Traffic Impact Analysis

for

Hampton Industrial Development on Aberdeen Road

Hampton, Virginia

November 23, 2016

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1.0 EXECUTIVE SUMMARY

Kimley-Horn was retained to perform a traffic impact analysis (TIA) for a proposed industrial development with up to 700,000 square feet (ft^2) of general light industrial, manufacturing, or general/high cube warehousing space. For purposes of analysis, a build-out date year of 2018 was assumed. One access to the site is proposed through a new signalized intersection along Aberdeen Road located approximately 800 feet south of the Aberdeen Road/Pembroke Avenue intersection. A secondary, emergency access is also proposed along Shell Road near the eastern property line.

The proposed development was evaluated under 2018 and 2034 conditions. The study area intersections and movements currently operate at LOS D or better with little change in LOS and minimal increases in delay anticipated due to the proposed development. The following transportation improvements are recommended to support the proposed development.

Aberdeen Road/Proposed Site Driveway

- Construction of this driveway and access to Aberdeen Road is predicated on approval of change to the limited access designation along Aberdeen Road
- Install a traffic signal and coordinate with Aberdeen Road signal system
- Driveway should be located a minimum of 1,050 feet south of Pembroke Avenue to meet minimum spacing standards based on highway functional classification (minor arterial) and posted speed limit (40 miles per hour) as defined in Appendix F of the VDOT *Road Design Manual*.
- Intersection geometrics should facilitate heavy vehicle movements

Northbound Aberdeen Road

- Maintain existing lane configuration

Southbound Aberdeen Road

- Restripe the existing inside through lane to an exclusive left-turn lane
- Install advance notification including pavement markings and “Left Lane Must Turn Left” signs (R3-7) prior to the intersection

Westbound Proposed Site Driveway

- Construct one exclusive left-turn lane continuous out of the site
- Construct one exclusive right-turn lane continuous out of the site
- Construct one inbound lane to enter the site

Shell Road/Proposed Site Driveway (Emergency Access)

- Construct a secondary access point along Shell Road along the eastern property line
- Driveway is intended to serve emergency vehicles only and should include the appropriate sign restrictions to designate it as such (i.e., “Authorized Vehicles Only” [R5-11])

Pine Avenue

- Cul-de-sac Pine Avenue approximately 300-feet north of 5th Street while maintaining access to the existing residential homes.

Shell Road

- Cul-de-sac Shell Road approximately 300-feet west of Old Pembroke Road while maintaining all access to the auto repair store located on the southwest corner of the Pembroke Road/Old Aberdeen Road intersection.

2.0 INTRODUCTION

Kimley-Horn was retained to perform a traffic impact analysis (TIA) for a proposed industrial development with up to 700,000 square feet (ft^2) of general light industrial, manufacturing, or general/high cube warehousing space. For purposes of analysis, a build-out date year of 2018 was assumed. One access to the site is proposed through a new signalized intersection along Aberdeen Road located approximately 800 feet south of the Aberdeen Road/Pembroke Avenue intersection. A secondary, emergency access is also proposed along Shell Road near the eastern property line.

The approximate 75-acre site was previously occupied by the Virginia School for the Death, Blind, and Multi-Disabled (VSDBMD). The site is currently zoned R-13 and will be rezoned to support the proposed land uses. In general, the site is bounded by Greenbriar Avenue to the east, Aberdeen Road to the west, Shell Road to the north, and Gloucester Street to the south. **Figure 1** illustrates the site location. Adjacent land uses are a mix between manufacturing to the north, commercial to the northwest, and residential to the south and east. **Figure 2** illustrates the existing zoning in the vicinity of the site.

Based on the project's anticipated daily trip generation potential (less than 5,000 vehicles per day), the proposed development will not require a Chapter 527 TIA (§15.2-2222.1 of the Code of Virginia and the Virginia Traffic Impact Analysis Regulations [24 VAC 30-155]) although the proposed access is located within 3,000 feet of a limited access, VDOT maintained facility (I-664).

This report has been prepared for submittal to the City of Hampton to evaluate existing conditions as well as future traffic conditions that include the proposed development. Assumptions regarding the study area, trip generation, site access, and trip distribution were discussed with City of Hampton Traffic Engineering staff prior to the completion of this analysis.

Operational analyses were conducted under weekday AM and PM peak hour conditions for the following five (5) scenarios:

- 2016 Existing Conditions
- 2018 No Build Conditions – without proposed development
- 2018 Build Conditions – with proposed development
- 2034 No Build Conditions – without proposed development
- 2034 Build Conditions – with proposed development

North

Not To Scale

Legend

- Signalized Intersection

Kimley»Horn	Hampton Industrial TIA Hampton, Virginia	Study Area	FIGURE 1

North

Not To Scale

Source: Hampton GIS

Kimley»Horn	Hampton Industrial TIA Hampton, Virginia	Existing Zoning	FIGURE **2**

3.0 PROJECT BACKGROUND

3.1 Study Area

The study area for this analysis includes the following roadways and intersections as identified during conversations with City of Hampton staff:

Roadways

- Aberdeen Road
- Aluminum Avenue/50th Street
- I-664 Southbound Ramps
- I-664 Northbound Ramps
- Pembroke Avenue
- Old Aberdeen Road
- Shell Road
- Pine Road

Intersections

- Aberdeen Road at Aluminum Avenue/50th Street (signalized)
- Aberdeen Road at I-664 Southbound Ramps (signalized)
- Aberdeen Road at I-664 Northbound Ramps (signalized)
- Aberdeen Road at Pembroke Avenue (signalized)
- Pembroke Avenue at Old Aberdeen Road/Shell Road (signalized)

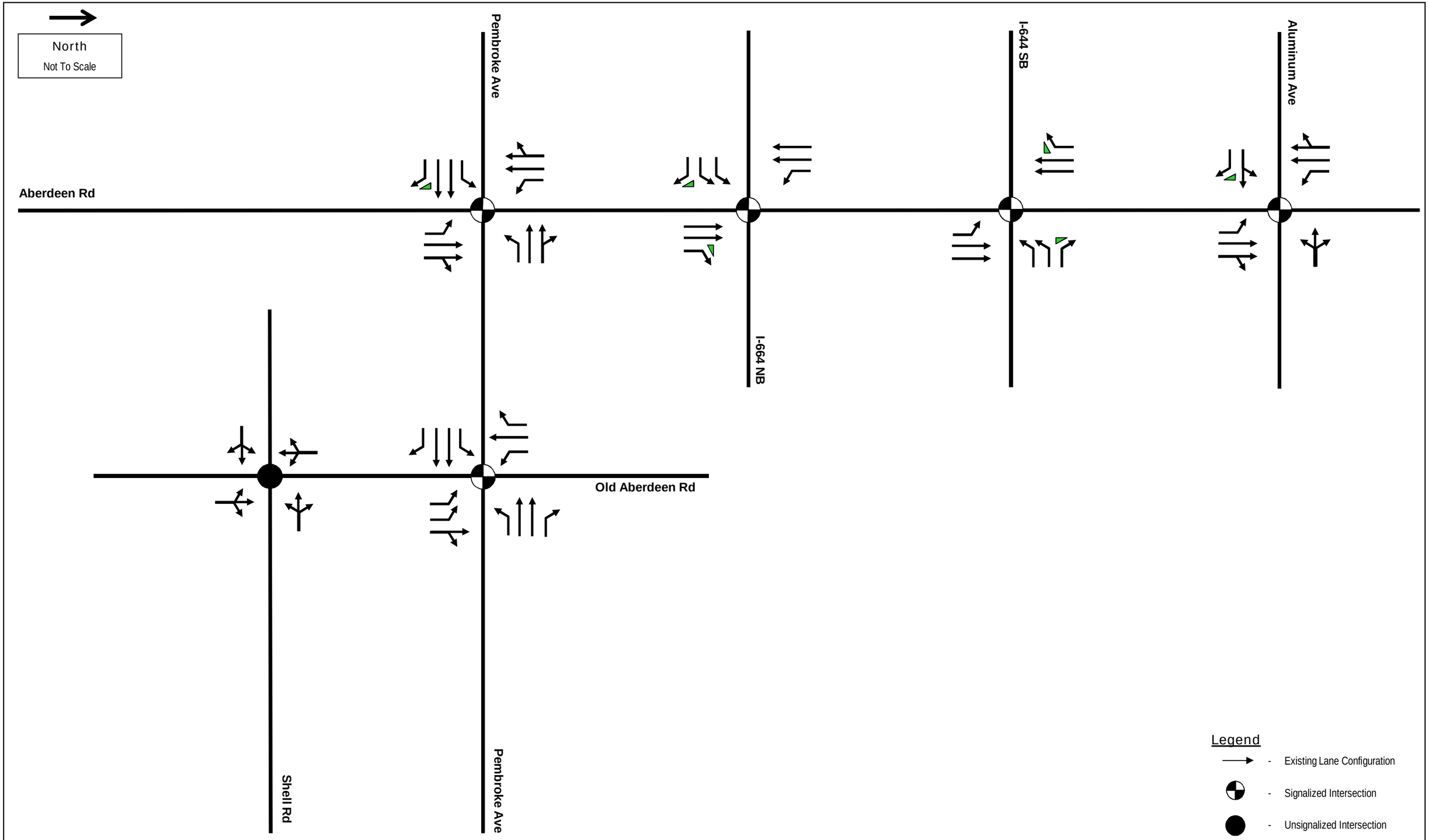
3.2 Existing Land Use and Zoning

The subject approximate 75-acre parcel, which is currently zoned R-13 (One Family Residential), previously occupied the VSDBMD. The total parcel is subdivided into three separate parcels owned partially by the City of Hampton and partially private. Although the buildings remain, the site has been abandoned and currently does not generate traffic. Adjacent land uses are a mix between manufacturing/light industrial to the north and west and residential to the south and east with limited commercial property along Pembroke Avenue.

3.3 Existing Conditions

Aberdeen Road is the primary north-south thoroughfare within the study area, providing connections to Aluminum Avenue/50th Street and Pembroke Avenue as well as northbound and southbound ramps from Interstate 664 (I-664) located north of the study area. **Figure 3** depicts existing roadway lane geometry configurations for study area roadways and intersections. The following provides a short description of existing roadway characteristics of each facility:

- **Aberdeen Road** is a primarily four-lane, divided minor arterial. Aberdeen Road runs in an approximate north/south direction between Todds Lane in Hampton and 27th Street in the southern part of Newport News. Traffic counts collected by the City of Hampton in 2014 indicate that Aberdeen Road carries approximately 11,200 vehicles per day (vpd) between the southern Hampton city line and Pembroke Avenue while traffic counts from 2013 indicate that Aberdeen Road carried 19,600 vpd to the north between Pembroke Avenue to Briarfield Road. The study area intersections of Aberdeen Road with Aluminum Avenue/50th Street, I-664 southbound and northbound ramps, and Pembroke Avenue are signalized. The posted speed limit is 40 miles per hour (mph). It is important to note that Aberdeen Road, south of Pembroke Avenue is designated as a Limited Access facility based on a previous designation prior to the construction of Interstate 664.
- **Aluminum Avenue** is a two-lane, undivided local road within the study area. Aluminum Avenue runs in an approximate east/west direction between the western city line and Aberdeen Road. Aluminum Avenue becomes 50th Street at the intersection at Aberdeen Road. The posted speed limit is 30 mph.
- **50th Street** is a two-lane undivided local road within the study area. 50th Street runs in an approximate east/west direction for a short distance between Aberdeen Road and its end at a local business's driveway.
- **Interstate 664 (I-664)** is a six-lane urban interstate that runs an approximate north/south direction. For the purpose of the analysis, the I-664 ramps will be considered to run east/west. According to 2014 City of Hampton traffic counts, I-664 carries approximately 85,000 vpd east of Aberdeen Road and 81,000 vpd to the west of Aberdeen Road.
- **Pembroke Avenue** is primarily a four-lane, undivided minor arterial. Within the study area, Pembroke Avenue is a divided roadway. Pembroke Avenue runs in an approximate east/west direction between the western city line and across the city to Mallory Street. Traffic counts collected by the City of Hampton in 2013 indicate that it carries approximately 10,000 vpd within the study area. The posted speed limit is 45 mph.
- **Shell Road** is a two-lane, local collector along the northern limits of the site. Shell Road parallels Pembroke Avenue and provides secondary access to the residential area bordering the study area. To the west of the site, Shell Road becomes Pine Road and continues south.
- **Pine Avenue** is a two-lane, local collector along the northern limits of the site. Pine Avenue previously served as the southern access to the school due to the limited access designation of Aberdeen Road and lack of a primary intersection for the school.



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2016 Existing Roadway Lane Configurations

FIGURE
3

3.4 Existing Traffic

Weekday AM and PM peak hour turning movement counts (TMCs) were collected by Peggy Malone & Associates, Inc. at the following study intersections:

- Aberdeen Road/Aluminum Avenue/50th Street – Tuesday, June 7, 2016
- Aberdeen Road/I-664 Southbound Ramps – Tuesday, June 7, 2016
- Aberdeen Road/I-664 Northbound Ramps – Tuesday, June 7, 2016
- Aberdeen Road/Pembroke Avenue – Tuesday, June 7, 2016
- Pembroke Avenue/Old Aberdeen Road/Shell Road – Tuesday, June 7, 2016

Existing AM and PM peak hour turning movement volumes are shown in **Figure 4.** Peak hours were generated using the four highest consecutive 15-minute intervals during the peak periods. The peak hours for each peak period and intersection are as follows.

- **Aberdeen Road/Aluminum Avenue/50th Street:** 6:45-7:45 AM (AM Peak); 3:30-4:30 PM (PM Peak)
- **Aberdeen Road/I-664 Southbound Ramps:** 6:45-7:45 AM (AM Peak); 3:30-4:30 PM (PM Peak)
- **Aberdeen Road/I-664 Northbound Ramps:** 8:15-9:15 AM (AM Peak); 3:45-4:45 PM (PM Peak)
- **Aberdeen Road/Pembroke Avenue:** 8:00-9:00 AM (AM Peak); 3:30-4:30 PM (PM Peak)
- **Pembroke Avenue/Old Aberdeen Road/Shell Road:** 7:45-8:45 AM (AM Peak); 3:45-4:45 PM (PM Peak)

3.5 Existing Bicycle, Pedestrian, and Transit Facilities

In the vicinity of the project site, pedestrian, bicycle and transit facilities do not exist. Sidewalks are not present along Aberdeen Road or Pembroke Avenue. Field observations confirmed that little to no pedestrian activity occurs in this area. However, an existing heavy rail line parallels Pembroke Avenue, located approximately 30 feet to the north. The rail line has at-grade crossings at the intersections of Pembroke Avenue/Old Aberdeen Road/Shell Road and Aberdeen Road/Pembroke Avenue. During train events, each of the signalized intersections are pre-empted.

North
Not To Scale

Aberdeen Rd

Old Aberdeen Rd

Pembroke Ave

I-664 NB

I-644 SB

Aluminum Ave

Shell Rd

Pembroke Ave

(108) 43
(436) 154
(74) 22

52 (67)
215 (359)
147 (253)

(250) 162
(83) 26

374 (623)
175 (302)

232 (191)
369 (747)

(73) 22
(4) 8
(257) 107

64 (25)
479 (636)
11 (19)

(43) 26
(336) 328
(21) 24

20 (23)
125 (194)
193 (199)

(510) 393
(130) 161

(53) 56
(720) 482

105 (162)
460 (222)

(91) 186
(803) 744
(46) 15

10 (26)
2 (2)
12 (37)

(15) 16
(2) 1
(0) 0

15 (22)
1 (0)
53 (129)

(17) 14
(558) 251
(143) 70

25 (15)
1 (0)
8 (2)

(0) 0
(8) 1
(0) 0

0 3 (12) 31 (63)
(0)

(76) 42
(0) 0
(10) 11

5 258 (325) 9 (5)
(11)

Legend

- Existing Lane Configuration
- Signalized Intersection
- Unsignalized Intersection
XX (XX) - AM (PM) Peak Hour Volume

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2016 Existing Peak Hour
Traffic Volumes

FIGURE
4

4.0 TRIP GENERATION

A trip generation analysis was completed to evaluate the traffic impacts due to the proposed industrial site. The trip generation rate used from the *Trip Generation Manual*, published by the Institute of Transportation Engineers [ITE], 9th Edition, 2012. Specific occupants have not been identified at this time. Therefore, as agreed upon with the City of Hampton, the ITE "Manufacturing" land use code was selected to provide a conservative estimate of both daily and peak hour trips for an industrial-type development. AM and PM peak hours reflect the peak hour of the adjacent street. Pass-by reductions were not assumed for this development. **Table 1** provides the trip generation information.

Table 1—Trip Generation—Manufacturing (ITE)

ITE Land Use Description	ITE Code	Size	Unit	Projected Trips						
				Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
Manufacturing	140	700	1000 SF	2,696	551	430	121	530	191	339

5.0 TRAFFIC DISTRIBUTION AND TRIP ASSIGNMENT

Traffic Distribution

The directional distribution and assignment of trips generated by the proposed redevelopment is based on a review of existing traffic volumes and an understanding of travel patterns within the study area. Considering that existing access to the site is limited to one site driveway along Aberdeen Road, a review of turning movement count data at intersections along Aberdeen Road during the AM and PM peak hours was conducted to determine the origin and destination of site trips. From this review, the following traffic distributions were derived and approved by the City of Hampton staff to be applied to the analysis of the study area:

- 20% to/from the north on Aberdeen Road
- 5% to/from the south on Aberdeen Road
- 5% to/from the west on Aluminum Avenue
- 25% to/from the east on I-664 SB
- 25% to/from the west on I-664 NB
- 15% to/from the west on Pembroke Avenue
- 5% to/from the east on Pembroke Avenue

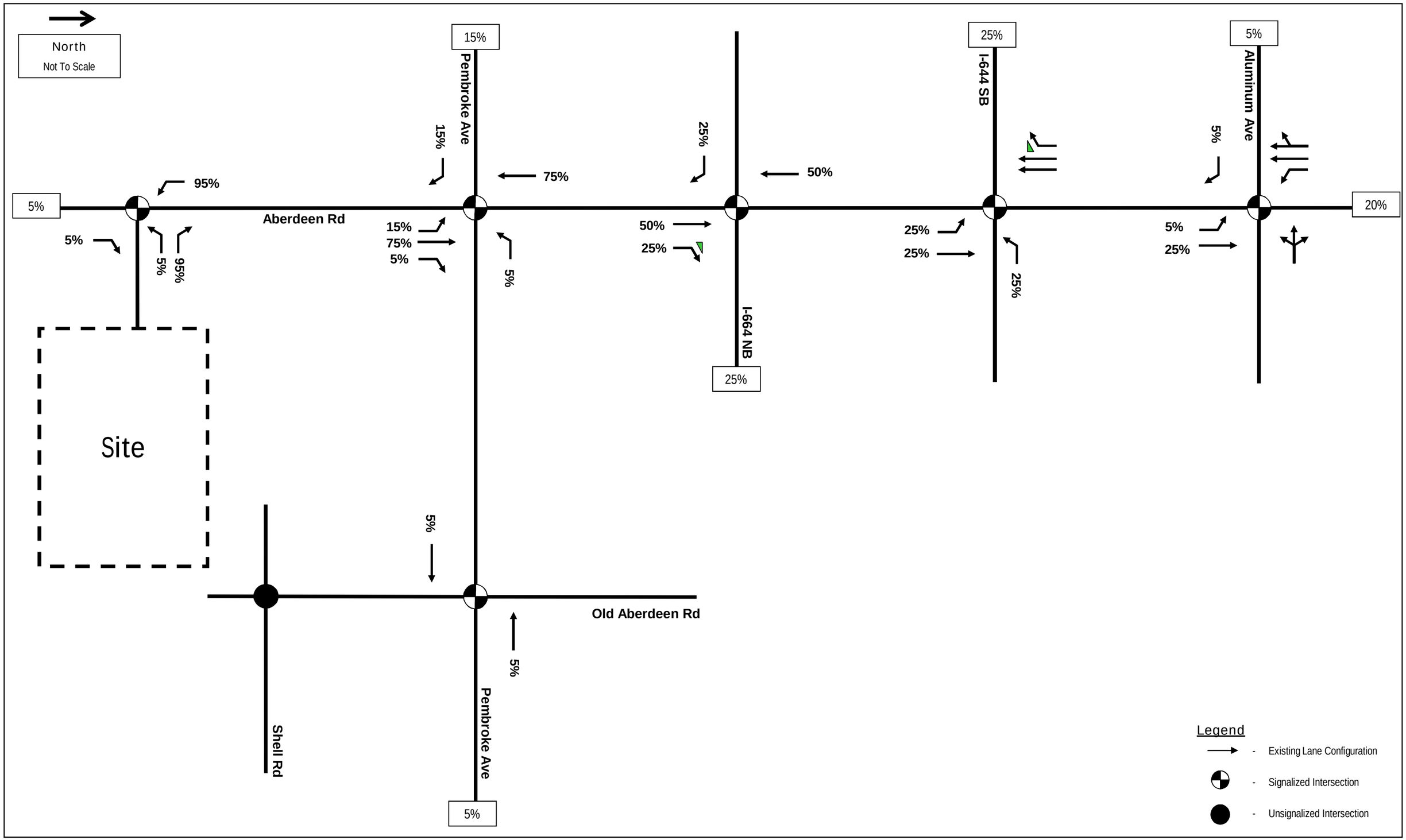
Figure 5 shows the detailed trip distribution throughout the study area.

Traffic Assignment

Aberdeen Road will be the primary corridor providing access to the development. The driveway on Aberdeen Road, south of Pembroke Avenue, will provide full movement access to the site.

Traffic associated with the proposed development is expected to come primarily from the north on Aberdeen Road. Half of the site trips are assigned to and from I-664.

Shell Road and Pine Avenue will be reconstructed to cul-de-sac. All existing access locations currently being served by these roads will remain; however, the existing connection through the site will be removed to limit the mixture of heavy vehicle traffic and passenger vehicles. As a result, existing traffic volume that would normally use this access was redistributed for the build scenarios of 2018 and 2034.



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Site Trip Distribution

FIGURE
5

6.0 PROJECTED TRAFFIC VOLUMES

6.1 Background Traffic Growth

Background traffic growth represents the increase in traffic volumes due to usage increases and non-specific land development growth in the vicinity of the proposed project. One method to establish growth rates is through review of historical traffic volumes along roadways within the study area. Historical volumes along study area roadways were reviewed using available traffic data through the VDOT website which suggests no growth over the five-year period reviewed. Additionally, 2009 and 2034 volumes were extracted from the Hampton Roads Regional Traffic Demand Forecasting Model as shown in **Table 2**.

Table 2—Historic Traffic Counts

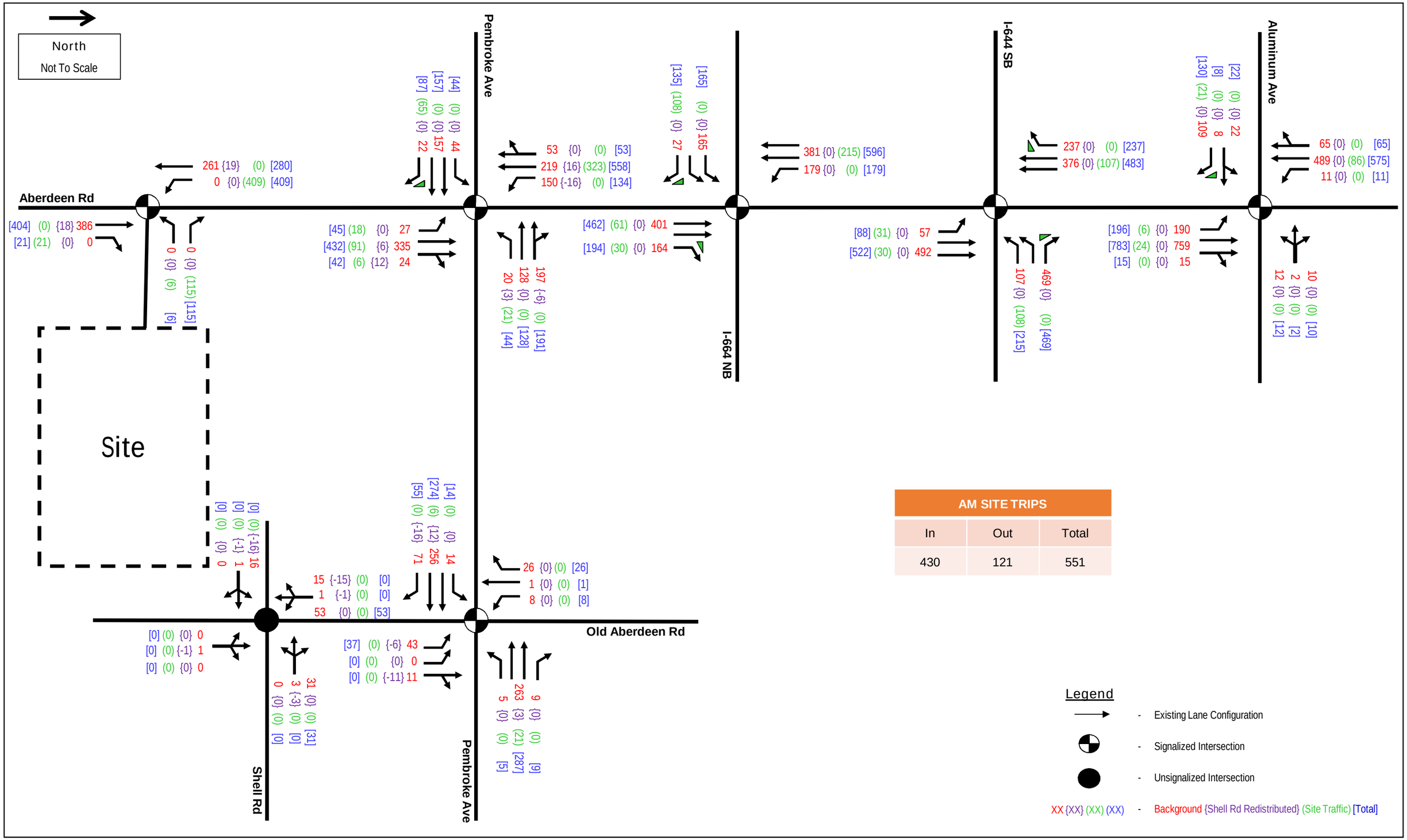
Roadway Segment			Hampton Roads Model			VDOT HISTORICAL DATA				
Name	From	To	2009 Base ADT	2034 Future ADT	Growth Rate	2011 ADT	2012 ADT	2013 ADT	2014 ADT	2015 ADT
Aberdeen Rd	N of Aluminum Ave	Aluminum Ave	13,900	21,500	2.19%	18,000	18,000	18,000	18,000	18,000
Aberdeen Rd	Aluminum Ave	N of I-664	13,600	20,800	2.12%					
Aberdeen Rd	S of I-664	Pembroke Ave	12,600	15,600	0.95%	11,000	10,000	11,000	10,000	11,000
Aberdeen Rd	Pembroke Ave	27th St	9,600	10,800	0.50%					
Pembroke Ave	Greenlawn	Aberdeen Rd	8,900	8,400	-0.22%	9,200	9,000	7,500	7,300	7,400
Pembroke Ave	Aberdeen Rd	Old Aberdeen Rd	10,800	11,400	0.22%			9,200	8,900	9,100
Pembroke Ave	Old Aberdeen Rd	E of Old Aberdeen Rd	5,700	5,900	0.14%					

After review of the available data and based on the location of the development being constructed in mostly built-out area, a one percent (1%) annualized growth rate is proposed for all turning movements at study area intersections. This growth rate results in a 19.6% increase in overall background traffic growth. Background traffic growth was applied all turning movements at the study intersections.

6.2 Total Traffic

To obtain 2018 and 2034 build traffic volumes, existing (2016) traffic volumes were incrementally grown using the aforementioned annual growth rate. The 2018 future No Build traffic volumes are illustrated in **Figures 6 and 7** as the "background" volume while the 2034 future No Build traffic volumes are illustrated in **Figure 8 and 9** as the "background" volume.

Once the background traffic volumes were established, traffic associated with the proposed development was added to develop total (build) traffic volumes for 2018 and 2034. In addition to the site trips, the redistributed volumes from Shell Road were distributed across the network. **Figures 6 and 7** illustrate future turning movement volumes for the AM and PM peak hours of 2018 including no build, site trips, and build conditions, respectively while **Figures 8 and 9** illustrate turning movements for the AM and PM peak hours of 2034 including no build, site trips, and build conditions, respectively.



AM SITE TRIPS		
In	Out	Total
430	121	551

Legend

- Existing Lane Configuration
- Signalized Intersection
- Unsignalized Intersection
- XX {XX} (XX) (XX) - Background {Shell Rd Redistributed} (Site Traffic) [Total]

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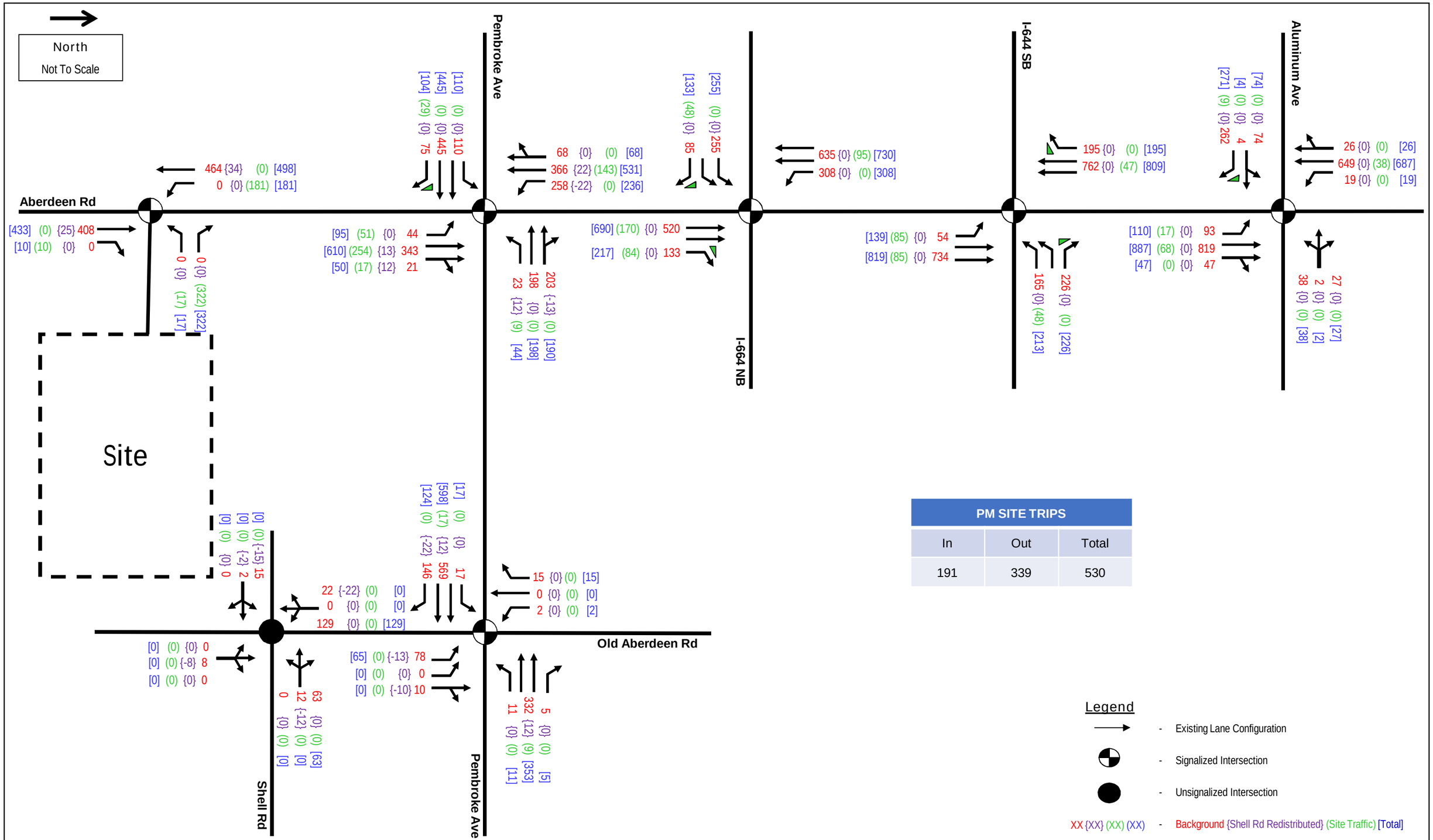
2018 Weekday
AM Peak Hour Traffic Volumes

FIGURE
6



PM SITE TRIPS		
In	Out	Total
191	339	530

Legend

- Existing Lane Configuration
- Signalized Intersection
- Unsignalized Intersection

XX {XX} (XX) (XX) - Background {Shell Rd Redistributed} (Site Traffic) [Total]

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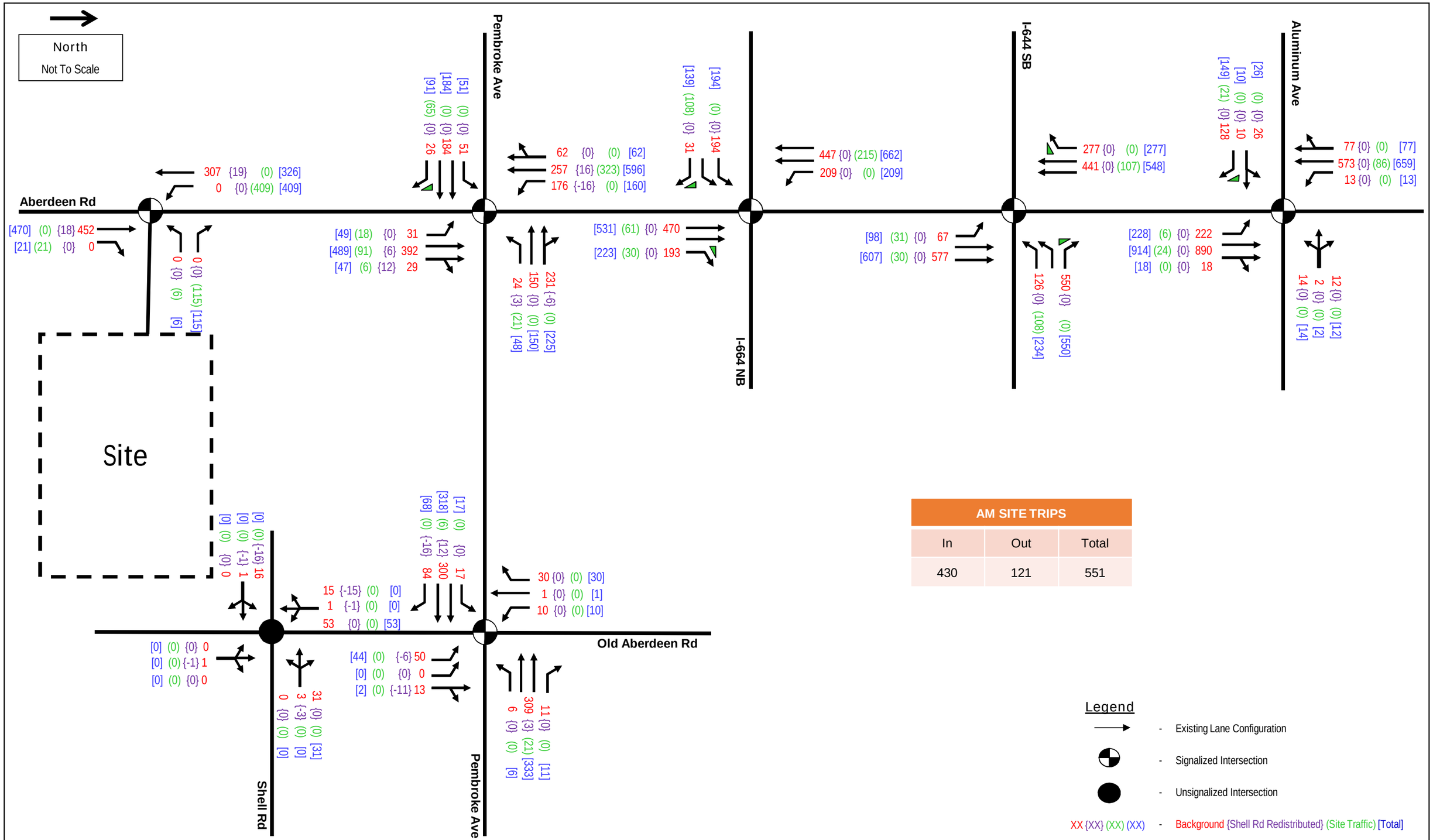
2018 Weekday
PM Peak Hour Traffic Volumes

FIGURE
7



AM SITE TRIPS		
In	Out	Total
430	121	551

Legend

- Existing Lane Configuration
- Signalized Intersection
- Unsignalized Intersection
- XX {XX} (XX) (XX) - Background {Shell Rd Redistributed} (Site Traffic) [Total]

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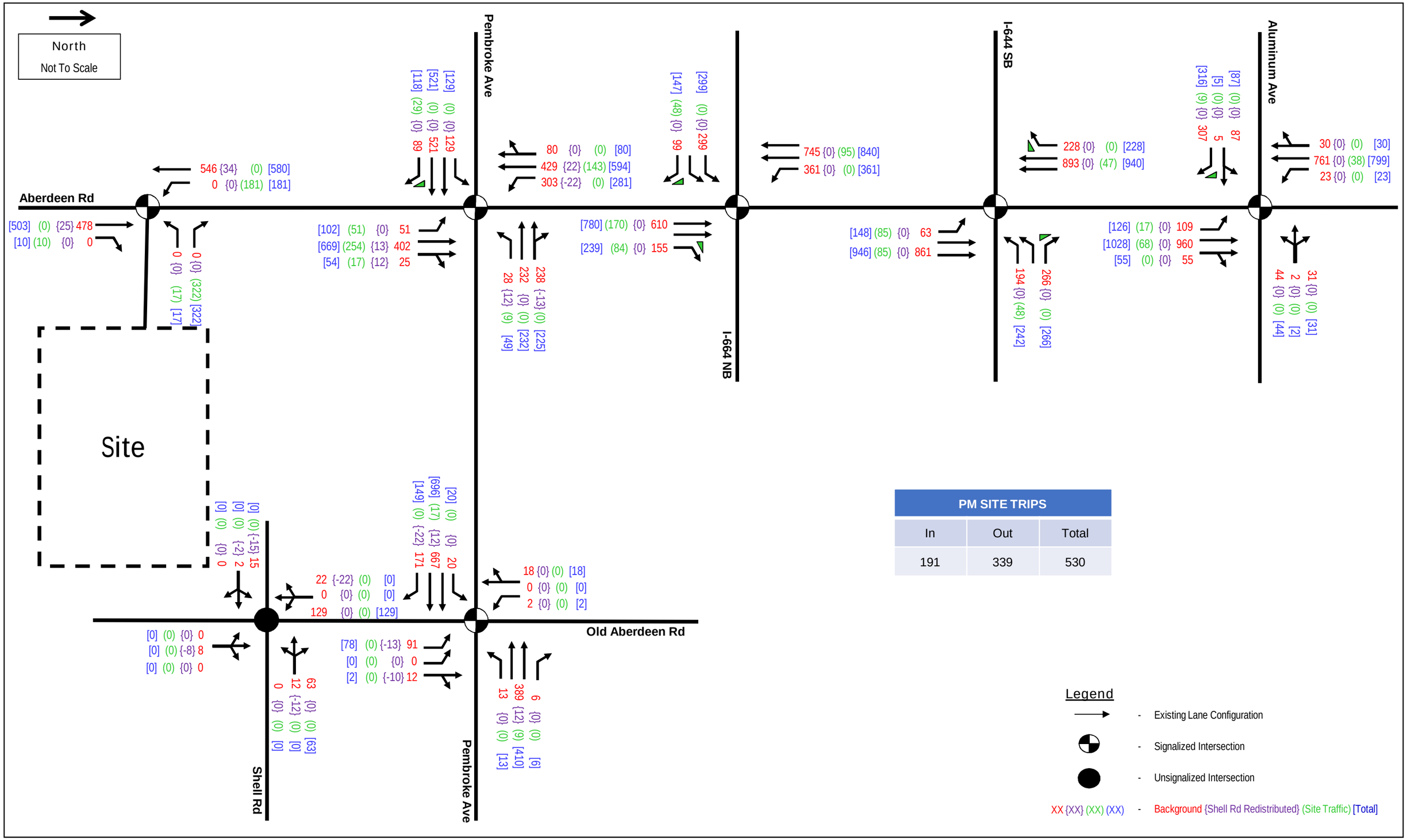
2034 Weekday
AM Peak Hour Traffic Volumes

FIGURE
8



PM SITE TRIPS		
In	Out	Total
191	339	530

Legend

- Existing Lane Configuration
- Signalized Intersection
- Unsignalized Intersection
- XX {XX} (XX) (XX) - Background {Shell Rd Redistributed} (Site Traffic) [Total]

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Hampton Industrial Traffic Impact Analysis
Hampton, VA

2034 Weekday
PM Peak Hour Traffic Volumes

FIGURE
9

7.0 TURN LANE WARRANT ANALYSIS

Turn lane warrant evaluations were conducted at Aberdeen Road and Driveway #1 entrance using analysis methodologies set forth in the *VDOT Governance Document Road Design Manual*, Appendix F. This methodology is used by VDOT and the City of Hampton for assisting in the determination of whether an exclusive turn-lane should be considered.

Turn lane warrant analyses were conducted under 2034 design year conditions. When warranted, Appendix F of the *Road Design Manual* was used to determine the recommended storage and taper lengths for the turn lanes. Detailed summaries of the turn lane warrant worksheets are included in **Appendix C.**

Based on the right-turn lane warrant analysis, a northbound right-turn lane at Driveway #1 was not warranted. Similarly, a taper for the northbound right-turn movement was not warranted at Driveway #1.

With regards to the left-turn analysis, Driveway #1 warrants a southbound left-turn lane with a storage length of at least 550 feet. Based on the configuration of Aberdeen Road and the inside lane drop located just to the south of the proposed driveway, it is recommended to convert the inside through lane to a continuous left-turn lane back to Pembroke Avenue.

8.0 SIGNAL WARRANT ANALYSIS

Traffic signal warrant evaluations were conducted at the intersection of Aberdeen Road and Driveway #1 of the proposed site using the analysis methodologies set forth in the Manual on Uniform Traffic Control Devices, 2009 Edition (MUTCD).

The MUTCD describes nine warrants providing guidance on justification of traffic signal consideration. Warrant 1 (Eight-Hour Vehicular Volume), Warrant 2 (Four-Hour Vehicular Volume), and Warrant 3 (Peak Hour) were evaluated in this study. Warrant 1 consists of three conditions, as shown in **Table 3**.

Table 3—MUTCD Warrant 1 Conditions

Warrant 1	Eight-Hour Vehicular Volume
Condition A	*Minimum Vehicular Volume*
Condition B	*Interruption of Continuous Traffic*
Combination	*Combination of Condition A and Condition B*

The existing volumes for each hour on the major street approaches all met the given thresholds; therefore, warrant evaluations were performed for the 2034 Build scenarios only. For the warrant analysis, 12-hour traffic volumes for the minor side street were determined by multiplying projected 2034 peak hour trips by hourly ratios determined as follows. For each of the 12 hours, the ratios were derived by dividing each of the existing hourly volumes obtained from the ADT counts by the overall volume of the 12 hours. From here, the AM and PM peak hour volumes were subtracted from the total daily site trips with the remaining volume being distributed throughout the 10 off-peak hours of the development using the calculated ratio. To determine the vehicles that traveled into and out of the site, a percentage of the "Total Site Trips per Hour" was calculated to provide the given volumes per hour. The AM and PM peak

hour volumes were held constant to be consistent with the trip generation. From 8:30 AM – 10:30 AM, the assumption was that 80% of vehicles entered the site while 20% exited the site. Between 11:30 AM – 3:30 PM, 50% of the volume entered and exited during this time. Lastly, between 4:30 PM – 8:30 PM, the assumption was that 40% of the vehicles entered the site and the remaining 60% exited the site. **Table 4** below summarizes these calculations.

Table 4—Signal Warrant Methodology

Time			Major St		Minor St		
			Volume of Both Approaches	Ratio of Total Volume per Hour	Total Site Trips per Hour	Site Trips	
Start	To	Finish				Entering	Exiting
07:30 AM	To	08:30 AM	629	0.077	551	430	121
08:30 AM	To	09:30 AM	574	0.070	113	90	23
09:30 AM	To	10:30 AM	544	0.066	107	86	21
11:30 AM	To	12:30 PM	581	0.071	115	58	57
12:30 PM	To	01:30 PM	605	0.074	120	60	60
01:30 PM	To	02:30 PM	649	0.079	128	64	64
02:30 PM	To	03:30 PM	739	0.090	145	73	72
03:30 PM	To	04:30 PM	856	0.105	530	191	339
04:30 PM	To	05:30 PM	777	0.095	153	61	92
05:30 PM	To	06:30 PM	774	0.095	153	61	92
06:30 PM	To	07:30 PM	737	0.090	145	58	87
07:30 PM	To	08:30 PM	720	0.088	142	57	85

Based on these calculations, the number of trips entering the site were added into the Major Street volumes for their corresponding hours in the Signal Warrant spreadsheet. Also, the number of trips exiting the site were the values used for the Minor Street Approach in the Signal Warrant Spreadsheet. **Table 5** summarizes the results from the traffic signal warrant analysis, while detailed traffic signal warrant worksheets are included in **Appendix D**. As shown, no signal warrants are met based on the aforementioned methodology; however, Warrant 1B meets seven of the eight volume thresholds with the eighth hour within 10 vehicle trips from meeting the warrant.

Table 5—Signal Warrant Results

Condition	Warrant 1A (Met/Needed)	Warrant 1B *(Met/Needed)*	Warrant 1 Combination *(Met/Needed)*	Warrant 2 *(Met/Needed)*	Warrant 3 *(Met/Needed)*
2034	Not Met *(1/8)*	Not Met *(7/8)*	Not Met *(2/8, 10/8)*	Not Met *(3/4)*	Met *(1/1)*

In addition to traffic signal warrants, it is important to note the proposed development will generate a high percentage of heavy vehicle traffic at this intersection. The volume thresholds described above do not consider heavy vehicles and is based only on passenger vehicles. Therefore, installation of a traffic signal should be further considered based on user type beyond just the signal warrant results alone.

9.0 TRAFFIC ANALYSIS

9.1 Operational Analysis Methodology

The existing conditions analysis evaluated existing intersection operations based on current intersection control (e.g., signalized or stop-controlled); lane geometry; and peak hour traffic volumes with peak hour factors and heavy vehicle percentages. Existing phase sequence and signal timing data (i.e., cycle lengths, splits and offsets) were obtained from the City of Hampton via provided Synchro files.

Operational analyses were completed using *Synchro Professional 9.0*, which uses methodologies contained in the 2000 and 2010 Highway Capacity Manual (HCM) [TRB Special Report 209, 2000]. All analyses evaluated vehicle delay. For this analysis, the 2000 HCM module was used due to detector settings in the existing Synchro networks resulting in the inability to perform the analysis with 2010 HCM methodologies.

The following assumptions were made for the future No Build and Build analyses of years 2018 and 2034:

- A minimum peak hour factor of 0.92 was assumed for each movement. When the existing peak hour factor was greater than 0.92, the existing peak hour factor was maintained.
- Existing lane configurations were maintained for 2018 and 2034 with the exception of the build conditions at Aberdeen Road and Driveway #1.
- Cycle lengths were increased to from 80 seconds to 90 seconds at each signalized intersection during the 2018 and 203 No Build/Build scenarios for both the AM and PM peak hour.
- Minor changes to splits and offsets were made to accommodate the background and additional site development traffic in the future scenarios.
- In the 2018 and 2034 Build scenarios, at the intersection of Aberdeen Road and Driveway #1, the westbound right-turn movement will overlap with the southbound left-turn movement.
- In the 2018 and 2034 Build scenarios, at the intersection of Aberdeen Road and Driveway #1, the proposed site volumes assumed 30-percent heavy vehicles for each movement.

Level of service (LOS) describes traffic conditions—the amount of traffic congestion—at an intersection or on a roadway. LOS ranges from A to F—A indicating a condition of little or no congestion and F a condition with severe congestion, unstable traffic flow, and stop-and-go conditions. For intersections, LOS is based on the average delay experienced by all traffic using the intersection during the busiest 15-minute peak period. LOS A through D is generally considered acceptable.

Table 6 highlights LOS thresholds of delay provided in the 2000 HCM for signalized and unsignalized intersections.

Table 6—Intersection LOS and Ranges of Delay

LOS	Average Stopped Delay (seconds/vehicle)		Description of Traffic Conditions
	Signalized	Unsignalized	
A	≤ 10.0	≤ 10.0	Very low delay, progression is extremely favorable; most vehicles arrive during green phase.
B	> 10.0 to 20.0	> 10.0 to 15.0	Generally good progression, low delays, more vehicles must stop at intersection red phases.
C	> 20.0 to 35.0	> 15.0 to 25.0	Fair progression, increasing number of vehicles must stop; signal cycle fails to process all traffic.
D	> 35.0 to 55.0	> 25.0 to 35.0	Traffic congestion more noticeable, increasing cycle failures, unfavorable progression and longer delays.
E	> 55.0 to 80.0	> 35.0 to 50.0	Poor progression, generally high v/c ratios, frequent cycle failures, intersection traffic approaching capacity.
F	≥ 80.0	≥ 50.0	Unacceptable conditions, arrival flow exceeds intersection capacity, many cycle failures, poor progression, and high delays.

9.2 Operational Analysis Results

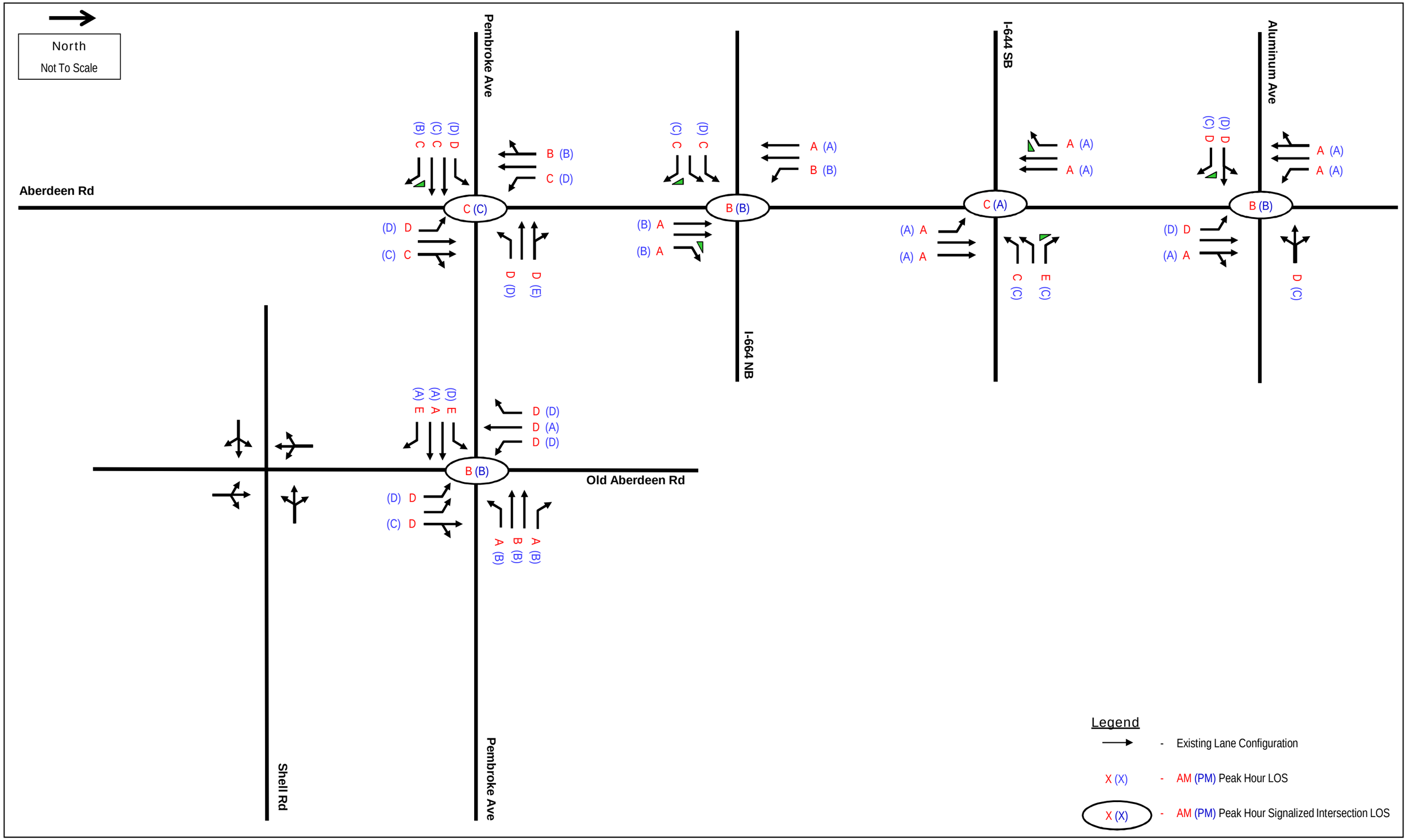
Capacity analyses for signalized intersections in the weekday AM and weekday PM peak hours were performed for the following scenarios:

- 2016 Existing Conditions
- 2018 No Build (background traffic growth)
- 2018 Build (background traffic growth and proposed site trips)
- 2034 No Build (background traffic growth)
- 2034 Build (background traffic growth and proposed site trips)

Given the existing coordinated settings, cycle lengths, splits, and offsets were maintained in the existing scenario. In the future No Build and Build scenarios, minor adjustments were made to splits, and offsets to reflect an optimized timing scenario for the coordinated signal system. The results are presented in the following summary tables per intersection and on figures as follows:

- **Figure 10** – 2016 Existing Level of Service
- **Figure 11** – 2018 No Build Level of Service
- **Figure 12** – 2018 Build Level of Service
- **Figure 13** – 2034 No Build Level of Service
- **Figure 14** – 2034 Build Level of Service

Supporting calculations are presented in the **Appendix**.

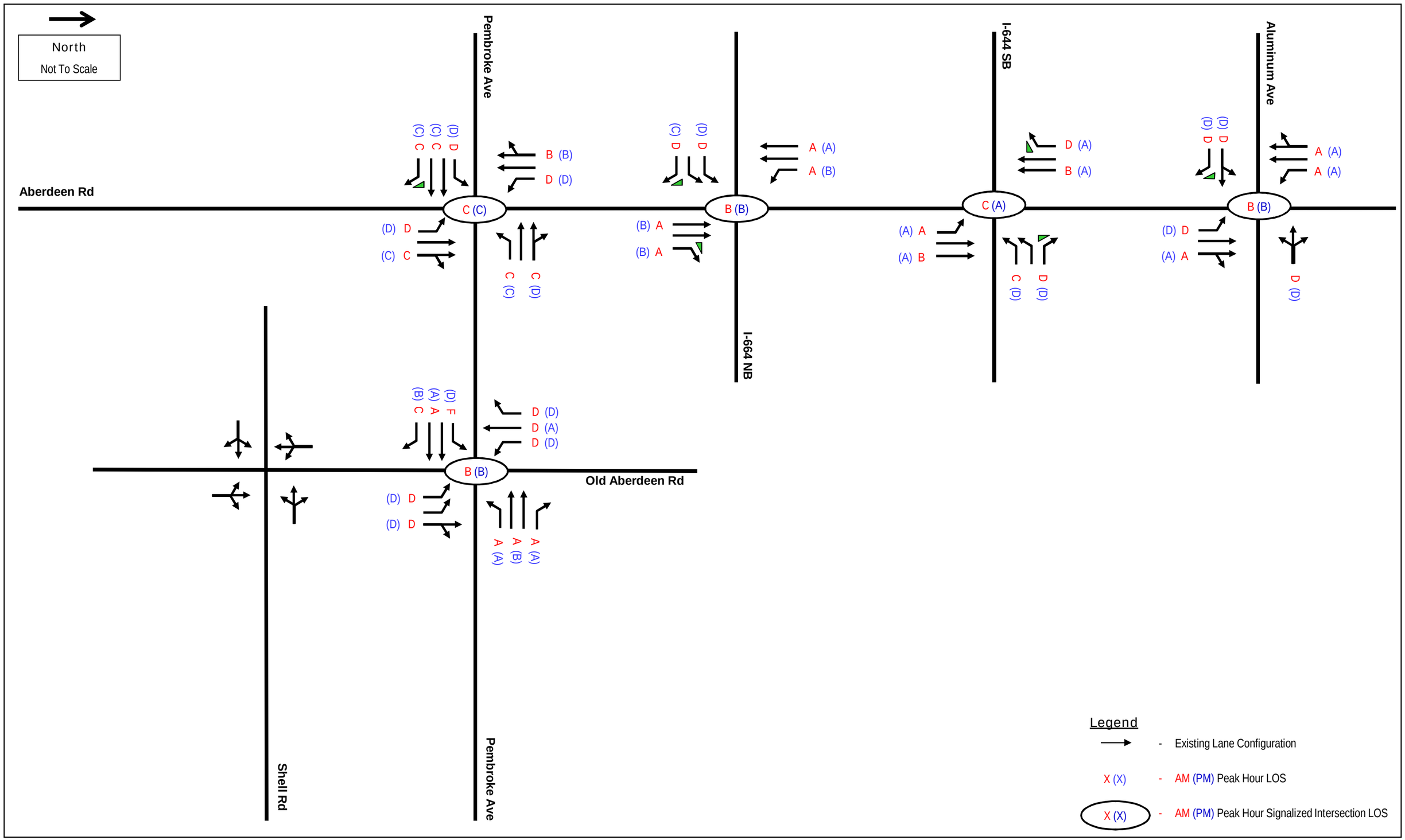


Kimley»Horn

Hampton Industrial Traffic Impact Analysis
Hampton, VA

2016 Existing Peak Hour
Level of Service

FIGURE
10

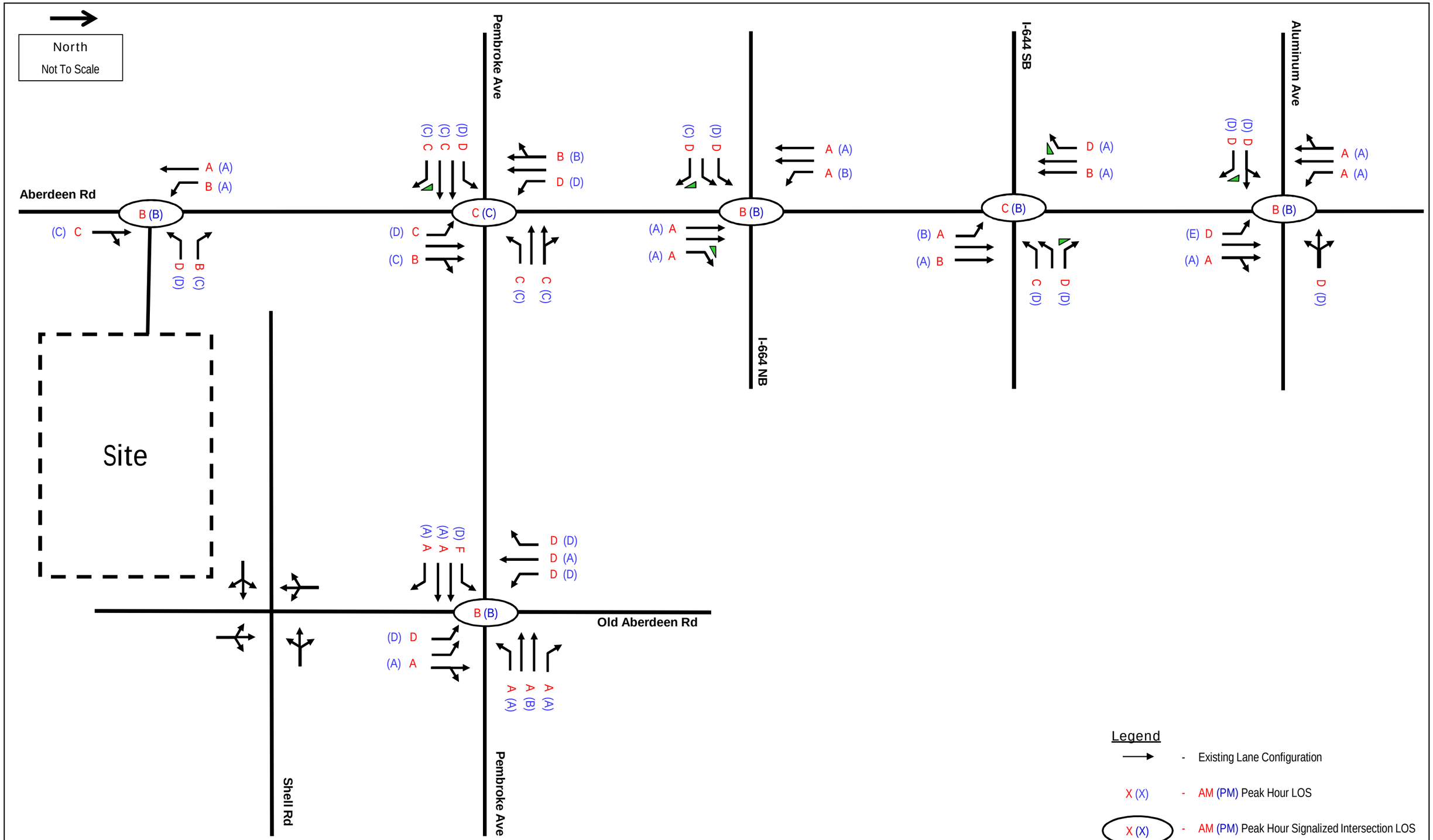


Kimley»Horn

Hampton Industrial Traffic Impact Analysis
Hampton, VA

2018 No Build Peak Hour
Level of Service

FIGURE
11

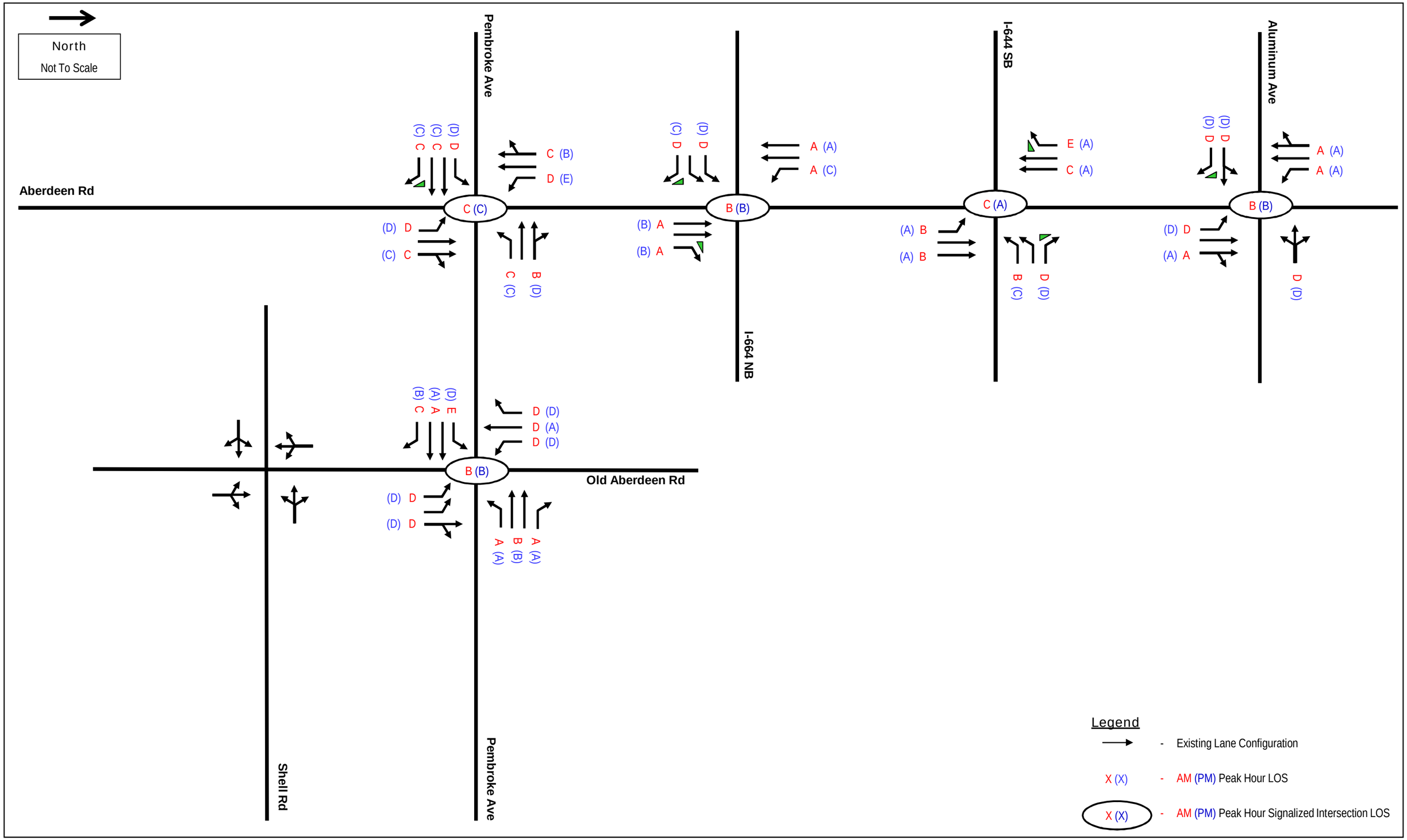


Kimley»Horn

Hampton Industrial Traffic Impact Analysis
Hampton, VA

2018 Build Peak Hour
Level of Service

FIGURE
12

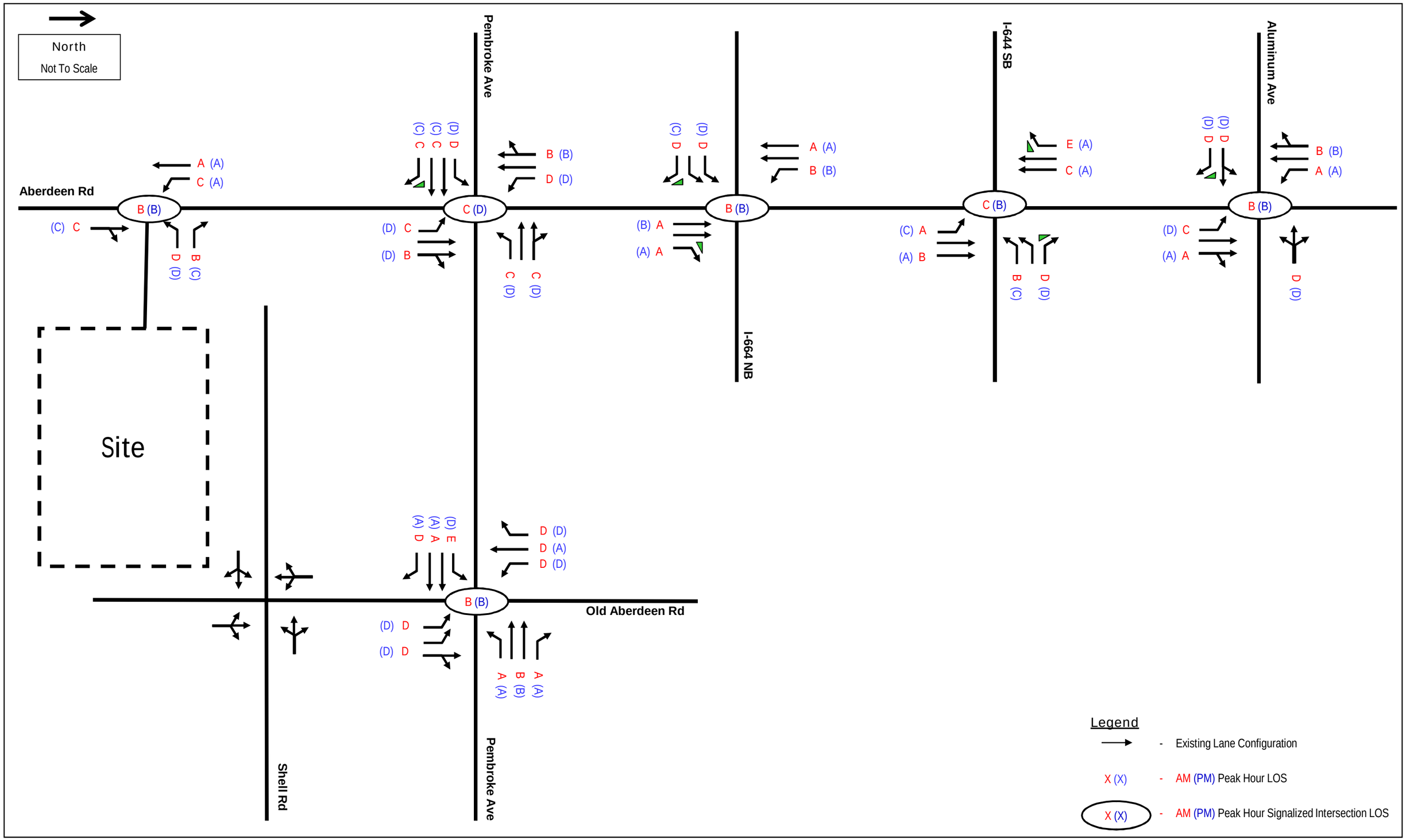


Kimley»Horn

Hampton Industrial Traffic Impact Analysis
Hampton, VA

2034 No Build Peak Hour
Level of Service

FIGURE
13



Kimley»Horn

Hampton Industrial Traffic Impact Analysis
Hampton, VA

2034 Build Peak Hour
Level of Service

FIGURE
14

9.3 Aberdeen Road/Aluminum Avenue/50th Street

This signalized intersection currently provides the following lane configurations:

- Aberdeen Road (northbound)—one exclusive left-turn lane, one exclusive through lane, and one shared through and right-turn lane
- Aberdeen Road (southbound)—one exclusive left-turn lane, one exclusive through lane, and one shared through and right-turn lane
- Aluminum Avenue (eastbound)—one shared through and left-turn lane and one exclusive channelized right-turn lane
- 50th Street (westbound)—one shared left-turn, through, and right-turn lane

Under existing conditions, this intersection functions at an overall LOS B during both the AM and PM peak hour.

With the increment of background growth and traffic associated with the proposed industrial site, the intersection is anticipated to continue to function at the same LOS during each peak hour. One movement to note is the northbound left as it experiences a slight increase in delay resulting in a LOS E during the 2018 Build PM peak hour; however, it functions at LOS D during the 2034 Build PM peak hour. This increase in delay is likely attributable to the arrival of the northbound platoon and is not anticipated to create adverse effects on the study area roadway.

Overall LOS remains essentially unchanged at the intersection when comparing existing with future conditions. **Table 7** shows level of service and delay for the intersection under 2016 Existing conditions, 2018 No Build and Build conditions, and 2034 No Build and Build conditions.

Table 7—Aberdeen Road/Aluminum Avenue/50th Street Intersection LOS

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)						
		Aluminum Avenue		50th Street	Aberdeen Road			
		Eastbound		Westbound	Northbound		Southbound	
		LT / TH	RT	LT / TH / RT	LT	TH / RT	LT	TH / RT
AM Peak Hour								
2016 Existing	B (11.3)	D (39.4)	D (35.2)	D (38.5)	D (36.3)	A (2.5)	A (5.0)	A (6.2)
		D (36.1)		D (38.5)	A (9.1)		A (6.2)	
2018 No Build	B (12.3)	D (39.5)	D (37.5)	D (38.7)	D (40.8)	A (4.4)	A (4.3)	A (6.0)
		D (37.9)		D (38.7)	B (11.6)		A (6.0)	
2018 Build	B (12.4)	D (39.2)	D (37.5)	D (38.5)	D (35.7)	A (4.5)	A (5.5)	A (7.8)
		D (37.8)		D (38.5)	B (10.6)		A (7.7)	
2034 No Build	B (13.1)	D (39.5)	D (37.3)	D (38.6)	D (38.9)	A (4.5)	A (6.6)	A (9.2)
		D (37.8)		D (38.6)	B (11.2)		A (9.2)	
2034 Build	B (13.3)	D (39.3)	D (37.2)	D (38.3)	C (34.4)	A (4.5)	A (7.7)	B (10.9)
		D (37.6)		D (38.3)	B (10.3)		B (10.9)	
PM Peak Hour								
2016 Existing	B (15.5)	D (47.5)	C (31.6)	C (31.9)	D (40.8)	A (6.2)	A (6.0)	A (8.2)
		D (35.2)		C (31.9)	A (9.5)		A (8.1)	
2018 No Build	B (14.4)	D (38.3)	D (35.4)	D (36.5)	D (45.8)	A (4.9)	A (6.1)	A (9.3)
		D (36.0)		D (36.5)	A (8.9)		A (9.3)	
2018 Build	B (13.6)	D (38.3)	D (35.4)	D (36.5)	E (61.3)	A (1.0)	A (6.6)	A (9.5)
		D (36.0)		D (36.5)	A (7.4)		A (9.4)	
2034 No Build	B (15.4)	D (40.0)	D (35.2)	D (36.4)	D (49.1)	A (4.9)	A (8.0)	B (11.6)
		D (36.3)		D (36.4)	A (9.2)		B (11.5)	
2034 Build	B (14.4)	D (40.0)	D (35.2)	D (36.4)	D (51.2)	A (1.3)	A (9.2)	B (13.0)
		D (36.3)		D (36.4)	A (6.5)		B (12.9)	

Source: Kimley-Horn and Associates, Inc.

Detailed level of service calculations are provided in the **Appendix B**.

9.4 Aberdeen Road/I-664 Southbound Ramps

This signalized intersection currently provides the following lane configurations:

- Aberdeen Road (northbound)—one exclusive left-turn lane and two exclusive through lanes
- Aberdeen Road (southbound)—two exclusive through lanes and one exclusive channelized right-turn lane
- I-664 Southbound Ramp (westbound)—two exclusive left-turn lanes and one exclusive channelized right-turn lane

Under existing conditions, this intersection functions at LOS C during the AM peak hour and LOS A during the PM peak Hour. During existing conditions, the right turn movement off of the I-664 southbound ramp functions at a LOS E. With signal timing modifications in the future scenarios, this movement will improve.

With the increment of background growth and traffic associated with the proposed industrial site, the intersection is anticipated to continue to function at the same LOS during the AM peak hour while the PM peak will slightly fluctuate between LOS A and LOS B for the future No Build and Build scenarios. Correspondingly due to the background growth, the southbound right-turn movement increases from a LOS D to LOS E in the future 2034 No Build and Build scenarios. This increase is due to the HCM calculation based on the platoon arrival. The 95th percentile queuing was reviewed at this location and there were not any vehicles from the southbound through movement that would block vehicles from the right-turn lane. Therefore, a permissive right-turn movement can be made, thus operating better than reported. **Table 8** shows level of service and delay for the intersection under 2016 Existing conditions, 2018 No Build and Build conditions, and 2034 No Build and Build conditions.

Table 8—Aberdeen Road/I-664 SB Off-Ramp Intersection LOS

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)					
		I-664 SB Off-Ramp		Aberdeen Road			
		Westbound		Northbound		Southbound	
		LT	RT	LT	TH	TH	RT
AM Peak Hour							
2016 Existing	C (24.3)	C (21.5)	E (62.4)	A (6.8)	A (5.8)	A (4.3)	A (4.1)
		D (54.8)		A (5.9)		A (4.2)	
2018 No Build	C (25.8)	C (21.1)	D (36.6)	A (8.7)	B (13.0)	B (16.3)	D (52.3)
		C (33.7)		B (12.6)		C (30.2)	
2018 Build	C (23.7)	C (21.4)	D (36.4)	A (2.9)	B (11.3)	B (16.9)	D (50.2)
		C (31.6)		B (10.1)		C (27.9)	
2034 No Build	C (30.7)	B (16.8)	D (35.5)	B (13.0)	B (18.6)	C (21.3)	E (72.2)
		C (32.0)		B (18.0)		D (41.0)	
2034 Build	C (27.6)	B (17.1)	D (35.1)	A (6.5)	B (15.5)	C (21.9)	E (67.9)
		C (29.7)		B (14.2)		D (37.3)	
PM Peak Hour							
2016 Existing	A (7.4)	C (31.9)	C (33.3)	A (2.1)	A (1.2)	A (2.7)	A (1.7)
		C (32.7)		A (1.3)		A (2.5)	
2018 No Build	A (8.0)	D (36.3)	D (38.1)	A (0.9)	A (0.7)	A (2.4)	A (1.6)
		D (37.4)		A (0.7)		A (2.2)	
2018 Build	B (10.3)	D (35.3)	D (40.1)	B (12.6)	A (5.3)	A (2.7)	A (1.5)
		D (37.8)		A (6.4)		A (2.4)	
2034 No Build	A (8.8)	C (32.2)	D (44.7)	A (1.9)	A (1.1)	A (3.2)	A (1.4)
		D (39.4)		A (1.2)		A (2.8)	
2034 Build	B (11.8)	C (31.5)	D (44.7)	C (20.4)	A (6.9)	A (3.9)	A (1.3)
		D (38.4)		A (8.7)		A (3.4)	

Source: Kimley-Horn and Associates, Inc.

Detailed level of service calculations are provided in the **Appendix B**.

9.5 Aberdeen Road/I-664 Northbound Ramps

This signalized intersection currently provides the following lane configurations:

- Aberdeen Road (northbound)—two exclusive through lanes and one exclusive channelized right-turn lane
- Aberdeen Road (southbound)—one exclusive left-turn lane and two exclusive through lanes
- I-664 Northbound Ramp (eastbound)—two exclusive left-turn lanes and one exclusive channelized right-turn lane

Under existing conditions, this intersection functions at overall LOS B during the AM and PM peak hours.

With the increment of background growth and traffic associated with the proposed industrial site, overall LOS at the intersection remains unchanged from existing conditions. The northbound through movement shows slight improvement in the 2018 and 2034 Build conditions due to the new traffic patterns associated with the proposed site. **Table 9** shows level of service and delay for the intersection under 2016 Existing conditions, 2018 No Build and Build conditions, and 2034 No Build and Build conditions.

Table 9—Aberdeen Road/I-664 NB Off-Ramp Intersection LOS

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)					
		I-664 NB Off-Ramp		Aberdeen Road			
		Eastbound		Northbound		Southbound	
		LT	RT	TH	RT	LT	TH
AM Peak Hour							
2016 Existing	B (11.4)	C (34.0)	C (31.4)	A (7.6)	A (7.1)	B (10.8)	A (5.7)
		C (33.6)		A (7.4)		A (7.3)	
2018 No Build	B (10.2)	D (38.7)	D (35.8)	A (7.5)	A (7.1)	A (4.2)	A (2.9)
		D (38.3)		A (7.4)		A (3.4)	
2018 Build	B (10.3)	D (38.7)	D (36.4)	A (6.5)	A (5.5)	A (7.3)	A (1.9)
		D (37.7)		A (6.2)		A (3.1)	
2034 No Build	B (10.7)	D (38.7)	D (35.0)	A (7.8)	A (6.3)	A (7.7)	A 3.0)
		D (38.2)		A (7.4)		A (4.5)	
2034 Build	B (11.3)	D (38.7)	D (35.6)	A (6.9)	A (4.7)	B (12.7)	A (3.4)
		D (37.4)		A (6.2)		A (5.6)	
PM Peak Hour							
2016 Existing	B (14.4)	D (36.8)	C (30.7)	B (11.9)	B (15.9)	B (12.8)	A (6.1)
		D (35.3)		B (12.7)		A (8.3)	
2018 No Build	B (15.5)	D (39.1)	C (34.0)	B (11.9)	B (13.4)	B (14.9)	A (7.1)
		D (37.8)		B (12.2)		A (9.6)	
2018 Build	B (12.3)	D (39.1)	C (34.2)	A (8.8)	A (3.9)	B (11.9)	A (4.4)
		D (37.4)		A (7.7)		A (6.6)	
2034 No Build	B (17.5)	D (40.2)	C (33.3)	B (13.3)	B (12.9)	C (22.5)	A (8.0)
		D (38.5)		B (13.2)		B (12.7)	
2034 Build	B (13.8)	D (40.2)	C (33.5)	B (10.9)	A (4.1)	B (14.9)	A (5.5)
		D (38.0)		A (9.3)		A (8.4)	

Source: Kimley-Horn and Associates, Inc

Detailed level of service calculations are provided in the **Appendix B**.

9.6 Aberdeen Road/Pembroke Avenue

This signalized intersection currently provides the following lane configurations:

- Aberdeen Road (northbound)—one exclusive left-turn lane, one exclusive through lane, and one shared through and right-turn lane
- Aberdeen Road (southbound)—one exclusive left-turn lane, one exclusive through lane, and one shared through and right-turn lane
- Pembroke Avenue (eastbound)—one exclusive left-turn lane, two exclusive through lanes, and one exclusive channelized right-turn lane
- Pembroke Avenue (westbound)—one exclusive left turn lane, one exclusive through lane, and one shared through and right-turn lane

Under existing conditions, this intersection functions at overall LOS C during the AM and PM peak hours. The westbound shared through and right-turn movement shows a LOS E but improves with the future scenarios due signal timing changes.

With the increment of background growth and traffic associated with the proposed industrial site, the intersection is anticipated to continue to function at the same LOS during each peak hour with exception of the 2034 Build scenario in which the LOS decreases from LOS C to LOS D. As a result of the adjustments made to the signal timings, several of the intersections' turning movements showed improvement from the existing conditions. On the contrary, the southbound left-turn movement in the 2034 No Build scenario functions at LOS E, but improves in the 2034 Build because of the redistributed traffic from Shell Road. **Table 10** shows level of service and delay for the intersection under 2016 Existing conditions, 2018 No Build and Build conditions, and 2034 No Build and Build conditions.

Table 10—Aberdeen Road/Pembroke Avenue Intersection LOS

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)								
		Pembroke Avenue					Aberdeen Road			
		Eastbound			Westbound		Northbound		Southbound	
		LT	TH	RT	LT	TH / RT	LT	TH / RT	LT	TH / RT
AM Peak Hour										
2016 Existing	C (26.5)	D (37.8)	C (22.5)	C (21.3)	D (38.7)	D (39.1)	D (38.3)	C (23.4)	C (33.3)	B (11.4)
		C (25.4)			D (39.1)		C (24.4)		B (19.1)	
2018 No Build	C (25.4)	D (45.7)	C (27.4)	C (25.9)	C (28.4)	C (22.4)	D (44.0)	C (20.6)	D (47.9)	B (16.4)
		C (30.8)			C (22.8)		C (22.3)		C (27.6)	
2018 Build	C (20.2)	D (45.7)	C (27.4)	C (26.2)	C (30.9)	C (22.1)	C (27.3)	B (10.3)	D (38.3)	B (17.1)
		C (29.8)			C (23.1)		C (11.8)		C (20.9)	
2034 No Build	C (25.9)	D (41.3)	C (25.9)	C (24.3)	C (26.2)	B (19.5)	D (41.4)	C (23.7)	D (48.5)	C (20.2)
		C (28.7)			B (19.9)		C (25.0)		C (30.2)	
2034 Build	C (20.4)	D (41.3)	C (26.0)	C (24.8)	C (28.9)	C (20.2)	C (28.4)	B (12.2)	D (38.5)	B (17.7)
		C (28.0)			C (21.2)		B (13.5)		C (21.8)	
PM Peak Hour										
2016 Existing	C (31.3)	D (47.0)	C (21.4)	B (18.2)	D (47.9)	E (55.0)	D (36.9)	C (31.7)	D (35.1)	B (15.6)
		C (25.5)			D (54.6)		C (32.3)		C (22.9)	
2018 No Build	C (29.5)	D (45.6)	C (26.3)	C (22.6)	C (29.6)	D (37.6)	D (43.0)	C (27.7)	D (51.1)	B (10.2)
		C (29.2)			D (37.1)		C (29.3)		C (25.4)	
2018 Build	C (29.4)	D (45.6)	C (26.3)	C (22.8)	C (33.1)	C (34.9)	D (41.4)	C (29.5)	D (43.7)	B (18.5)
		C (29.0)			C (34.7)		C (31.0)		C (25.6)	
2034 No Build	C (33.6)	D (52.9)	C (26.4)	C (22.0)	C (29.4)	D (45.3)	D (40.2)	C (31.3)	E (63.8)	B (11.1)
		C (30.5)			D (44.4)		C (32.2)		C (30.8)	
2034 Build	D (35.9)	D (52.9)	C (26.4)	C (22.1)	D (35.3)	D (43.3)	D (47.3)	D (43.8)	D (54.1)	B (19.6)
		C (30.2)			D (42.5)		D (44.2)		C (29.8)	
Source: Kimley-Horn and Associates, Inc										

Detailed level of service calculations are provided in the **Appendix B**.

9.7 Pembroke Avenue/Old Aberdeen Road

This signalized intersection currently provides the following lane configurations:

- Shell Road (northbound)—two exclusive left-turn lanes and one shared through and right-turn lane
- Old Aberdeen Road (southbound)—one exclusive left-turn lane, one exclusive through lane, and one exclusive right-turn lane
- Pembroke Avenue (eastbound)—one exclusive left-turn lane, two exclusive through lanes, and one exclusive right-turn lane
- Pembroke Avenue (westbound)—one exclusive left-turn lane, two exclusive through lanes, and one exclusive right-turn lane.

Under existing conditions, this intersection functions at overall LOS B during the AM and PM peak hours. The eastbound left-turn and right-turn movements both function at LOS E in the AM peak conditions. The remaining AM movements and all the PM movements perform at an acceptable level.

With the increment of background growth and traffic associated with the proposed industrial site, the intersection is anticipated to continue to function at the same LOS during each peak hour. Due to the adjustments made to the signals timings, the eastbound left-turn movement decreases to a LOS F during the 2018 AM peak hour scenarios, but increases to a LOS E during the 2034 PM peak hour scenarios. Volumes for this movement are less than 20 vehicles per hour for both the AM and PM peak hours. **Table 11** shows level of service and delay for the intersection under 2016 Existing conditions, 2018 No Build and Build conditions, and 2034 No Build and Build conditions.

Table 11—Pembroke Avenue/Old Aberdeen Road Intersection LOS

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Pembroke Avenue						Old Aberdeen Road					
		Eastbound			Westbound			Northbound		Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH/ RT	LT	TH	RT	
AM Peak Hour													
2016 Existing	B (19.6)	E (77.2)	A (3.7)	E (75.6)	A (9.3)	B (10.4)	A (9.3)	D (37.2)	D (35.8)	D (37.0)	D 35.7)	D (35.8)	
		C (21.7)			C (10.3)			D (36.9)		D (36.1)			
2018 No Build	B (15.9)	F (128.8)	A (5.0)	C (27.0)	A (8.3)	A (9.3)	A (8.3)	D (42.1)	D (40.8)	D (42.1)	D (40.7)	D (40.8)	
		B (14.6)			A (9.2)			D (41.9)		D (41.1)			
2018 Build	B (13.0)	F (126.3)	A (5.6)	A (5.0)	A (8.3)	A (9.3)	A (8.2)	D (42.0)	A (0.0)	D (42.1)	D (40.7)	D (40.8)	
		B (10.3)			A (9.3)			D (42.0)		D (41.1)			
2034 No Build	B (15.3)	E (60.8)	A (6.6)	C (22.9)	A (9.7)	B (11.0)	A (9.7)	D (40.6)	D (39.5)	D (42.4)	D (40.6)	D (40.7)	
		B (12.2)			B (11.0)			D (40.4)		D (41.1)			
2034 Build	B (15.1)	E (58.2)	A (6.2)	D (36.1)	A (9.1)	B (10.4)	A (9.0)	D (42.2)	D (40.7)	D (42.4)	D (40.6)	D (40.7)	
		B (13.4)			B (10.4)			D (42.1)		D (41.1)			
PM Peak Hour													
2016 Existing	B (10.5)	D (42.9)	A (4.8)	A (3.0)	B (10.4)	B (11.6)	B (10.1)	D (35.7)	C (33.8)	D (37.9)	A (0.0)	D (37.5)	
		A (5.3)			B (11.6)			D (35.5)		D (37.5)			
2018 No Build	B (11.5)	D (48.7)	A (6.1)	B (10.3)	A (9.2)	B (10.3)	A (9.0)	D (40.7)	D (38.9)	D (42.6)	A (0.0)	D (42.4)	
		A (7.9)			B (10.2)			D (40.5)		D (42.4)			
2018 Build	B (10.2)	D (48.9)	A (5.5)	A (7.8)	A (9.1)	B (10.2)	A (8.8)	D (40.7)	A (0.0)	D (42.6)	A (0.0)	D (42.4)	
		A (6.8)			B (10.2)			D (40.7)		D (42.4)			
2034 No Build	B (11.6)	D (48.5)	A (6.0)	B (10.1)	A (9.5)	B (10.8)	A (9.1)	D (40.8)	D (38.6)	D (42.6)	A (0.0)	D (42.4)	
		A (7.8)			B (10.7)			D (40.5)		D (42.4)			
2034 Build	B (10.5)	D (48.3)	A (5.4)	A (7.8)	A (9.4)	B (10.7)	A (9.0)	D (40.7)	D (38.8)	D (42.6)	A (0.0)	D (42.4)	
		A (6.9)			B (10.7)			D (40.7)		D (42.4)			

Detailed level of service calculations are provided in the **Appendix B**.

10.0 CONCLUSIONS AND RECOMMENDATIONS

This TIA examines the traffic impacts associated with the proposed industrial development along Aberdeen Road. The proposed development is anticipated to increase traffic volumes throughout the day and during the peak periods; however, there is sufficient capacity within the existing study area roadway and intersections to support the additional trips with minor modifications to existing signal timings. The study area intersections and movements currently operate at LOS D or better with little change in LOS and minimal increases in delay anticipated due to the proposed development. **Figure 15** shows the proposed site changes. Specific offsite transportation improvements are recommended as follows.

Aberdeen Road/Proposed Site Driveway

- Construction of this driveway and access to Aberdeen Road is predicated on approval of change to the limited access designation along Aberdeen Road
- Install a traffic signal and coordinate with Aberdeen Road signal system
- Driveway should be located a minimum of 1,050 feet south of Pembroke Avenue to meet minimum spacing standards based on highway functional classification (minor arterial) and posted speed limit (40 miles per hour) as defined in Appendix F of the VDOT *Road Design Manual*.
- Intersection geometrics should facilitate heavy vehicle movements

Northbound Aberdeen Road

- Maintain existing lane configuration

Southbound Aberdeen Road

- Restripe the existing inside through lane to an exclusive left-turn lane
- Install advance notification including pavement markings and “Left Lane Must Turn Left” signs (R3-7) prior to the intersection

Westbound Proposed Site Driveway

- Construct one exclusive left-turn lane continuous out of the site
- Construct one exclusive right-turn lane continuous out of the site
- Construct one inbound lane to enter the site

Shell Road/Proposed Site Driveway (Emergency Access)

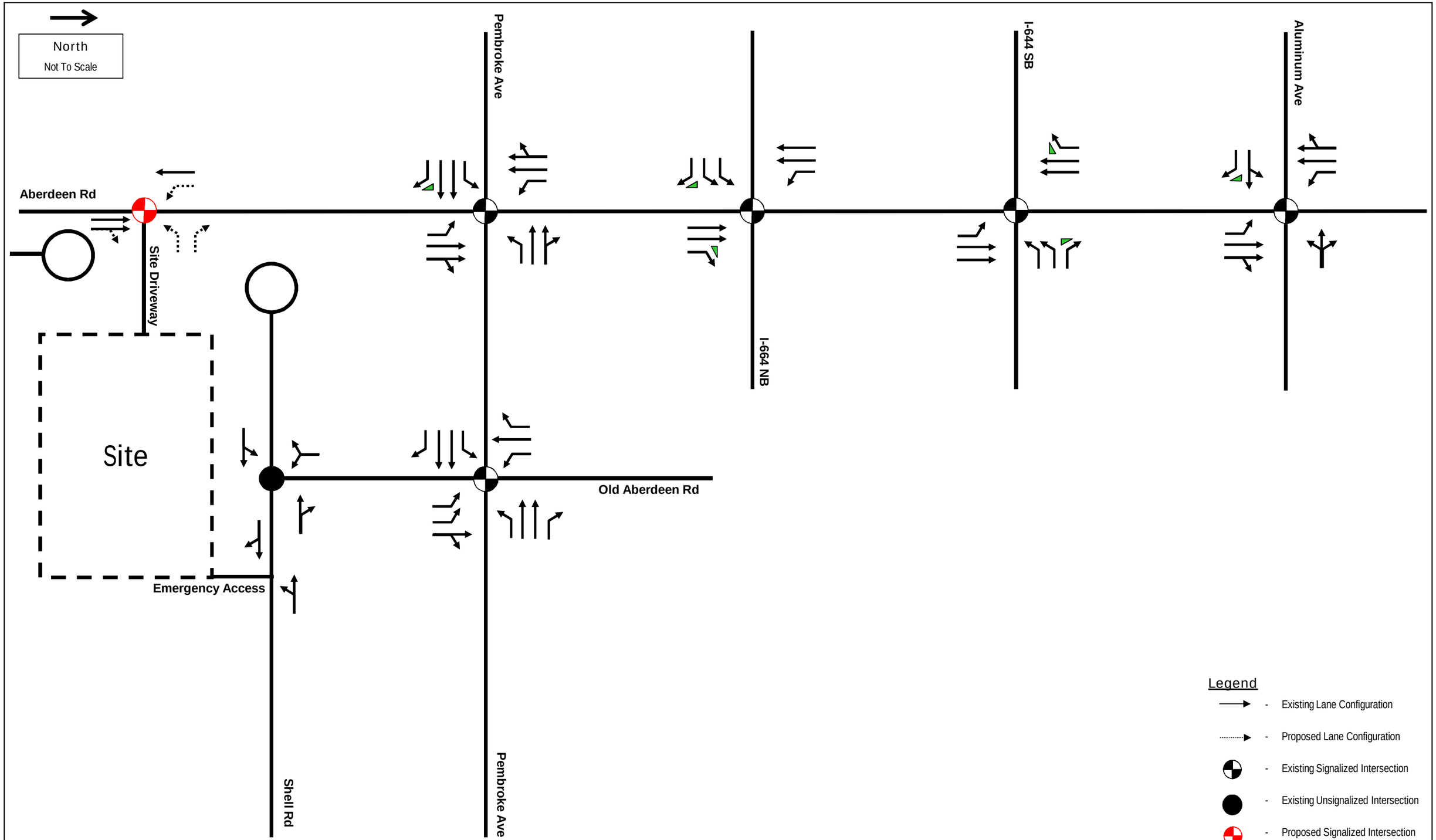
- Construct a secondary access point along Shell Road along the eastern property line
- Driveway is intended to serve emergency vehicles only and should include the appropriate sign restrictions to designate it as such (i.e., “Authorized Vehicles Only” [R5-11])

Pine Avenue

- Cul-de-sac Pine Avenue approximately 300-feet north of 5th Street while maintaining access to the existing residential homes.

Shell Road

- Cul-de-sac Shell Road approximately 300-feet west of Old Pembroke Road while maintaining all access to the auto repair store located on the southwest corner of the Pembroke Road/Old Aberdeen Road intersection.



Kimley»Horn

Hampton Industrial Traffic Impact Analysis
Hampton, VA

Recommended Lane Configurations

FIGURE
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