Gilbert Street Mixed-Use
Blacksburg, Virginia

TRAFFIC IMPACT ANALYSIS

Prepared for

W.M. Jordan

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COMMONWEALTH OF VIRGINIA
KAREN C. McPHERSON
Lic. No. 025738
PROFESSIONAL ENGINEER

Digitally signed by:
kmcpherson@mcphersonconsulting.com
Date: 2019.07.30 15:43:08 -05'00'

Karen C. McPherson, PE
McPherson Consulting, LLC

McPherson CONSULTING

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Executive Summary

The proposed Gilbert Street mixed-use development will be comprised of retail as well as office, university, and event space. The development is located in the southwest quadrant of the Prices Fork Road and N. Main Street roundabout. The site access will include two entrance points that include the existing driveway along Prices Fork Road at Orchard Street. The current driveway along Gilbert Street will be closed and second access point will create the fourth leg of the Turner Street and Perry Street intersection.

The site is supported by a mature roadway network with access management strategies that provide an enhanced multimodal network. As a result, there are several side street connections that have vehicle restrictions to facilitate heavy pedestrian activity as well as roundabout and pedestrian crossings, which limit the vehicle conflict points and provide a robust multimodal network. **Figure 1** illustrates the site location, two proposed access points, and study area intersections.

The proposed Gilbert Street mixed use development is consistent with the Town's Comprehensive Plan and will provide for an inviting gathering space that will complement the vision for the Downtown Northwest district for a more walkable, urban, architecturally appealing, mixed-use area with quality retail. The proposed 237,000 SF of mixed-use development will require Building 460 to stay and building 400 to be demolished.

McPherson Consulting, LLC (McPherson) was retained by W.M. Jordan to perform a traffic impact analysis for the proposed development. This report has been prepared for submittal to the Town of Blacksburg to evaluate existing and future traffic conditions and make recommendations to mitigate the impact of the proposed development, if necessary. Assumptions regarding the study area, count data, traffic generation, and trip distribution patterns were discussed with Town of Blacksburg staff prior to the completion of this analysis.

The study area includes roadways and intersections in the immediate vicinity of the proposed development. Given the mature roadway network, most of the study intersections (9 of the 11) that do not provide direct access to the proposed development provide adequate capacity and acceptable operations without additional improvements and are summarized below:

1. Prices Fork Road / Toms Creek Street (signalized)
2. Prices Fork Road / Turner Street (RI/RO)
3. Prices Fork Road / N. Main (roundabout)
4. N. Main Street / Progress Street (signalized)
5. N. Main Street / Gilbert Street (unsignalized – channelized)
6. N. Main Street/ Turner Street (signalized)
7. Gilbert Street / Turner Street (unsignalized)
8. Perry Street / Stanger Street (unsignalized)
9. Stanger Street / BT Entrance (proposed roundabout)

As currently proposed, the development will moderately increase traffic volumes, with the most notable increase at the proposed Turner Street / Perry Street intersection entrance. This intersection was recently reconfigured to a T-intersection with the site entrance converted into a pedestrian walkway. With the proposed development, this intersection will be returned to a four-legged unsignalized intersection. Intersection improvements are recommended at the two site driveways to address access management enhancements and well as provide for multimodal operations. These recommendations are as follows and are illustrated in Chapter 6 /Figure 10:

Prices Fork Road / Orchard Street (unsignalized)

- Construct a channelized median opening
  - Extends the left-turn storage lanes along Prices Fork Road.
  - Restricts northbound and southbound Orchard Street to outbound right-turn only movements.

Perry Street / Turner Street (unsignalized)

- Construct the westbound approach to provide for a four-legged intersection with a single lane on all four approaches.
  - Allow inbound only movements to the parking area beneath the building (restrict outbound movements).
- Operate intersection as a 4-way stop.
- Construct pedestrian crosswalks and ADA ramps.

1 Introduction

1.1 Project History and Background

The proposed Gilbert Street mixed-use development will be comprised of retail as well as office, university, and event space. The development is located in the southwest quadrant of the Prices Fork Road and N. Main Street roundabout. The site access will include two entrance points that include the existing driveway along Prices Fork Road at Orchard Street. The current driveway along Gilbert Street will be closed and the second access point will create the fourth leg of the Turner Street and Perry Street intersection. This second access will be designed to accommodate both pedestrian and vehicles. **Figure 1** illustrates the site location, two proposed access points, and study area intersections. As shown in Figure 1, N. Main Street and Turner Street run in an approximate north/south direction and Prices Fork Road and Perry Street runs in an approximate east/west direction.

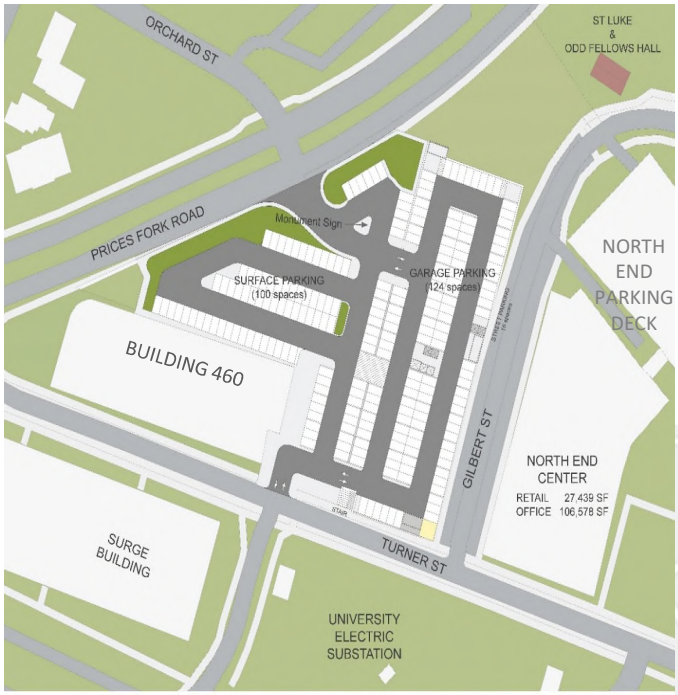
The site currently supports three buildings: two mixed-use buildings (buildings 400 and 460) that comprise approximate 69,000 SF development and support retail shops, restaurants, offices, and classrooms, and the third building is vacant. The proposed Gilbert Street building will include approximately 237,000 SF of mixed-use development will require Building 460 to stay and building 400 to be demolished.

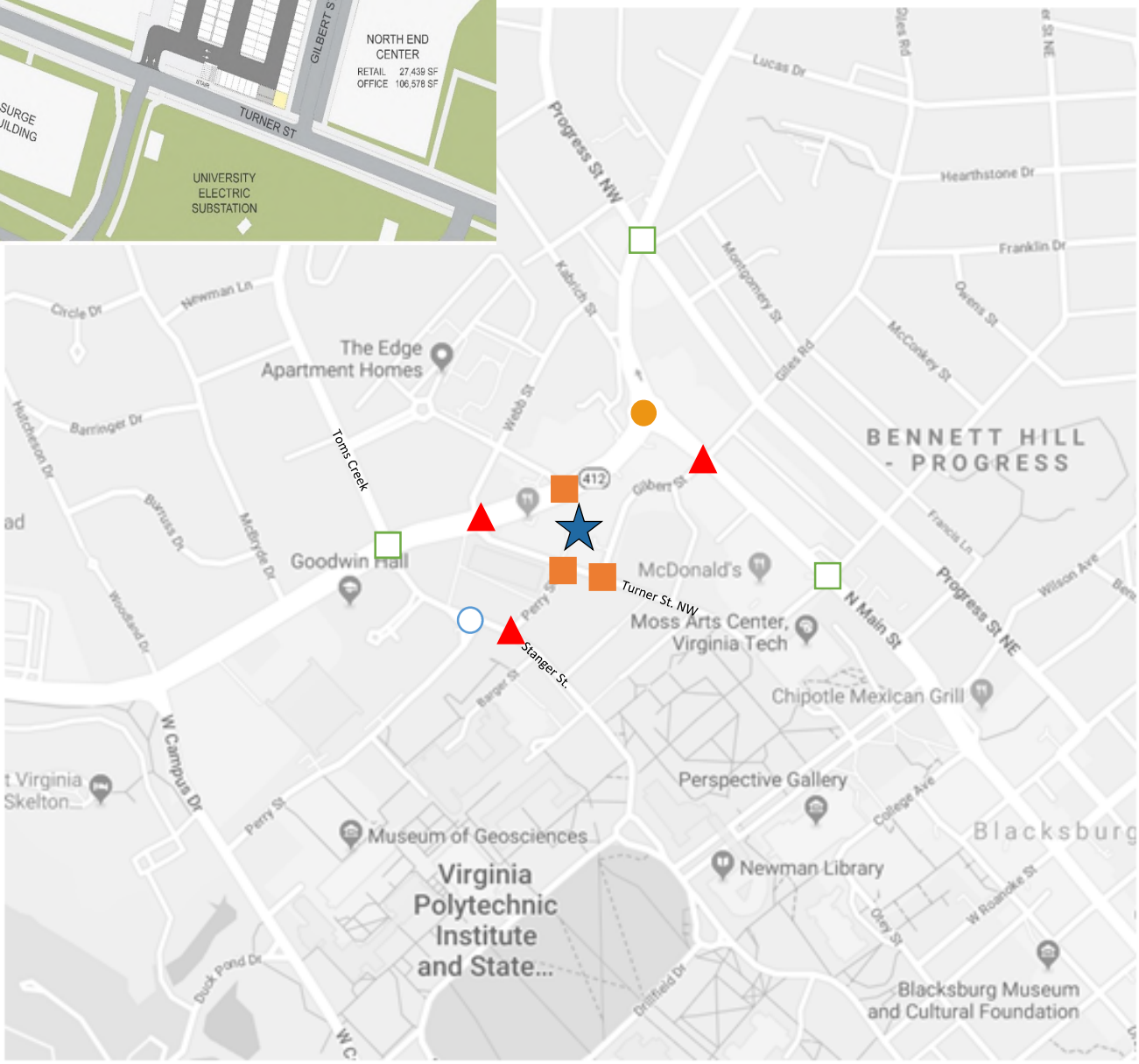
McPherson Consulting, LLC (McPherson) was retained by W.M. Jordan to perform a traffic impact analysis for the proposed development. This report has been prepared for submittal to the Town of Blacksburg to evaluate existing and future traffic conditions and make recommendations to mitigate the impact of the proposed development, if necessary. Assumptions regarding the study area, count data, traffic generation, and trip distribution patterns, and multimodal trip distribution were discussed with Town of Blacksburg staff prior to the completion of this analysis.

Study Area

Legend

- Site
- Signalized Intersections
- Unsignalized (Full Access)
- Unsignalized (Restricted)
- Roundabout
- Future Roundabout





2 Existing Conditions

2.1 Study Area

The study area for this analysis includes the following roadways and intersections:

Roadways

- Prices Fork Road
- N. Main Street

Intersections

- Prices Fork Road / Toms Creek Street (signalized)
- Prices Fork Road / Turner Street (RI/RO)
- Prices Fork Road / Orchard Street (unsignalized)
- Prices Fork Road / N. Main Street (roundabout)
- Gilbert Street / Turner Street (unsignalized)
- Gilbert Street / N. Main Street (unsignalized – channelized)
- N. Main Street / Progress Street (signalized)
- N. Main Street / Turner Street (signalized)
- Perry Street / Turner Street (unsignalized)
- Perry Street / Stanger Street (unsignalized – channelized)

Study area roadways and intersections were identified during conversations with the Town of Blacksburg staff. Current development plan includes two driveways:

- One driveway is located at the existing Orchard Street unsignalized intersection and will be channelized such that outbound movements will be restricted to right-turns only.
- The second driveway will create the fourth leg to the Turner Street and Perry Street unsignalized intersection.

The access points will be designed with both pedestrian and vehicle accommodations.

2.2 Existing Land Use

The current site supports three buildings, one of which is currently vacant. The remaining two buildings provide retail shops, restaurants, and offices. As part the 2016 Comprehensive Plan, the N. Main Street Corridor and Price Fork Road corridor were identified as areas that should support office, commercial, and retail establishment. The proposed Gilbert Street mixed-use development will require the vacant building and Building 400 to be demolished and be replaced with a building that provides complementary uses as well as a national retailer, and additional meeting spaces as well as public-use event space.

2.3 Existing Conditions

N. Main Street and Prices Fork Road will be the primary external roadways providing access to the Gilbert Street Development. The site is supported by a mature roadway network with access management strategies that provide an enhanced multimodal network. As a result, there are several side street connections that have vehicle restrictions to facilitate heavy pedestrian activity as well as roundabout and pedestrian crossings, which limit the vehicle conflict points and provide a robust multimodal network.

In the project vicinity, Prices Fork Road is oriented east/west with an interchange to US 460 to the west and a roundabout with N. Main Street at its eastern termini. Southwest of the development are several academic buildings associated with Virginia Tech. North of the development are various residential developments that predominately provide college housing and a few retail shops. Southeast of the development are retail shops oriented along Main Street with numerous residential developments within a block along both sides of the downtown core. The proposed Gilbert Street Development is consisted with the Town's Comprehensive plan and will provide for an inviting gathering space that will complement the vision for the Downtown Northwest district for a more walkable, urban, architecturally appealing, mixed-use area with a quality retail anchor.

The following provides a short description of each roadway:

- **N. Main Street** – is a four-lane, undivided roadway, north of Prices Fork Road and a two-lane, undivided roadway, with a two-way left-turn lane south of Prices Fork Road. N Main Street serves the core of Downtown Blacksburg with a focus on pedestrian mobility and has a posted speed limit of 25 miles per hour (mph). North of Prices Fork Road, N. Main Street has an average daily traffic (ADT) volume of 17,000 vehicles per day (vpd) and 19,000 vpd south of Prices Fork Road.

- **Prices Fork Road** – is a four-lane divided roadway, with a posted speed limit of 35 mph. Within the study area, Prices Fork Road has an ADT volume of 21,000 vpd.

2.3.1 Turning Movement Counts (TMCs)

Twelve hour (12) turning movement counts (TMC) were collected by Data Collection Group (7:00 a.m. to 7:00 p.m.) on two separate weekdays on April 17 and April 18, 2019 for the following intersections:

- N. Main Street and Progress Street
- N. Main Street and Turner Street
- Prices Fork Road and Orchard Street
- Prices Fork Road and Toms Creek Road
- Stanger Street and Perry Street
- Turner Street and Gilbert Street
- Turner Street and Perry Street

Data was collected on April 23 and April 24, 2019 for the following roundabout:

- Prices Fork Road and N. Main Street

2.3.2 Average Daily Traffic (ADT) Counts

Historical ADT counts were taken from the *2017 VDOT Daily Traffic Volume Estimates including Vehicle Classification Estimate (Special Locality Report 150- Town of Blacksburg)* for daily traffic volumes along N. Main Street and Prices Fork Road.

TMC and ADT data is illustrated in **Figure 2**.

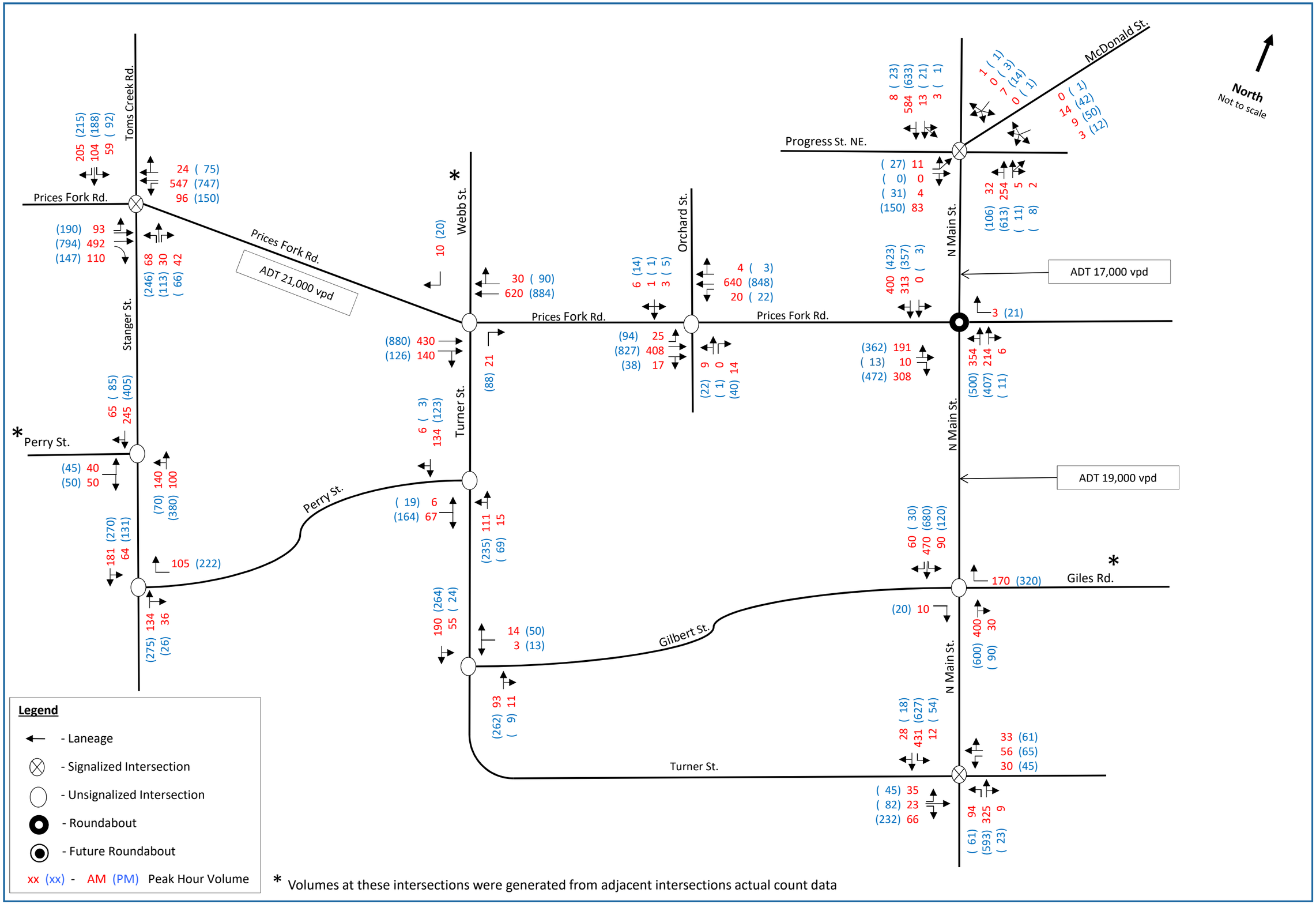


Figure 2

Gilbert Street Mixed-Use Development - Blacksburg, VA
Existing Conditions

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3 Proposed Development

The Gilbert Street Development will be a mixed-use development that will include commercial land uses among the first floor including regional restaurants, the Wine Lab, and a National Retailer. The second to the fifth floors, are planned to include office/university land uses, and a quality restaurant and event space on the roof top terrace. These land uses have a vast difference in user types and peak hour demands. In addition, based on the location of the site, proximity to campus, and the future Blacksburg Transit (BT) transfer station, it is anticipated that a large portion of the user trips will be non-vehicle (i.e. pedestrian, bike, or transit).

In order to capture the various demands and travel patterns associated with each land use, the proposed develop was divided into three (3) user types.

- Commercial/Retail Users
- Anchor Tenant Users
- Office/University Users

To address the non-vehicle users, a comparison between existing traffic demand and industry standards peak hour generation was performed. Traffic count data was taken at the existing Prices Fork Road / Orchard Street intersection. Traffic demands were also generated using methodology contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition, 2017* for the existing 400 and 460 buildings only, as the third vacant building does not generate any current driveway traffic.

The driveway volumes and existing land use data (type of use and size) were to determine a pedestrian reduction factor for each of the three land uses was calculated. This methodology was discussed and agreed upon by Town of Blacksburg with detailed summaries included in the Appendix. The pedestrian reduction factors for each land use type are shown in **Table 1**.

Table 1: Proposed Pedestrian Reduction Factors per Land Use

Land Use	ITE (Code)	Pedestrian Reduction Factor
Commercial/Retail Users	933	25%
	931/925	10%
Anchor Tenant	850	5%
Office/University User	550/630	0%

3.1 Trip Generation

Table 2 summarizes the site generated commercial traffic along with the applied pedestrian reduction factors that will be reflected in the driveway volumes.

Table 2: Proposed Trip Generation – Commercial Component

Land Use (code)	Variable *(KSF)*	AM Peak		PM Peak	
		In	Out	In	Out
Fast-food Restaurant w/o Drive Through Window (933)	2.2	33	22	31	31
Fast-food Restaurant w/o Drive Through Window (933)	2.3	35	23	33	32
Fast-food Restaurant w/o Drive Through Window (933)	7	39	31	42	26
Quality Restaurant (931)	3.0	0	0	15	8
Drinking Place (925)	7.4	0	0	55	29
Total Site Traffic		107	76	176	126
25% for land use 933 *10% for land uses 931 / 925* **Total Vehicle Trips w/ Pedestrian Reduction Factors**		80	57	143	100

Table 2 indicates that the commercial component for the proposed development has the potential to generate approximately 183 and 243 peak hour trips during the AM and PM peak periods, respectively, if all trips were vehicle trips.

After the pedestrian reduction factor is applied, the commercial component has the potential to generate approximately 137 and 243 peak hour vehicle trips during the AM and PM peaks, respectively. For the quality restaurant and winery land uses, it was assumed the operating hours would occur only during the PM hours. This methodology was discussed and agreed upon by the Town of Blacksburg.

Table 3 summarizes the anchor tenant component site generated traffic for the proposed development along with the total generated traffic with the applied pedestrian factors.

Table 3: Proposed Trip Generation – Anchor Tenant

Land Use (code)	Variable *(KSF)*	AM Peak		PM Peak	
		In	Out	In	Out
Supermarket "Anchor Tenant" (850)	18.7	43	28	88	85
Total		43	28	88	85
Total Vehicle Trips w/ Pedestrian Reduction Factor (5%)		41	27	84	81

Table 3 indicates that the anchor tenant component of the proposed development has the potential to generate approximately 71 and 173 peak hour trips during the AM and PM peak periods, respectively, if all trips were vehicle trips. After the pedestrian reduction factors of 5% was applied, the commercial component has the potential to generate approximately 68 and 165 peak hour trips during the AM and PM peaks, respectively. This methodology was discussed and agreed upon by the Town of Blacksburg.

Table 4 summarizes the office/university component site generated traffic for the proposed development.

Table 4: Proposed Trip Generation – Office/University

Land Use (code)	Variable *(KSF)*	AM Peak		PM Peak	
		In	Out	In	Out
Clinic (630)	3.2	9	3	3	7
University/College (550)	31.4	26	8	12	25
University/College (550)	77.5	65	19	29	62
University/College (550)	32	27	8	12	25
Total	144.1	127	38	56	119

Given the specific land use type available in the ITE Trip Generation Manual, pedestrian reduction factors were not considered for this component of the new building. Table 4 indicates that the office/university component of the proposed development has the potential to generate approximately 165 and 175 peak hour trips during the AM and PM peaks, respectively.

Table 5 summarizes the entire Gilbert Street Development with the proposed pedestrian reduction factor for the commercial and anchor tenant component of the development.

Table 5: Proposed Trip Generation – Gilbert Street Development

Land Use	Variable *(KSF)*	AM Peak		PM Peak	
		In	Out	In	Out
Commercial Component	21.9	80	57	143	100
Anchor Tenant Component	18.7	41	27	84	81
Office/university Component	144.1	127	38	56	119
Total		248	122	283	300

Table 5 indicates that the proposed Gilbert Street Development has the potential to generate approximately 370 and 583 peak hour vehicle trips during the AM and PM peaks, respectively.

3.2 Trip Distribution

The directional distribution and assignment of trips generated by the proposed development is based on a review of existing intersection and roadway volumes and an understanding of travel patterns within the study area, along with discussions with the Town of Blacksburg. This development will have two driveways: one restricted access point along Prices Fork Road that provides right-in and right-out movements, and the second driveway at the Turner Street / Perry Street intersection that provides access to the proposed parking deck as well at an inbound movement only for the parking located under the building. The only outbound movement at this intersection will be from the parking deck.

The Gilbert Street Development site will provide parking for the proposed commercial and anchor tenant, while the university and office user will be required to park in the North End Garage. Like the trip generation, separate trip distributions were developed for these three specific users.

- Commercial – park at Gilbert Street
- Anchor Tenant – park at Gilbert Street
- Office/University – park at North End Garage

The Commercial/Anchor tenant will have the following overall trip distribution and be destined to the Gilbert Street site:

- 25% to/from Toms Creek Road
- 25% to/from Prices Fork Road
- 2.5% to/from Stanger Street (VT Campus)
- 5% to/from Progress Street
- 15% to/from N. Main Street (to the north)
- 2.5% to/from Turner Street
- 25% to/from N. Main Street (to the south)

While these two users are anticipated to have similar travel patterns towards the outer edges of the study area, they vary as they enter the site driveways and access the directional side streets. Based on direct access to the anchor tenant via the proposed parking deck, there are slight variations in the driveway usage. Detailed driveway percentages are included in the Appendix.

The Office/University trips will have the following overall trip distribution: and be destined to the North End Garage:

- 50% to/from the northwest towards Toms Creek Road
- 30% to/from the west towards Prices Fork Road
- 2.5% to/from the southwest towards Stanger Street
- 5% to/from the northeast towards Progress Street
- 5% to/from the northeast towards N. Main Street
- 2.5% to/from the southeast towards Turner Street
- 5% to/from the southeast towards N. Main Street

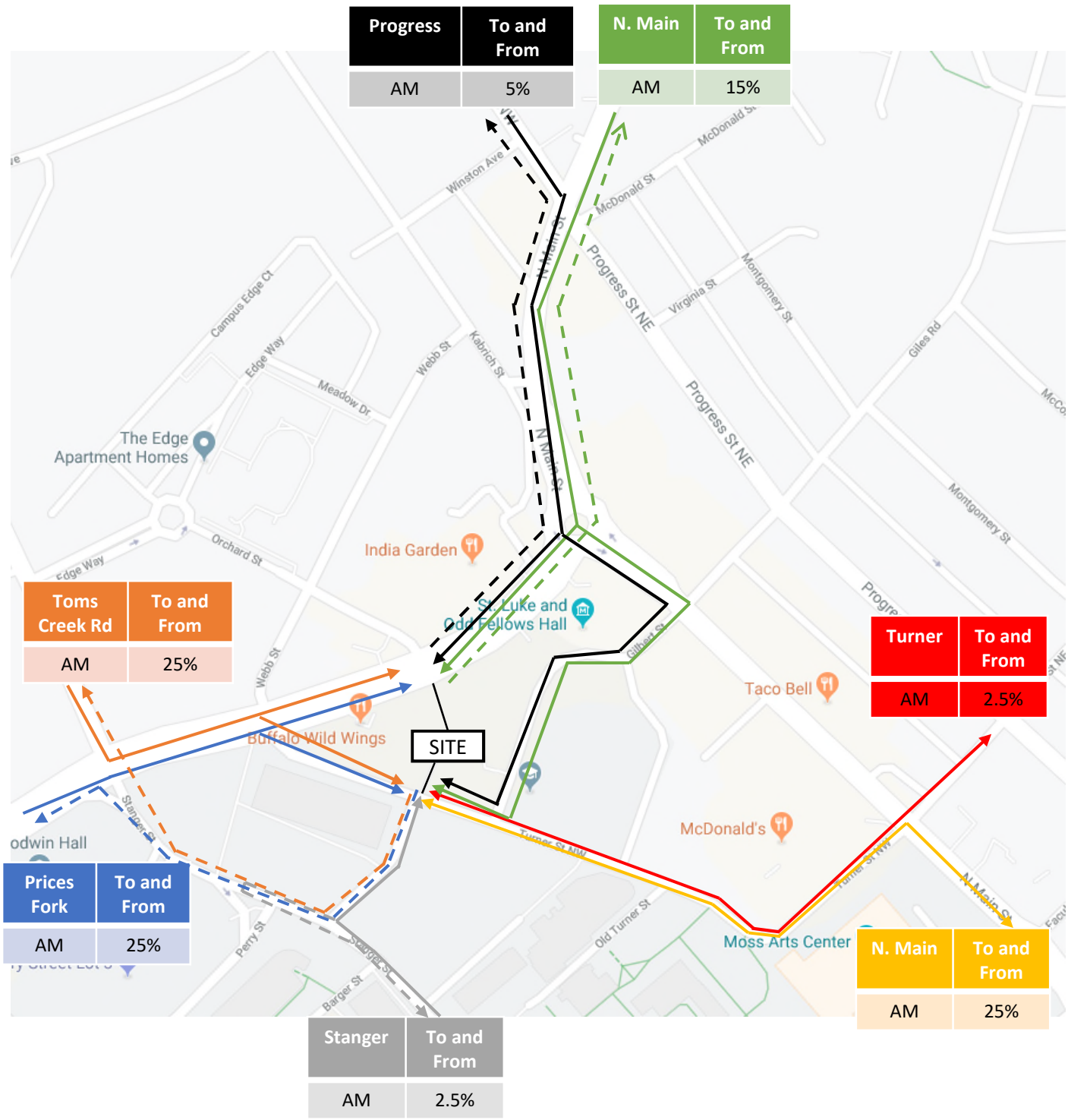
The commercial trip distribution, anchor tenant distribution, and the office/university trip distribution for the eleven (11) study area intersections is illustrated in **Figure 3**, **Figure 4**, and **Figure 5** for the AM and PM peak periods and was agreed upon by the Town of Blacksburg.

3.3 Trip Assignment

The trip distribution percentages illustrated in **Figure 3**, **Figure 4**, and **Figure 5** were applied to the proposed trip generation outlined in **Table 1**, **Table 2**, and **Table 3**. The overall proposed AM and PM peak hour site generated trips are illustrated in **Figure 6**. Detailed trips assignments for each specific land use for each driveway are include in the Appendix.

Trip Distribution: Commercial AM/PM

Trip Distribution: Anchor Tenant AM/PM



Trip Distribution: Office/University AM/PM

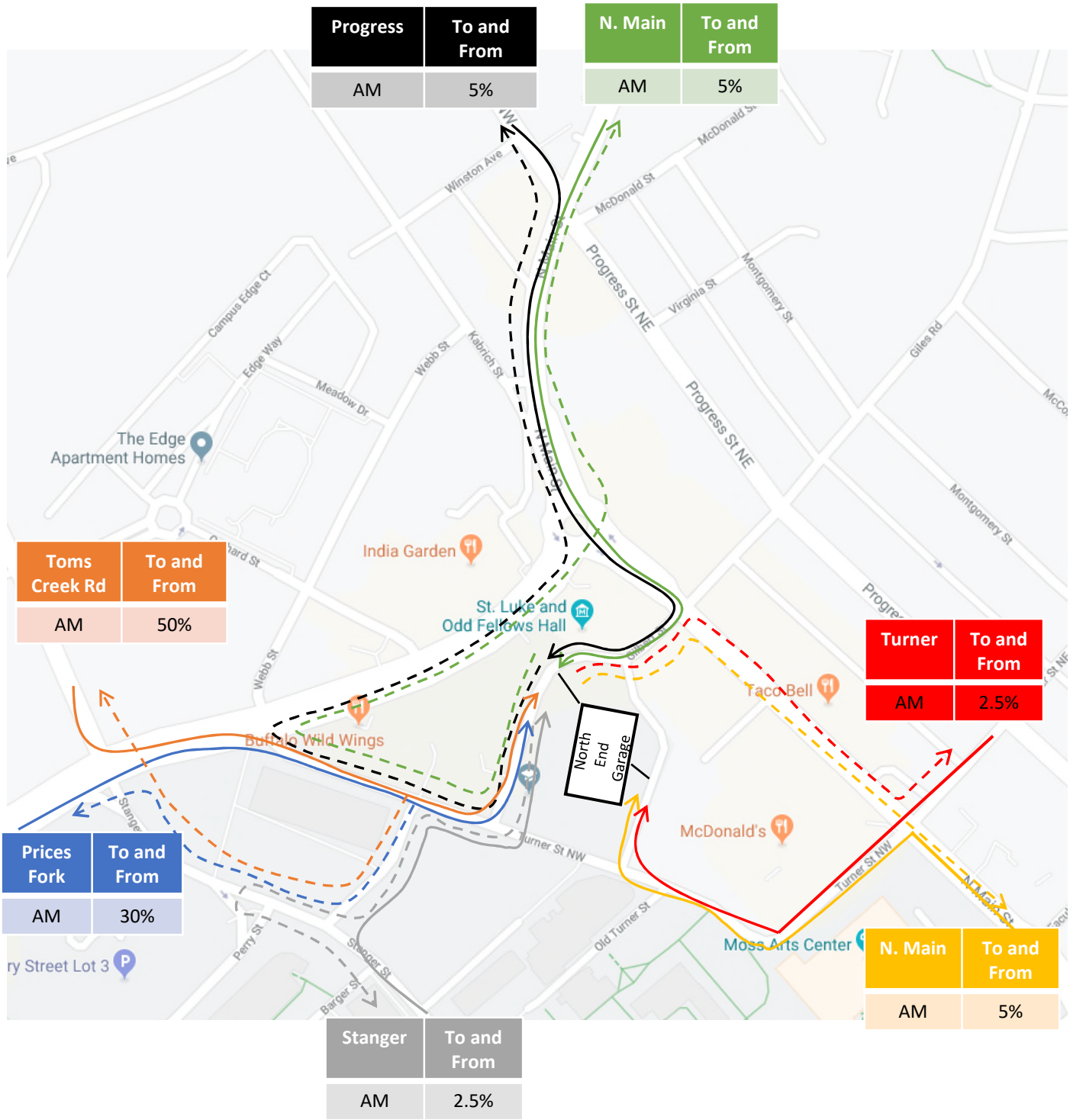
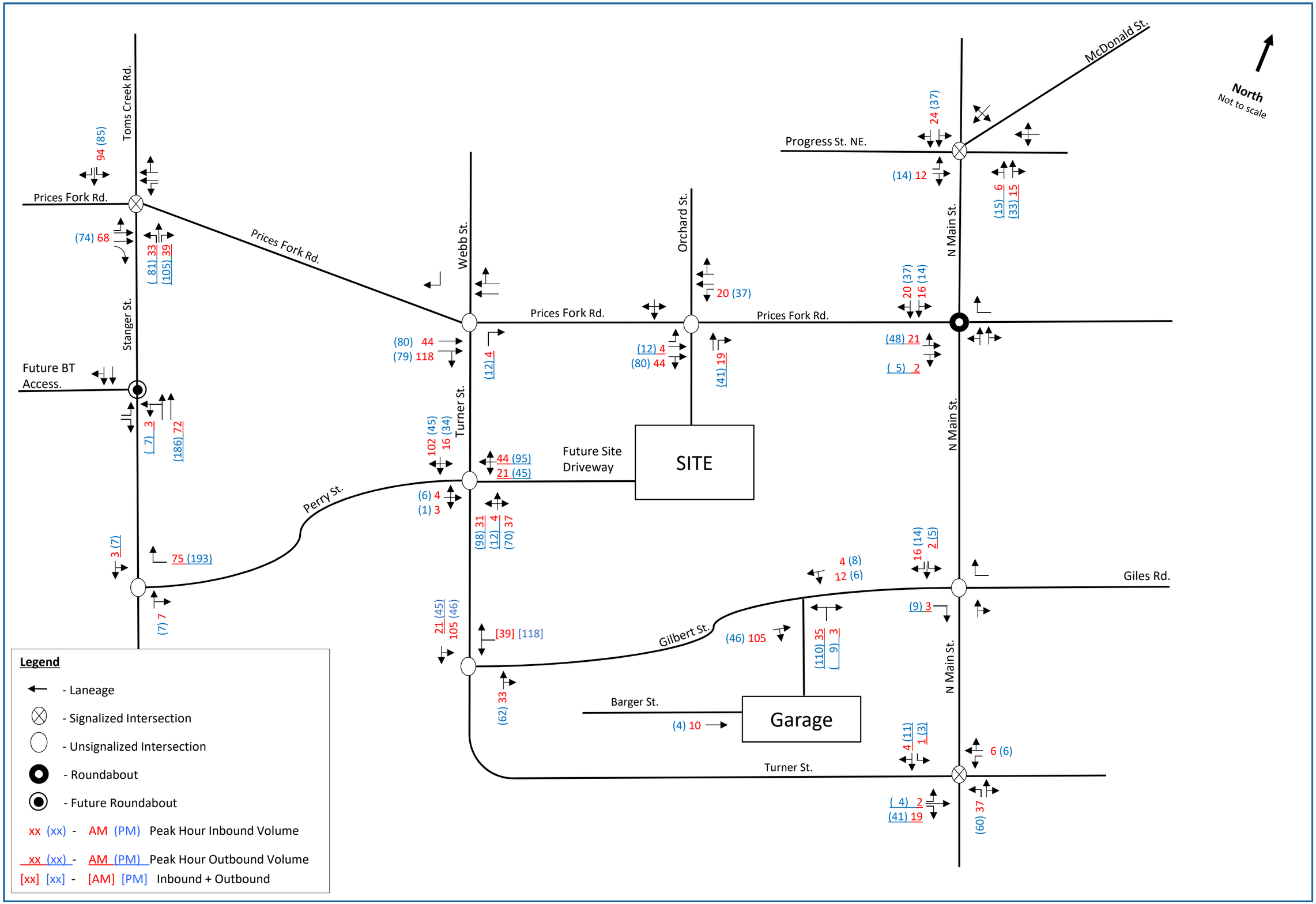


Figure 6

Gilbert Street Mixed-Use Development - Blacksburg, VA
Total Site Generated Traffic



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4 Future Conditions

4.1 Background Traffic Volume

Background traffic growth is the increase in traffic volumes due to usage increase and non-specific growth throughout an area. The methodology used to determine growth rate was based on historical ADT data from 2013 to 2017 through the *VDOT Daily Traffic Volume Estimates including Vehicle Classification Estimate (Special Locality Report 150- Town of Blacksburg).* After reviewing the data, it was assumed that a separate growth rate was needed for various segments within the study area as follows:

Table 6: Background Traffic Segment Limits – Growth Rates Factor

Segment #	Street Name	From	To	Growth Rate
1	Prices Fork Road	Toms Creek Road	N. Main Street	2.5%
2	N. Main Street	Progress Street	Prices Fork Road	1.5%
3	N. Main Street	Prices Fork Road	Roanoke Street	2.8%

The growth rates were applied to the through volumes within the study area limits over a 3-year period to the generate the 2022 Background volumes, without the proposed Gilbert Street Development. The Background volumes are provided in the Appendix.

4.2 Multi-Modal Transit Facility

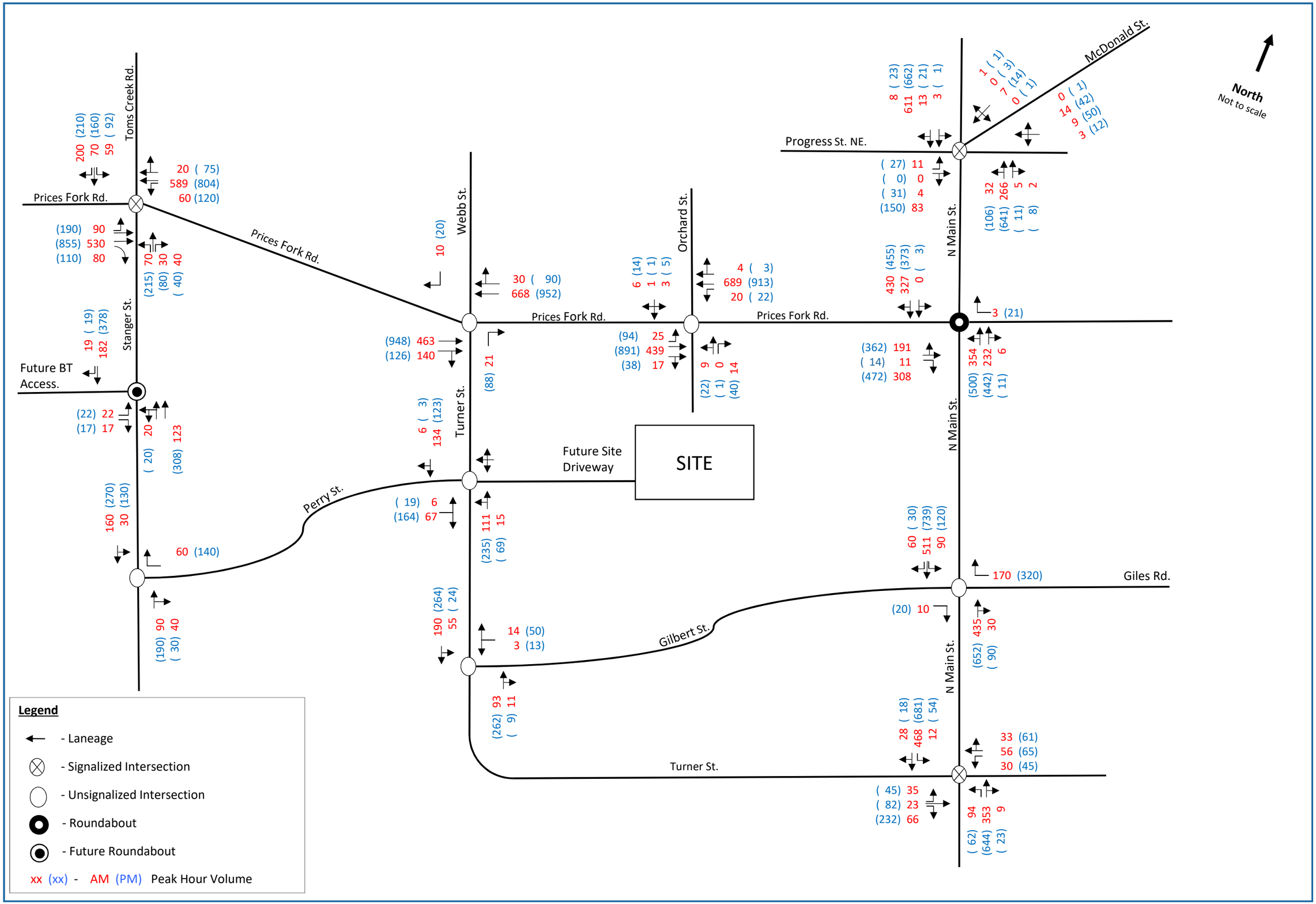
Within the study area, the Town of Blacksburg is constructing a new Multimodal Transit Station that will be located west of Stanger Street between Prices Fork Road and Perry Street. A traffic study was prepared by Whitman, Requardt & Assoc. LLP, on January 28, 2019 that evaluate the main site access along Stanger Street and evaluate various types of traffic control. The study recommended a roundabout be constructed at the main entrance along Stanger Street.

The transit facility has been approved and construction will be complete within the same time frame as the proposed Gilbert Street Development. The transit facility will alter the type of vehicle trips currently using Stanger Street, and the Perry Street connection between Stanger Street and W. Campus Drive will be abandoned. As a result, there will no longer be direct access to the parking facility from Stanger Street, greatly reducing the number of vehicle trips at the Perry Street and Stanger Street intersection. The Multimodal study includes the projected traffic volumes for the main entrance roundabout. These volumes were used to balance the

Background volumes at the adjacent intersections at Prices Fork Road and Perry Street and are included in the Appendix. These revised volumes along Stanger Street were incorporated into the Background volumes with the growth rates to reflect the 2022 No Build network. **Figure 7** illustrates the total No Build traffic in the AM and PM peak periods.

Figure 7

Gilbert Street Mixed-Use Development - Blacksburg, VA
2022 No Build With BT Roundabout



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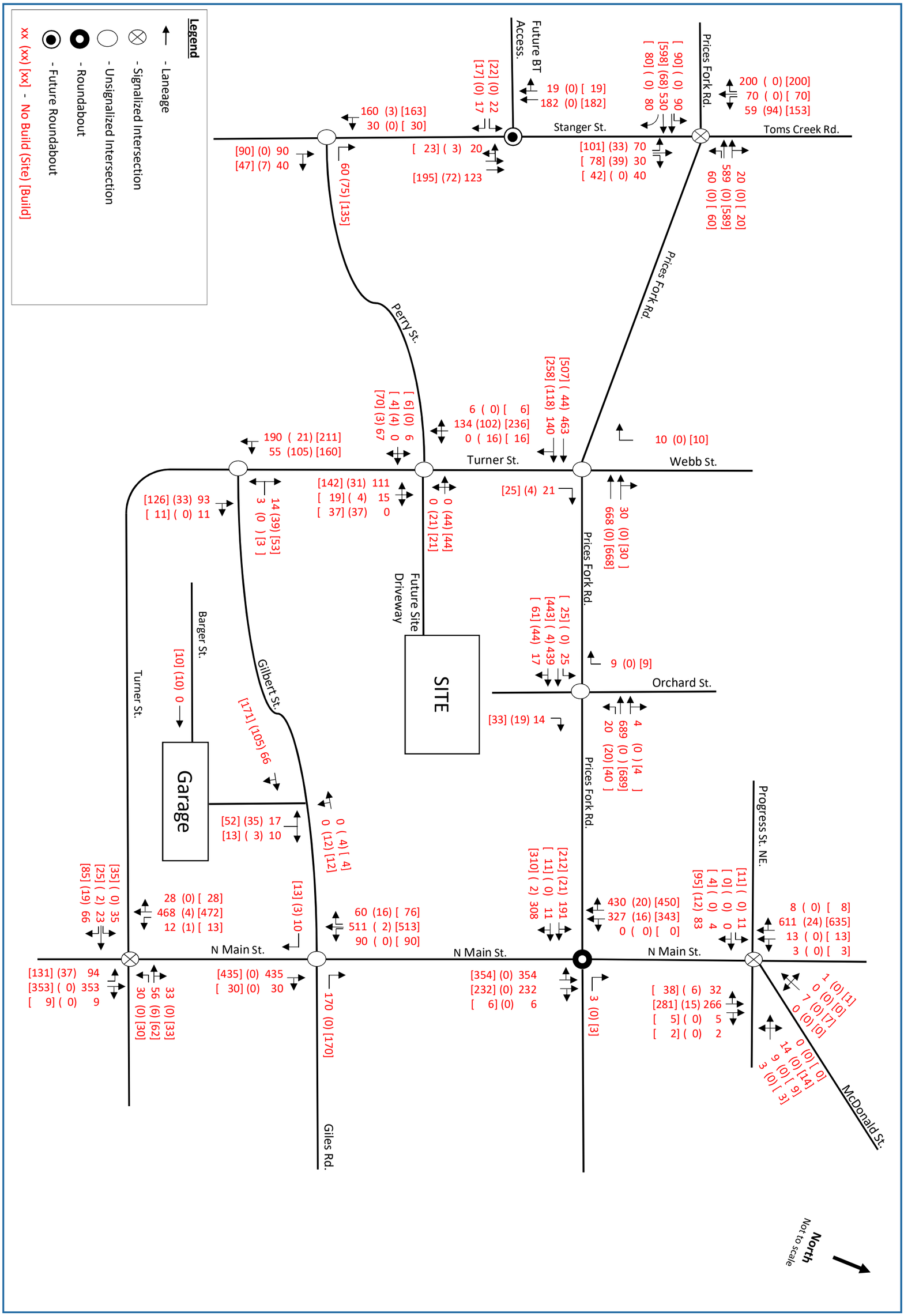
4.2 Future Traffic Volume

Total future traffic volumes represent the addition of traffic generated by the proposed Gilbert Street Development that includes the pedestrian reduction factor combined with Background traffic volumes that include the proposed BT Transfer Station. These resulting volumes are also referred to as “Build” volumes.

- **Figure 8** - Total Build: AM Peak Hour Volumes
- **Figure 9** - Total Build: PM Peak Hour Volumes



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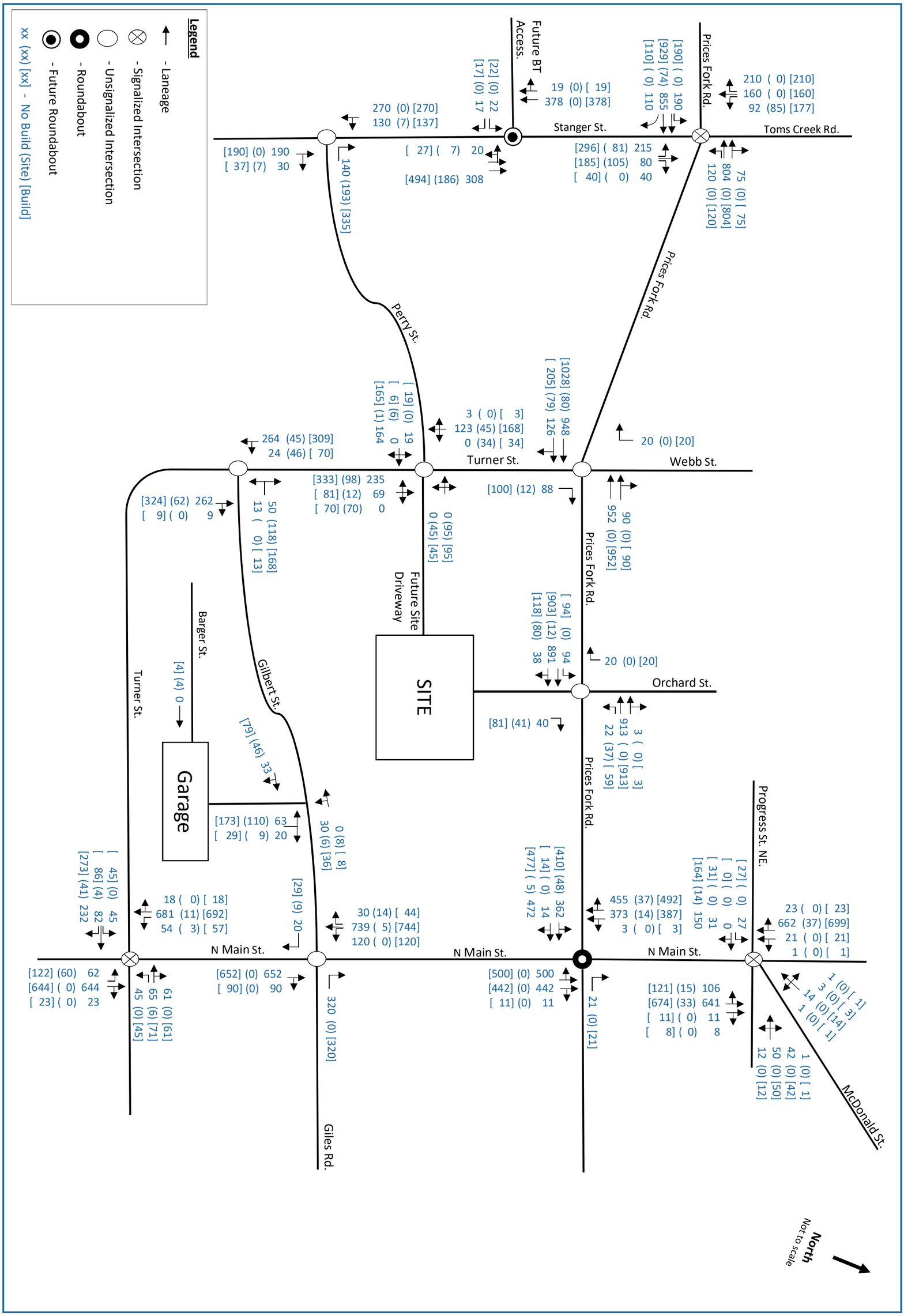
Gilbert Street Mixed-Use Development - Blacksburg, VA

2022 AM Build

Figure 8



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Gilbert Street Mixed-Use Development - Blacksburg, VA

2022 PM Build

Figure 9

5 Analysis

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

- Existing Conditions (2019 data)
- No-Build Conditions (Existing with an applied growth rate and BT Transit Station)
- Build Conditions (No-Build plus proposed development)

Analyses were completed to determine the operating characteristics of study area intersections and roadways using *Synchro Professional 10, which uses methodologies contained in the 2000 Highway Capacity Manual (HCM) [TRB Special Report 209, 2000]*.

Prices Fork Road / Toms Creek Road / Stanger Street Intersection

This signalized intersection currently provides the following laneage:

- Stanger Street (northbound) - one exclusive left-turn lane, one through lane, and one exclusive right-turn lane.
- Toms Creek Road (southbound) - one exclusive left-turn lane, one through lane, and one exclusive right-turn lane.
- Prices Fork Road (eastbound) - one exclusive left-turn lane, two through lanes, and one channelized free flow right-turn lane.
- Prices Fork Road (westbound) - one exclusive left-turn lane, one through lane, and one shared through-right-turn lane.

Table 7 illustrates the delay and level of service (LOS) results for the study area intersection for the three (3) scenarios listed above. Detailed analysis is included in the Appendix:

Table 7: Prices Fork Road / Toms Creek Road / Stanger Street Signalized Intersection Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)		
	Existing	No Build	Build
AM			
Northbound - Stanger Street			
Left	D (38.4)	D (38.4)	D (39.7)
Through	D (46.5)	D (46.5)	D (48.6)
Right	C (32.7)	C (32.7)	C (32.7)
Approach Total	**D (38.4)**	**D (38.5)**	**D (41.5)**
Southbound - Toms Creek Road			
Left	D (39.7)	D (39.7)	D (44.3)
Through	D (50.8)	D (49.1)	D (49.1)
Right	C (31.8)	C (31.9)	C (32.2)
Approach Total	**D (38.5)**	**D (37.0)**	**D (39.4)**
Eastbound - Prices Fork Road			
Left	B (19.1)	B (19.4)	B (19.4)
Through	C (33.9)	C (34.5)	D (35.6)
Right	A (0.1)	A (0.1)	A (0.1)
Approach Total	**C (26.6)**	**C (28.6)**	**C (30.0)**
Westbound - Prices Fork Road			
Left	C (23.0)	C (22.2)	C (22.5)
Through- Right	D (39.3)	D (40.0)	D (40.0)
Approach Total	**D (37.0)**	**D (38.4)**	**D (38.5)**
Intersection Total	**C (33.5)**	**C (34.4)**	**D (35.9)**
PM			
Northbound - Stanger Street			
Left	D (36.2)	C (33.4)	D (38.7)
Through	D (42.4)	D (41.2)	D (45.4)
Right	C (30.4)	C (30.1)	C (30.1)
Approach Total	**D (36.9)**	**C (34.9)**	**D (40.4)**
Southbound - Toms Creek			
Left	D (40.4)	D (40.4)	D (45.5)
Through	E (56.3)	D (54.2)	D (54.2)
Right	C (33.8)	C (33.6)	C (33.6)
Approach Total	**D (43.6)**	**D (42.1)**	**D (43.5)**
Eastbound - Prices Fork Road			
Left	D (46.7)	D (47.2)	D (47.2)
Through	D (44.4)	D (46.3)	D (49.3)
Right	A (0.1)	A (0.1)	A (0.1)
Approach Total	**D (39.0)**	**D (42.0)**	**D (44.5)**
Westbound - Prices Fork Road			
Left	D (43.3)	D (40.9)	D (44.5)
Through- Right	E (62.3)	E (70.2)	E (70.2)
Approach Total	**E (59.4)**	**E (66.7)**	**E (67.1)**
Intersection Total	**D (46.0)**	**D (49.6)**	**D (50.6)**

This intersection operates at an overall LOS C and D, respectively during the existing AM and PM peak periods. For the No Build and Build scenarios, traffic volumes for trips destined to/from Stanger Street were reduced to depict the impacts of the proposed BT station. The reductions along with the proposed site traffic included in the Build scenario result is a LOS D for both the AM and PM peak periods. During the AM peak, this LOS D is less than 3 seconds of delay over existing conditions but crosses the LOS C/D threshold. Overall, the proposed operations provided acceptable levels of service.

Prices Fork Road/ Orchard Street / Site Driveway

This unsignalized intersection currently provides the following laneage:

- Site Driveway (northbound) – one shared left-through lane and one exclusive right-turn lane.
- Orchard Street (southbound) – one shared left-through-right-turn lane.
- Prices Fork Road (eastbound) – one exclusive left-turn lane, one through lane, and one shared through-right-turn lane.
- Prices Fork Road (westbound) – one exclusive left-turn lane, one through lane, and one shared through-right-turn lane.

With the proposed developments, the side streets (northbound and southbound) will be modified to restrict outbound movements to right-out only. This laneage is reflected in the Build scenario only.

Table 8 illustrates the delay and LOS results for the overall unsignalized intersection. Prices Fork Road operates under free conditions under all three scenarios; therefore, data is not provided for the movements. Detailed analysis is included in the Appendix.

Table 8: Prices Fork Road / Orchard Street / Site Driveway Unsignalized Intersection Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)		
	Existing	No Build	Build
AM			
Northbound - Site Driveway			
Left-Through	C (19.9)	C (21.0)	N/A
Right	A (9.0)	A (8.9)	A (9.5)
Approach Total	**B (13.4)**	**B (13.8)**	**A (9.5)**
Southbound - Orchard Street			
Left-Through-Right	C (15.6)	C (16.5)	N/A
Right	N/A	N/A	B (10.9)
Approach Total	**C (15.6)**	**C (16.5)**	**B (10.9)**
Eastbound - Prices Fork Road			
Left	A (9.2)	A (9.4)	A (9.4)
Approach Total	**A (0.5)**	**A (0.5)**	**A (0.4)**
Westbound - Prices Fork Road			
Left	A (8.1)	A (8.2)	A (8.5)
Approach Total	**A (0.2)**	**A (0.2)**	**A (0.5)**
Intersection Total	**A (0.7)**	**A (0.7)**	**A (0.8)**
PM			
Northbound - Site Driveway			
Left-Through	F (78.6)	F (101.8)	N/A
Right	A (9.2)	A (9.4)	A (9.8)
Approach Total	**D (34.7)**	**E (43.3)**	**A (9.8)**
Southbound - Orchard Street			
Left-Through-Right	D (28.6)	D (33.6)	N/A
Right	N/A	N/A	B (12.3)
Approach Total	**D (28.6)**	**D (33.6)**	**B (12.3)**
Eastbound - Prices Fork Road			
Left	B (10.7)	B (11.1)	B (11.1)
Approach Total	**A (1.0)**	**A (1.0)**	**A (0.9)**
Westbound - Prices Fork Road			
Left	A (9.2)	A (9.4)	B (10.0)
Approach Total	**A (0.2)**	**A (0.2)**	**A (0.6)**
Intersection Total	**A (2.1)**	**A (2.3)**	**A (1.2)**

This intersection operates at an overall LOS A during both the existing AM and PM peak periods with the northbound site driveway experiencing some delays during the PM peak period. As part of the development plan, access management strategies are being implemented to restrict the northbound and the southbound Orchard Street approaches to allow right-turns only. With this recommendation, the Build scenario results in an overall LOS A with all movements at a LOS B or better during both the AM and PM peak periods.

Prices Fork / N. Main Street Roundabout

This roundabout intersection currently provides the following laneage:

- N. Main Street (northbound) – one shared left-through lane and one shared through-right-turn lane.
- N. Main Street (southbound) – one shared left-through lane and one shared through-right-turn lane.
- Prices Fork Road (eastbound) – one shared left-through lane and shared one through-right lane.
- Commercial Parking Lot (westbound) – one exclusive right-turn lane.

Table 9 illustrates the delay and LOS results for the overall roundabout intersection for the three (3) scenarios listed above. While this roundabout is modeled in the overall Synchro network, the LOS analysis was performed using Sidra Intersection 8, which is the preferred software for VDOT and Town of Blacksburg for roundabout operations. Detailed analysis is included in the Appendix.

Table 9: Prices Fork / N. Main Street Roundabout Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)		
	Existing	No Build	Build
AM			
North Approach	B	B	B
South Approach	A	A	A
East Approach	A	A	A
West Approach	A	A	A
Intersection	**A**	**A**	**A**
PM			
North Approach	B	C	C
South Approach	B	C	C
East Approach	A	A	B
West Approach	B	B	B
Approach Total	**B**	**B**	**C**

This roundabout intersection operates at an overall LOS A and B during both the AM and PM peak periods, respectively. Under Build conditions, the roundabout will drop to LOS C during the PM peak period, which is an acceptable operation.

N. Main Street / Progress Street / McDonald Street

This signalized intersection is a non-traditional configuration with 5-legged configuration that currently provides the following laneage:

- N. Main Street (northbound) – one shared left-through lane and one share through-right-turn lane.
- N. Main Street (southbound) – one shared left-through lane and one shared through-right-turn lane.
- McDonald Street (southwest bound) – one shared left-through-right-turn lane.
- Progress Street NE (eastbound) – one exclusive left-turn lane and one shared through-right-turn lane.
- Progress Street NE (westbound) – one shared left-through-right-turn lane.

Table 10 illustrates the delay and LOS results for the overall signalized intersection for the three (3) scenarios listed above. Detailed analysis is included in the Appendix.

Table 10: N. Main Street / Progress Street / McDonald Street Signalized Intersection Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)		
	Existing	No Build	Build
AM			
Northbound - N. Main Street			
Left-Through	A (3.1)	A (3.2)	A (3.2)
Through- Right	A (3.1)	A (3.2)	A (3.2)
Approach Total	**A (3.1)**	**A (3.2)**	**A (3.2)**
Southbound - N. Main Street			
Left-Through	A (4.7)	A (4.8)	A (4.9)
Through- Right	A (4.7)	A (4.8)	A (4.9)
Approach Total	**A (4.7)**	**A (4.8)**	**A (4.9)**
Southwest bound – McDonald Street			
Left-Through Right	E (69.6)	E (69.6)	E (69.6)
Approach Total	**E (69.6)**	**E (69.6)**	**E (69.6)**
Eastbound - Progress Street NE			
Left	E (64.1)	E (64.1)	E (64.0)
Through-Right	E (63.5)	E (63.5)	E (63.5)
Approach Total	**E (63.6)**	**E (63.6)**	**E (63.5)**
Westbound - Progress Street NE			
Left-Through-Right	E (65.7)	E (65.7)	E (66.7)
Approach Total	**E (65.7)**	**E (65.7)**	**E (66.7)**
Intersection Total	**B (11.9)**	**B (11.7)**	**B (12.0)**
PM			
Northbound - N. Main Street			
Left-Through	A (7.8)	A (8.1)	A (8.9)
Through- Right	A (7.8)	A (8.1)	A (8.9)
Approach Total	**A (7.8)**	**A (8.1)**	**A (8.9)**
Southbound - N. Main Street			
Left-Through	A (8.7)	A (8.8)	A (9.3)
Through- Right	A (8.7)	A (8.8)	A (9.3)
Approach Total	**A (8.7)**	**A (8.8)**	**A (9.3)**
Southwest bound – McDonald Street			
Left-Through Right	E (67.4)	E (67.4)	E (67.4)
Approach Total	**E (67.4)**	**E (67.4)**	**E (67.4)**
Eastbound - Progress Street NE			
Left	E (57.8)	E (57.8)	E (57.0)
Through-Right	E (59.1)	E (59.1)	E (58.6)
Approach Total	**E (58.9)**	**E (58.9)**	**E (58.4)**
Westbound - Progress Street NE			
Left-Through- Right	F (127.7)	F (127.7)	F (130.2)
Approach Total	**F (127.7)**	**F (127.7)**	**F (130.2)**
Intersection Total	**C (22.1)**	**C (21.8)**	**C (22.1)**

This intersection operates at an overall LOS B and C during for all scenarios during the AM and PM peak periods respectively.

N. Main Street / Turner Street

This signalized intersection currently provides the following laneage:

- N. Main Street (northbound) – one exclusive left-turn lane and one shared through-right-turn lane.
- N. Main Street (southbound) – one exclusive left-turn lane and one share through-right-turn lane.
- Turner Street (eastbound) – one exclusive left-turn lane, one through lane, and one exclusive right-turn lane.
- Turner Street (westbound) – one exclusive left-turn lane and one shared through-right turn lane.

Table 11 illustrates the delay and LOS results for the overall signalized intersection for the three (3) scenarios listed above. Detailed analysis is included in the Appendix.

Table 11: N. Main Street / Turner Street
Signalized Intersection Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)		
	Existing	No Build	Build
AM			
Northbound - N. Main Street			
Left	B (10.6)	B (11.1)	B (11.9)
Through-Right	B (16.4)	B (16.9)	B (16.9)
Approach Total	**B (15.1)**	**B (15.7)**	**B (15.6)**
Southbound - N. Main Street			
Left	A (8.5)	A (8.7)	A (8.7)
Through-Right	B (18.7)	B (19.6)	B (19.6)
Approach Total	**B (18.5)**	**B (19.3)**	**B (19.4)**
Eastbound - Turner Street			
Left	D (37.6)	D (37.6)	D (37.7)
Through	D (36.4)	D (36.4)	D (36.5)
Right	D (36.3)	D (36.3)	D (36.4)
Approach Total	**D (36.7)**	**D (36.7)**	**D (36.7)**
Westbound - Turner Street			
Left	D (37.2)	D (37.2)	D (37.2)
Through- Right	D (38.4)	D (38.4)	D (38.7)
Approach Total	**D (38.1)**	**D (38.1)**	**D (38.3)**
Intersection Total	**C (21.3)**	**C (21.6)**	**C (21.7)**
PM			
Northbound - N. Main Street			
Left	B (12.8)	B (14.5)	B (18.0)
Through-Right	C (22.0)	C (23.8)	C (23.8)
Approach Total	**C (21.2)**	**C (23.0)**	**C (22.9)**
Southbound - N. Main Street			
Left	B (11.9)	B (13.2)	B (13.3)
Through-Right	C (22.9)	C (25.1)	C (25.6)
Approach Total	**C (22.1)**	**C (24.2)**	**C (24.7)**
Eastbound - Turner Street			
Left	D (39.8)	D (39.8)	D (39.9)
Through	D (39.5)	D (39.5)	D (39.6)
Right	D (38.7)	D (38.7)	D (39.2)
Approach Total	**D (39.0)**	**D (39.0)**	**D (39.4)**
Westbound - Turner Street			
Left	D (39.1)	D (39.1)	D (39.2)
Through- Right	D (40.8)	D (40.8)	D (41.1)
Approach Total	**D (40.3)**	**D (40.3)**	**D (40.6)**
Intersection Total	**C (26.6)**	**C (27.8)**	**C (28.1)**

This signalized intersection operates at an overall level of service C during both the AM and PM peak periods for all three (3) scenarios, with all movements operating at a LOS D or better.

Perry Street / Turner Street / Future Site Driveway

This unsignalized T- intersection currently provides the following laneage:

- Turner Street (northbound) – one shared left-through lane.
- Turner Street (southbound) – one shared through-right turn lane.
- Perry Street (eastbound) – one shared left-right turn lane.

With the proposed development, the fourth westbound leg of the intersection will be provided to include the following laneage:

- Site Driveway (westbound) – one shared left-through-right turn lane.

  This driveway will provide a two-way access to the proposed parking deck as well as inbound movements to the parking area underneath the building. In order to provide unimpeded access to the development and mitigate any impacts to the adjacent roadway, there will be no outbound movements provided from the area beneath the building.

Table 12 illustrates the delay and LOS results for the overall unsignalized intersection for the three (3) scenarios listed above. Detailed analysis is included in the Appendix.

Table 12: Perry Street / Turner Street
Unsignalized Intersection Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)		
	Existing	No Build	Build
AM			
Northbound - Turner Street			
Left-Through	A (6.9)	A (6.9)	N/A
Left-Through-Right	N/A	N/A	A (6.2)
Approach Total	**A (6.9)**	**A (6.9)**	**A (6.2)**
Southbound - Turner Street			
Through-Right	A (0.0)	A (0.0)	N/A
Left-Through-Right	N/A	N/A	A (0.0)
Approach Total	**A (0.0)**	**A (0.0)**	**A (0.0)**
Eastbound - Perry Street			
Left-Right	A (9.7)	A (9.7)	N/A
Left-Through-Right	N/A	N/A	B (10.9)
Approach Total	**A (9.7)**	**A (9.7)**	**B (10.9)**
Westbound - Site Driveway			
Left-Through-Right	N/A	N/A	C (18.9)
Approach Total	**N/A**	**N/A**	**C (18.9)**
Intersection Total	**A (4.7)**	**A (4.7)**	**A (5.7)**
PM			
Northbound - Turner Street			
Left-Through	A (6.5)	A (6.5)	N/A
Left-Through-Right	N/A	N/A	A (6.6)
Approach Total	**A (6.5)**	**A (6.5)**	**A (6.6)**
Southbound - Turner Street			
Through-Right	A (0.0)	A (0.0)	N/A
Left-Through-Right	N/A	N/A	A (1.4)
Approach Total	**A (0.0)**	**A (0.0)**	**A (1.4)**
Eastbound - Perry Street			
Left-Right	B (11.3)	B (11.3)	N/A
Left-Through-Right	N/A	N/A	D (29.2)
Approach Total	**B (11.3)**	**B (11.3)**	**D (29.2)**
Westbound - Site Driveway			
Left-Through-Right	N/A	N/A	F (239.5)
Approach Total	**N/A**	**N/A**	**F (239.5)**
Intersection Total	**A (6.6)**	**A (6.6)**	**E (41.7)**

The T-intersection will operate at LOS A during both the AM and PM peak periods under both existing and No Build conditions.

With the proposed development, the Build scenario reflects a four-legged intersection with two-way stop operations along Perry Street and the Site Driveway. This operation operates at a LOS A during the AM peak period, however, during the PM, the LOS drops to a LOS E with significant delays along the site driveway.

If this intersection was operated as a four-way stop control, the intersection would operate at LOS A and C during the AM and PM peak periods, respectively, with the site delay being reduced to 12.3 seconds during the PM peak, which is a LOS B.

The four-way stop will increase delay along Turner Street, however, it will be 28.4 seconds northbound and 12.7 seconds southbound, and the overall queues will be less than 165‘ on any given approach.

Furthermore, given the anticipated pedestrian movements at this intersection, a four-way stop will allow all movements and be aware of pedestrian movements.

Stanger Street / Future BT Access

This future roundabout intersection is planned to provide the following laneage:

- Stanger Street (northbound) – one shared left-through lane and one through lane.
- Stanger Street (southbound) – one through lane and one shared through-right lane.
- Future BT Access (eastbound) – one exclusive right-turn lane and one exclusive left-turn lane.

Table 13 illustrates the delay and LOS results for the overall roundabout intersection for the no build and build scenarios. Detailed analysis is included in the Appendix to include both LOS.

Table 13: Stanger Street / Future BT Access Roundabout Level of Service

Approach	Level of Service per Movement by Approach (delay in sec/veh)	
	No Build	Build
AM		
North Approach	A	A
South Approach	A	A
West Approach	A	A
Intersection	**A**	**A**
PM		
North Approach	A	A
South Approach	A	B
West Approach	A	A
Approach Total	**A**	**B**

This roundabout is projected to operate at LOS A under the No Build scenarios for both the AM and PM peak periods. Under Build conditions, the roundabout will continue to operation at acceptable LOS of A for the AM and LOS B during the PM peak period.

Study Area Intersections with Minor Impacts

Within the study area, travel patterns for vehicle trips to and from the site have been routed through eleven (11) intersections with some intersections having minimal variations between the scenarios given their location within the study area or the access management controls that prohibit full movement access. **Table 14** illustrates the overall LOS for the AM and PM peak for the Build scenario, which demonstrates a LOS A. A detailed analysis for these intersections for all three (3) scenarios for both peak periods is provided in the Appendix.

Table 14: Minor Intersections
Unsignalized Intersection Overall Level of Service

Intersection	2022 Build LOS (delay)	
	AM Peak	PM Peak
Prices Fork Road / Turner Street / Webb Street	A (0.2)	A (0.5)
N. Main Street / Gilbert Street / Giles Street	A (2.4)	A (7.1)
Perry Street and Stanger Street	A (3.5)	A (5.9)
Gilbert Street and Turner Street	A (3.6)	A (3.6)

Queuing Analysis

To further evaluate the potential impacts of the Gilbert Street Development, queuing analysis was performed at the site driveways. The primary focus along Prices Fork Road was the westbound left-turn lane movement at the Orchard Street entrance. Similarly, queueing was performed for all movements at the Turner Street / Perry Street intersection.

The results indicate that the currently storage lanes are adequate to accommodate the proposed development. The analysis was performed with the recommended four-way stop at the Turner Street/Perry Street entrance. The results indicate that a queue of approximately 5-6 vehicles during the peak period, which will not adversely impact adjacent driveway on access points. The maximum queue length in feet (ft) for the Build condition for both the AM and PM peak periods are reported in **Figure 10**.

6 Conclusions and Recommendations

The study area includes roadways and intersections in the immediate vicinity of the proposed development. As currently proposed, the development will moderately increase traffic volumes, with the most notable increase at the proposed Turner Street / Perry Street intersection entrance. Given the mature roadway network, a majority of the study intersections (9 of the 11) provide adequate capacity and acceptable operations without additional improvements, and are summarized below :

1. Prices Fork Road / Toms Creek Street (signalized)
2. Prices Fork Road / Turner Street (RI/RO)
3. Prices Fork Road / N. Main (roundabout)
4. N. Main Street / Progress Street (signalized)
5. N. Main Street / Gilbert Street (unsignalized – channelized)
6. N. Main Street / Turner Street (signalized)
7. Gilbert Street / Turner Street (unsignalized)
8. Perry Street / Stanger Street (unsignalized)
9. Stanger Street / BT Entrance (proposed roundabout)

With the proposed development, intersection improvements are recommended at the two site driveways to address access management enhancements and well as provide for multimodal operations. These recommendations are as follows and are illustrated in **Figure 10**:

Prices Fork Road / Orchard Street (unsignalized)

- Construct a channelized median opening
  - Extends the left-turn storage lanes along Prices Fork Road.
  - Restricts northbound and southbound Orchard Street to outbound right-turn only movements.

Perry Street / Turner Street (unsignalized)

- Construct the westbound approach to provide for a four-legged intersection with a single lane on all four approaches.
  - Allow inbound only movements to the parking area beneath the building (restrict outbound movements).
- Operate intersection as a four-way stop.
- Construct pedestrian crosswalk and ADA ramps.

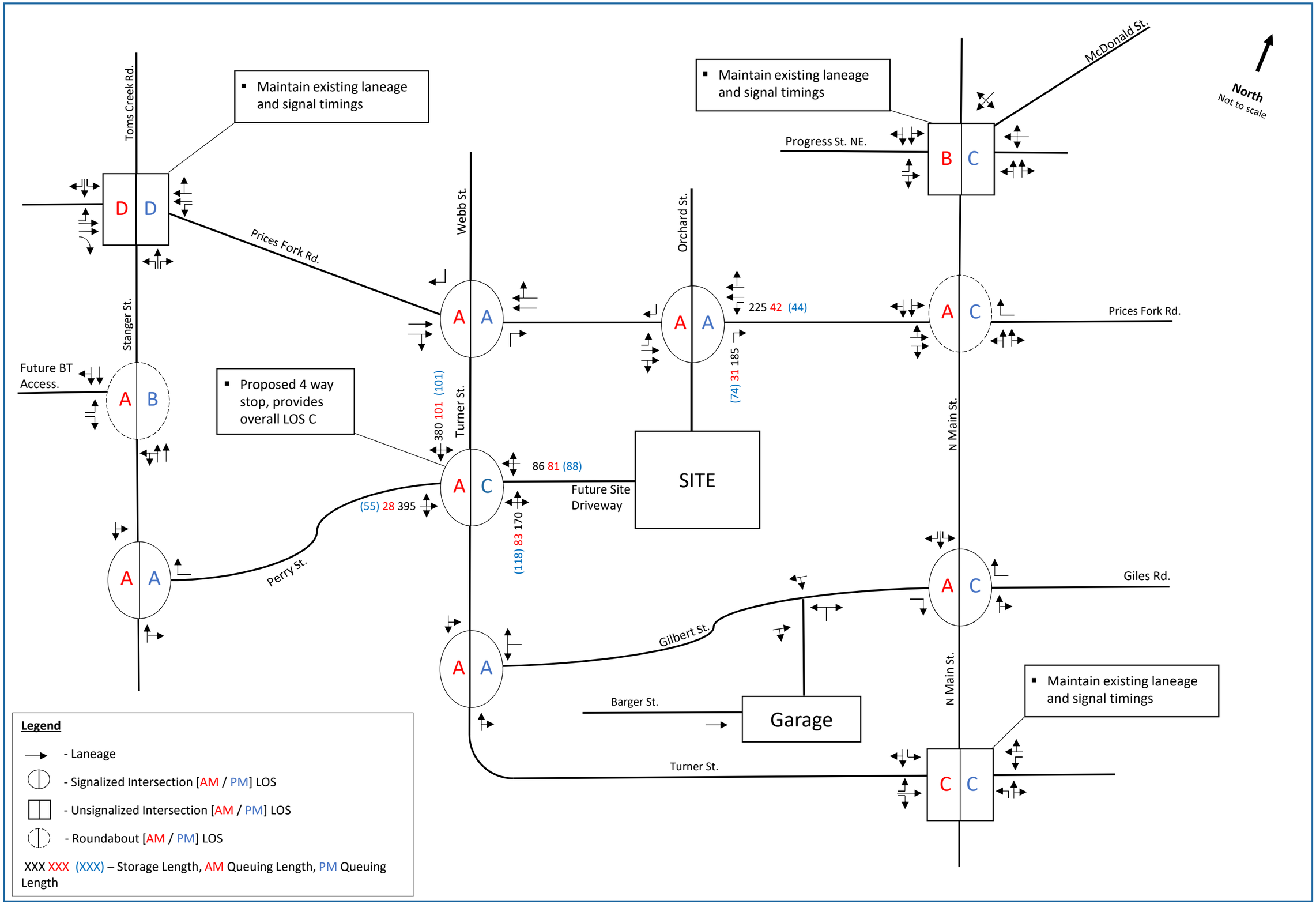

Figure 10

Gilbert Street Mixed-Use Development - Blacksburg, VA
Recommendations

McPherson CONSULTING