improvement
D8	Seminary Rd at Library Lane	Change pedestrian signal phase at Seminary / Library to concurrent phasing with advanced pedestrian signal.	Beauregard Planning Study Assumed Improvements

NOTE: The 2035 Development scenario would include most of the projects identified in the 2035 Baseline scenario. The Development scenario projects are in addition to those in the 2035 Baseline scenario, but in some cases, the projects in the 2035 Development scenario replace projects in the 2035 Baseline scenario, as noted.

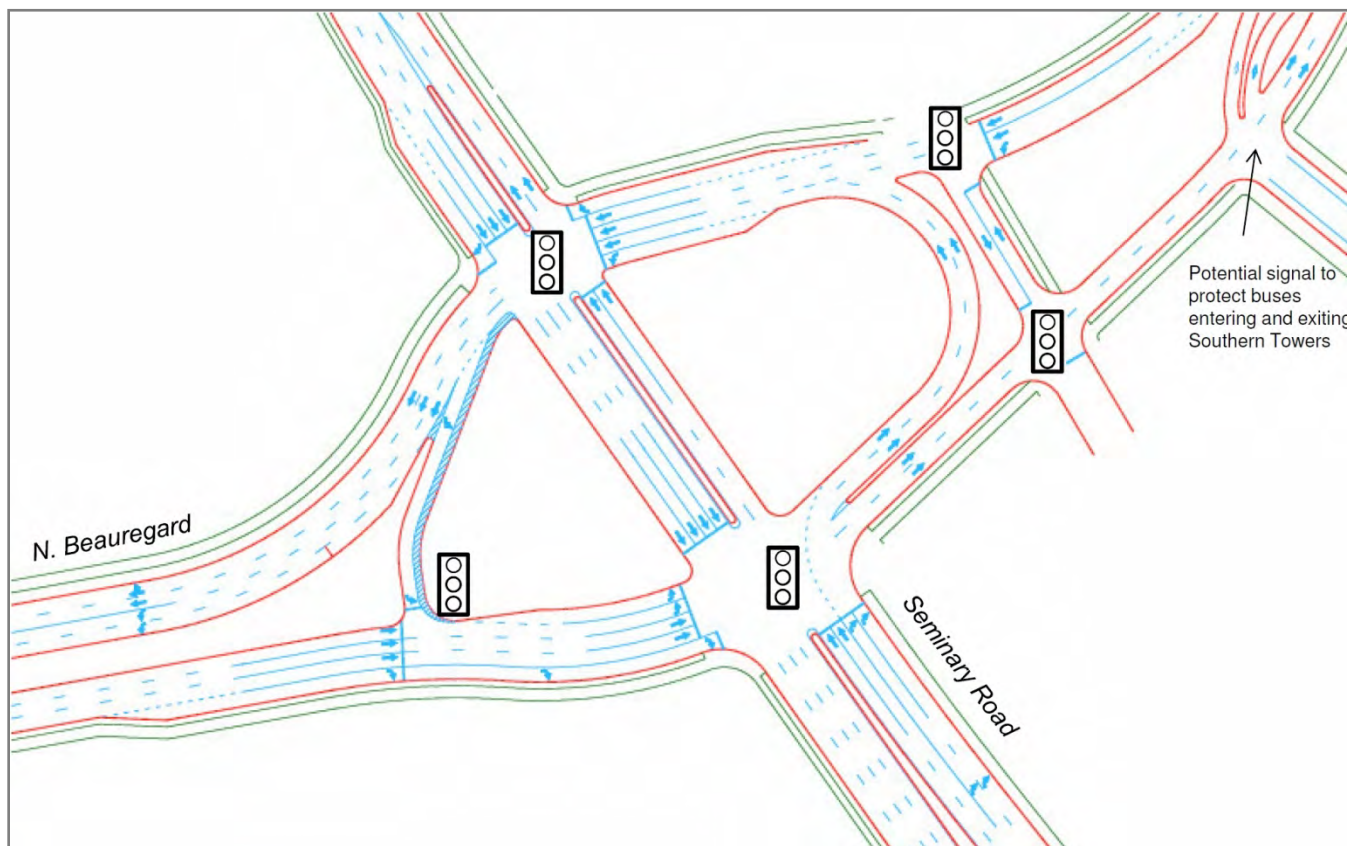


Figure 10.1: Proposed Ellipse Configuration at Beauregard St & Seminary Rd

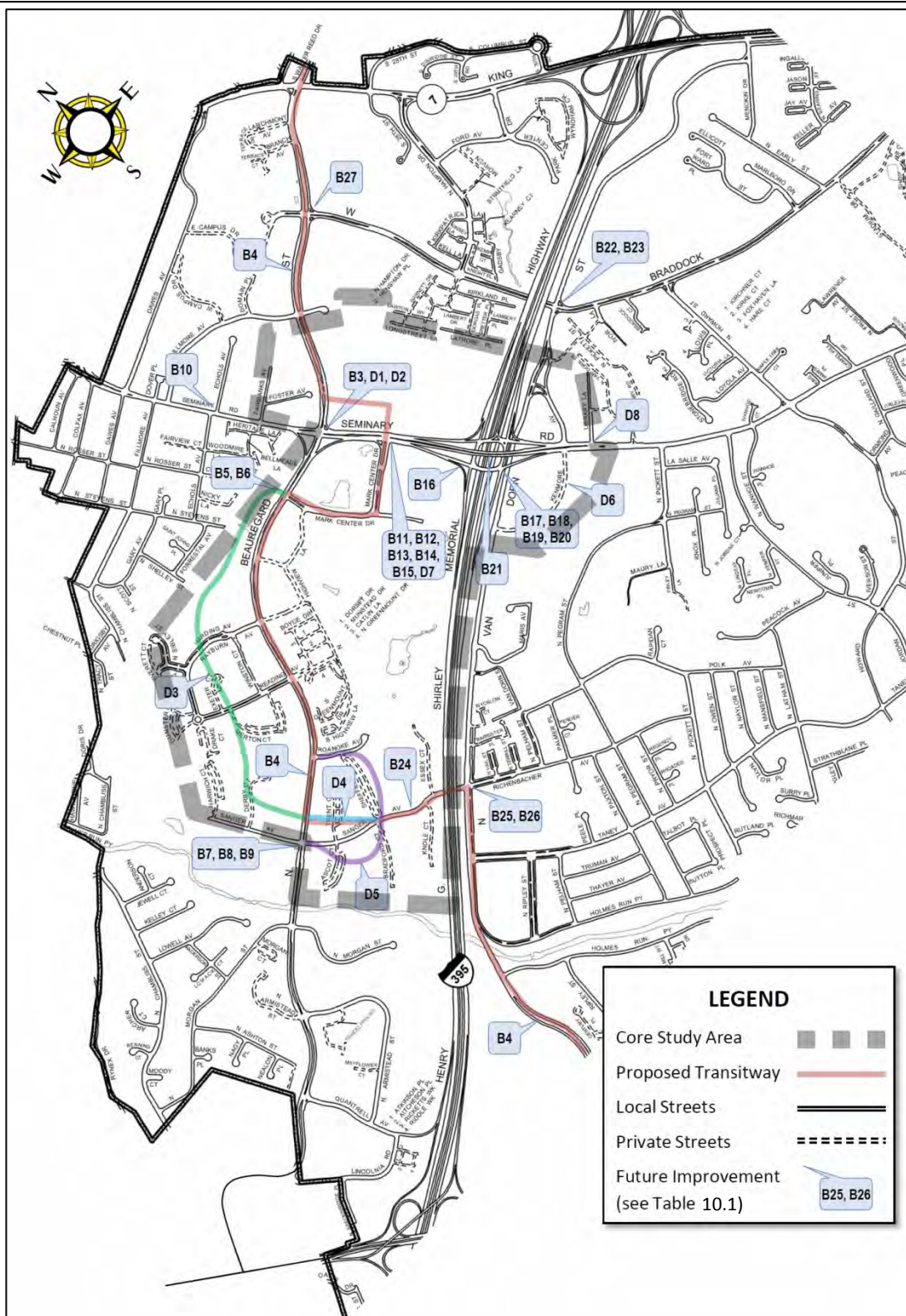


Figure 10.2: Map of Transportation Improvements Required for 2035 Conditions With Development

Figures 10.3 and 10.4 show the change in the AM and PM peak hour turning movement volumes between the Year 2035 Conditions With Development and the Year 2035 Baseline (Without Development). These values represent the trip generation and distribution as determined by the COG travel demand model. The COG model assigns trips to the network based on a gravity model. The COG model shows the proposed land use changes in the TAZs within the study area associated with the

new development in 2035, as well as the proposed new parallel roadways west of Beauregard Street and north of Seminary Road (between I-395 and Beauregard Street) would result in a significant decrease in the volume of traffic traveling along portions of Beauregard Street and along Seminary Road, compared to the 2035 Baseline (Without Development) condition. Some of the traffic would be diverted to these parallel roads, and some drivers would choose different routes through the study area, possibly due to the shifts in land use types among the TAZs. The Year 2035 traffic volumes for conditions with development are shown on the roadway network diagrams on **Figures 10.5 and 10.6**.

a) Signal Timing/Phasing Assumptions:

For the 2035 Conditions With Development, the cycle lengths were increased slightly compared to the 2035 Baseline (Without Development) conditions for all the signalized intersections along:

- (a) Beauregard Street from Chambliss Street (south-end) to Braddock Street (north-end); and
- (b) Seminary Road from Dawes Avenue (north-end) to Jordan Street (south-end).

Splits and offsets were initially optimized in Synchro and further fine-tuned in VISSIM based on the simulation observations for 2035 Conditions With Development.

Beauregard Street/Seminary Road (Ellipse)

A signal phasing and timing plan was designed for the Ellipse configuration at Beauregard Street/Seminary Road. The signal control at the Ellipse comprises of five nodes which include:

1. Northbound Beauregard Street at Seminary Road
2. Southbound Beauregard Street at Seminary Road
3. Eastbound Main Street at Southbound Beauregard Street
4. Northbound Beauregard Street at Ellipse (intersects with eastbound left-turn leg)
5. Westbound Main Street at Northbound Beauregard Street (from Southern Towers)

While Nodes 1 - 4 are designed to operate as a single controller with 130-second cycle length, Node 5 is designed to operate as a separate controller at half-cycles (65-second cycle length). The purpose of shorter cycle length at Node 5 is to reduce the delay for left-turning vehicles from Southern Towers. Despite different cycle lengths, both the controllers are designed to be coordinated, providing uninterrupted traffic flow on Beauregard Street.

Seminary Road at Library Lane

In the existing conditions, the intersection at Library Lane and Seminary Road operates with an exclusive pedestrian phase. For 2035 conditions with development, the exclusive pedestrian phase has significant impacts on the intersection performance especially for the eastbound traffic at this intersection due to growing traffic demand. For the future year signal operations at this intersection, it is proposed that a 10-seconds leading pedestrian phase be provided for northbound and southbound approaches. This would allow pedestrians to cross half-way before the start of the concurrent vehicle phases. **Appendix B** summarizes the details of the alternative analysis considered for this intersection.

b) Simulation Results

VISSIM was used to evaluate the AM and PM peak hour traffic operations at the key intersections throughout the Beauregard Corridor Plan study area, using the projected traffic volumes associated with build-out of the proposed development through 2035. **Table 10.2** and **Table 10.3** show the delay and LOS results for 2035 Conditions With Development AM and PM analysis. **Table 10.4** lists the queue length results at critical intersections. As shown in the delay and LOS tables, all the intersections would operate at LOS E or better in both AM and PM periods.

At the intersection of Seminary Road and Beauregard Street, the southbound approach would experience LOS F conditions during the AM peak hour, and westbound and southbound vehicles would experience LOS F conditions during the PM peak hour. However, queues in the simulation were not observed to spill beyond upstream intersections on these approaches. The overall intersection LOS would be LOS D and E during the AM and PM peak hours, respectively.

At the intersection of Van Dorn Street and Sanger Avenue, eastbound vehicles would experience LOS F conditions during both AM and PM peak hours since right turn-on-red is not allowed on this approach.

Long queues were observed in the simulation along the proposed Main Street within the Southern Towers site during the PM peak hour. Eastbound queues extended back beyond Beauregard Street, as indicated in **Table 10.4**. Three potential causes for the long queues at this intersection are:

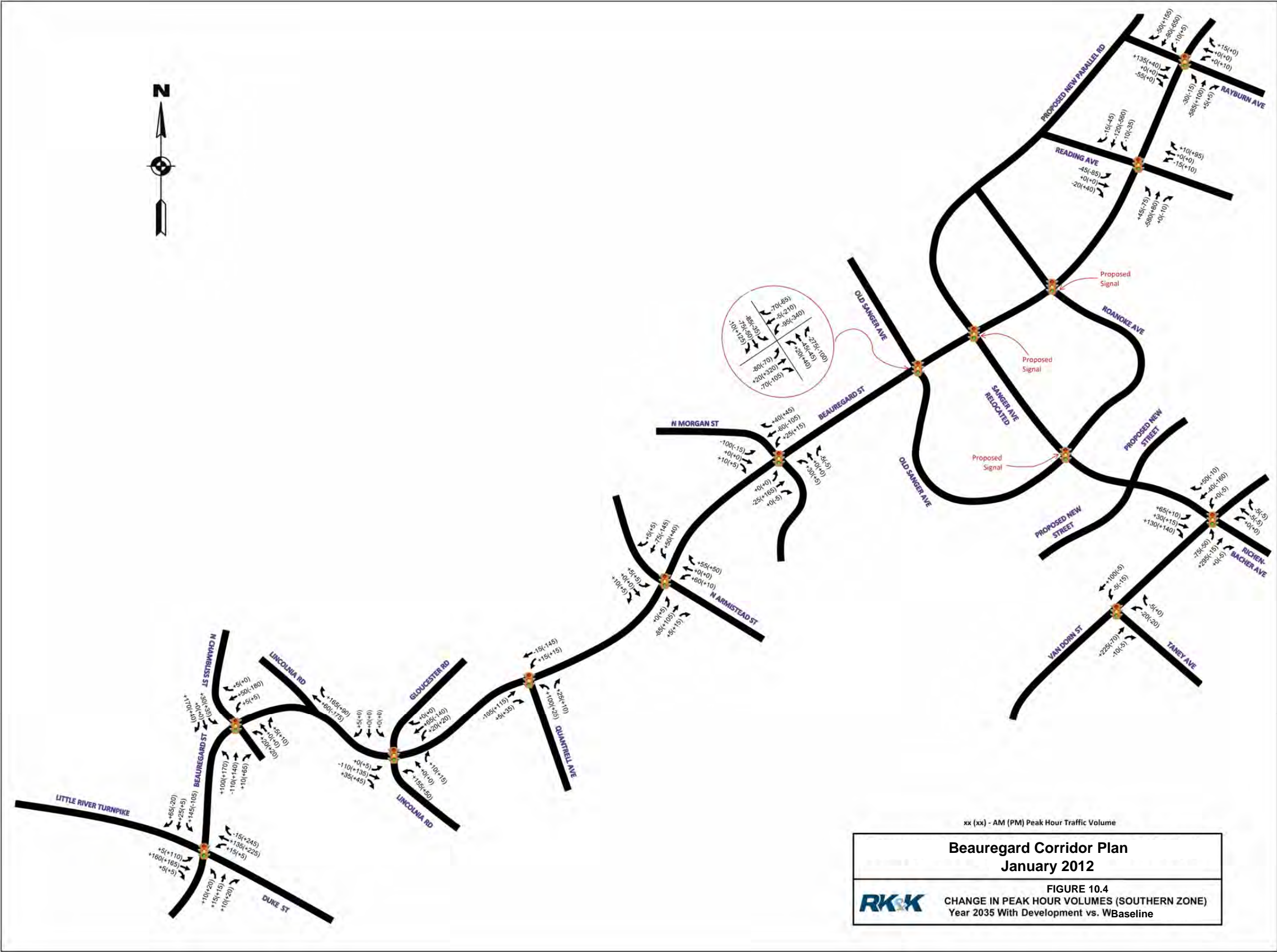
- a. Heavy westbound left-turn movements from Main Street;
- b. Inadequate green time for southbound approach at adjacent intersection Mark Center Drive/Seminary Road. Adjusting the green time for this movement might negatively impact traffic flow along Seminary Road and from Mark Center. Queues from the southbound approach at Mark Center Drive/Seminary Road spill over beyond Mark Center Drive/Main Street; and
- c. Short storage length (200 ft) between Main Street and Seminary Road on Mark Center Drive.

The results of the VISSIM analysis are shown on the roadway network diagrams in **Figures 10.7 and 10.8**. See **Appendix E** for the Synchro-based lanes, signal timing and phasing that were used in the VISSIM simulations.

The AM and PM peak hour levels of service on the roadway links along Beauregard Street and along Seminary Road for the 2035 Conditions With Development are summarized in **Tables 10.5 and 10.6**. These levels of service were calculated using the Highway Capacity Manual (HCM) methodology for arterial LOS.

Comparing the analysis results for the Year 2035 Conditions With Development to the results for the Year 2035 Baseline (Without Development) conditions shows the traffic operations under conditions with development are somewhat better than the operations under the baseline conditions. There are several reasons for the improved network performance under the Year 2035 conditions with development: 1) The combination of transportation improvements, including the improved grid network and the ellipse intersection, would help improve operations; 2) There would be a shift of some of the regional traffic outside of the study area due to the increase in local development density; and 3) There would be a greater shift of trips to other modes (bicycle, pedestrian, transit) due to the improved connectivity, and a greater number of persons using high capacity transit.







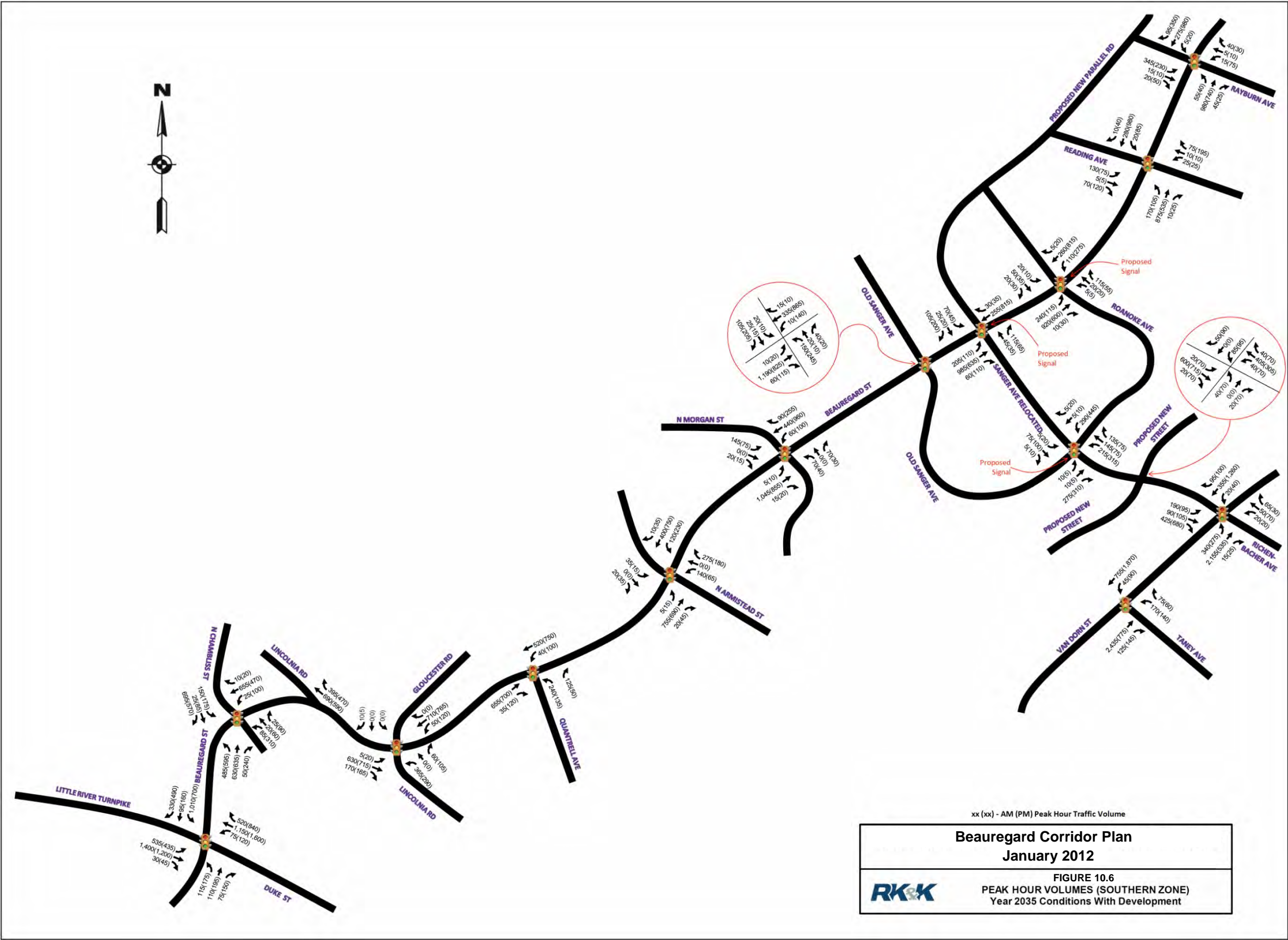


Table 10.2: Year 2035 Conditions With Development AM Peak Hour Delay and Level of Service (LOS) by Approach

Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	63.4	E	61.9	E	88.5	F	39.6	D	64.4	E
2	Beauregard St / N Chambliss St	9.7	A	41.5	D	127.3	F	73.1	E	55.6	E
3	Beauregard St / Lincolnia Rd	9.9	A	9.6	A	1.5	A	47.2	D	17.8	B
4	Beauregard St / Quantrell Ave	7.4	A	3.9	A	-	-	48.6	D	15.5	B
5	Beauregard St / N Armistead St	3.5	A	5.7	A	19.0	B	25.7	C	9.8	A
6	Beauregard St / N Morgan St	3.2	A	5.0	A	50.0	D	28.7	C	9.3	A
7	Beauregard St / Old Sanger Ave	9.9	A	7.8	A	18.4	B	44.0	D	13.7	B
8	Beauregard St / Reloc. Sanger Ave	9.7	A	8.1	A	33.9	C	37.5	D	14.6	B
9	Beauregard St / Roanoke Ave	14.5	B	21.1	C	49.3	D	20.7	C	18.2	B
10	Beauregard St / Reading Ave	14.1	B	19.0	B	38.9	D	15.2	B	18.0	B
11	Beauregard St / Rayburn Ave	14.1	B	5.3	A	57.8	E	18.8	B	18.8	B
12	Beauregard St / Highview Ln	17.2	B	14.6	B	50.0	D	17.1	B	22.8	C
13	Beauregard St / Mark Center Dr	26.7	C	59.6	E	53.8	D	41.5	D	41.5	D
14	Beauregard St / Seminary Rd	23.6	C	100.2	F	48.3	D	69.2	E	54.3	D
15	Beauregard St / Fillmore Ave	7.8	A	5.3	A	13.4	B	57.9	E	9.8	A
16	Beauregard St / W Braddock Rd	18.5	B	37.5	D	38.5	D	22.7	C	25.1	C
17	Beauregard St / King St	56.1	E	170.3	F	54.9	D	48.6	D	64.2	E
18	Seminary Rd / S. George Mason Dr	16.3	B	20.6	C	7.1	A	23.4	C	14.5	B
19	Seminary Rd / Dawes Ave	36.8	D	28.7	C	7.3	A	4.1	A	4.5	A
20	Seminary Rd / Echols Ave	20.0	B	45.9	D	3.7	A	12.5	B	6.7	A
21	Seminary Rd / Mark Center Dr	18.1	B	57.1	E	37.4	D	28.0	C	32.8	C
22-24	Seminary Rd / I-395 Rotary	35.3	D	16.0	B	31.0	C	28.0	C	26.7	C
25	Seminary Rd / I-395 HOV Ramp	31.4	C	-	-	32.2	C	35.9	D	33.0	C
26	Seminary Rd / Library Ln	48.1	D	44.5	D	21.5	C	9.8	A	19.8	B
27	Seminary Rd / Hammond M.S.	50.9	D	24.8	C	2.6	A	1.2	A	3.3	A
28	Seminary Rd / N Pickett St	39.0	D	-	-	2.6	A	3.7	A	7.2	A
29	Seminary Rd / N Jordan St	50.3	D	-	-	4.6	A	7.5	A	14.1	B
30	N Van Dorn St / Taney Ave	16.2	B	7.2	A	-	-	44.7	D	16.2	B
31	N Van Dorn St / Sanger Ave	17.0	B	20.9	C	86.4	F	39.2	D	31.1	C
32	N Van Dorn St / Kenmore Ave	7.9	A	5.5	A	-	-	33.8	C	9.3	A
33	N Van Dorn St / W Braddock Rd	21.1	C	27.3	C	50.3	D	50.5	D	31.2	C
34	W Braddock Rd / Hampton Dr	43.5	D	28.5	C	3.7	A	5.6	A	9.9	A

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.

Table 10.3: Year 2035 Conditions With Development PM Peak Hour Delay and Level of Service (LOS) by Approach

Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	60.3	E	41.4	D	105.7	F	86.4	F	79.8	E
2	Beauregard St / N Chambliss St	13.2	B	34.7	C	39.3	D	125.4	F	37.9	D
3	Beauregard St / Lincoln Rd	9.8	A	10.7	B	1.6	A	44.0	D	16.3	B
4	Beauregard St / Quantrell Ave	2.7	A	4.9	A	-	-	46.1	D	8.2	A
5	Beauregard St / N Armistead St	8.6	A	3.7	A	10.6	B	18.5	B	7.4	A
6	Beauregard St / N Morgan St	3.4	A	4.2	A	50.0	D	27.3	C	6.4	A
7	Beauregard St / Old Sanger Ave	22.1	C	7.0	A	9.9	A	55.1	E	18.5	B
8	Beauregard St / Reloc. Sanger Ave	5.3	A	7.6	A	23.7	C	31.1	C	9.9	A
9	Beauregard St / Roanoke Ave	25.8	C	38.1	D	25.8	C	16.0	B	32.2	C
10	Beauregard St / Reading Ave	14.0	B	16.5	B	24.7	C	9.8	A	15.8	B
11	Beauregard St / Rayburn Ave	9.8	A	9.2	A	44.8	D	42.5	D	15.1	B
12	Beauregard St / Highview Ln	4.9	A	6.2	A	57.0	E	30.1	C	9.4	A
13	Beauregard St / Mark Center Dr	24.0	C	15.4	B	49.4	D	37.2	D	24.5	C
14	Beauregard St / Seminary Rd	36.8	D	94.9	F	35.5	D	85.8	F	64.1	E
15	Beauregard St / Fillmore Ave	9.5	A	24.0	C	23.5	C	56.4	E	19.6	B
16	Beauregard St / W Braddock Rd	22.9	C	29.2	C	52.7	D	18.6	B	27.0	C
17	Beauregard St / King St	52.6	D	81.4	F	79.1	E	33.6	C	63.4	E
18	Seminary Rd / S. George Mason Dr	29.2	C	22.0	C	9.3	A	33.3	C	22.0	C
19	Seminary Rd / Dawes Ave	37.0	D	40.4	D	5.6	A	7.4	A	8.8	A
20	Seminary Rd / Echols Ave	18.0	B	45.8	D	3.6	A	5.2	A	4.9	A
21	Seminary Rd / Mark Center Dr	24.5	C	48.3	D	33.2	C	46.7	D	35.3	D
22-24	Seminary Rd / I-395 Rotary	10.3	B	29.1	C	18.2	B	10.0	B	16.0	B
25	Seminary Rd / I-395 HOV Ramp	-	-	-	-	10.4	B	12.8	B	11.3	B
26	Seminary Rd / Library Ln	39.9	D	40.5	D	24.2	C	14.3	B	23.3	C
27	Seminary Rd / Hammond M.S.	30.0	C	16.5	B	1.5	A	0.8	A	1.4	A
28	Seminary Rd / N Pickett St	32.2	C	-	-	3.6	A	4.1	A	5.1	A
29	Seminary Rd / N Jordan St	54.0	D	-	-	6.4	A	8.6	A	11.8	B
30	N Van Dorn St / Taney Ave	8.5	A	5.6	A	-	-	42.0	D	9.0	A
31	N Van Dorn St / Sanger Ave	39.1	D	53.8	D	96.4	F	72.0	E	61.7	E
32	N Van Dorn St / Kenmore Ave	4.3	A	9.5	A	-	-	58.9	E	15.8	B
33	N Van Dorn St / W Braddock Rd	36.2	D	35.4	D	34.7	C	43.2	D	36.6	D
34	W Braddock Rd / Hampton Dr	31.4	C	46.6	D	2.9	A	7.7	A	15.8	B

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.

Table 10.4: 2035 Conditions With Development - Average and Maximum Queue Lengths

Intersection	Approach	Road	AM		PM		Storage Length (ft)
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	
Seminary Rd @ I-395 Rotary	WB	I-395 NB On-Ramp	101	331	22	146	580
	SB	I-395 SB Off-Ramp	28	123	18	94	1830
	EBTH	I-395 SB On-Ramp	94	395	64	284	870
	EBRT ¹	I-395 SB On-Ramp	-	-	12	217	1700
	NB	I-395 NB Off-Ramp	51	197	50	206	1110
Seminary Rd @ Mark Center Dr	WBLT	Seminary Rd	229	528	35	216	1100
	WBTH	Seminary Rd	89	524	127	441	960
	WBRT	Seminary Rd	60	327	21	233	960
	EBLT	Seminary Rd	14	89	29	185	570
	EBTH	Seminary Rd	110	412	114	506	570
	EBRT	Seminary Rd	13	182	7	277	570
	NBLT	Mark Center Dr	20	116	101	408	760
	NBTH	Mark Center Dr	20	116	101	408	760
	NBRT	Mark Center Dr	20	116	101	408	760
	SBLT	Mark Center Dr	93	225	176	246	490
	SBTH	Mark Center Dr	93	225	176	246	490
	SBRT	Mark Center Dr	93	225	176	246	490
Beauregard St @ Mark Center Dr	WBLT	Mark Center Dr	18	115	91	375	920
	WBTH	Mark Center Dr	18	115	91	375	920
	WBRT	Mark Center Dr	0	2	21	244	920
	EBLT	Mark Center Dr	54	193	76	272	275
	EBTH	Mark Center Dr	54	193	76	272	275
	EBRT	Mark Center Dr	1	59	9	146	275
	NBLT	Beauregard St	180	770	83	424	690
	NBTH	Beauregard St	180	770	83	424	690
	NBRT	Beauregard St	180	770	83	424	690
	SBLT	Beauregard St	200	422	61	287	670
	SBTH	Beauregard St	200	422	61	287	670
	SBRT	Beauregard St	23	172	0	38	670
Seminary Rd @ Echols Ave	WBLT	Seminary Rd	0	33	1	53	840
	WBTH	Seminary Rd	34	372	19	334	840
	WBRT	Seminary Rd	23	313	9	251	840
	EBLT	Seminary Rd	1	27	1	23	940
	EBTH	Seminary Rd	10	242	11	249	940
	EBRT	Seminary Rd	3	165	1	119	940
	NBLT	Echols Ave	10	132	4	69	435
	NBRT	Echols Ave	1	57	0	7	435
	SBLT	Echols Ave	4	45	4	50	390
	SBRT	Echols Ave	0	0	0	0	390

Table 10.4 (Cont'd.): 2035 Conditions With Development - Average and Maximum Queue Lengths

Seminary Rd @ Library Ln	WBLT	Seminary Rd	1	32	3	50	370
	WBTH	Seminary Rd	21	192	29	220	370
	WBRT	Seminary Rd	21	192	29	220	370
	EBLT	Seminary Rd	57	350	151	940	950
	EBTH	Seminary Rd	57	350	151	940	950
	EBRT	Seminary Rd	57	350	148	941	950
	NBLT	Library Ln	14	99	11	92	330
	NBTH	Library Ln	14	99	11	92	330
	NBRT	Library Ln	14	99	1	47	330
	SBLT	Library Ln	9	74	26	202	650
	SBTH	Library Ln	9	74	26	202	650
	SBRT	Library Ln	63	376	56	375	650
Mark Center Dr @ Main St	WBLT	Main St	521	565	475	772	704
	WBTH	Main St	521	565	451	746	704
	WBRT	Main St	521	565	475	772	704
	EBLT	Main St	25	226	210	690	612
	EBTH	Main St	25	226	210	690	612
	EBRT	Main St	25	226	210	690	612
	NBLT	Marc Center Dr	0	6	0	16	130
	NBTH	Marc Center Dr	0	6	0	16	130
	NBRT	Marc Center Dr	0	6	0	16	130
	SBLT	Marc Center Dr	15	128	2	76	350
	SBTH	Marc Center Dr	34	156	15	119	350
	SBRT	Marc Center Dr	15	128	2	76	350
Seminary Rd @ Beauregard St ²	WBLT *	Seminary Rd	121	365	168	365	365
	WBLT	Seminary Rd	148	438	174	499	550
	WBTH	Seminary Rd	148	438	174	499	550
	WBRT	Seminary Rd	148	438	174	499	550
	EBLT	Seminary Rd	29	408	74	588	920
	EBTH	Seminary Rd	96	520	74	588	920
	EBRT	Seminary Rd	29	408	74	588	920
	NBLT	Beauregard St	18	193	33	325	430
	NBTH	Beauregard St	18	193	33	325	430
	NBRT	Beauregard St	18	193	33	325	430
	SBLT	Beauregard St	116	369	312	842	1106
	SBTH	Beauregard St	116	369	312	842	1106
	SBRT	Beauregard St	116	369	312	842	1106
	WBLT **	Southern Towers	43	204	157	519	612
	WBTH **	Southern Towers	43	204	157	519	612
	WBRT **	Southern Towers	43	204	157	519	612
	EBLT **	Hekemian	43	172	48	181	181
	EBTH **	Hekemian	43	172	48	181	181
	EBRT **	Hekemian	43	172	48	181	181

Table 10.4 (Cont'd.): 2035 Conditions With Development - Average and Maximum Queue Lengths

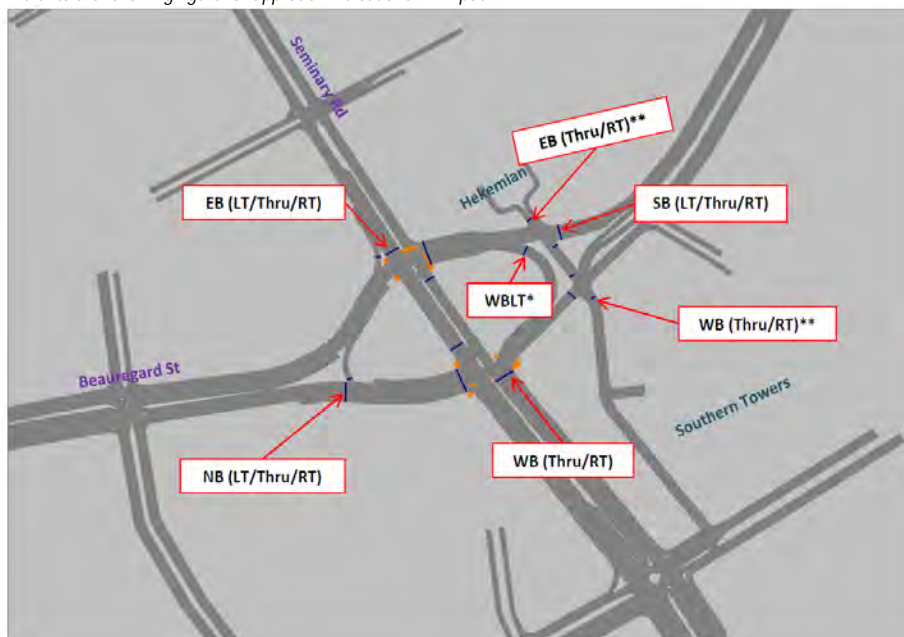
Beauregard St @ Highview Ln	WBLT	Mark Center Dr	2	41	16	88	235
	WBTH	Mark Center Dr	2	41	16	88	235
	WBRT	Mark Center Dr	0	4	0	10	235
	EBLT	Mark Center Dr	102	383	38	192	430
	EBTH	Mark Center Dr	102	383	38	192	430
	EBRT	Mark Center Dr	36	276	1	83	430
	NBLT	Beauregard St	46	448	13	124	610
	NBTH	Beauregard St	46	448	13	124	610
	NBRT	Beauregard St	2	206	0	9	610
	SBLT	Beauregard St	17	134	26	273	690
	SBTH	Beauregard St	17	134	26	273	690
	SBRT	Beauregard St	0	3	0	47	690
Beauregard St @ Rayburn Ave	WBLT	Rayburn Ave	4	52	21	110	470
	WBTH	Rayburn Ave	4	52	21	110	470
	WBRT	Rayburn Ave	4	52	0	13	470
	EBLT	Rayburn Ave	113	399	67	301	910
	EBTH	Rayburn Ave	113	399	67	301	910
	EBRT	Rayburn Ave	113	399	16	205	910
	NBLT	Beauregard St	27	210	22	139	625
	NBTH	Beauregard St	27	210	22	139	625
	NBRT	Beauregard St	4	72	2	58	625
	SBLT	Beauregard St	5	117	33	299	610
	SBTH	Beauregard St	5	117	33	299	610
	SBRT	Beauregard St	0	0	0	43	610
Beauregard St @ Reading Ave	WBLT	Reading Ave	6	67	7	94	470
	WBTH	Reading Ave	6	67	7	94	470
	WBRT	Reading Ave	3	66	9	98	470
	EBLT	Reading Ave	29	146	18	116	1020
	EBTH	Reading Ave	29	146	18	116	1020
	EBRT	Reading Ave	30	148	15	117	1020
	NBLT	Beauregard St	60	251	39	167	850
	NBTH	Beauregard St	60	251	39	167	850
	NBRT	Beauregard St	12	248	2	117	850
	SBLT	Beauregard St	17	99	48	239	625
	SBTH	Beauregard St	17	99	48	239	625
	SBRT	Beauregard St	12	101	35	235	625
Beauregard St @ Roanoke Ave	WBLT	Roanoke Ave	13	164	5	85	280
	WBTH	Roanoke Ave	13	164	5	85	280
	WBRT	Roanoke Ave	0	6	0	0	280
	EBLT	Roanoke Ave	18	115	8	90	500
	EBTH	Roanoke Ave	18	115	8	90	500
	EBRT	Roanoke Ave	0	0	0	0	500
	NBLT	Beauregard St	86	408	66	295	415
	NBTH	Beauregard St	86	408	66	295	415
	NBRT	Beauregard St	14	267	3	145	415
	SBLT	Beauregard St	33	167	148	580	850
	SBTH	Beauregard St	33	167	148	580	850
	SBRT	Beauregard St	0	68	37	405	850

Table 10.4 (Cont'd.): 2035 Conditions With Development - Average and Maximum Queue Lengths

Beauregard St @ New Sanger Ave	WBTH	New Sanger Ave	33	204	17	148	730
	WBRT	New Sanger Ave	33	204	17	148	730
	EBLT	New Sanger Ave	24	152	24	235	380
	EBTH	New Sanger Ave	24	152	24	235	380
	EBRT	New Sanger Ave	24	153	21	235	380
	NBLT	Beauregard St	3	116	1	69	370
	NBTH	Beauregard St	26	389	6	197	370
	NBRT	Beauregard St	25	389	4	199	370
	SBLT	Beauregard St	14	80	17	165	415
	SBTH	Beauregard St	14	80	17	165	415
	SBRT	Beauregard St	1	82	15	164	415
Beauregard St @ Old Sanger Ave	WBLT	Old Sanger Ave	35	152	59	223	840
	WBTH	Old Sanger Ave	35	152	59	223	840
	WBRT	Old Sanger Ave	43	165	69	236	840
	EBLT	Old Sanger Ave	12	102	7	72	540
	EBTH	Old Sanger Ave	12	102	7	72	540
	EBRT	Old Sanger Ave	11	110	11	85	540
	NBLT	Beauregard St	0	17	1	40	860
	NBTH	Beauregard St	25	273	56	371	860
	NBRT	Beauregard St	25	274	55	372	860
	SBLT	Beauregard St	7	117	4	90	910
	SBTH	Beauregard St	7	117	15	201	910
	SBRT	Beauregard St	6	119	14	202	910

Notes:

1. I-395 SB Ramp is metered in the PM Peak. The queue results are obtained from a Queue Counter placed at the ramp meter in VISSIM.
2. Refer to the following figure for approach indications in Ellipse.





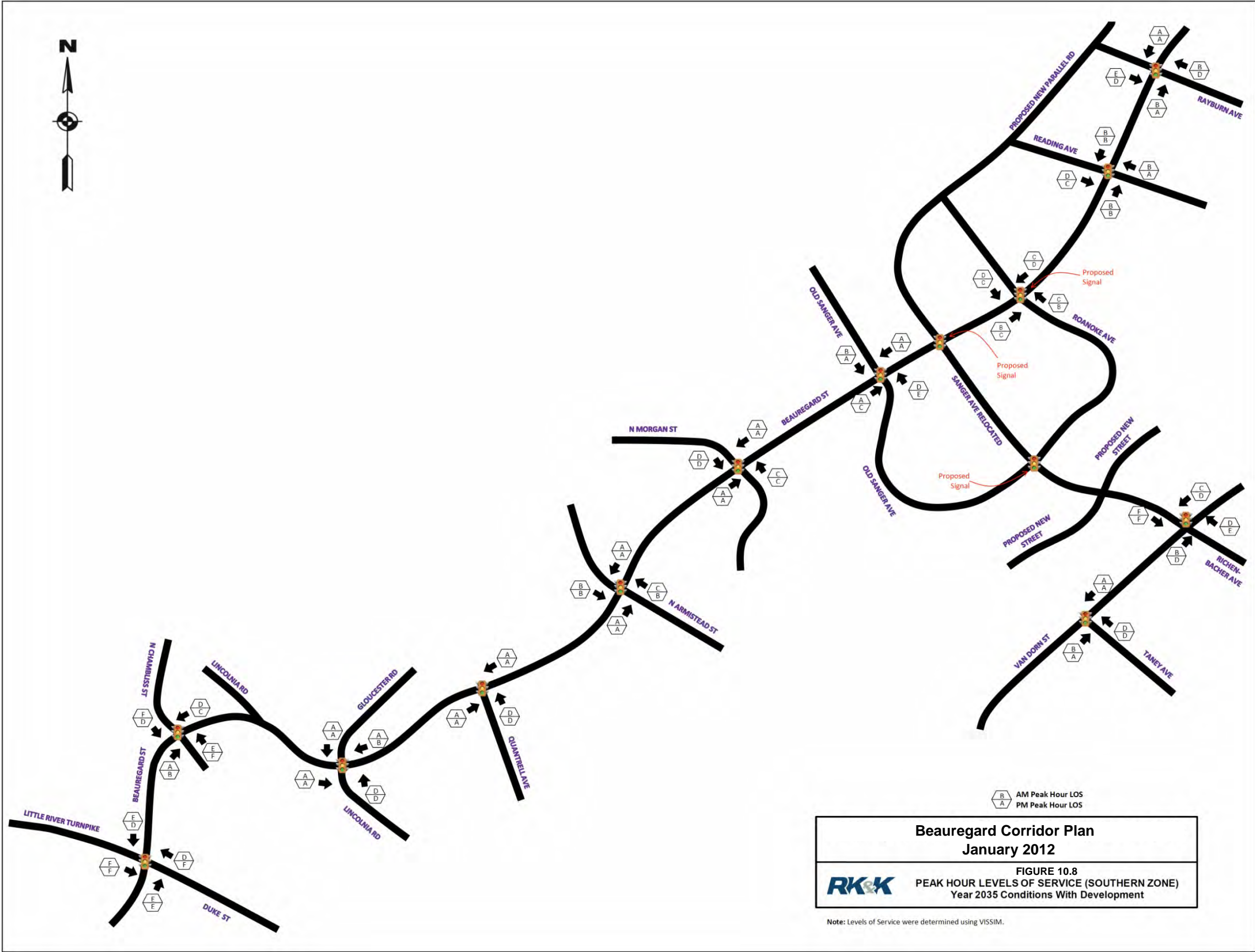


Table 10.5: 2035 Conditions With Development AM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	33	21	C	29	24	B
N Armistead St	N Morgan St	40	18	D	27	26	B
N Morgan St	Old Sanger Ave	26	25	B	40	16	D
Old Sanger Ave	Reloc Sanger Ave	21	13	E	15	18	C
Reloc Sanger Ave	Roanoke Ave	17	21	C	22	16	D
Roanoke Ave	Reading Ave	26	25	B	31	21	C
Reading Ave	Rayburn Ave	20	24	C	22	22	C
Rayburn Ave	Highview Lane	24	20	C	22	22	C
Highview Lane	Mark Center Dr	34	16	D	25	22	C
Mark Center Dr	Seminary Rd	63	8	F	22	23	C
Seminary Rd	Fillmore Ave	39	24	B	65	14	D
Fillmore Ave	W Braddock Rd	54	14	D	39	20	C
W Braddock Rd	King St	153	6	F	52	19	C
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	36	19	C	30	23	C
Echols Ave	Beauregard St	66	13	E	41	20	C
Beauregard St	Mark Center Dr	34	14	E	37	13	E
Library Lane	N Pickett St	35	6	F	9	24	C
N Pickett St	N Jordan St	26	20	C	68	8	F

Table 10.6: 2035 Conditions With Development PM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	30	23	C	26	27	B
N Armistead St	N Morgan St	31	23	C	26	27	B
N Morgan St	Old Sanger Ave	33	20	C	38	17	D
Old Sanger Ave	Reloc Sanger Ave	29	9	F	19	14	D
Reloc Sanger Ave	Roanoke Ave	16	22	C	24	15	D
Roanoke Ave	Reading Ave	24	27	B	34	19	C
Reading Ave	Rayburn Ave	21	24	C	23	21	C
Rayburn Ave	Highview Lane	20	25	B	21	23	C
Highview Lane	Mark Center Dr	32	17	D	23	24	C
Mark Center Dr	Seminary Rd	58	9	F	38	14	E
Seminary Rd	Fillmore Ave	44	21	C	74	13	E
Fillmore Ave	W Braddock Rd	58	13	E	33	23	C
W Braddock Rd	King St	91	11	E	39	25	B
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	43	16	D	32	21	C
Echols Ave	Beauregard St	37	22	C	46	18	D
Beauregard St	Mark Center Dr	57	8	F	42	11	E
Library Lane	N Pickett St	35	6	F	9	24	C
Pickett St	N Jordan St	21	24	B	28	18	C

11 Year 2020 Traffic Analysis for Interim Development

As stated previously in this report, the majority of proposed redevelopment within the Beauregard Corridor study area would likely occur in phases between 2011 and 2035. The Year 2020 was selected by the City and the redevelopment team as a interim milestone at which traffic operations should be evaluated, especially to determine the phasing of improvements.

Most of the improvements that are assumed built by 2035 will also be needed by 2020 and were included in the 2020 traffic model. These improvements are summarized in **Table 11.1**, with their locations shown on **Figure 11.1**.

Earlier in this report, **Table 7.3** shows the net changes in land uses between the Year 2020 With Interim Development and the Existing 2010 conditions. **Table 7.4** compares the land uses for the 2020 With Interim Development to the 2035 Baseline (Without Development) conditions. The Year 2020 traffic volumes for conditions with interim development are shown on the roadway network diagrams on **Figures 11.2 and 11.3**.

Table 11.1: Transportation Improvements Required by Year 2020 With Interim Development

No.	Location	Interim Development Scenario Improvements by 2020	Source of Improvement
B3	Beauregard St at Seminary Rd	Add a separate right turn lane along westbound Seminary Road extending back to Mark Center Drive.	Beauregard Planning Study Assumed Improvement
D1		Construct an ellipse configuration at the intersection of Seminary / Beauregard. The conventional 8 phase traffic signal is replaced with a pair of interconnected, coordinated 3-phase signals along Seminary Road located about 300 feet apart. Left turns would be prohibited in the eastbound and westbound directions of Seminary Road. This project replaces 2035 Baseline projects numbers B1 and B2.	Beauregard Planning Study Assumed Improvement
D2		Add a new road through Southern Towers, parallel to Seminary, that would connect from the I-395 off-ramp into Southern Towers. The road would extend west, across Beauregard Street connecting to the future Hekemian development. The intersection with the new road and Beauregard Street would be signalized, and shared with a future transitway. The existing driveway from the Hermitage apartments at Beauregard Street would be closed, and adequate improvements to allow for access into and out of the Hermitage apartments.	Beauregard Planning Study Assumed Improvement
B4	Beauregard Street	Construct a dedicated transitway in each direction along Beauregard Street heading southbound from King Street, turning east into Southern Towers, south and west onto Mark Center Drive and south onto Beauregard to Sanger Avenue. (See Appendix A for transit corridor assumptions).	Transitway Feasibility Study
B5	Beauregard Street at Mark Center Drive	Provide a separate right turn lane along NB Beauregard Street. Provide an additional southbound left turn lane onto Mark Center Drive.	Beauregard Planning Study Assumed Improvement
B6		Reconfigure westbound approach as three lanes - 1 left, 1 thru and 1 right	Beauregard Planning Study Assumed Improvement
B7	Beauregard St at Existing Sanger Ave	Reconfigure the Sanger Ave approaches to consist of a separate left turn lane, a thru lane, and a separate right turn lane in both the eastbound and westbound directions. The portion of Beauregard Street between Roanoke and existing Sanger will be mixed operations. SB transit will transition from median runningway on Beauregard Street to curbside running along existing Sanger Avenue.	Beauregard Planning Study Assumed Improvement
B8		Provide permissive left-turn phasing for the Sanger Ave left turns	Beauregard Planning Study Assumed Improvement
B9		Provide permissive right turn phasing for WB Sanger Ave	Beauregard Planning Study Assumed Improvement
B10	Seminary Rd at Echols Ave	Add separate left turn lanes along EB and WB Seminary Rd, with protected/permissive left turn phasing	Beauregard Planning Study Assumed Improvement

No.	Location	Interim Development Scenario Improvements by 2020	Source of Improvement
B11	Seminary Road at Mark Center Drive	Widen the Seminary Road westbound approach and gore area from the rotary back to the Mark Center Drive intersection from one to two lanes and provide a dedicated right-turn lane into Southern Towers. Restripe the westbound Seminary Road flyover to allow one through lane on Seminary Road and one left-turn lane into Mark Center Drive. Provide a physical separation between the two lanes from the rotary and the left-turn lane at Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
B12		Redesign eastbound Seminary Road approach to Mark Center Drive to allow three through lanes, and to align with new lane on Seminary east of Mark Center Drive accessing I-395.	BRAC / VDOT Short-Mid Term Improvement
B13		Add lanes at Southern Towers approach to separate the existing shared through/left turn lanes. The approach would include dual left turn lanes, one thru lane and one right turn lane.	Beauregard Planning Study Assumed Improvement
B14		Widen northbound Mark Center Drive to allow for a third right turn onto eastbound Seminary. This approach would be a left turn, thru/right, and dual right turn lanes.	BRAC / VDOT Short-Mid Term Improvement
B15		Construct a pedestrian bridge across Seminary Road west of Mark Center Drive.	BRAC / VDOT Short-Mid Term Improvement
D7		Widen Mark Center Dr to allow for a third right turn onto EB Seminary. This approach would be a left turn, one thru lane and three right turn lanes.	Beauregard Planning Study Improvement
B16	EB Seminary Rd Off-ramp to I-395 Rotary	Widen eastbound Seminary Road and the southbound I-395 on-ramp by one lane from Mark Center Drive to the ramp meter signal to provide a continuous two-lane ramp from Seminary Road to the ramp meter. Restripe the southbound ramp connection from the rotary to provide a merge into the two-lane ramp from eastbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvement
B17	I-395 at the Seminary rotary	Widen the northbound I-395 off-ramp from two to three lanes and provide two through lanes and one right turn lane.	BRAC / VDOT Short-Mid Term Improvement
B18		On the eastbound rotary (toward onramp), restripe the pavement to provide a separate left turn lane, a shared thru/left turn lane, and a thru lane. Requires removal of the island at westbound Seminary Road.	BRAC / VDOT Short-Mid Term Improvements
B19		Restripe the rotary to provide dual lefts for the eastbound-to-northbound movements.	BRAC / VDOT Short-Mid Term Improvement
B20		Restripe the westbound approach at the I-395 southbound off-ramp intersection to provide two through lanes and one left turn lane.	BRAC / VDOT Short-Mid Term Improvement
B21	I-395 at Seminary Road	Construct a new HOV ramp at Seminary Road and I-395 to and from the north, connecting to the upper bridge of Seminary Road.	VDOT project (Subject to EA)
B22	Van Dorn St at Braddock Rd	Replace the shared thru/left turn lanes along NB and SB Van Dorn St with separate left turn lanes	Beauregard Planning Study Assumed Improvements
B23		Add protected/permissive left turn phasing along northbound and southbound Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B24	Existing Sanger Avenue	Remove on-street parking in both directions and provide dedicated transit lane (one transit lane and one GP lane each direction).	Transitway Feasibility Study
B25	Van Dorn St at Sanger Ave / Richenbacher Ave	Reconfigure eastbound Sanger Avenue to consist of a right turn lane, and a left/thru/right lane approaching Van Dorn Street.	Beauregard Planning Study Assumed Improvements
B26		Restripe the westbound approach along Richenbacher Avenue to consist of a separate left turn lane and a shared thru/right turn lane.	Beauregard Planning Study Assumed Improvements
B27	Beauregard St at Braddock Rd	Change dual left to single left on westbound Braddock Road and replace the left-turn lane with a thru lane.	Beauregard Planning Study Assumed Improvements
D6	Relocated Kenmore Avenue and Library Lane Extended	Kenmore Avenue currently connects Van Dorn St. to Seminary Rd. via an unsignalized intersection along Seminary Road that restricts movements to right turns only. To support the redevelopment of this area, and improve traffic flow, the plan proposes to relocate a portion of Kenmore Avenue south of Seminary Road such that it aligns with the Library Lane intersection at Seminary Road.	Beauregard Planning Study Assumed Improvement
D8	Seminary Rd at Library Lane	Change pedestrian signal phase at Seminary / Library to concurrent phasing with advanced pedestrian signal. (See Appendix B for detailed analysis of signal operations at this intersection).	Beauregard Planning Study Assumed Improvements

a) Transit Alignments

Transit routes for Year 2020 With Interim Development are the same as the 2035 Baseline condition. Transit vehicles would make turns at the Beauregard Street/Existing Sanger Avenue intersection. Transit vehicles would operate in a median dedicated lane on southbound Beauregard Street. At Sanger Avenue, the dedicated transit lane becomes the left-turn pocket – sharing the lane with left-turn vehicles. In the northbound direction, transit operates in mixed traffic from Sanger Avenue to Roanoke Avenue and along northbound Beauregard Street. Transit vehicles would get back to dedicated transit-way via the left-turn pocket at Roanoke Avenue/Beauregard Street. Roanoke Avenue would be signalized in 2020 to accommodate this transit transition and also protect southbound left-turn vehicles that conflict with transit vehicles going through.

As opposed to 2035 conditions, the dedicated transitway would run curbside along Sanger Avenue under the Year 2020 With Interim Development scenario. In the eastbound direction, transit vehicles would operate in dedicated lanes from Beauregard Street to Knole Court and in mixed traffic from Knole Court to Van Dorn Street. The length of Sanger Avenue having mixed traffic operations would be approximately 400 feet. In the westbound direction, transit vehicles would operate within dedicated lanes from Van Dorn Street to approximately 200 feet prior to Beauregard Street, where they would commence operation in mixed traffic. Transit vehicles would use the curb lane to make right turns onto Beauregard Street. See **Appendix A** for transit corridor assumptions.

b) Signal Timing/Phasing Assumptions

To accommodate increased traffic volumes under the Year 2020 With Interim Development conditions, the cycle length was increased to 130 seconds for all the signalized intersections along:

- (a) Beauregard Street from Chambliss Street (south-end) to Braddock Street (north-end);
- (b) Seminary Road from Dawes Avenue (north-end) to Jordan Street (south-end); and

Signal timing at the Beauregard Street and Seminary Road intersection (ellipse), and the Library Lane and Seminary Road intersection use the same assumptions as in the 2035 With Development scenario.

Splits and offsets were initially optimized in Synchro and further fine-tuned in VISSIM based on the simulation observations for 2020 With Interim Development.

c) Simulation Results

Table 11.2 and **Table 11.3** show the delay and LOS results for the Year 2020 With Interim Development AM and PM analysis. **Table 11.4** lists the queue length results at key intersections. As shown in delay and LOS tables, all the intersections would operate at LOS E or better in both AM and PM periods.

Westbound Sanger Avenue would experience long delays at Beauregard Street (LOS F). Westbound queues would spill beyond existing Sheffield Court but would not reach Knole Court. It appears the exclusive pedestrian phase is the major cause of long queues at this intersection. During this phase, pedestrians receive a Walk indication on all four legs of the intersection while all vehicular traffic received a Red indication, with right turns on red prohibited to reduce potential pedestrian/vehicle conflicts.

The results of the VISSIM analyses are shown on the roadway network diagrams in **Figures 11.4 and 11.5**. See **Appendix F** for the Synchro-based lanes, signal timing and phasing that were used in the VISSIM simulations.

The 2020 With Interim Development AM and PM peak hour levels of service on the roadway links along Beauregard Street and along Seminary Road are summarized in **Tables 11.5 and 11.6**. These levels of service were calculated using the Highway Capacity Manual (HCM) methodology for arterial LOS.



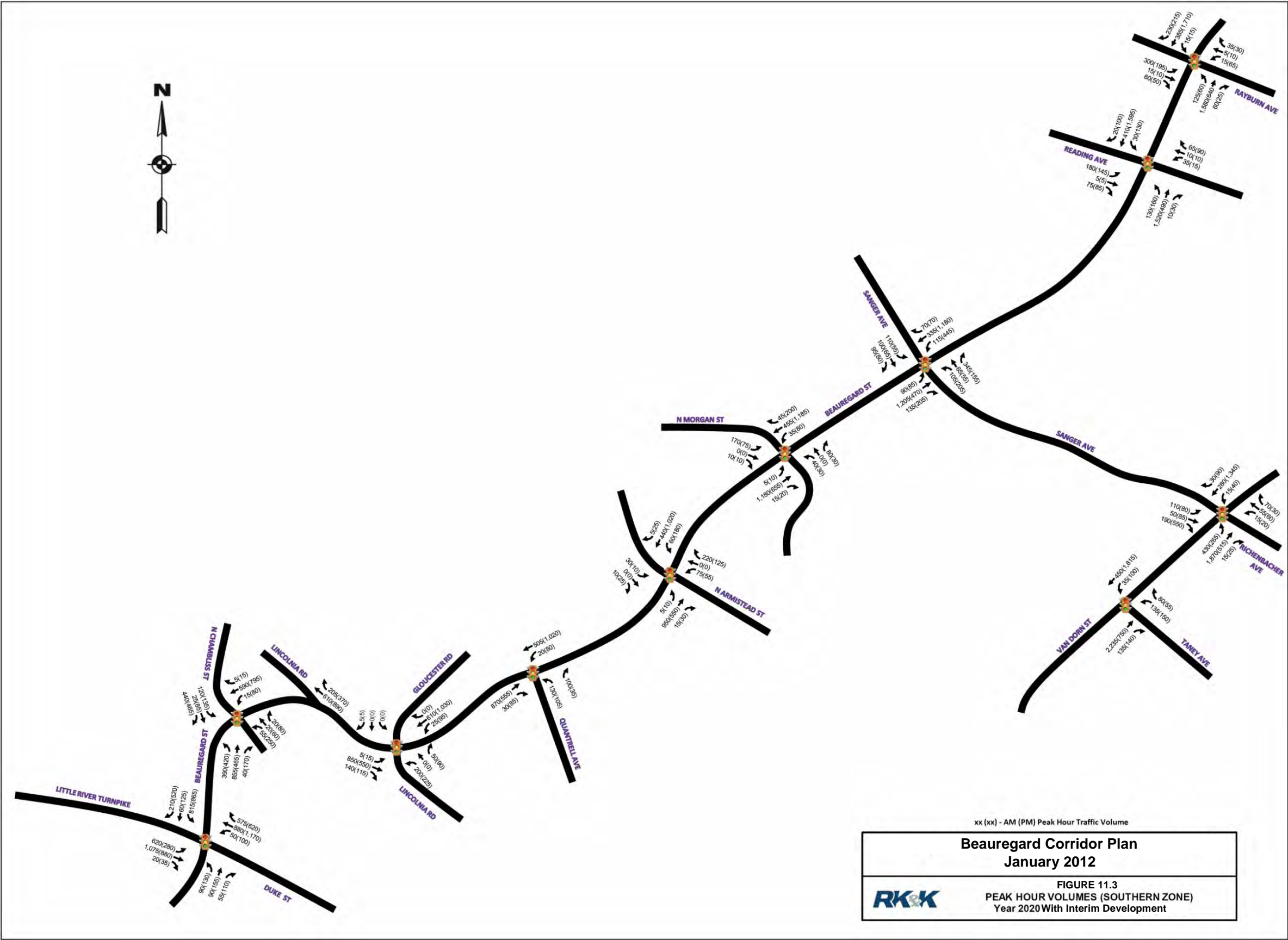


Table 11.2: Year 2020 With Interim Development AM Peak Hour Delay and Level of Service (LOS) by Approach

Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	66.8	E	49.8	D	47.8	D	35.2	D	45.1	D
2	Beauregard St / N Chambliss St	8.7	A	15.6	B	21.7	C	50.6	D	14.9	B
3	Beauregard St / Lincolnia Rd	6.0	A	4.4	A	1.1	A	47.3	D	11.0	B
4	Beauregard St / Quantrell Ave	2.7	A	1.9	A	-	-	39.8	D	7.7	A
5	Beauregard St / N Armistead St	1.9	A	3.9	A	22.5	C	18.8	B	5.6	A
6	Beauregard St / N Morgan St	5.5	A	4.7	A	55.1	E	26.3	C	10.8	B
7	Beauregard St / Sanger Ave	34.1	C	24.1	C	42.4	D	73.0	E	40.2	D
8	Beauregard St / Reading Ave	23.1	C	17.3	B	40.4	D	24.8	C	23.9	C
9	Beauregard St / Rayburn Ave	13.9	B	7.9	A	45.8	D	19.0	B	16.8	B
10	Beauregard St / Highview Ln	6.1	A	4.7	A	44.7	D	17.6	B	8.0	A
11	Beauregard St / Mark Center Dr	12.9	B	47.0	D	47.0	D	47.0	D	20.2	C
12	Beauregard St / Seminary Rd	46.1	D	77.9	E	47.5	D	42.3	D	49.8	D
13	Beauregard St / Fillmore Ave	4.4	A	4.1	A	19.1	B	45.8	D	6.6	A
14	Beauregard St / W Braddock Rd	13.0	B	29.2	C	50.0	D	22.2	C	20.1	C
15	Beauregard St / King St	40.0	D	43.2	D	39.9	D	38.8	D	39.8	D
16	Seminary Rd / S. George Mason Dr	16.3	B	20.0	B	8.2	A	24.2	C	14.7	B
17	Seminary Rd / Dawes Ave	35.2	D	31.3	C	2.3	A	4.8	A	4.9	A
18	Seminary Rd / Echols Ave	21.9	C	44.1	D	5.6	A	10.2	B	9.1	A
19	Seminary Rd / Mark Center Dr	40.6	D	71.4	E	27.2	C	33.0	C	35.0	D
20-23	Seminary Rd / I-395 Rotary	36.7	D	24.5	C	34.3	C	31.2	C	32.4	C
24	Seminary Rd / I-395 HOV Ramp	56.8	E	-	-	15.0	B	33.6	C	35.6	D
25	Seminary Rd / Library Ln	42.3	D	49.4	D	13.9	B	8.3	A	15.0	B
26	Seminary Rd / Hammond M.S.	49.4	D	27.0	C	3.9	A	1.5	A	3.8	A
27	Seminary Rd / N Pickett St	42.5	D	-	-	5.8	A	4.3	A	8.6	A
28	Seminary Rd / N Jordan St	42.1	D	-	-	8.1	A	9.9	A	15.4	B
29	N Van Dorn St / Taney Ave	13.4	B	6.5	A	-	-	41.3	D	14.3	B
30	N Van Dorn St / Sanger Ave	18.7	B	19.8	B	54.3	D	35.2	D	23.7	C
31	N Van Dorn St / Kenmore Ave	4.2	A	1.6	A	-	-	24.2	C	5.2	A
32	N Van Dorn St / W Braddock Rd	13.0	B	19.4	B	33.9	C	49.5	D	21.7	C
33	W Braddock Rd / Hampton Dr	44.9	D	28.9	C	7.6	A	5.2	A	11.4	B

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.

Table 11.3: Year 2020 With Interim Development PM Peak Hour Delay and Level of Service (LOS) by Approach

Int. #	Intersection	Northbound		Southbound		Eastbound		Westbound		Overall Intersection	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Beauregard St / Route 236	62.1	E	37.6	D	63.1	E	36.0	D	45.1	D
2	Beauregard St / N Chambliss St	14.4	B	37.9	D	21.2	C	62.3	E	29.1	C
3	Beauregard St / Lincolnia Rd	5.8	A	5.6	A	2.9	A	45.1	D	11.5	B
4	Beauregard St / Quantrell Ave	1.1	A	7.3	A	-	-	47.1	D	8.0	A
5	Beauregard St / N Armistead St	4.3	A	2.2	A	9.7	A	20.7	C	4.6	A
6	Beauregard St / N Morgan St	4.9	A	6.3	A	51.7	D	24.9	C	8.0	A
7	Beauregard St / Sanger Ave	59.9	E	38.4	D	48.7	D	94.5	F	55.4	E
8	Beauregard St / Reading Ave	29.2	C	14.9	B	37.1	D	11.2	B	20.6	C
9	Beauregard St / Rayburn Ave	12.0	B	11.5	B	46.7	D	40.0	D	15.4	B
10	Beauregard St / Highview Ln	6.2	A	6.5	A	51.3	D	31.1	C	8.4	A
11	Beauregard St / Mark Center Dr	20.0	C	14.4	B	44.0	D	38.5	D	21.2	C
12	Beauregard St / Seminary Rd	31.9	C	71.1	E	13.3	B	59.7	E	48.8	D
13	Beauregard St / Fillmore Ave	8.2	A	5.7	A	28.4	C	49.8	D	10.6	B
14	Beauregard St / W Braddock Rd	21.2	C	25.0	C	48.0	D	29.7	C	26.3	C
15	Beauregard St / King St	33.5	C	68.0	E	55.2	E	31.6	C	47.7	D
16	Seminary Rd / S. George Mason Dr	34.2	C	42.7	D	2.2	A	4.6	A	14.0	B
17	Seminary Rd / Dawes Ave	36.3	D	43.7	D	9.2	A	10.3	B	11.9	B
18	Seminary Rd / Echols Ave	24.9	C	51.2	D	15.9	B	11.7	B	14.6	B
19	Seminary Rd / Mark Center Dr	50.0	D	62.1	E	28.7	C	37.1	D	39.8	D
20-23	Seminary Rd / I-395 Rotary	28.3	C	28.9	C	55.8	E	57.3	E	43.7	D
24	Seminary Rd / I-395 HOV Ramp	-	-	-	-	16.7	B	17.1	B	16.9	B
25	Seminary Rd / Library Ln	38.3	D	51.9	D	21.7	C	13.8	B	23.7	C
26	Seminary Rd / Hammond M.S.	31.6	C	13.4	B	1.3	A	0.8	A	1.3	A
27	Seminary Rd / N Pickett St	34.1	C	-	-	3.1	A	5.3	A	5.3	A
28	Seminary Rd / N Jordan St	50.9	D	-	-	7.1	A	9.4	A	12.1	B
29	N Van Dorn St / Taney Ave	8.7	A	7.2	A	-	-	43.0	D	10.1	B
30	N Van Dorn St / Sanger Ave	47.5	D	40.2	D	59.5	E	49.7	D	47.0	D
31	N Van Dorn St / Kenmore Ave	4.3	A	10.2	B	-	-	58.4	E	16.5	B
32	N Van Dorn St / W Braddock Rd	21.2	C	30.4	C	27.7	C	37.2	D	29.1	C
33	W Braddock Rd / Hampton Dr	34.2	C	42.7	D	2.2	A	4.6	A	14.0	B

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delay/LOS determined using VISSIM.

Table 11.4: 2020 With Interim Development - Average and Maximum Queue Lengths

Intersection	Approach	Road	AM		PM		Storage Length (ft)
			Avg Queue (ft)	Max Queue (ft)	Avg Queue (ft)	Max Queue (ft)	
Seminary Rd @ I-395 Rotary	WB	I-395 NB On-Ramp	85	461	70	314	580
	SB	I-395 SB Off-Ramp	42	162	72	333	1830
	EBTH	I-395 SB On-Ramp	105	401	68	297	870
	EBRT ¹	I-395 SB On-Ramp	-	-	831	1488	1700
	NB	I-395 NB Off-Ramp	111	436	47	196	1110
Seminary Rd @ Mark Center Dr	WBLT	Seminary Rd	331	538	60	324	1100
	WBTH	Seminary Rd	138	532	148	521	960
	WBRT	Seminary Rd	139	336	37	313	960
	EBLT	Seminary Rd	5	57	12	90	570
	EBTH	Seminary Rd	69	356	75	309	570
	EBRT	Seminary Rd	1	126	0	83	570
	NBLT	Mark Center Dr	40	126	258	604	760
	NBTH	Mark Center Dr	40	126	258	604	760
	NBRT	Mark Center Dr	40	126	258	604	760
	SBLT	Mark Center Dr	151	443	88	325	490
	SBTH	Mark Center Dr	151	443	88	325	490
	SBRT	Mark Center Dr	151	443	88	325	490
Beauregard St @ Mark Center Dr	WBLT	Mark Center Dr	18	121	91	370	920
	WBTH	Mark Center Dr	18	121	91	370	920
	WBRT	Mark Center Dr	0	4	18	234	920
	EBLT	Mark Center Dr	5	55	44	195	275
	EBTH	Mark Center Dr	5	55	44	195	275
	EBRT	Mark Center Dr	0	0	1	71	275
	NBLT	Beauregard St	68	681	63	395	690
	NBTH	Beauregard St	68	681	63	395	690
	NBRT	Beauregard St	68	681	63	395	690
	SBLT	Beauregard St	105	359	63	330	670
	SBTH	Beauregard St	105	359	63	330	670
	SBRT	Beauregard St	1	110	1	81	670
Seminary Rd @ Echols Ave	WBLT	Seminary Rd	9	175	41	421	840
	WBTH	Seminary Rd	62	474	48	475	840
	WBRT	Seminary Rd	48	415	31	380	840
	EBLT	Seminary Rd	5	59	5	84	940
	EBTH	Seminary Rd	13	255	129	763	940
	EBRT	Seminary Rd	4	178	87	636	940
	NBLT	Echols Ave	10	124	13	168	435
	NBRT	Echols Ave	1	49	2	92	435
	SBLT	Echols Ave	3	51	4	44	390
	SBRT	Echols Ave	0	0	0	0	390

Table 11.4 (Cont'd.): 2020 With Interim Development - Average and Maximum Queue Lengths

Seminary Rd @ Library Ln	WBLT	Seminary Rd	0	24	3	55	370
	WBTH	Seminary Rd	24	253	30	214	370
	WBRT	Seminary Rd	24	253	30	214	370
	EBLT	Seminary Rd	31	261	145	941	950
	EBTH	Seminary Rd	31	261	145	941	950
	EBRT	Seminary Rd	28	262	145	942	950
	NBLT	Library Ln	14	106	11	97	330
	NBTH	Library Ln	14	106	11	97	330
	NBRT	Library Ln	14	109	10	100	330
	SBLT	Library Ln	13	106	31	352	650
	SBTH	Library Ln	13	106	31	352	650
	SBRT	Library Ln	56	312	124	566	650
Seminary Rd @ Beauregard St ²	WBLT *	Seminary Rd	165	365	116	348	365
	WBLT	Seminary Rd	117	553	146	506	550
	WBTH	Seminary Rd	117	553	146	506	550
	WBRT	Seminary Rd	117	553	146	506	550
	EBLT	Seminary Rd	26	387	216	617	920
	EBTH	Seminary Rd	106	526	216	617	920
	EBRT	Seminary Rd	26	387	216	617	920
	NBLT	Beauregard St	53	320	21	191	430
	NBTH	Beauregard St	53	320	21	191	430
	NBRT	Beauregard St	53	320	21	191	430
	SBLT	Beauregard St	71	218	151	320	1106
	SBTH	Beauregard St	71	218	151	320	1106
	SBRT	Beauregard St	71	218	151	320	1106
	WBLT **	Southern Towers	91	323	23	197	612
	WBTH **	Southern Towers	91	323	23	197	612
	WBRT **	Southern Towers	91	323	23	197	612
	EBLT **	Hekemian	9	94	17	137	181
	EBTH **	Hekemian	9	94	17	137	181
	EBRT **	Hekemian	9	94	17	137	181
Beauregard St @ Highview Ln	WBLT	Mark Center Dr	2	43	15	86	235
	WBTH	Mark Center Dr	2	43	15	86	235
	WBRT	Mark Center Dr	0	0	0	6	235
	EBLT	Mark Center Dr	33	166	17	110	430
	EBTH	Mark Center Dr	33	166	17	110	430
	EBRT	Mark Center Dr	1	57	0	9	430
	NBLT	Beauregard St	20	323	18	155	610
	NBTH	Beauregard St	20	323	18	155	610
	NBRT	Beauregard St	1	157	0	44	610
	SBLT	Beauregard St	12	114	26	366	690
	SBTH	Beauregard St	12	114	26	366	690
	SBRT	Beauregard St	0	31	1	125	690

Table 11.4 (Cont'd.): 2020 With Interim Development - Average and Maximum Queue Lengths

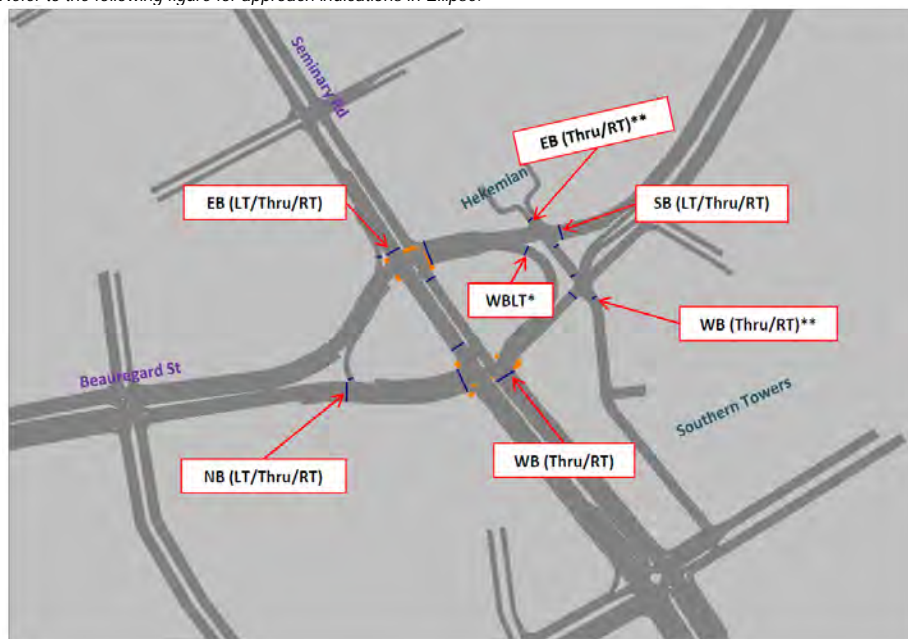
Beauregard St @ Rayburn Ave	WBLT	Rayburn Ave	4	49	18	91	470
	WBTH	Rayburn Ave	4	49	18	91	470
	WBRT	Rayburn Ave	4	49	0	1	470
	EBLT	Rayburn Ave	92	353	55	273	910
	EBTH	Rayburn Ave	92	353	55	273	910
	EBRT	Rayburn Ave	92	353	10	177	910
	NBLT	Beauregard St	85	706	35	175	625
	NBTH	Beauregard St	85	706	35	175	625
	NBRT	Beauregard St	23	461	2	83	625
	SBLT	Beauregard St	15	170	64	636	610
	SBTH	Beauregard St	15	170	64	636	610
	SBRT	Beauregard St	0	23	8	312	610
Beauregard St @ Reading Ave	WBLT	Reading Ave	10	90	5	54	470
	WBTH	Reading Ave	10	90	5	54	470
	WBRT	Reading Ave	6	89	6	58	470
	EBLT	Reading Ave	49	209	41	206	1020
	EBTH	Reading Ave	49	209	41	206	1020
	EBRT	Reading Ave	49	209	38	207	1020
	NBLT	Beauregard St	114	736	92	371	850
	NBTH	Beauregard St	114	736	92	371	850
	NBRT	Beauregard St	92	743	55	365	850
	SBLT	Beauregard St	23	142	98	726	625
	SBTH	Beauregard St	23	142	98	726	625
	SBRT	Beauregard St	18	144	67	701	625
Beauregard St @ Roanoke Ave	WBLT	Roanoke Ave	9	71	10	78	280
	WBTH	Roanoke Ave	9	71	10	78	280
	WBRT	Roanoke Ave	0	0	0	0	280
	EBLT	Roanoke Ave	9	74	9	79	500
	EBTH	Roanoke Ave	9	74	9	79	500
	EBRT	Roanoke Ave	0	0	0	0	500
	NBLT	Beauregard St	17	328	12	210	415
	NBTH	Beauregard St	17	328	12	210	415
	NBRT	Beauregard St	1	183	0	64	415
	SBLT	Beauregard St	10	143	48	395	850
	SBTH	Beauregard St	10	143	48	395	850
	SBRT	Beauregard St	0	15	23	253	850

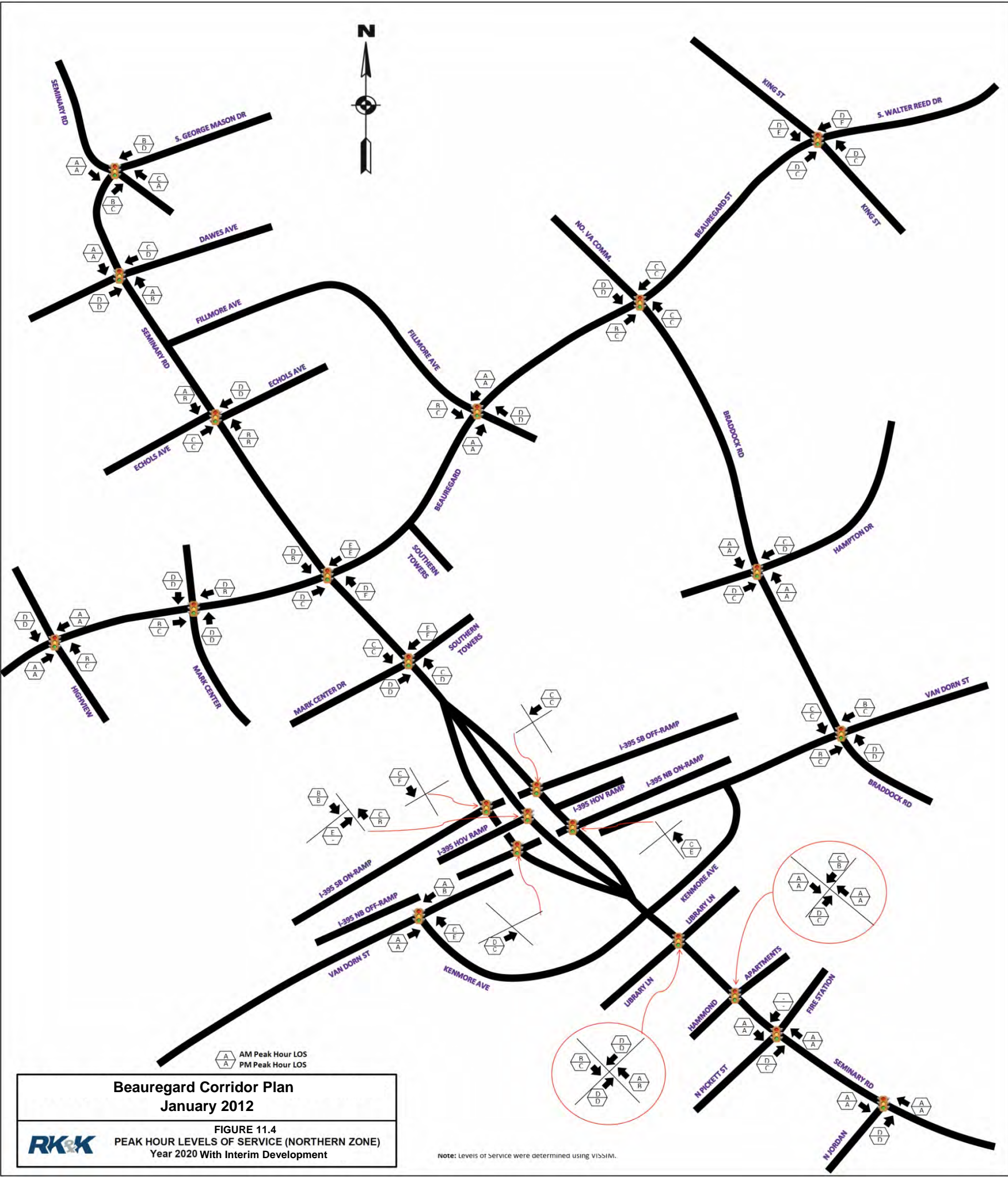
Table 11.4 (Cont'd.): 2020 With Interim Development - Average and Maximum Queue Lengths

Beauregard St @ Old Sanger Ave	WBLT	Old Sanger Ave	171	502	524	1149	840
	WBTH	Old Sanger Ave	171	502	524	1149	840
	WBRT	Old Sanger Ave	171	502	524	1149	840
	EBLT	Old Sanger Ave	55	324	37	224	540
	EBTH	Old Sanger Ave	55	324	37	224	540
	EBRT	Old Sanger Ave	55	324	15	202	540
	NBLT	Beauregard St	5	83	26	210	860
	NBTH	Beauregard St	161	783	128	540	860
	NBRT	Beauregard St	161	783	128	540	860
	SBLT	Beauregard St	42	226	309	975	910
	SBTH	Beauregard St	42	226	309	975	910
	SBRT	Beauregard St	42	226	309	975	910

Notes:

1. I-395 SB Ramp is metered in the PM Peak. The queue results are obtained from a Queue Counter placed at the ramp meter in VISSIM.
2. Refer to the following figure for approach indications in Ellipse.





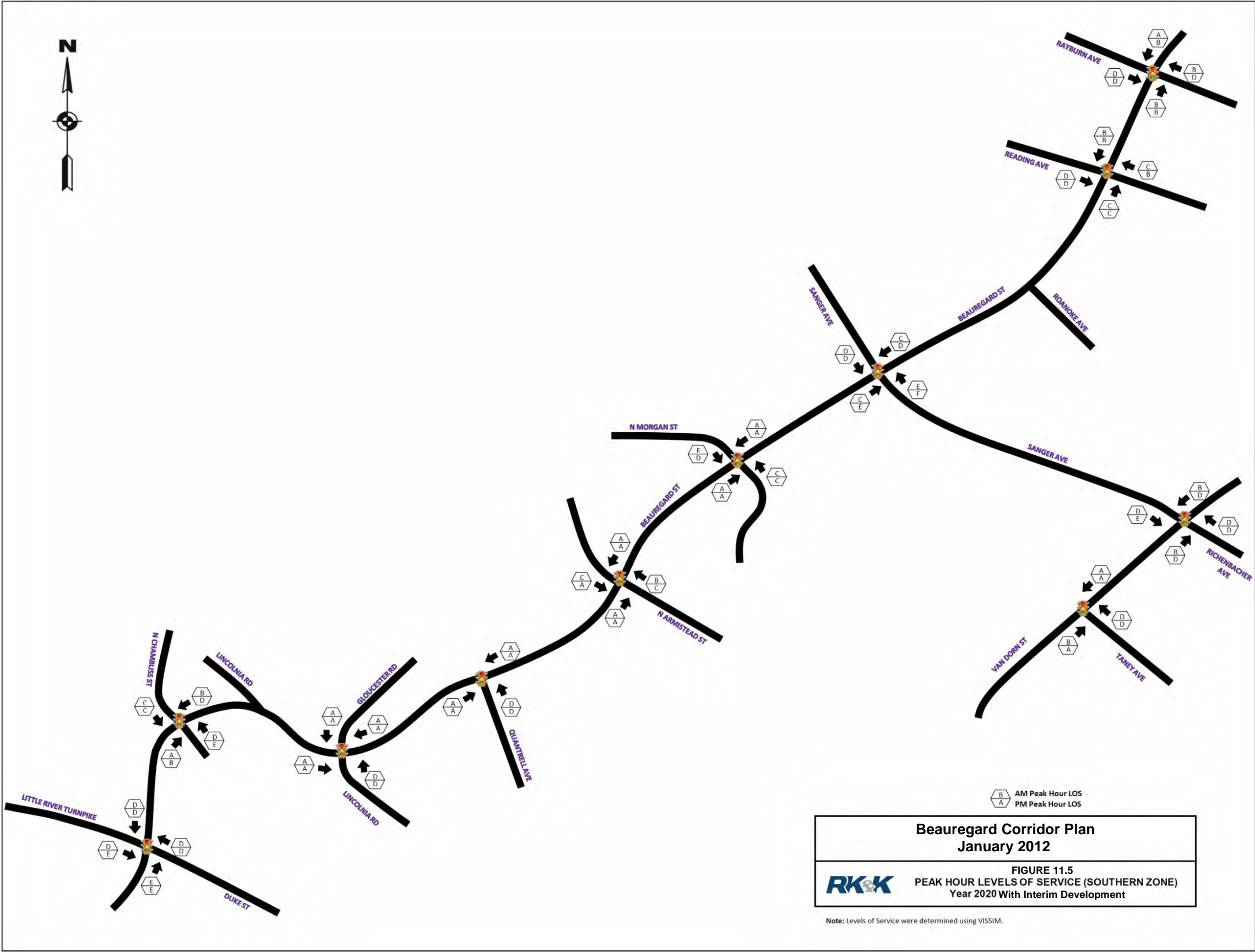


Table 11.5: 2020 With Interim Development AM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	30	23	C	25	28	C
N Armistead St	N Morgan St	36	20	C	27	27	B
N Morgan St	Sanger Ave	47	20	C	36	26	E
Sanger Ave	Reading Ave	43	23	C	49	21	D
Reading Ave	Rayburn Ave	34	14	D	24	20	C
Rayburn Ave	Highview Lane	23	21	C	19	26	B
Highview Lane	Mark Center Dr	27	20	C	23	24	C
Mark Center Dr	Seminary Rd	49	11	E	35	15	C
Seminary Rd	Fillmore Ave	38	25	B	78	12	B
Fillmore Ave	W Braddock Rd	41	19	C	31	25	B
W Braddock Rd	King St	142	7	F	46	21	B
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	35	20	C	25	28	B
Echols Ave	Beauregard St	67	12	E	34	25	B
Beauregard St	Mark Center Dr	51	9	F	39	12	E
Library Lane	N Pickett St	34	6	F	10	21	C
N Pickett St	N Jordan St	21	24	B	43	12	E

Table 11.6: 2020 With Interim Development PM Peak Hour Roadway Link Levels of Service (HCM Method)

Beauregard Street		Northbound			Southbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Quantrell Ave	N Armistead St	30	24	C	29	24	B
N Armistead St	N Morgan St	29	24	B	25	28	B
N Morgan St	Sanger Ave	49	19	C	35	27	B
Sanger Ave	Reading Ave	47	21	C	35	28	B
Reading Ave	Rayburn Ave	22	22	C	32	15	D
Rayburn Ave	Highview Lane	19	25	B	34	14	D
Highview Lane	Mark Center Dr	38	14	D	25	22	C
Mark Center Dr	Seminary Rd	64	8	F	50	10	E
Seminary Rd	Fillmore Ave	39	24	C	97	10	F
Fillmore Ave	W Braddock Rd	49	16	D	30	26	B
W Braddock Rd	King St	73	14	E	46	21	C
Seminary Road		Eastbound			Westbound		
Endpoint A	Endpoint B	Travel Time (s)	Travel Speed (mph)	Link LOS	Travel Time (s)	Travel Speed (mph)	Link LOS
Dawes Ave	Echols Ave	38	18	C	29	24	C
Echols Ave	Beauregard St	45	19	C	39	21	C
Beauregard St	Mark Center Dr	55	9	F	41	12	E
Library Lane	N Pickett St	29	7	F	9	24	C
N Pickett St	N Jordan St	22	24	C	36	14	D

12 Conclusions

Table 12.1 compares the number of intersections that would operate at level of service (LOS) E or F during the AM and PM peak hours for each of the four (4) land use scenarios that were evaluated for this study. The analysis results for the Year 2035 conditions with development and the Year 2020 conditions with interim development include roadway network improvements that would be implemented as part of the new development.

Table 12.1: Number of Intersections Performing at Level of Service (LOS) E or F, by Development Scenario

Development Scenario	AM Peak Hour		PM Peak Hour	
	LOS E	LOS F	LOS E	LOS F
Existing (2010) Conditions	0	1	3	0
2035 Baseline (Without Development) Conditions	5	3	5	0
2035 With Development Conditions	3	0	4	0
2020 Interim Development Conditions	0	0	1	0

Note: These analysis results were obtained using VISSIM.

The findings of this transportation study indicate with build-out of the proposed redevelopment in 2035 and the transportation improvements identified for the Year 2035 Conditions With Development scenario in the report, traffic operations would be at an acceptable level (i.e., peak hour intersection LOS E or better). Tables 12.2 and 12.3 show a comparison of the overall intersection levels of service and delays, respectively, for each of the four land use scenarios that were evaluated for this study. Without the improvements identified for the Year 2035 Conditions With Development scenario (see Tables 9.1, 10.1 and Figure 10.2), there would be a significant degradation of traffic operations in 2035. Although this study did not evaluate a scenario with the proposed redevelopment occurring without the recommended transportation improvements, the levels of service and delays associated with that scenario would be worse than the analysis results for the 2035 Baseline conditions. The 2035 With Development scenario would generate more trips than the 2035 Baseline scenario, but with only the 2035 Baseline transportation network in place.

The Year 2020 interim development would consist of an additional 2,157 residential units, 273,000 square feet of retail space, and approximately 2.2 million square feet of office space, compared to existing (Year 2010) conditions (the additional office space by 2020 includes the BRAC-133 facility). Traffic operations under the growth associated with this interim redevelopment by Year 2020 would also be acceptable, with no intersections operating at an overall LOS F during the peak hours, as long as the improvements described in Table 11.1 and shown in Figure 11.1 are phased in by 2020.

Table 12.2: AM & PM Peak Hour Levels of Service (LOS) by Intersection (All Scenarios)

Int. #	Intersection	Existing (2010)		2035 Baseline (Without Development)		2035 With Development		2020 With Interim Development	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Beauregard St / Route 236	F	E	E	E	E	E	D	D
2	Beauregard St / N Chambliss St	B	E	B	C	E	D	B	C
3	Beauregard St / Lincolnia Rd	B	B	B	B	B	B	B	B
4	Beauregard St / Quantrell Ave	B	A	C	A	B	A	A	A
5	Beauregard St / N Armistead St	A	A	E	A	A	A	A	A
6	Beauregard St / N Morgan St	B	B	F	B	A	A	B	A
7	Beauregard St / (Old) Sanger Ave	D	D	F	E	B	B	D	E
	Beauregard St / Reloc. Sanger Ave					B	A		
	Beauregard St / Roanoke Ave					B	C		
8	Beauregard St / Reading Ave	B	B	C	C	B	B	C	C
9	Beauregard St / Rayburn Ave	B	B	C	B	B	B	B	B
10	Beauregard St / Highview Ln	A	A	C	A	C	A	A	A
11	Beauregard St / Mark Center Dr	B	B	E	B	D	C	C	C
12	Beauregard St / Seminary Rd	C	D	F	E	D	E	D	D
13	Beauregard St / Fillmore Ave	B	B	B	C	A	B	A	B
14	Beauregard St / W Braddock Rd	B	D	E	D	C	C	C	C
15	Beauregard St / King St	D	D	D	E	E	E	D	D
16	Seminary Rd / S. George Mason Dr	C	D	B	D	B	C	B	B
17	Seminary Rd / Dawes Ave	A	A	A	C	A	A	A	B
18	Seminary Rd / Echols Ave	A	B	A	B	A	A	A	B
19	Seminary Rd / Mark Center Dr	C	C	D	D	C	D	D	D
20	Seminary Rd / Ramp to I-395 South	D	D						
22	Seminary Rd / Ramp from I-395 South	B	D						
21	Seminary Rd / Ramp from I-395 North	C	D						
23	Seminary Rd / Ramp to I-395 North	A	A						
20-23	Seminary Rd / I-395 Rotary			C	D	C	B	C	D
	Seminary Rd / I-395 HOV Ramp			E	A	C	B	D	B
24	Seminary Rd / Library Ln	B	C	C	C	B	C	B	C
25	Seminary Rd / Hammond M.S.	A	B	A	A	A	A	A	A
26	Seminary Rd / N Pickett St	C	B	A	A	A	A	A	A
27	Seminary Rd / N Jordan St	C	C	C	B	B	B	B	B
28	N Van Dorn St / Taney Ave	D	A	B	B	B	A	B	B
29	N Van Dorn St / Sanger Ave	D	E	C	E	C	E	C	D
30	N Van Dorn St / Kenmore Ave	B	B	B	B	A	B	A	B
31	N Van Dorn St / W Braddock Rd	C	C	C	C	C	D	C	C
32	W Braddock Rd / Hampton Dr	A	B	D	B	A	B	B	B

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. LOS was determined using VISSIM.

Table 12.3: AM & PM Peak Hour Delay (seconds/vehicle) by Intersection (All Scenarios)

Int. #	Intersection	Existing (2010)		2035 Baseline (Without Development)		2035 With Development		2020 With Interim Development	
		AM	PM	AM	PM	AM	PM	AM	PM
1	Beauregard St / Route 236	83.3	66.3	70.7	59.1	64.4	79.8	45.1	45.1
2	Beauregard St / N Chambliss St	13.8	62.1	16.7	31.8	55.6	37.9	14.9	29.1
3	Beauregard St / Lincolnia Rd	10.6	13.5	16.8	13.5	17.8	16.3	11.0	11.5
4	Beauregard St / Quantrell Ave	11.0	6.7	29.6	4.5	15.5	8.2	7.7	8.0
5	Beauregard St / N Armistead St	6.4	5.9	64.8	7.2	9.8	7.4	5.6	4.6
6	Beauregard St / N Morgan St	13.9	14.0	81.1	13.3	9.3	6.4	10.8	8.0
7	Beauregard St / (Old) Sanger Ave	43.3	49.2	81.3	68.4	13.7	18.5	40.2	55.4
	Beauregard St / Reloc. Sanger Ave					14.6	9.9		
	Beauregard St / Roanoke Ave					18.2	32.2		
8	Beauregard St / Reading Ave	17.3	11.7	28.8	22.4	18.0	15.8	23.9	20.6
9	Beauregard St / Rayburn Ave	13.2	10.8	25.0	17.9	18.8	15.1	16.8	15.4
10	Beauregard St / Highview Ln	8.5	7.7	24.4	8.3	22.8	9.4	8.0	8.4
11	Beauregard St / Mark Center Dr	10.0	10.8	57.5	15.6	41.5	24.5	20.2	21.2
12	Beauregard St / Seminary Rd	34.7	42.1	84.5	58.3	54.3	64.1	49.8	48.8
13	Beauregard St / Fillmore Ave	15.3	13.9	10.5	20.9	9.8	19.6	6.6	10.6
14	Beauregard St / W Braddock Rd	14.8	46.4	78.4	45.7	25.1	27.0	20.1	26.3
15	Beauregard St / King St	35.1	41.8	49.4	56.6	64.2	63.4	39.8	47.7
16	Seminary Rd / S. George Mason Dr	30.3	50.4	15.8	38.1	14.5	22.0	14.7	14.0
17	Seminary Rd / Dawes Ave	7.8	10.0	3.4	21.1	4.5	8.8	4.9	11.9
18	Seminary Rd / Echols Ave	10.0	10.6	4.1	12.9	6.7	4.9	9.1	14.6
19	Seminary Rd / Mark Center Dr	21.1	28.0	48.7	43.9	32.8	35.3	35.0	39.8
20	Seminary Rd / Ramp to I-395 South	48.0	37.9						
22	Seminary Rd / Ramp from I-395 South	13.0	36.9						
21	Seminary Rd / Ramp from I-395 North	25.4	46.6						
23	Seminary Rd / Ramp to I-395 North	8.5	7.4						
20-23	Seminary Rd / I-395 Rotary			22.0	35.3	26.7	16.0	32.4	43.7
	Seminary Rd / I-395 HOV Ramp			71.3	7.0	33.0	11.3	35.6	16.9
24	Seminary Rd / Library Ln	18.8	23.6	25.8	20.5	19.8	23.3	15.0	23.7
25	Seminary Rd / Hammond M.S.	9.3	13.3	3.2	1.9	3.3	1.4	3.8	1.3
26	Seminary Rd / N Pickett St	21.2	12.5	8.9	4.0	7.2	5.1	8.6	5.3
27	Seminary Rd / N Jordan St	26.5	26.4	20.8	15.3	14.1	11.8	15.4	12.1
28	N Van Dorn St / Taney Ave	44.3	9.7	11.4	13.2	16.2	9.0	14.3	10.1
29	N Van Dorn St / Sanger Ave	36.1	73.2	32.2	73.0	31.1	61.7	23.7	47.0
30	N Van Dorn St / Kenmore Ave	15.7	12.5	12.5	18.6	9.3	15.8	5.2	16.5
31	N Van Dorn St / W Braddock Rd	23.9	26.5	33.1	33.3	31.2	36.6	21.7	29.1
32	W Braddock Rd / Hampton Dr	9.8	14.3	43.8	13.2	9.9	15.8	11.4	14.0

Note: Beauregard Street and North Van Dorn Street are north-south roadways. Seminary Road and West Braddock Road are east-west roadways. Delays were determined using VISSIM.