

Transportation Impact Study

4131 Chain Bridge Road

City of Fairfax, Virginia

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Executive Summary

The following report presents the findings of a Transportation Impact Study (TIS) conducted for the proposed 4131 Chain Bridge Road development in the City of Fairfax, Virginia. This study was developed in accordance with guidelines and recommendations set forth by the City of Fairfax.

This study was prepared in accordance with the best professional practices and standards in order to assess the impact of the proposed development on the surrounding transportation systems and recommend improvements to lessen or negate those impacts. This study involves the evaluation of anticipated roadway conditions with and without the proposed development and recommends possible transportation improvements and strategies to offset both the impacts of the increase in future traffic demand and the changes in traffic operations and characteristics due to the development. This study serves to assist public officials and developers in balancing interrelations between efficient traffic movements with necessary access.

Site Location and Study Area

The proposed development will be located between the eastern frontage of Chain Bridge Road (Route 123) at Judicial Drive and the western frontage of University Drive (Route 6627) at Breckinridge Lane, to the north of Armstrong Street, in the City of Fairfax, Virginia.

For this study, the analysis presented herein includes five (5) existing intersections and three (3) future intersections.

The study intersections are as follows:

1. University Drive (Route 6627) at Breckinridge Lane
2. University Drive (Route 6627)/George Mason Boulevard at Armstrong Street
3. Chain Bridge Road (Route 123) at West Drive
4. Chain Bridge Road (Route 123) at Armstrong Street
5. Chain Bridge Road (Route 123) at Judicial Drive
6. Chain Bridge Road (Route 123) at Page Avenue/Future FCJC Entrance
7. Chain Bridge Road (Route 123) at New Service Drive (Future)
8. University Drive (Route 6627) at New Service Drive (Future)

Description of Proposed Development

The proposed site is situated on one approximately 2.67-acre parcel of land that can be identified on the City of Fairfax Real Estate Assessment Database with the following Tax Map #: 57-4-02-040. The parcel is currently zoned as RM (Residential Medium) with a Future Land Use of Activity Center, per the Future Land Use Map of the 2035 Comprehensive Plan. Currently, a single-family home is built on the parcel (Davies Property). It should be noted that the trips associated with the existing single-family home are assumed to be negligible and were not removed in the analysis.

The proposed site is a mixed-use development consisting of approximately 276 multi-family residential apartment dwelling units, approximately 6,381 square feet of retail use, and approximately 4,188 square feet of office use along with an approximately 424-space multi-level structured garage. The redevelopment of the site is anticipated to be complete by 2028.

Principal Findings and Conclusions

Discussions regarding the study assumptions and relevant background information were held with the City of Fairfax staff during a scoping meeting on October 23, 2024. A copy of the signed scoping document is included in Appendix A.

The analysis presented in this report supports the following major findings:

- The intersection capacity analysis results for the Future Conditions with Development are similar to Existing and Future Conditions without Development. Therefore, the development will have a minimal impact on the traffic operations and safety of the street network.

Additional assumptions, findings, and conclusions are as follows:

TIA Components

- As determined based on discussions with the City, 1.0% regional growth was applied to the Chain Bridge Road / University Drive mainline through movements at the intersection of Chain Bridge Road at Judicial Street as well as at the intersection of University Boulevard/George Mason Boulevard at Armstrong Street volumes.
- A mode split/TDM reduction of 15 percent was applied to the residential and office uses, as agreed upon with the City.
- The internal trip reduction is based on 10 percent trips between residential, office, and commercial uses, as agreed upon with the City.
- The proposed development is anticipated to generate approximately 115 new trips during the AM peak hour, 142 new trips during the PM peak hour, and 1,505 new daily trips on a typical weekday.

Infrastructure

- Existing vehicular access is provided via one driveway on Chain Bridge Road.
- Access to the site will be provided via two partial-movement right-in/right-out (RIRO) entrances along Chain Bridge Road and University Drive, each connected via an internal new service drive on-site.
- A traffic signal at the future intersection of Chain Bridge Road and Fairfax County Judicial Complex (FCJC) Entrance is the only planned improvement in the study area that will be completed by 2028. The signal at this intersection has already been approved and therefore a signal warrant is not required.

Non-SOV Elements

- Five (5) bus routes provide service in the vicinity of the site, providing regional access to the area.

Analysis Results

- Three (3) intersections within the study area operate below acceptable levels of service under Existing Conditions (2024):
 - Intersection 3: Chain Bridge Road and West Drive
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
 - Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
 - Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (PM Peak)
- The following intersections have approaches that operate below acceptable levels of service under Future Conditions without Development (2028) and continue to do so in Future Conditions with Development (2028):
 - Intersection 3: Chain Bridge Road and West Drive

- Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
- Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
- Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Westbound Approach (AM Peak)
- The intersection capacity analysis results for the Future Conditions with and without Development are similar to Existing Conditions.
- Based on the queuing analysis performed for Future Conditions with Development, the turning movements at the study intersections are anticipated to have 95th percentile queues that can be accommodated within the available storage lengths of the turn bays, except for turn bays at three (3) intersections.
 - Intersection 3: Chain Bridge Road and West Drive
 - Northbound Thru/Right (AM Peak)
 - Southbound Thru/Right (PM Peak)
 - Intersection 4: Chain Bridge Road and Armstrong Street
 - Southbound Left (AM Peak)
 - Intersection 5: Chain Bridge Road and Judicial Drive
 - Northbound Left (AM and PM Peaks)
 - Northbound Thru (AM Peak)
 - Southbound Thru (PM Peak)
- No signal timing adjustment has been proposed as a mitigation measure for the signalized intersections along Chain Bridge Road. This is because all signals along Chain Bridge Road are coordinated and the side street movements run under split phasing. Any adjustment would impact the overall performance of the adjacent intersection and the entire corridor. The side street delays are typical for commuter corridors in Northern Virginia and reflect the prioritization of traffic along the mainlines in order to accommodate the largest possible volume in the area. Therefore, the corridor has a better overall traffic operation than prioritizing all movements equally.

Introduction

The following report presents the findings of a Transportation Impact Study (TIS) conducted for the proposed development of the 4131 Chain Bridge Road in the City of Fairfax, Virginia. This study was developed in accordance with guidelines and recommendations set forth by the City of Fairfax.

The proposed program is a mixed-use development consisting of approximately 276 multi-family residential apartment dwelling units, approximately 6,381 square feet of retail use, and approximately 4,188 square feet of office use along with an approximately 424-space multi-level structured garage. The development of the site is anticipated to be complete by 2028.

The following tasks were completed as part of this study effort:

- A scoping meeting was held with the City of Fairfax on October 23, 2024, which included discussions about the parameters of the study and relevant background information. A copy of the signed scoping document is included in Appendix A.
- Existing conditions were observed in the field to verify roadway geometry, pedestrian and bicycle infrastructure, and traffic flow characteristics.
- Turning movement counts were collected at the study area intersections on Wednesday, November 20, 2024, and on Thursday, December 5, 2024, during the morning and afternoon peak periods.
- Vehicular traffic analysis for the study intersections was performed using *Synchro 11* based on Highway Capacity Manual (HCM) 6th Edition methodology. HCM 2000 methodology was used if HCM 6th Edition was not applicable.
- Intersection capacity analyses were performed for the 2024 existing year, 2028 Future Conditions without Development, and 2028 Future Conditions with Development.
- Future traffic volumes were developed by accounting for regional growth in the area and background developments and roadway improvements. A growth rate of 1.0% per year regional growth was applied to the Chain Bridge Road / University Drive mainline through movements at the intersection of Chain Bridge Road at Judicial Street as well as at the intersection of University Boulevard/George Mason Boulevard at Armstrong Street for the period between 2024 and 2028.
- Proposed site traffic volumes were generated based on the methodology outlined in ITE *Trip Generation*, 11th Edition.
- An assessment of the previous crashes has been conducted at existing study intersections.

Sources of data for this study include the Institute of Transportation Engineers (ITE), the City of Fairfax, the Virginia Department of Transportation (VDOT), and the office files and field reconnaissance efforts by Gorove Slade.

Background Information: Existing Development and Nearby

Description of the Existing Site

Site Location

The proposed development will be located between the eastern frontage of Chain Bridge Road (Route 123) at Judicial Drive and the western frontage of University Drive (Route 6627) at Breckinridge Lane, to the north of Armstrong Street, in the City of Fairfax, Virginia

The geographic scope of the study area was developed in accordance with the City of Fairfax guidance. Figure 1 shows the location of existing and future study intersections.

Description of the Parcel

The proposed site is situated on one approximately 2.67-acre parcel of land that can be identified on the City of Fairfax Real Estate Assessment Database with the following Tax Map #: 57-4-02-040. The parcel map is shown in Figure 2.

Location within Jurisdiction and Region

The site is located between the eastern frontage of Chain Bridge Road (Route 123) at Judicial Drive and the western frontage of University Drive (Route 6627) at Breckinridge Lane, to the north of Armstrong Street, in the City of Fairfax, Virginia as shown in Figure 3.

Comprehensive Plan Recommendations

According to the City of Fairfax 2035 Comprehensive Plan, this site is planned for the Activity Center Place Type (ACPT). The ACPT applies to locations in the City where pedestrian-oriented, mixed-use development is strongly encouraged. The Old Town Fairfax Activity Center encompasses a cultural hub for the City, with a concentration of historic buildings, public services, active open space, and commercial buildings. Old Town Fairfax can also capitalize on its proximity to George Mason University to attract university supported businesses and arts and entertainment venues.

Zoning for the Site and Nearby Uses

The existing zoning for the site is RM (Residential Medium) as shown in Figure 4.



Figure 1: Study Intersections

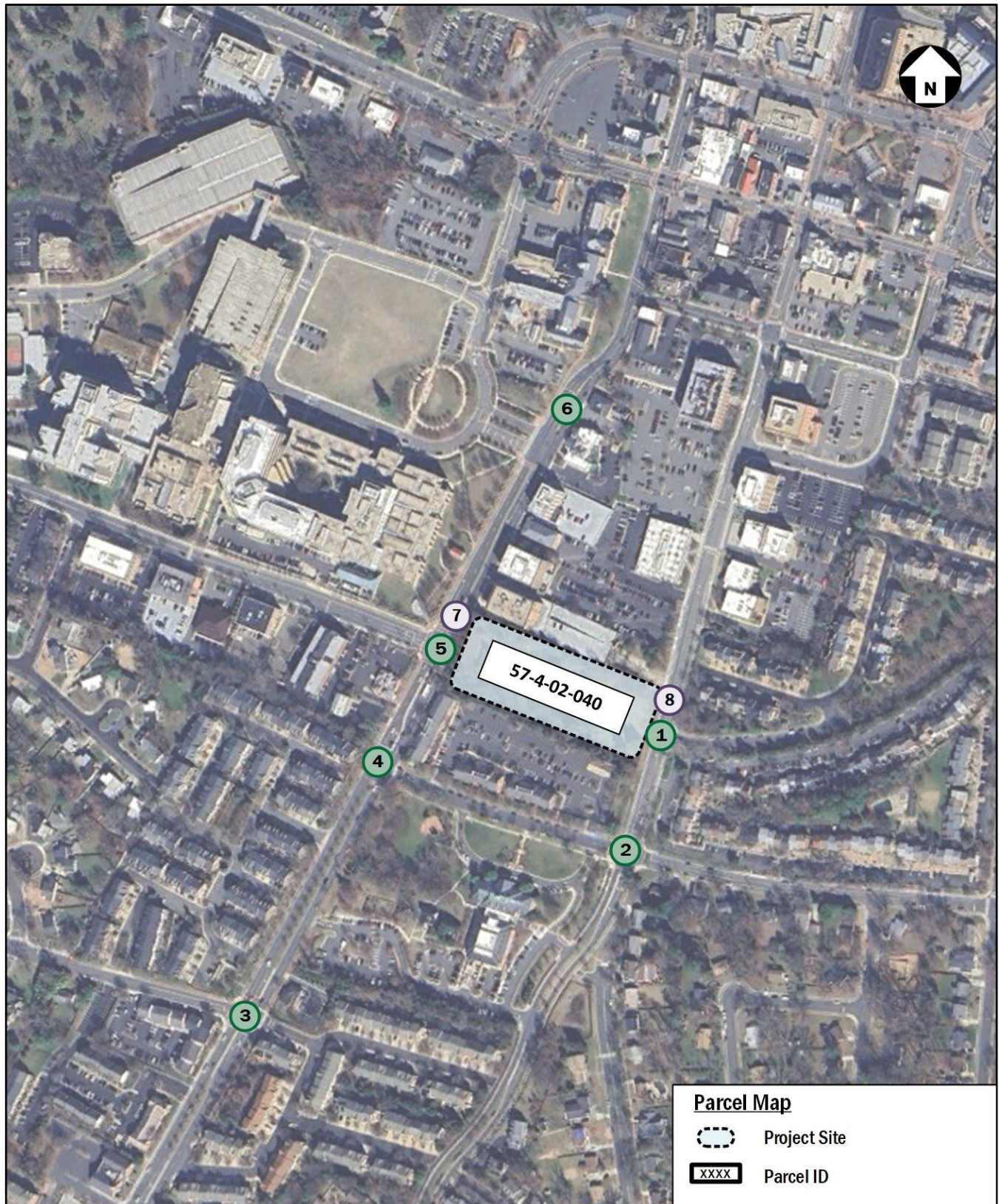


Figure 2: Parcel Map

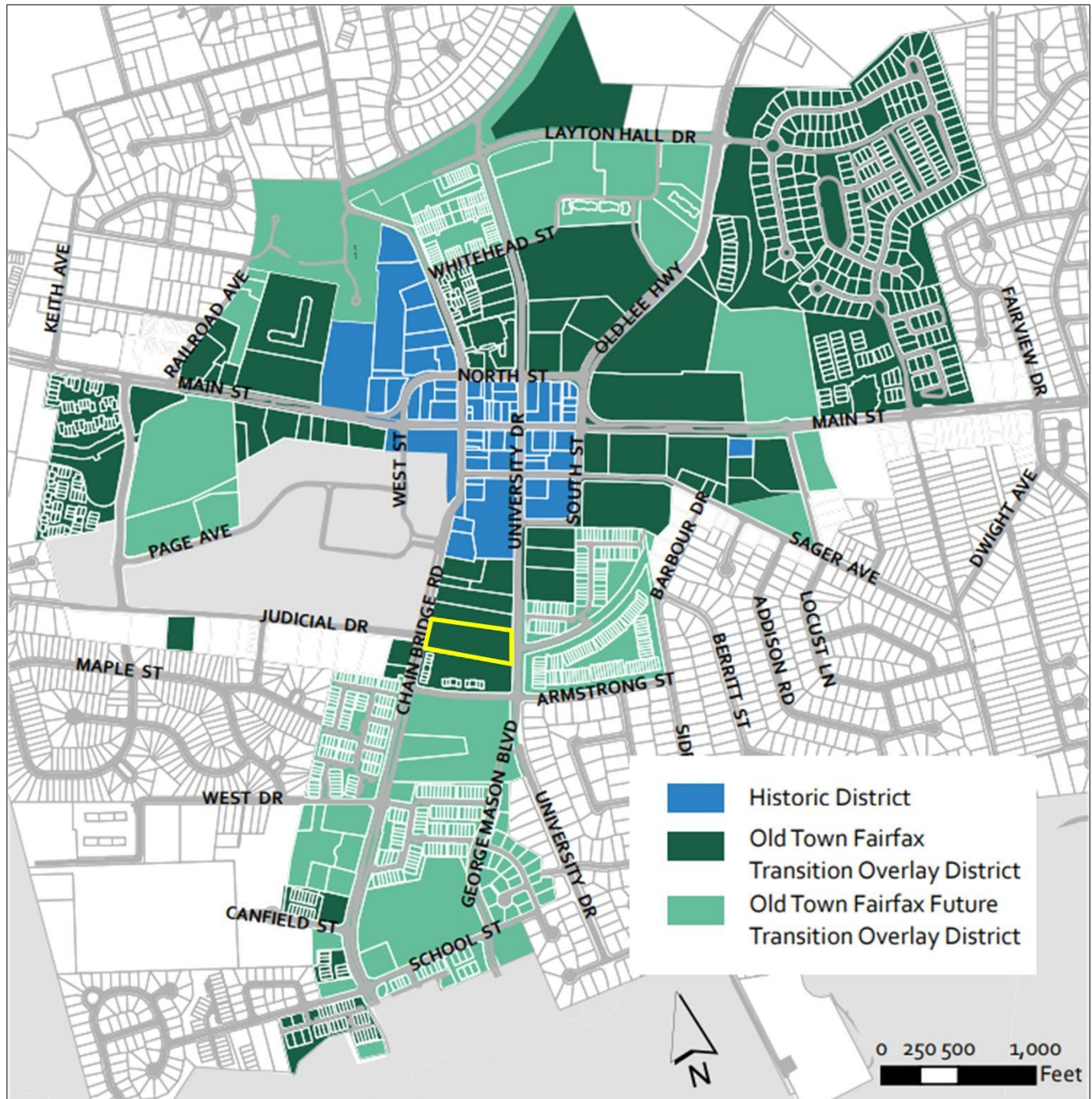


Figure 3: Jurisdiction Location (Source: City of Fairfax 2035 Comprehensive Plan)

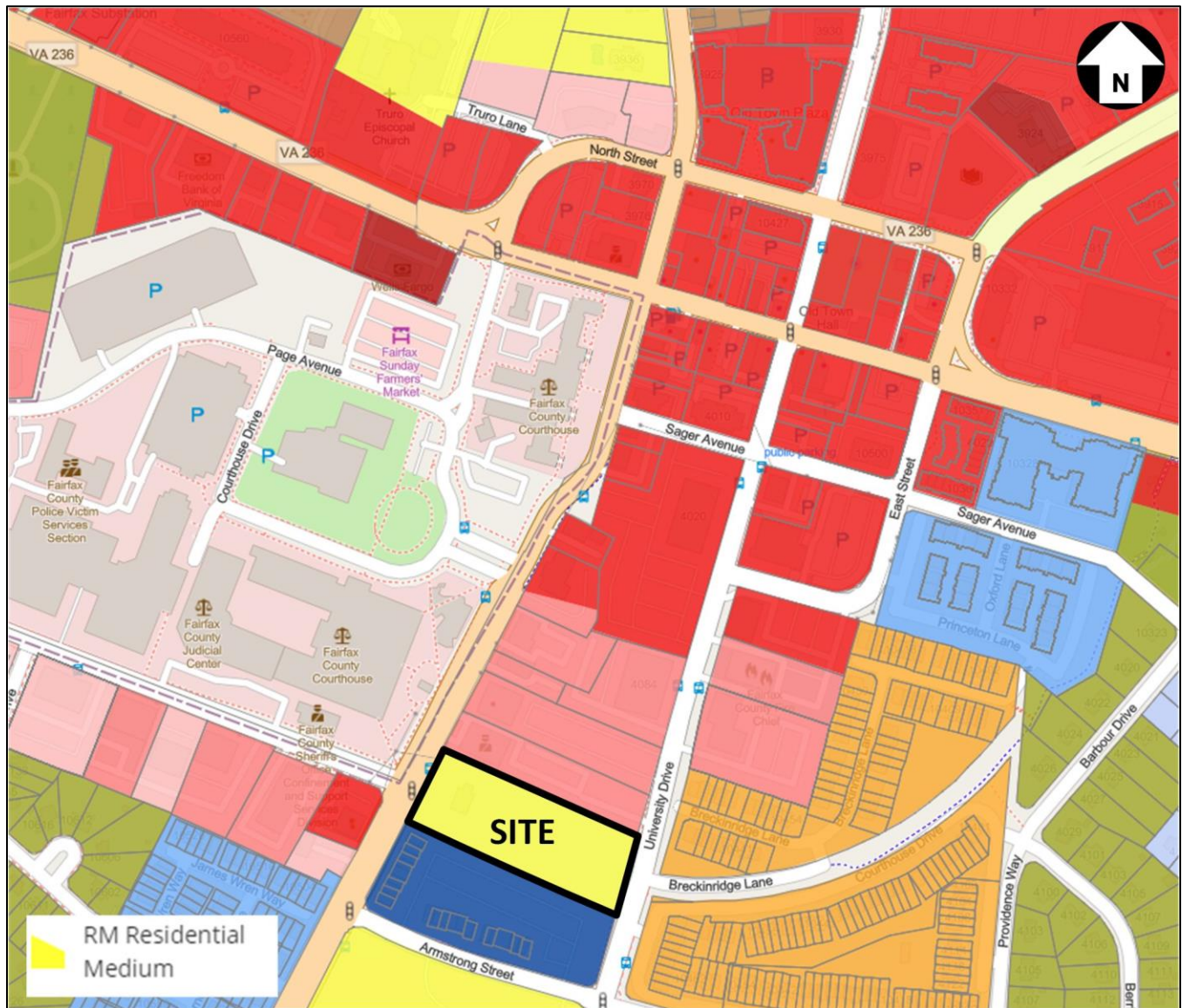


Figure 4: Zoning Map

Description of Geometric Scope and Limits of the Study Area

The geographic scope of the study area was developed in accordance with the City of Fairfax guidance.

Existing Roadways

The site is located between the eastern frontage of Chain Bridge Road (Route 123) at Judicial Drive and the western frontage of University Drive (Route 6627) at Breckinridge Lane, to the north of Armstrong Street, in the City of Fairfax, Virginia

The existing study area includes six (6) existing intersections along Chain Bridge Road and University Drive.

Detailed roadway descriptions are provided in the 2024 Existing Conditions section of this study.

The vehicular study area includes the following existing intersections:

1. University Boulevard (Route 6627) at Breckinridge Lane
2. University Boulevard (Route 6627) at Armstrong Street
3. Chain Bridge Road (Route 123) at West Drive
4. Chain Bridge Road (Route 123) at Armstrong Street
5. Chain Bridge Road (Route 123) at Judicial Drive
6. Chain Bridge Road (Route 123) and Page Avenue/Future FCJC Entrance

Planned Future Transportation Improvements

South Street Extension

The City's recommended extension of South Street to West Street between University Drive and Chain Bridge Road will reroute traffic and relieve congestion on Main Street through Old Town. The extension will also permit the continuation of pedestrian facilities through Old Town. The proposed South Street Extension will provide access to the City Centre site, and as such, will be completed as part of the development of the City Centre site.

The extension is aligned with the City's plans, and thus has a completion date of 2031. The traffic volumes and analysis contained herein are based on the assumption that the South Street extension will be completed by 2031, consistent with the site access plans for the City Centre redevelopment.

Old Town Streetscape Plan & Standards and Main Street Streetscape Design

The Main Street Streetscape Design is part of an overall effort to prepare an Old Town Streetscape Plan and Standards that would improve the appearance and experience of Old Town Fairfax as a destination. These improvements are to be completed by others.

Transit Improvements

According to the City of Fairfax 2035 Comprehensive Plan, bus improvements and bus transfer improvements are proposed in the vicinity of the site. Figure 5 shows the City's proposed transit network enhancements.

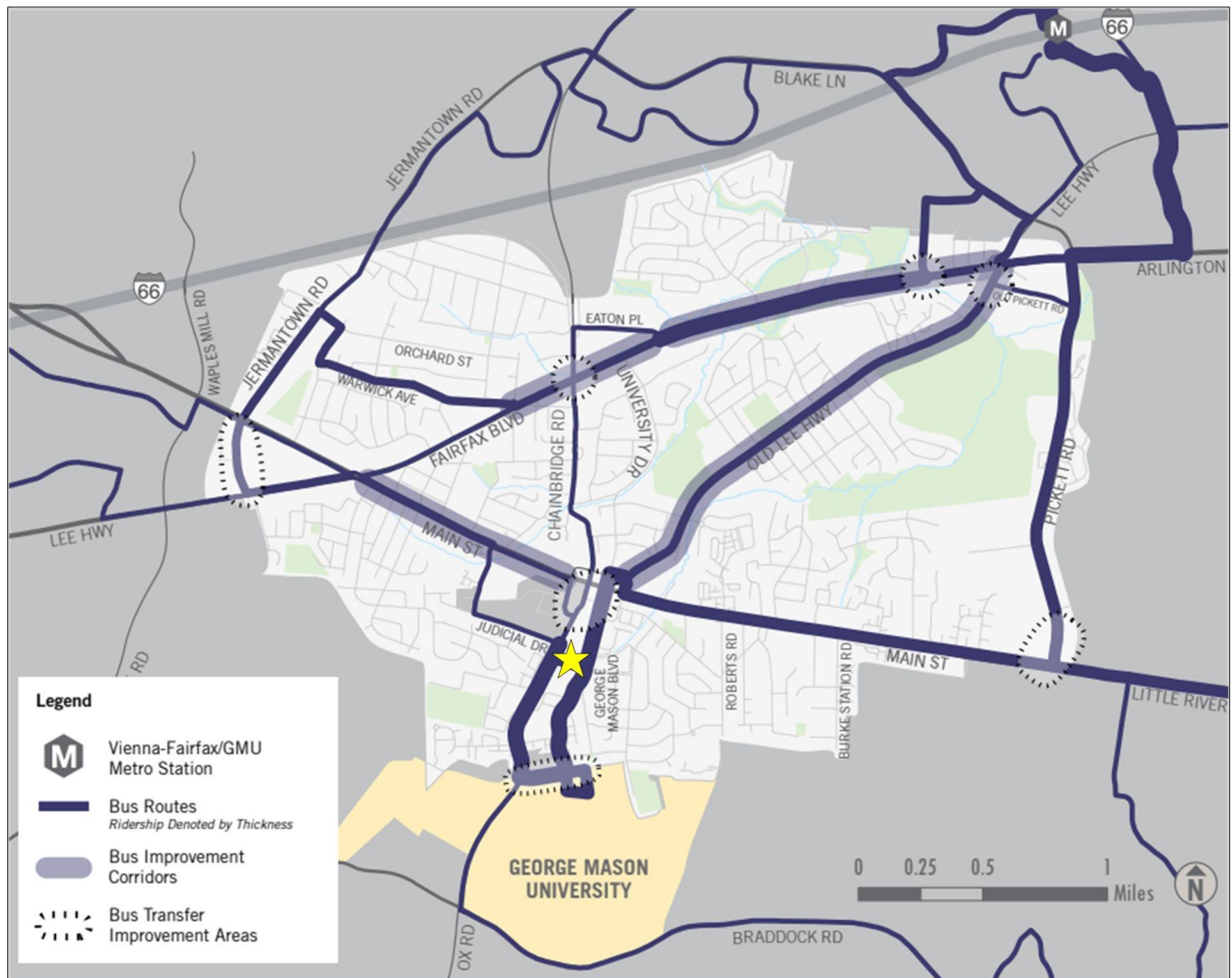


Figure 5: Proposed Transit Network Enhancements (Source: City of Fairfax 2035 Comprehensive Plan)

Bicycle and Pedestrian Improvements

According to the City of Fairfax 2035 Comprehensive Plan, on-street bike facilities and concentrated bicycle supportive infrastructure are proposed along and near Main Street and University Drive in the vicinity of the site. Figure 6 shows the City's proposed network for bicycle travel.

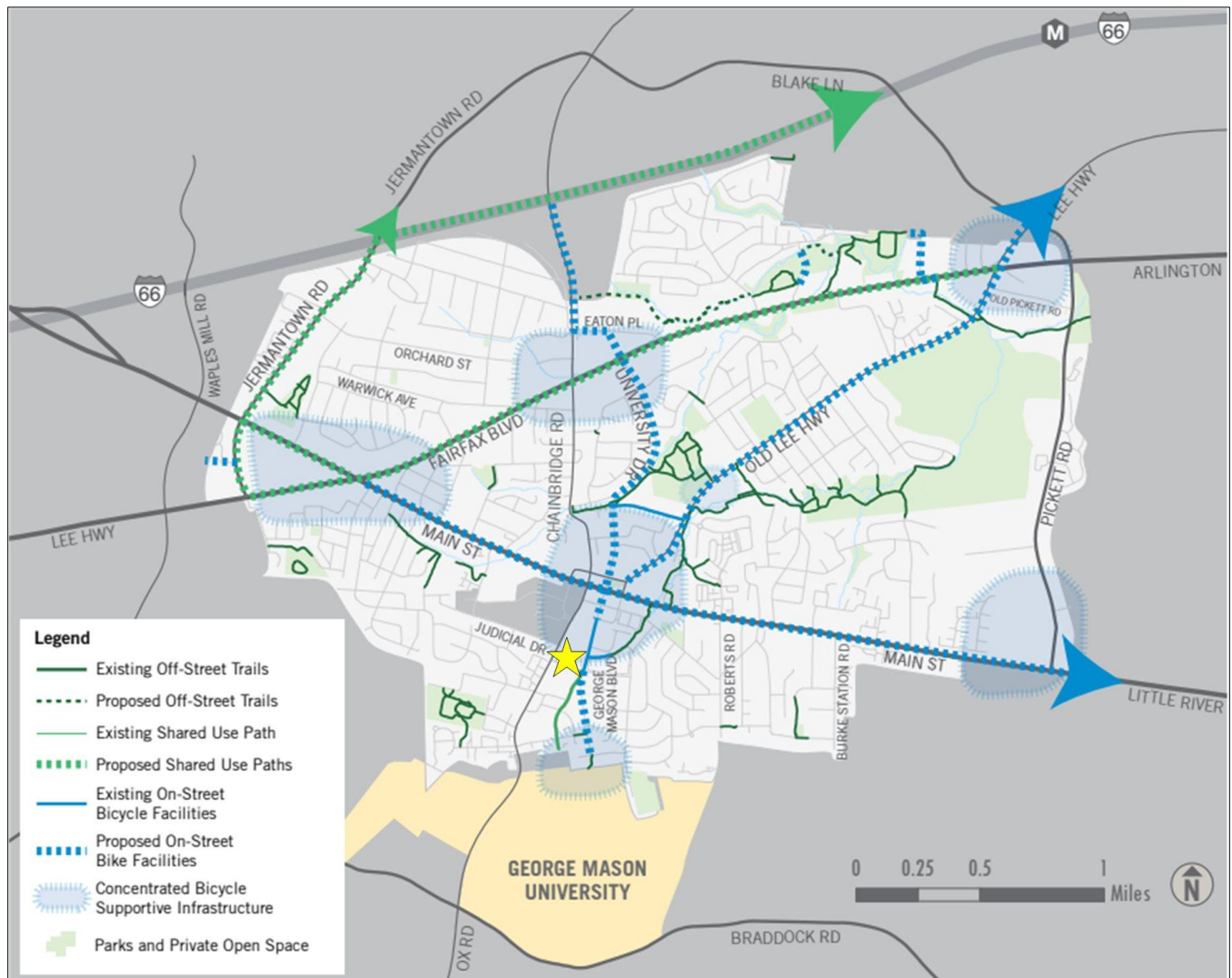


Figure 6: Proposed Network for Bicycle Travel (Source: City of Fairfax 2035 Comprehensive Plan)

Existing Conditions (2024)

In order to project future traffic conditions, it was necessary to create an existing scenario.

A site visit was conducted in order to capture existing conditions along the site perimeter and written descriptions of the conditions observed, noting any deficiencies and substandard conditions of the multimodal facilities present or lacking. The site visit occurred on Wednesday, November 27, 2024.

The site visit indicates locations to improve the multimodal connectivity aspects in and around the site and provides suggestions to improve upon any discontinuous facility segments, lack of crosswalks, or other places with low levels of comfort in the vicinity of the site.

Existing Transit Service

Five (5) bus routes currently serve the site area on Main Street, Chain Bridge Road (Route 123), and University Drive. Bus service is provided by the City of Fairfax CUE Gold and Green Routes, Metrobus Routes 29K and 17G, and Fairfax Connector Route 306. The existing bus routes are shown in Figure 7 through Figure 10.

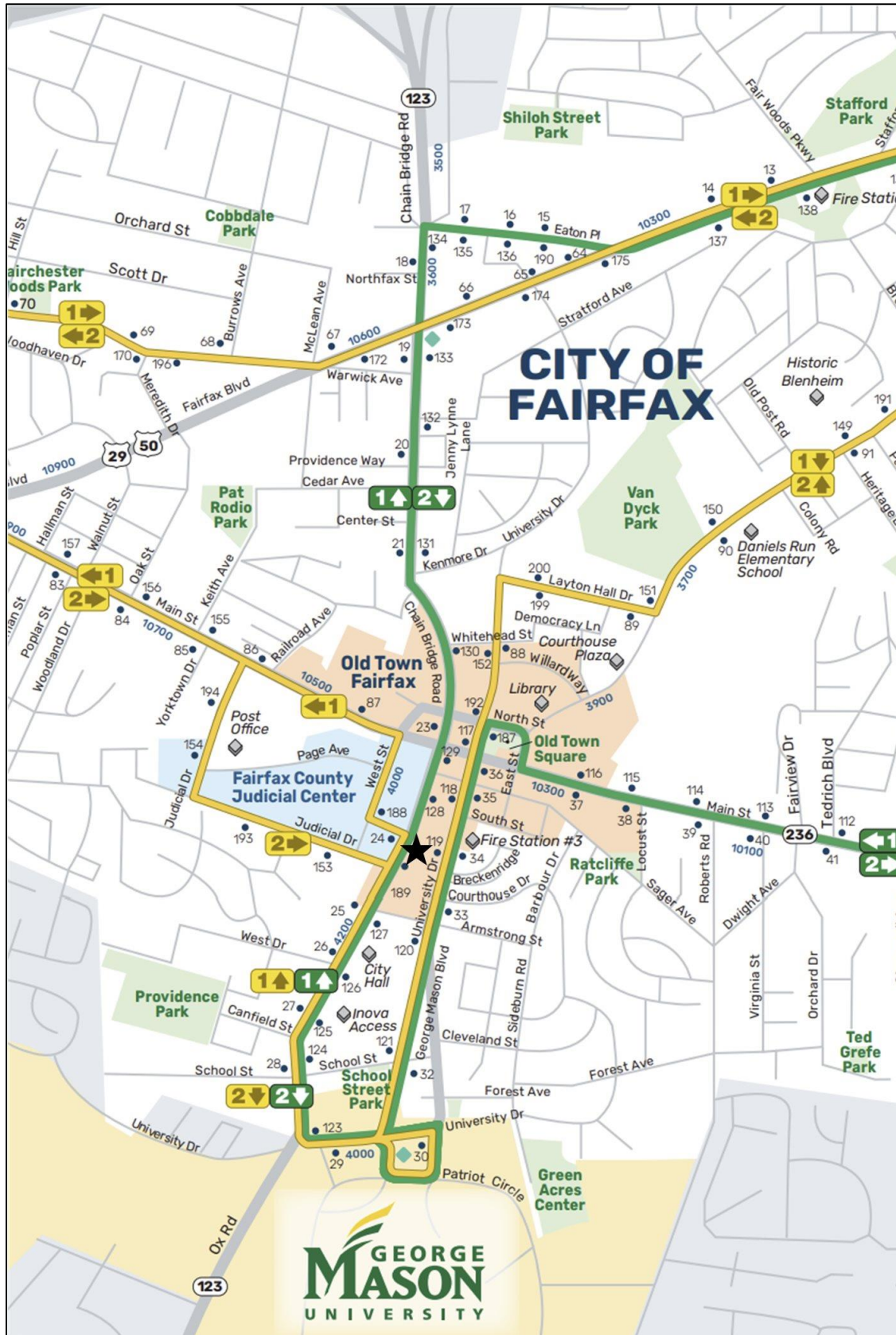


Figure 7: Existing CUE Bus Routes (Source: City of Fairfax)

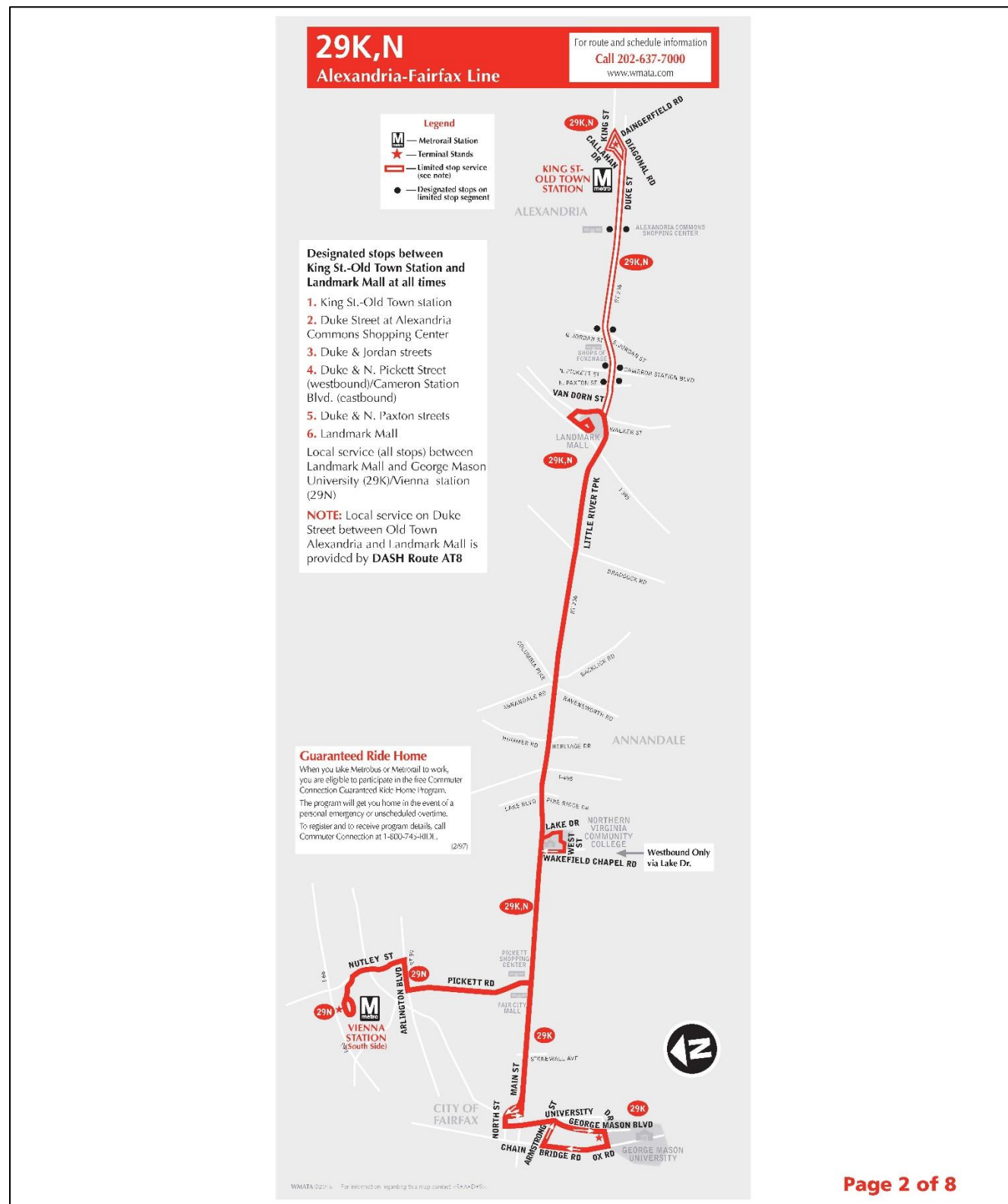


Figure 8: Existing Metrobus Route 29K (Source: WMATA)

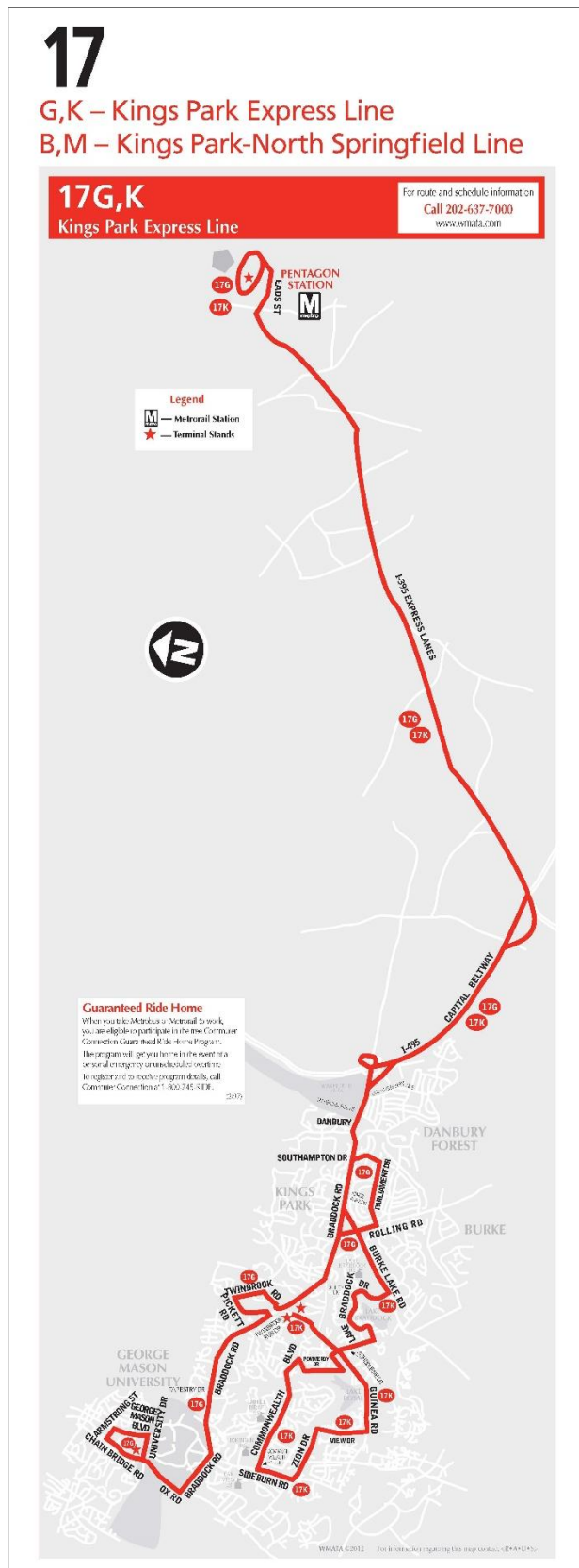


Figure 9: Existing Metrobus Route 17G (Source: WMATA)

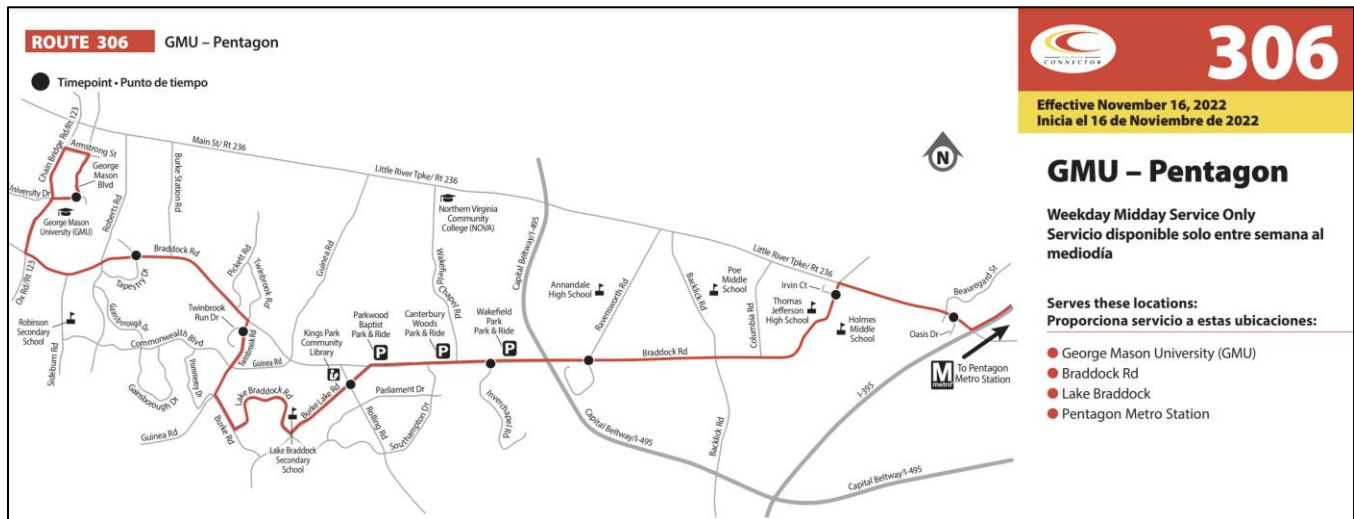


Figure 10: Existing Fairfax Connector Route 306 (Source: Fairfax Connector)

Existing Bicycle Facilities

The roadways adjacent to the site are considered comfortable bicycling routes per the Fairfax County Bicycle Map (which includes the City of Fairfax). Sager Avenue is considered “Most Comfortable,” University Drive is considered “Somewhat Comfortable,” and Chain Bridge Road is considered “Less Comfortable.” Main Street is considered a “Use Caution” bicycling route.

The 10-minute, 20-minute, and 30-minute bicycle travel shed for the proposed development is shown in Figure 11. Within a 10-minute bicycle ride, the proposed development has access to several destinations including George Mason University, public transportation stops, residential neighborhoods, retail zones, and community amenities. Within a 20-minute bicycle ride, the proposed development has access to destinations in Fairfax County including residential neighborhoods and retail zones. Within a 30-minute bicycle ride, the proposed development has access to the Town of Vienna, the Mosaic District, and is accessible to the Vienna/Fairfax-GMU Metro Station served by the Orange Line and the Burke Centre Amtrak/VRE Station.

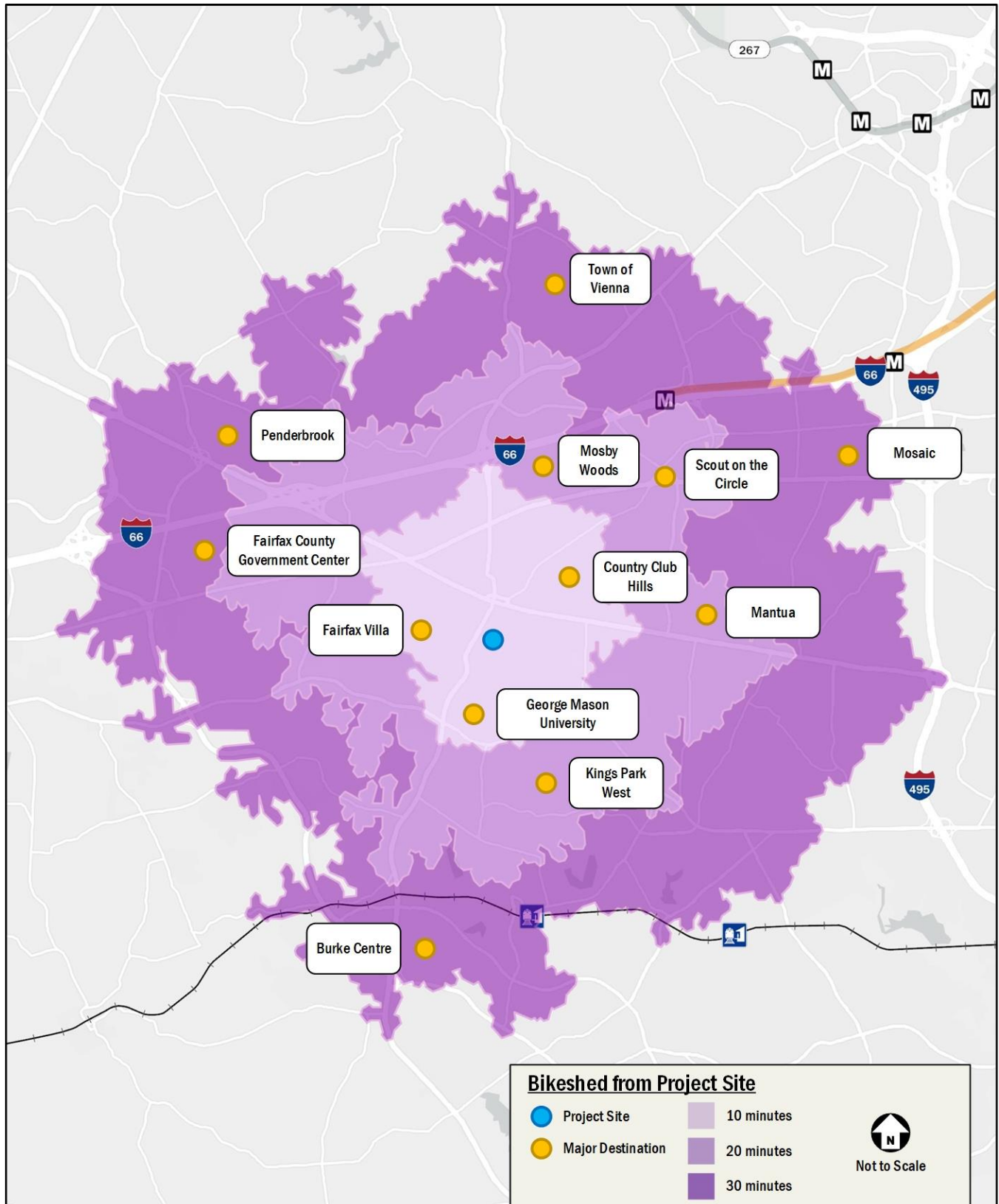


Figure 11: Approximate Bicycle Travel Times

Existing Pedestrian Facilities

Sidewalks and curb ramps generally exist along the corridors adjacent to and within the vicinity of the site. Sidewalks exist on one side of Chain Bridge Road and both sides of University Drive and Sager Avenue along the perimeter of the site, but most driveways lack crosswalks. The signalized intersection of University Drive & Sager Avenue has marked crosswalks with pedestrian signal heads and call buttons in place. The unsignalized intersections of Chain Bridge Road & Sager Avenue and University Drive & Fairfax Volunteer Fire Department Entrance have marked crosswalks in place.

The existing pedestrian infrastructure facilities, including curb ramps, marked striped crossings, and any observed deficiencies are depicted in Figure 12. Of note, this graphic includes these items within a quarter-mile radius walkshed of the site.

The 10-minute, 20-minute, and 30-minute walk travel shed for the proposed development is shown in Figure 13. Within a 10-minute walk, the proposed development has access to several destinations including the Fairfax County Judicial Center, the City of Fairfax Regional Library, public transportation stops, nearby residential neighborhoods, and retail zones. Within a 20-minute walk, the proposed development has access to destinations including City Hall, residential neighborhoods, and retail zones. Within a 30-minute walk, the proposed development has access to destinations including the Stacy C. Sherwood Community Center, United States Postal Service, and residential neighborhoods.



Figure 12: Existing Pedestrian Facilities

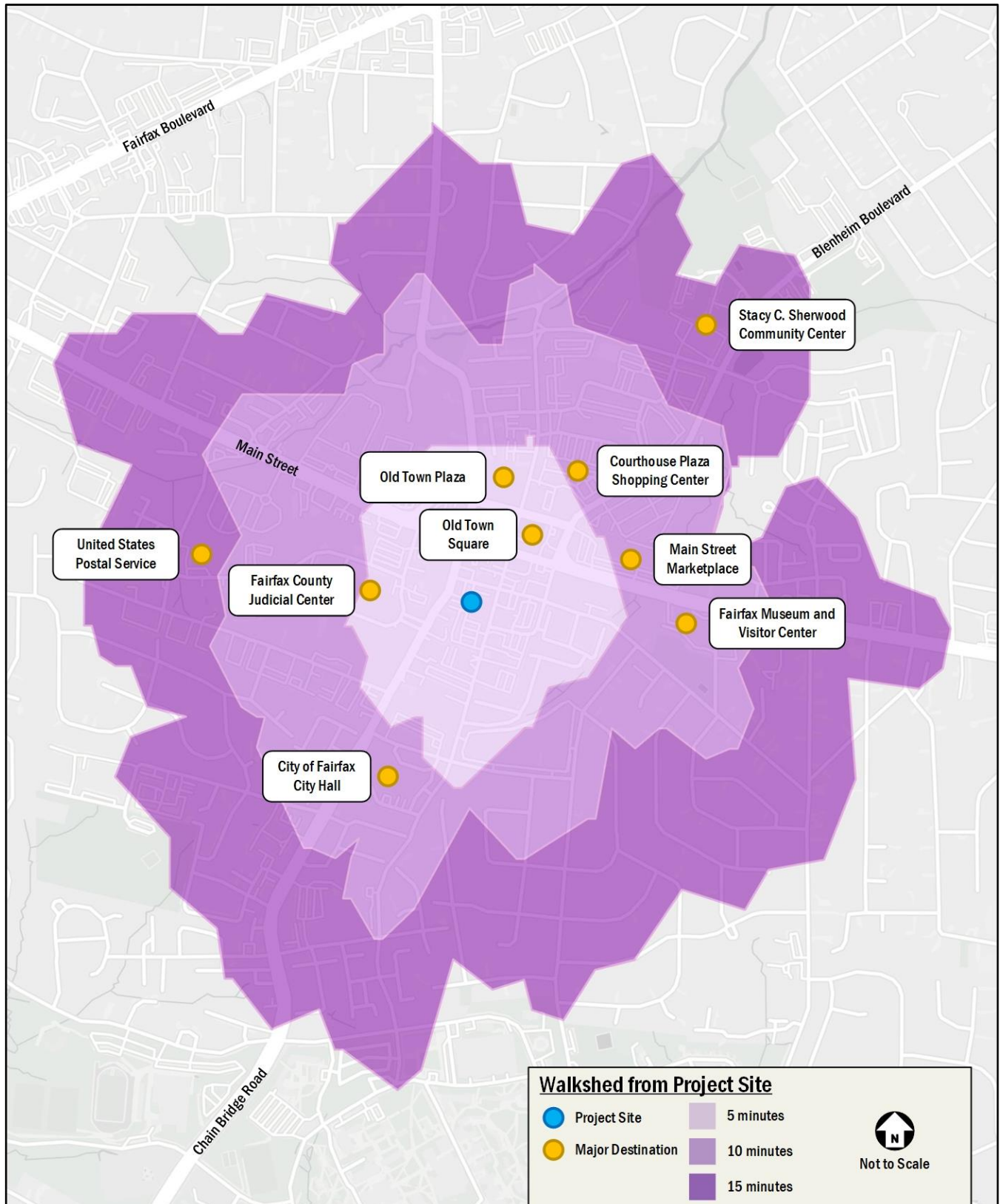


Figure 13: Approximate Pedestrian Travel Times

Existing Roadway Network

A description of the major roadways within the study area is presented in Table 1. The existing lane configurations and traffic control devices at the study intersections are shown in Figure 14.

Table 1: Existing Road Network

Roadway	From	To	VDOT Classification	Lanes	Speed (mph)	On-Street Parking	AADT (vpd)*
Chain Bridge Road	SCL Fairfax	Judicial Drive	Other Principal Arterial	4	30	No	28,000
Chain Bridge Road	Judicial Drive	Main Street	Other Principal Arterial	4	30	No	22,000
Judicial Drive	Page Avenue	Chain Bridge Road	Major Collector	2	25	No	9,000
University Drive	SCL Fairfax	Armstrong St	Major Collector	4	25	No	10,000
University Drive	Armstrong St	South St	Major Collector	4	25	No	15,000
University Drive	South St	SR 236 Main St	Major Collector	4	25	No	11,000

* VDOT 2019 Annual Average Daily Traffic (AADT) Data

Existing Traffic Volumes

Turning movement counts were collected at the study area intersections on Wednesday, November 20, 2024, and Thursday, December 5, 2024. The traffic volumes were balanced using traffic trends in the area and engineering judgment due to two different data collection dates, as appropriate. Analysis of the traffic data found the following system peak hours:

- Weekday Morning (AM) Peak Hour: 8:00 AM to 9:00 AM
- Weekday Afternoon (PM) Peak Hour: 4:15 PM to 5:15 PM

The existing peak hour traffic volumes for the study area intersections are presented in Figure 15. The raw existing turning movement counts are included in Appendix B.



Figure 14: Existing (2024) – Lane Configuration

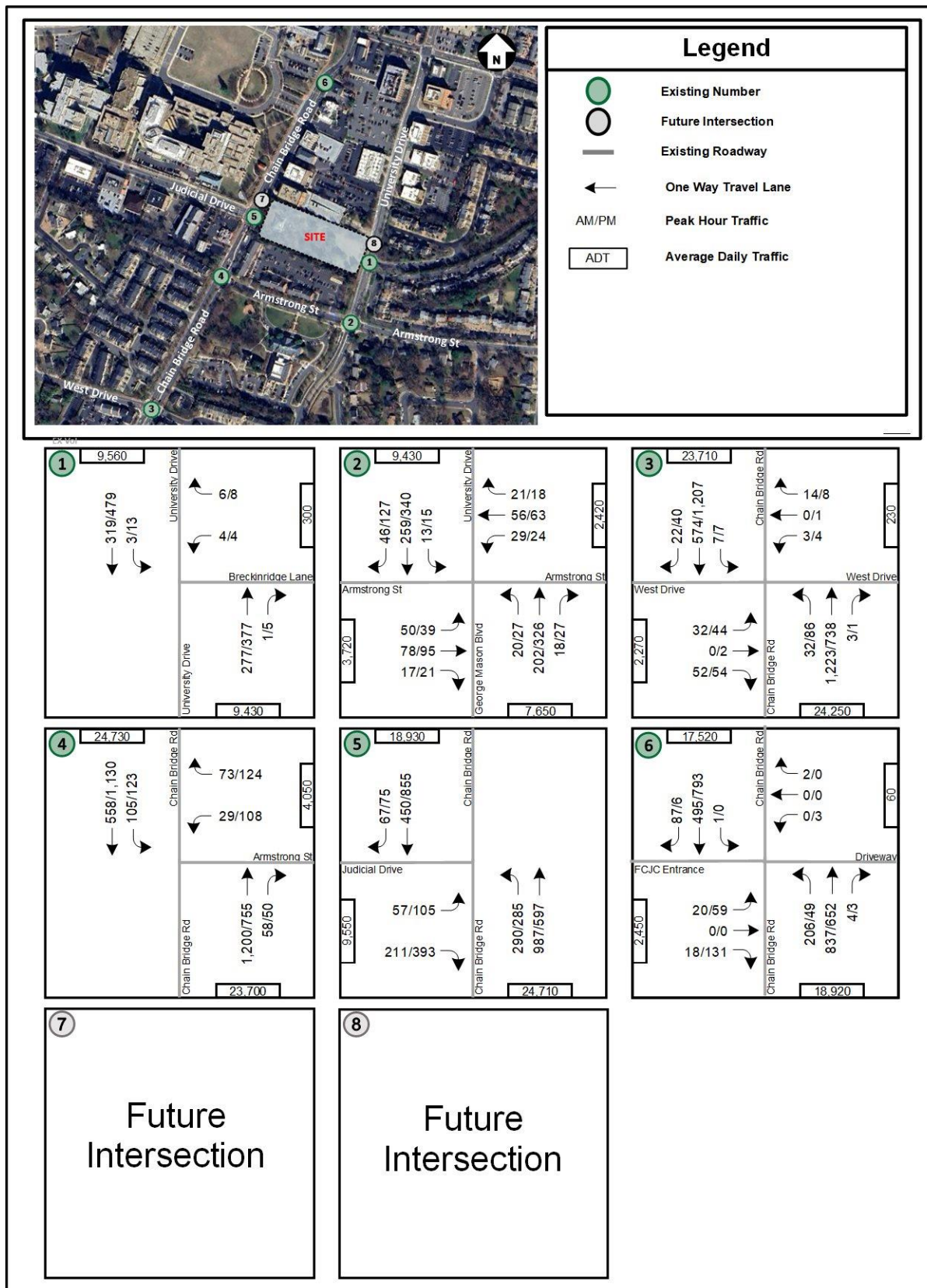


Figure 15: Existing (2024) – Peak Hour Traffic Volumes

Existing (2024) Intersection Analysis

Intersection capacity analysis was performed at the intersections within the study area during the weekday AM and weekday PM hours under Existing Conditions (2024). *Synchro Version 11* was used to analyze the study intersections based on the HCM 6th edition, and if the output is not available, HCM 2000 methodology presented in the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) and analysis guidelines provided in VDOT's Traffic Operations and Safety Analysis Manual (TOSAM) is used. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

Existing signal timings were provided by the city and used as a base for the existing analysis. Existing peak hour factors found in the field were used, except where the field peak hour factor was lower than 0.85 in which case a minimum value of 0.85 was used, consistent with VDOT analysis guidelines. As discussed in the scope, the heavy vehicle percentages (HV%) were based on the existing counts and a default *Synchro* HV% of 2.0% was utilized for all other lane groups.

Per the scoping meeting with the City staff, it would be considered acceptable and/or desirable to achieve an approach LOS D or better for traffic operations using HCM methodology. The results of the intersection capacity analyses from *Synchro* are presented in Table 2 and graphically in Figure 16. The results are expressed in LOS and delay (seconds per vehicle) for overall signalized intersections and per approach and lane group for all study intersections. The overall signalized intersections and any approaches that operate at LOS E or F are displayed in red.

The 95th percentile queues were also determined from *Synchro* and are expressed in feet. The lane groups where the queue lengths exceeded the available effective storage capacity of existing turn lanes are displayed in red.

The description of different LOS and delay are included in Appendix C. The detailed analysis worksheets of 2024 Existing Conditions are contained in Appendix D.

Table 2: Existing (2024) – Intersection Analysis

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour			PM Peak Hour		
			LOS	Delay (sec/veh)	95th % Queue (ft.) [2] [3]	LOS	Delay (sec/veh)	95th % Queue [2] [3]
			Synchro			Synchro		
1	University Drive (NS) & Breckinridge Ln (EW)							
	Overall Intersection (Unsignalized)							
	Westbound Approach		B	11.6		B	13.9	
	Westbound Left/Right	400	B	11.6	3	B	13.9	3
2	Armstrong Street (EW) & University drive/ George mason boulevard (NS)							
	Overall Intersection (Signalized)		B	12.8		B	14.4	
	Eastbound Approach		B	16.1		B	19.6	
	Eastbound Left/Thru/Right	385	B	16.1	108	B	19.6	123
	Westbound Approach		B	15.5		B	18.5	
	Westbound Left/Thru/Right	265	B	15.5	76	B	18.5	84
	Northbound Approach		B	10.1		B	10.9	
	Northbound Left	160	A	8.2	12	A	8.7	15
	Northbound Thru/Right	425	B	10.3	121	B	11.1	201
	Southbound Approach		B	12.4		B	14.3	
	Southbound Left	230	A	8.1	9	A	8.3	10
	Southbound Thru/Right	655	B	12.6	170	B	14.5	272
3	Chain Bridge Road (NS) & West Drive (EW)							
	Overall Intersection (Signalized)		B	19.6		B	19.7	
	Eastbound Approach		E	55.4		E	55.6	
	Eastbound Left	210	E	56.3	60	E	56.5	75
	Eastbound Thru/Right	300	D	54.9	0	D	54.9	0
	Westbound Approach		E	55.9		E	55.9	
	Westbound Left	115	E	56.0	14	E	56.0	15
	Westbound Thru/Right	115	E	55.9	0	E	55.9	0
	Northbound Approach		C	20.6		B	17.0	
	Northbound Left	165	B	11.1	34	B	19.2	75
	Northbound Thru/Right	530	C	20.8	#686	B	16.7	362
	Southbound Approach		B	11.6		A	18.3	
4	Chain Bridge Road (NS) & Armstrong Street (EW)							
	Overall Intersection (Signalized)		B	11.4		C	24.8	
	Westbound Approach		E	64.9		E	74.0	
	Westbound Left/Right	590	E	64.9	86	E	74.0	290
	Northbound Approach		B	10.5		C	26.8	
	Northbound Thru/Right	650	B	10.5	245	C	26.8	431
	Southbound Approach		A	4.7		B	14.8	
	Southbound Left	80	C	21.3	52	B	13.1	69
	Southbound Thru	245	A	1.5	49	B	15.0	263
5	Chain Bridge Road (NS) & Judicial Drive (EW)							
	Overall Intersection (Signalized)		C	22.7		C	32.2	
	Eastbound Approach		D	51.2		D	46.6	
	Eastbound Left	410	E	60.7	103	E	55.9	158
	Eastbound Right	660	D	48.6	87	D	44.1	148
	Northbound Approach		B	17.9		C	26.0	
	Northbound Left	170	B	18.5	228	D	49.8	#352
	Northbound Thru	240	B	17.8	362	B	14.7	121
	Southbound Approach		B	18.9		C	29.6	
	Southbound Thru	475	B	19.3	218	D	30.2	436
	Southbound Right	240	B	16.6	31	C	22.4	42
6	Chain Bridge Road (NS) & FCJC Entrance/Driveway (EW)							
	Overall Intersection (Unsignalized)							
	Eastbound Approach		F	58.7		E	35.0	
	Eastbound Left	120	F	101.8	38	F	81.9	80
	Eastbound Right	120	B	10.9	3	B	13.9	28
	Westbound Approach		B	11.8		E	49.7	
	Westbound Left/Thru/Right	100	B	11.8	0	E	49.7	3
	Northbound Approach							
	Northbound Left	280	B	10.4	25	B	10.0	5
	Southbound Approach							
	Southbound Left	250	B	10.0	0	A	0.0	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[3] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

The intersection capacity analysis results show that the following three (3) intersections have one or more approaches that operate below acceptable levels of service during one or more peak hours under Existing Conditions (2024):

- Intersection 3: Chain Bridge Road and West Drive
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
- Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
- Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (PM Peak)

Based on the queuing analysis performed for existing conditions, the turning movements at the study intersections are anticipated to have 95th percentile queues that can be accommodated within the available storage lengths of the turn bays, except for the following movements:

- Intersection 3: Chain Bridge Road and West Drive
 - Northbound Thru/Right (AM Peak)
 - Southbound Thru/Right (PM Peak)
- Intersection 4: Chain Bridge Road and Armstrong Street
 - Southbound Thru (PM Peak)
- Intersection 5: Chain Bridge Road and Judicial Drive
 - Northbound Left (AM and PM Peaks)
 - Northbound Thru (AM Peak)

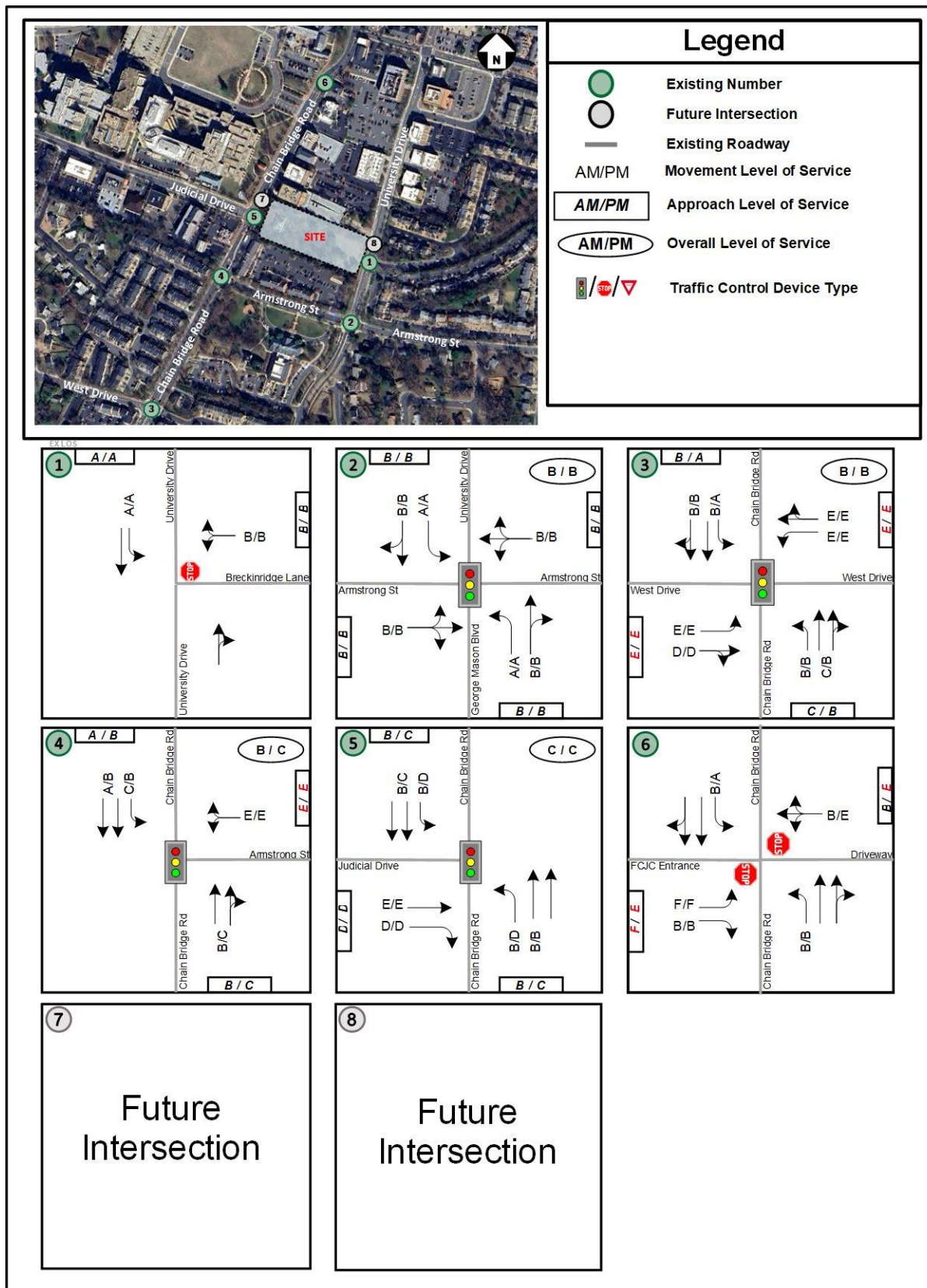


Figure 16: Existing (2024) – Levels of Service

Future Conditions without Development (2028)

Future Conditions without Development (2028) Traffic Volumes

The proposed 4131 Chain Bridge Road development is anticipated to be completed in 2028. The future background traffic volumes were projected by increasing the existing volumes to 2028 using an inherent growth rate. Historical ADT data is shown in Table 3. As determined based on discussions with the City, a 1.0% per year regional growth was applied to the Chain Bridge Road / University Drive mainline through movements at the intersection of Chain Bridge Road at Judicial Street as well as at the intersection of University Boulevard/George Mason Boulevard at Armstrong Street as shown in Figure 17.

Table 3: Historical Growth Rate

Road Segment:	From:	To:	Published VDOT AADT					Growth Rate			
			2015	2016	2017	2018	2019	2015 - 2019	2016 - 2019	2017 - 2019	2018 - 2019
Chain Bridge Road	SCL Fairfax	Judicial Drive	26,000	27,000	28,000	28,000	28,000	2%	1%	0%	0%
Chain Bridge Road	Judicial Drive	Main St Rte 236	20,000	21,000	21,000	21,000	22,000	2%	2%	2%	5%
University Drive (George Mason Blvd)	SCL Fairfax	Armstrong St	11,000	11,000	10,000	10,000	10,000	-2%	-3%	0%	0%
University Drive	Armstrong St	South St	14,000	14,000	14,000	14,000	15,000	2%	2%	4%	7%
University Drive	South St	Main St Rte 236	11,000	12,000	11,000	11,000	11,000	0%	-3%	0%	0%
Judicial Drive	Page Ave	Chain Bridge Rd	9,300	9,400	9,100	9,000	9,000	-1%	-1%	-1%	0%

Source: VDOT Traffic Data (<http://www.virginiadot.org/info/ct-trafficcounts.asp>)

In addition to the regional background growth, three planned developments in the vicinity of the site were taken into consideration. As discussed at the scoping meeting, the following developments were included in the 2028 analysis:

- **One University** – One University is a 10.8-acre site located adjacent to the George Mason University campus in Fairfax County. For the purposes of this analysis, the One University site was anticipated to build 240 affordable senior independent dwelling units and 333 student housing dwelling units by 2028.
- **Fairfax County Judicial Complex** – The Judicial Complex is a 47.8-acre portion of Fairfax County surrounded by the City of Fairfax. A new Master Plan for the complex was completed in January 2021 and a Traffic Impact study was submitted on January 18, 2024. Phase One of the redevelopment project was assumed to be in place by 2028. For the purposes of this analysis, Phase One was anticipated to include 89,683 SF of office uses and 60,317 SF of government related uses (records and evidence storage).
- **City Centre West** – The City Centre West site is currently occupied by a vacant 3,721 SF bank, a vacant 4,408 SF restaurant, and 11,340 SF of office that will all be removed. For the purposes of this analysis, the proposed redevelopment consists of 79 multifamily units, 27,793 SF of general office, 8,584 SF of retail, a 3,510 SF bank, and a 3,865 SF restaurant. The redevelopment was assumed to be in place by 2028 and a Traffic Impact Study was submitted on June 30, 2023.

The background growth is shown in Figure 17 and the background development volumes for One University, Fairfax County Judicial Complex, and City Centre West are shown in Figure 18, Figure 19, and Figure 20 respectively. The total background development volumes are shown in Figure 21. The details outlining the methodologies for volume calculation are provided in Appendix E.

The trips generated by background growth and background development were added to the existing volumes in order to generate Future Conditions without Development (2028) traffic volumes presented in Figure 22.

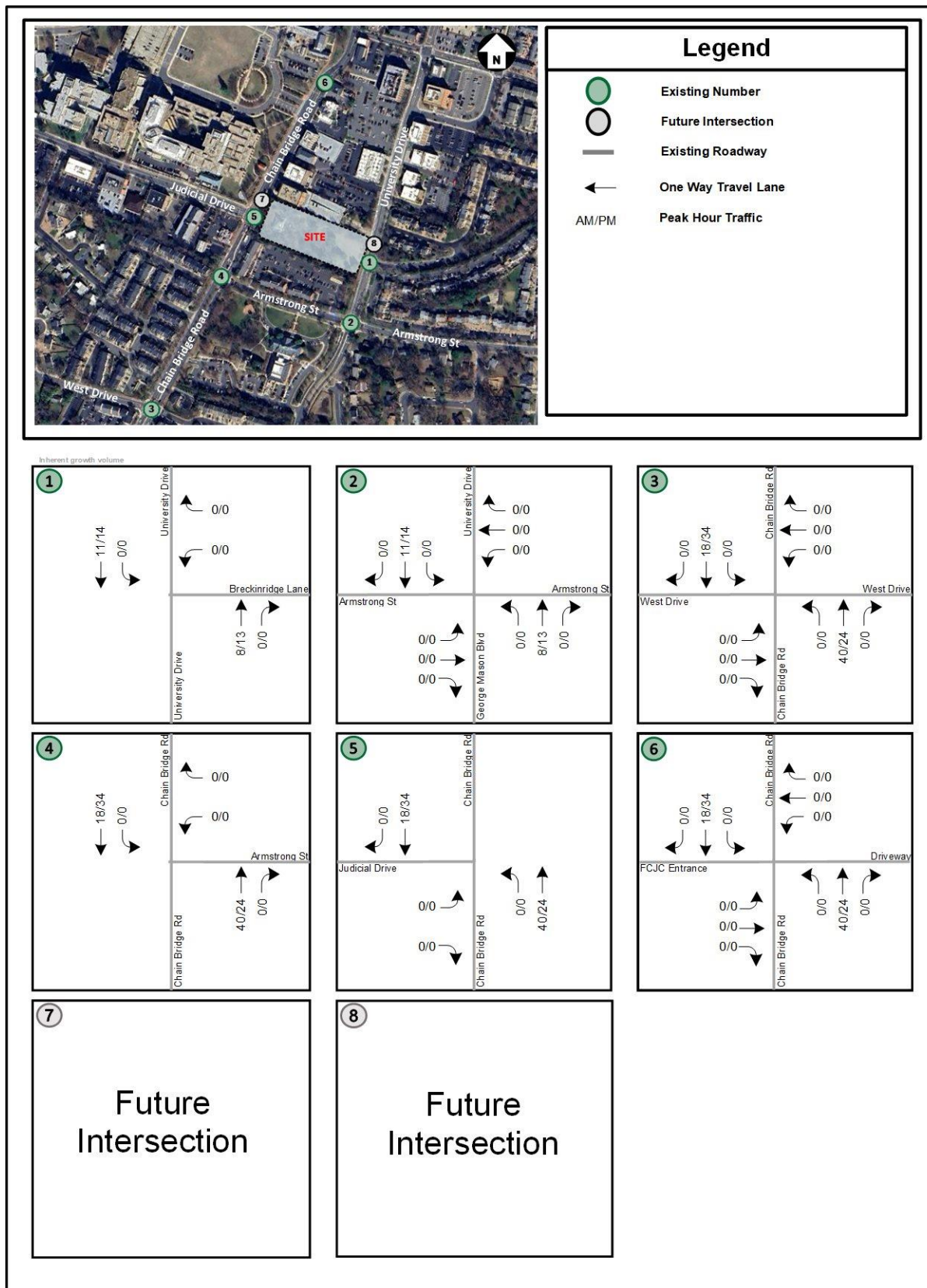


Figure 17: Background Growth (2024 - 2028)

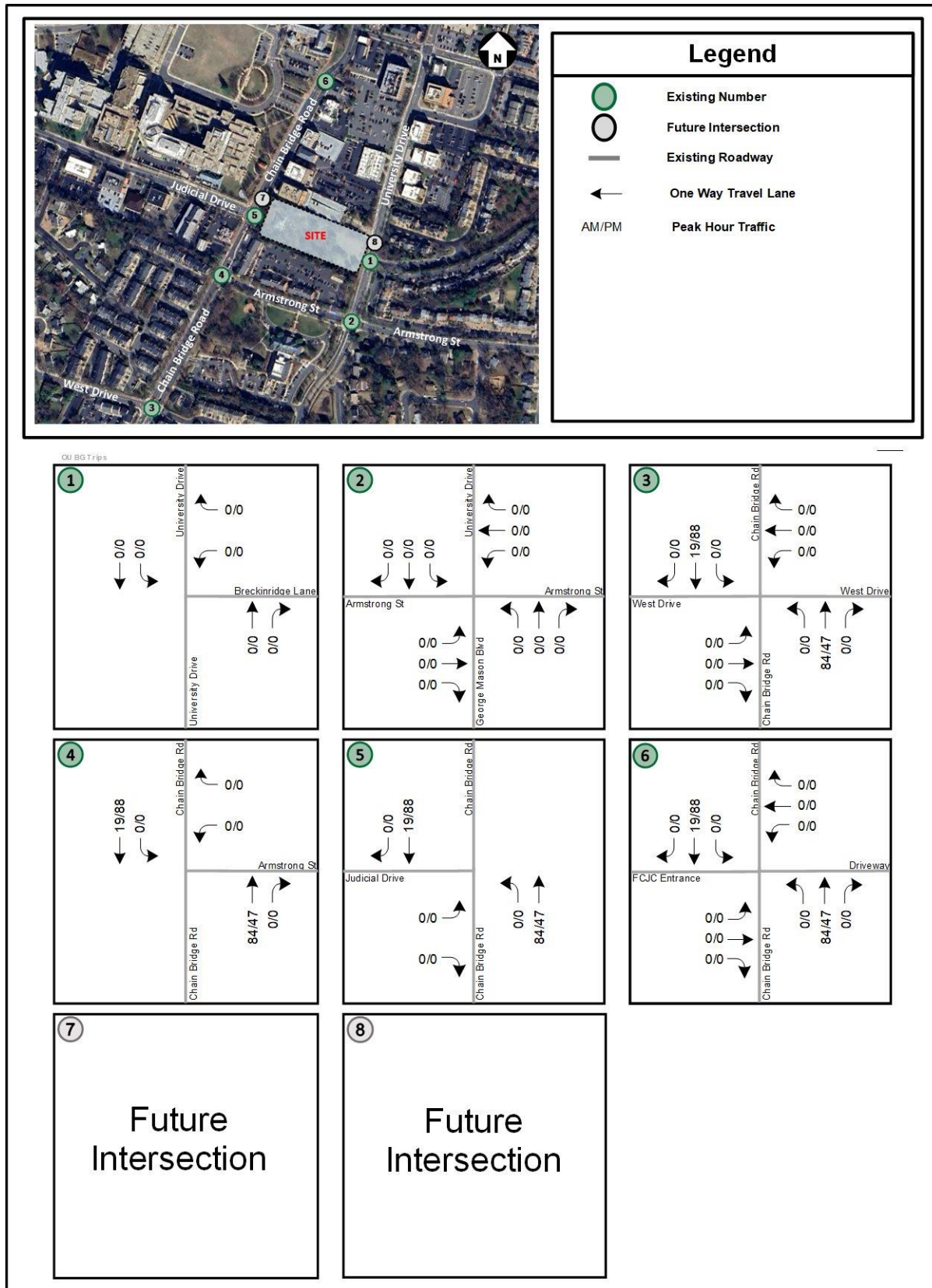


Figure 18: One University Background Development Net Trips

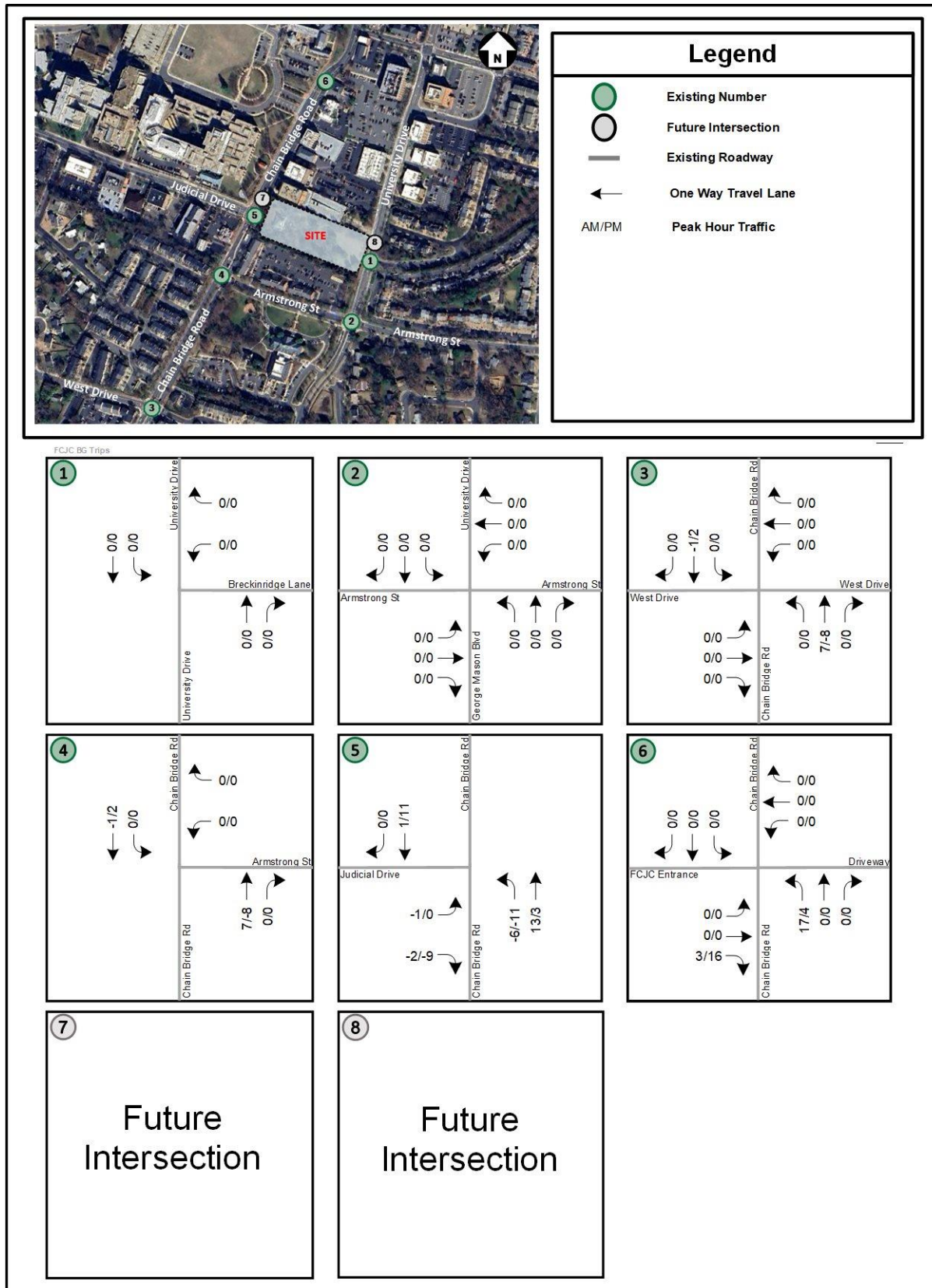


Figure 19: Phase 1 of FCJC Background Development Net Trips

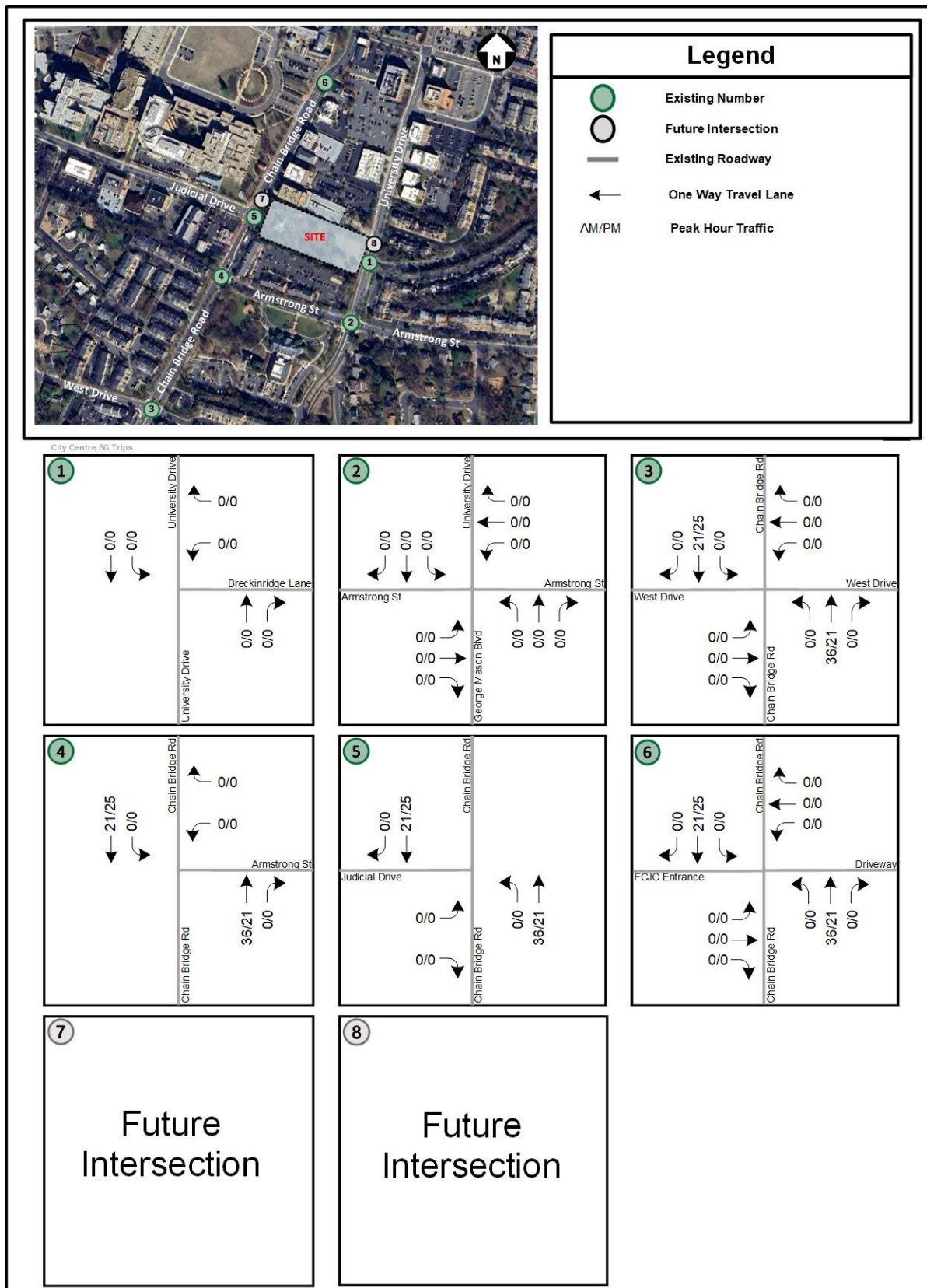


Figure 20: City Centre West Background Development Net Trips

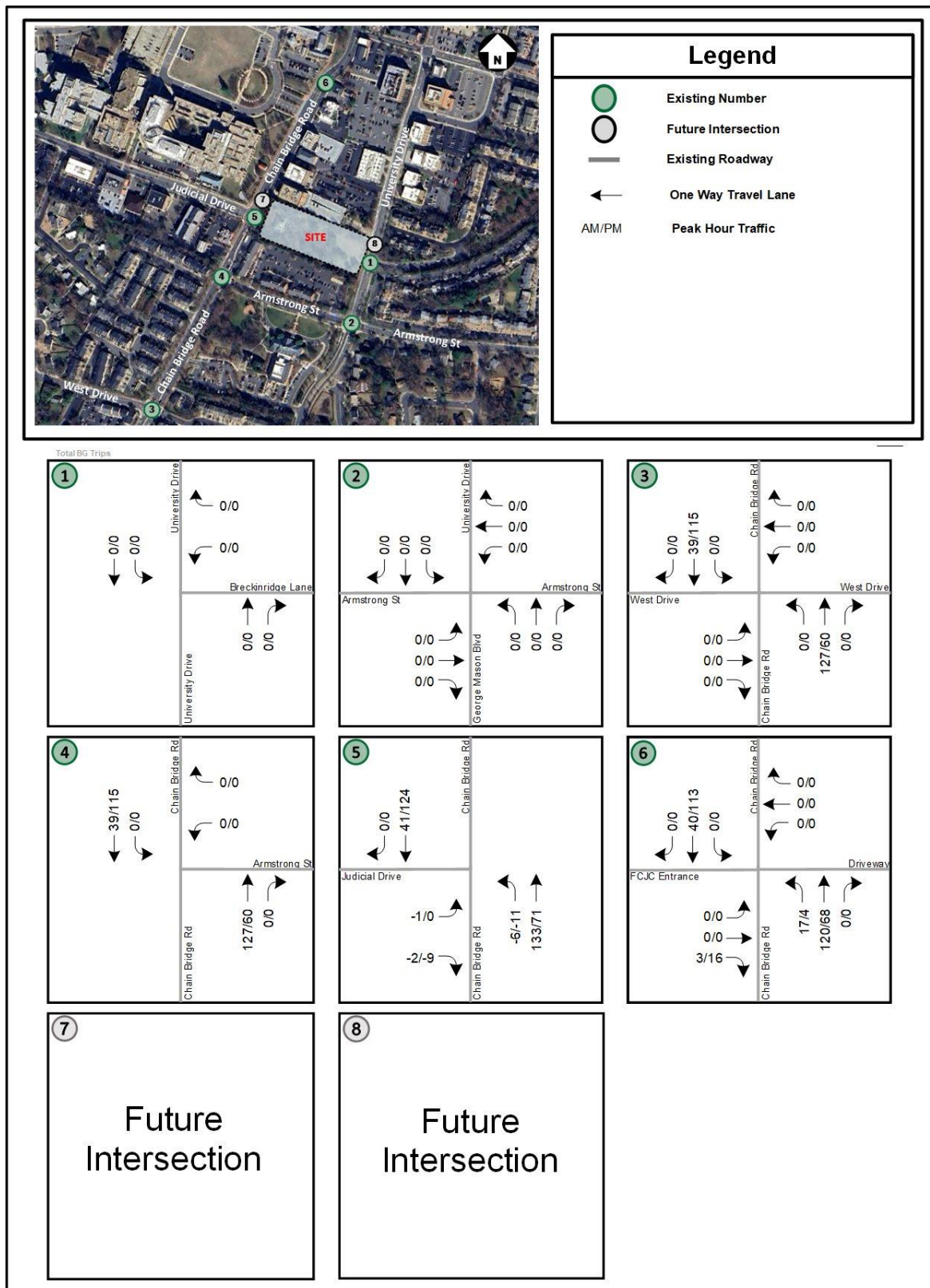


Figure 21: Total Background Development Trips¹

¹ Note: The volumes above reflect a total of the rerouting of existing trips, addition of pass-by trips of the background developments, and addition of the background development site trips, consistent with methodology of the respective traffic studies; therefore, volumes presented above may be shown as negative. Detailed informations and assumptions are provided in the Appendix E..

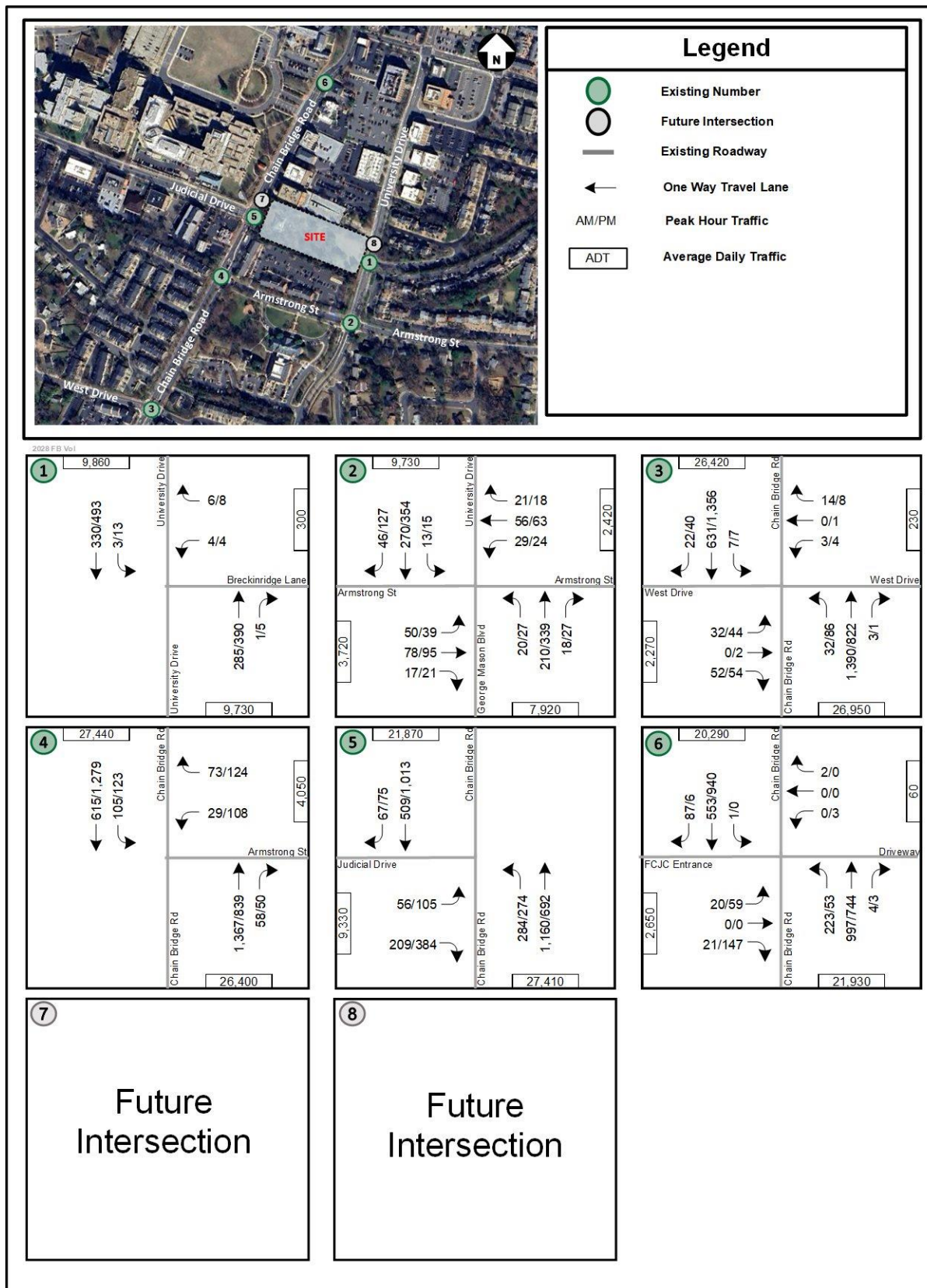


Figure 22: Future without Development (2028) – Peak Hour Traffic Volumes

Future without Development (2028) Intersection Analysis

Intersection capacity analysis was performed at the intersections within the study area during the weekday AM and weekday PM hours under Future Conditions without Development (2028). *Synchro Version 11* was used to analyze the study intersections based on the HCM 6th edition, and if the output is not available, the HCM 2000 methodology presented in the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) and analysis guidelines provided in VDOT's Traffic Operations and Safety Analysis Manual (TOSAM) is used. The analysis herein includes the level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

Signal phasing and timings were not changed from the existing conditions, with the exception of the addition of the new traffic signal at the intersection of Chain Bridge Road and the FCJC Entrance that will be completed by 2028. A peak hour factor of 0.92 was used unless the peak hour collected in the field was higher. As discussed in the scope, the heavy vehicle percentages (HV%) were based on the existing counts and a default *Synchro* HV% of 2.0% was utilized for all other lane groups.

Per the scoping meeting with the City staff, it would be considered acceptable and/or desirable to achieve an approach LOS D or better for traffic operations using HCM methodology. The results of the intersection capacity analysis are presented in Table 4 and are expressed in LOS and delay (seconds per vehicle) per lane group. Level of service results are also presented in Figure 23. The detailed analysis worksheets are included in Appendix F.

Table 4: Future without Development (2028) – Intersection Analysis

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour			PM Peak Hour		
			LOS	Delay (sec/veh)	95th % Queue (ft.) [2] [3]	LOS	Delay (sec/veh)	95th % Queue [2] [3]
			Synchro			Synchro		
1	University Drive (N/S) & Breckinridge Ln (EW) Overall Intersection (Unsignalized)							
	Westbound Approach							
	Westbound Left/Right	400	B	11.6	3	B	13.9	3
	Southbound Approach							
2	Armstrong Street (EW) & University drive/ George mason boulevard (N/S) Overall Intersection (Signalized)							
	Eastbound Approach		B	12.7		B	14.1	
	Eastbound Left/Thru/Right	385	B	15.7	104	B	19.8	123
	Westbound Approach		B	15.1		B	18.8	
	Westbound Left/Thru/Right	265	B	15.1	75	B	18.8	84
	Northbound Approach		B	10.3		B	10.7	
	Northbound Left	160	A	8.2	12	A	8.5	14
	Northbound Thru/Right	425	B	10.5	124	B	10.8	205
	Southbound Approach		B	12.4		B	14.0	
	Southbound Left	230	A	8.2	9	A	8.0	10
3	Chain Bridge Road (N/S) & West Drive (EW) Overall Intersection (Signalized)							
	Eastbound Approach		E	55.4		E	55.6	
	Eastbound Left	210	E	56.3	60	E	56.5	75
	Eastbound Thru/Right	300	D	54.9	0	D	54.9	0
	Westbound Approach		E	55.9		E	55.9	
	Westbound Left	115	E	55.9	12	E	56.0	15
	Westbound Thru/Right	115	E	55.9	0	E	55.9	0
	Northbound Approach		C	22.9		B	17.6	
	Northbound Left	165	B	11.1	34	C	23.8	90
	Northbound Thru/Right	530	C	23.2	#895	B	16.9	406
	Southbound Approach		B	15.7		A	19.7	
	Southbound Left	110	B	17.8	m8	A	3.3	m1
4	Chain Bridge Road (N/S) & Armstrong Street (EW) Overall Intersection (Signalized)							
	Westbound Approach		E	64.9		E	73.2	
	Westbound Left/Right	590	E	64.9	90	E	73.2	284
	Northbound Approach		B	12.8		C	27.7	
	Northbound Thru/Right	650	B	12.8	323	C	27.7	465
	Southbound Approach		A	7.4		B	12.1	
	Southbound Left	80	D	43.6	85	B	11.6	57
	Southbound Thru	245	A	1.2	44	B	12.1	236
5	Chain Bridge Road (N/S) & Judicial Drive (EW) Overall Intersection (Signalized)							
	Eastbound Approach		D	51.2		D	47.0	
	Eastbound Left	410	E	61.0	100	E	57.1	159
	Eastbound Right	660	D	48.6	82	D	44.3	146
	Northbound Approach		B	17.7		C	27.9	
	Northbound Left	170	B	17.9	211	E	61.4	#320
	Northbound Thru	240	B	17.6	377	B	14.6	155
	Southbound Approach		C	33.8		B	11.2	
	Southbound Thru	475	B	30.1	265	E	11.8	547
	Southbound Right	240	E	61.2	69	A	2.1	m14

Table 4: Future without Development (2028) – Intersection Analysis

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour		
			LOS	Delay (sec/veh)	95th % Queue (ft.) [2] [3]	Ave. Max Queue (ft.)	LOS	Delay (sec/veh)	95th % Queue [2] [3]
			Synchro			SimTraffic	Synchro		
6	Chain Bridge Road (N/S) & FCJC Entrance/Driveway (EW) Overall Intersection (Signalized)		C	21.5			C	22.4	
	Eastbound Approach		C	26.3			D	43.9	
	Eastbound Left	120	C	26.2	43		D	40.3	90
	Eastbound Thru/Right	120	C	26.3	0		D	45.4	60
	Westbound Approach		E	68.0			D	53.4	
	Westbound Left/Thru/Right	100	E	68.0	0		D	53.4	12
	Northbound Approach		B	10.1			A	2.9	
	Northbound Left	280	C	25.4	123		C	23.2	68
	Northbound Thru	480	A	6.7	335		A	1.5	307
	Northbound Right	480	A	6.7	0		A	1.4	0
	Southbound Approach		D	42.7			C	34.6	
	Southbound Left	250	C	30.8	3		A	0.0	0
	Southbound Thru	475	D	42.7	292		C	34.7	440
	Southbound Right	475	D	42.8	0		C	34.5	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[3] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

In order to achieve the acceptable levels of service and improve traffic operations conditions, the following roadway improvements have been approved to be in place by 2028:

- Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Install a traffic signal and relocate the future South Street access point off of Chain Bridge Road. This traffic signal has already been approved and therefore a signal warrant analysis is not required.

The intersection capacity analysis results show that the following three (3) intersections have movements that operate below acceptable levels of service during one or more peak hours under Future Conditions without Development (2028):

- Intersection 3: Chain Bridge Road and West Drive
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
- Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
- Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Westbound Approach (AM Peak)

Based on the queuing analysis performed for the future conditions without development, the turning movements at the study intersections are anticipated to have 95th percentile queues that can be accommodated within the available storage lengths of the turn bays, except for the following movements:

- Intersection 3: Chain Bridge Road and West Drive
 - Northbound Thru/Right (AM Peak)
 - Southbound Thru/Right (PM Peak)
- Intersection 4: Chain Bridge Road and Armstrong Street
 - Southbound Left (AM Peak)

- Intersection 5: Chain Bridge Road and Judicial Drive
 - Northbound Left (AM and PM Peak)
 - Northbound Thru (AM Peak)
 - Southbound Thru (PM Peak)

The intersection capacity analysis results are similar to existing conditions. The same three (3) intersections that currently operate below acceptable levels of service are expected to continue to operate unacceptably, and the same movements that have 95th percentile queues greater than the storage lengths are expected to do so under Future Conditions without Development (2028).

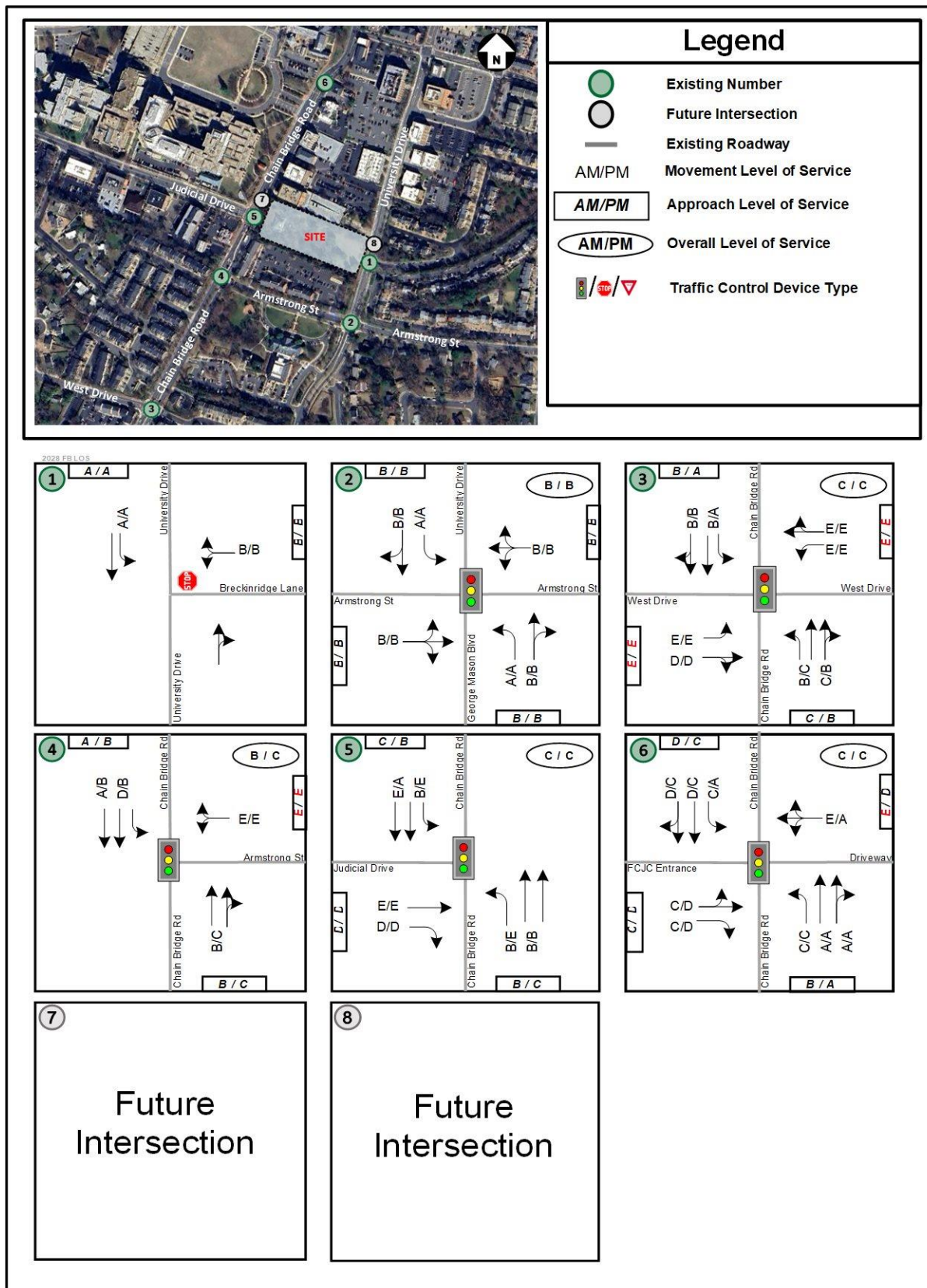


Figure 23: Future without Development (2028) – Levels of Service

Future Conditions with Development (2028)

Site Description

The proposed site is a mixed-use development consisting of approximately 276 multi-family residential apartment dwelling units, approximately 6,381 square feet of retail use, and approximately 4,188 square feet of office use along with an approximately 424-space multi-level structured garage. The development of the site is anticipated to be complete by 2028.

Site Access

Access to the site will be provided via two partial-movement right-in/right-out (RIRO) entrance along Chain Bridge Road and University Drive, each connected via an internal new service drive on-site.

Site Generated Traffic

The Institute of Transportation Engineers (ITE) Trip Generation, 11th Edition was used to determine the future trips generated by the proposed development as shown in Table 5. A Mode Split/TDM reduction of 15 percent was applied to the residential and office uses along with a 10 percent reduction for internal capture between commercial, residential, and office, based on guidance from City staff.

Table 5: Trip Generation for Full-Build, 2028 (ITE 11th Edition; Peak Hour of Adjacent Street)

Land Use	ITE Code	Size	----- Week day -----						Daily Total		
			AM Peak Hour			PM Peak Hour					
			In	Out	Total	In	Out	Total			
Existing (to Be Removed)											
Single-Family Detached Housing	210	1 DU	0	1	1	1	0	1	15		
Proposed											
Residential											
Multifamily Housing (Mid-Rise) ^[1]	221	276 DU	25	85	110	66	42	108	1,270		
Total Residential Trips without Reductions			25	85	110	66	42	108	1,270		
Internal Trip Reduction (Residential to Commercial) ^[2]			10%	All Periods	-1	-1	-2	-3	-3	-6	-50
Internal Trip Reduction (Residential to Office) ^[2]			10%	All Periods	0	-1	-1	-1	0	-1	-7
Subtotal Residential Trips with Internal Capture Reductions			24	83	107	62	39	101	1,213		
TDM / Mode Split Reduction			15%	All Periods	-4	-12	-17	-9	-6	-15	-182
Subtotal Residential Trips with Internal Capture and TDM Reductions			20	71	90	53	33	86	1,031		
Commercial											
Shopping Center (<40 kSF)	822	6,381 kSF of GFA	13	8	21	28	29	57	499		
Total Commercial Trips without Reductions			13	8	21	28	29	57	499		
Internal Trip Reduction (Commercial to Residential) ^[2]			10%	All Periods	-1	-1	-2	-3	-3	-6	-50
Internal Trip Reduction (Commercial to Office) ^[2]			10%	All Periods	0	-1	-1	-1	0	-1	-7
Subtotal Commercial Trips with Internal Trip Reduction			12	6	18	24	26	50	442		
Office											
Office	710	4.2 kSF of GFA	10	1	11	2	10	12	73		
Total Office Trips without Reductions			10	1	11	2	10	12	73		
Internal Trip Reduction (Office to Residential) ^[2]			10%	All Periods	-1	0	-1	0	-1	-1	-7
Internal Trip Reduction (Office to Commercial) ^[2]			10%	All Periods	-1	0	-1	0	-1	-1	-7
Subtotal Office Trips with Internal Trip Reduction			8	1	9	2	8	10	59		
TDM / Mode Split Reduction			15%	All Periods	-1	0	-1	0	-1	-2	-9
Subtotal Office Trips with Internal Capture and TDM Reductions			7	1	8	2	7	8	50		
Net Total Trips without Reductions (Proposed Minus Existing)			48	93	141	95	81	176	1,827		
Net Total Trips with Reductions (Internal, Transit)			39	77	115	78	66	143	1,508		

Notes:

[1]: For Multifamily Housing, ITE 11 does not differentiate between apartment, condo, and townhome; per ITE, subcategory of not near rail transit selected.

[2]: The internal trip reduction is based on the smaller of 5% of trips between residential and commercial uses.

As shown in the table above after reductions, the proposed development will generate approximately 115 new trips during the AM peak hour, 143 new trips during the PM peak hours, and 1,508 new daily trips on a typical weekday.

Site Trip Distribution

The distribution of site trips was based on the 2045 Metropolitan Council of Governments (MwCOG) model as well as existing and anticipated traffic patterns with guidance and input from the city staff. The directional distribution percentages are shown in Figure 24. The traffic assignment for the site trips at the study intersections are shown in Figure 25.



Figure 24: Directional Distribution

Future with Development (2028) Traffic Volumes

In order to determine the Future Conditions with Development (2028) traffic volumes, the site-generated traffic volumes were added to the Future without Development (2028) traffic volumes. The Future with Development (2028) peak hour traffic volumes are presented in Figure 26.

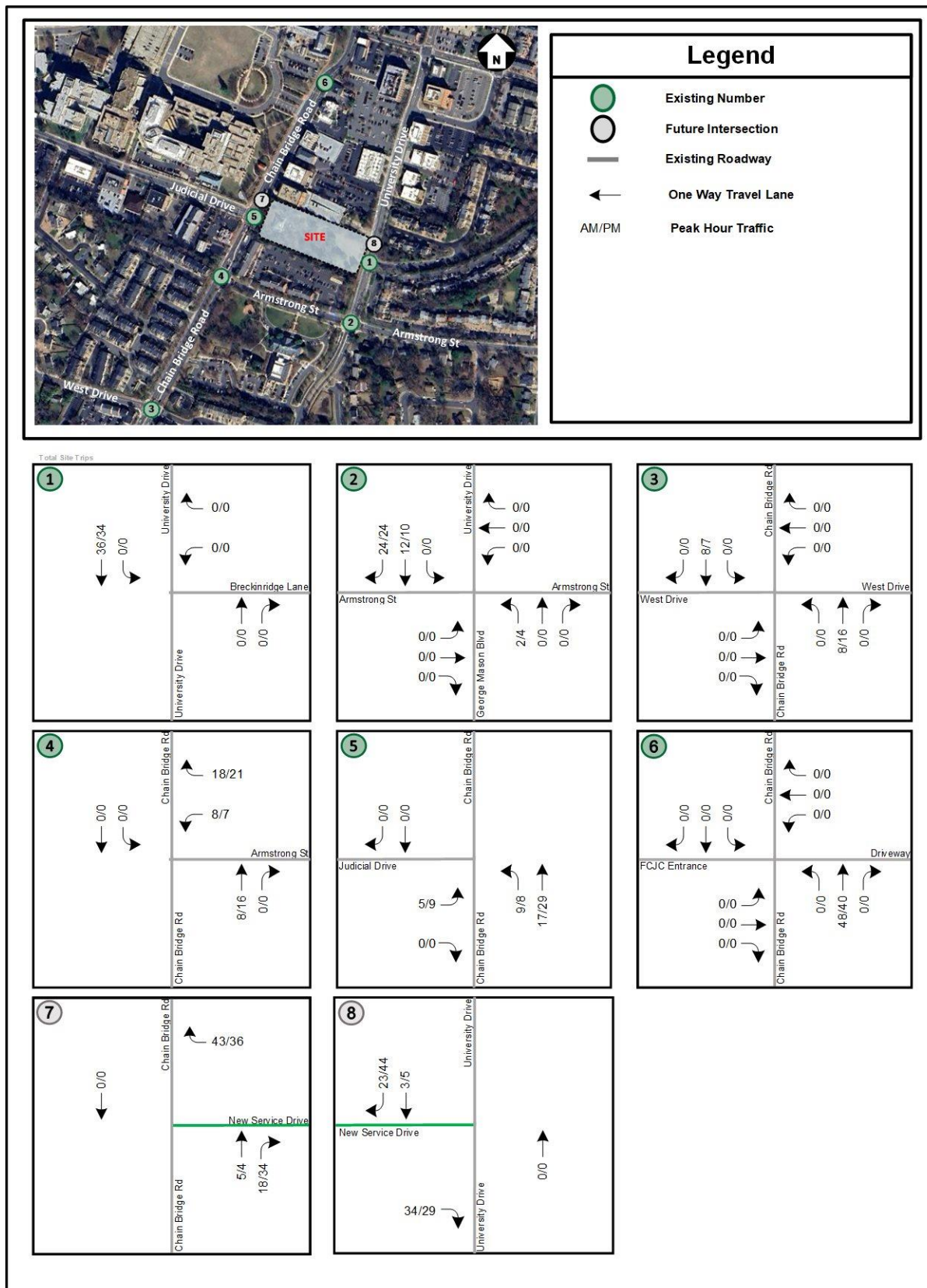


Figure 25: Site Trips (2028)

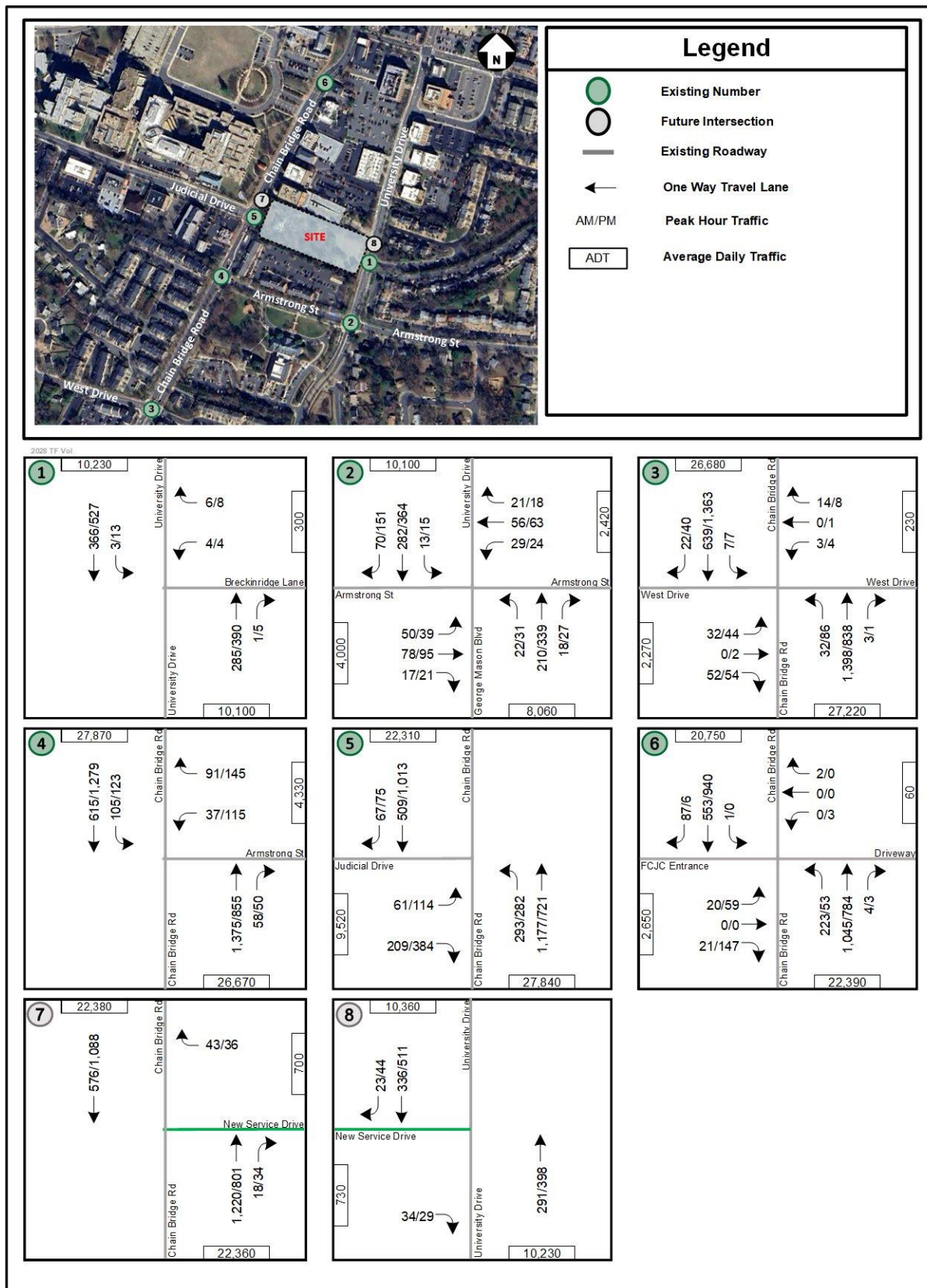


Figure 26: Future with Development (2028) – Peak Hour Traffic Volumes

Future with Development (2028) Intersection Analysis

Intersection capacity analysis was performed in a manner consistent with the methodology used for the Future Conditions without Development (2028) analysis. *Synchro Version 11* was used to analyze the study intersections based on the HCM 6th edition, and if the output is not available, the HCM 2000 methodology presented in the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) and analysis guidelines provided in VDOT's Traffic Operations and Safety Analysis Manual (TOSAM) is used. The analysis herein includes the level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

Signal phasing and timings were not changed from the future conditions without development. A peak hour factor of 0.92 was used unless the peak hour collected in the field was higher. As discussed in the scope, the heavy vehicle percentages (HV%) were based on the existing counts and a default *Synchro* HV% of 2.0% was utilized for all other lane groups.

Per the scoping meeting with the City staff, it would be considered acceptable and/or desirable to achieve an approach LOS D or better for traffic operations using HCM methodology. The results of the intersection analysis are presented in Table 6 and are expressed in LOS and delay (seconds per vehicle) per lane group. Level of service results are also presented in Figure 27. The detailed analysis worksheets are included in Appendix G.

Table 6: Future with Development (2028) – Intersection Analysis

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour			PM Peak Hour		
			LOS	Delay (sec/veh)	95th % Queue (ft.) [2] [3]	LOS	Delay (sec/veh)	95th % Queue [2] [3]
			Synchro			Synchro		
1	University Drive (NS) & Breckinridge Ln (EW) Overall Intersection (Unsignalized)							
	Westbound Approach		B	11.8		B	14.2	
	Westbound Left/Right	400	B	11.8	3	B	14.2	3
	Southbound Approach							
	Southbound Left/Thru	175	A	7.9	0	A	8.5	0
2	Armstrong Street (EW) & University drive/ George mason boulevard (NS) Overall Intersection (Signalized)		B	12.5		B	14.5	
	Eastbound Approach		B	15.5		C	20.7	
	Eastbound Left/Thru/Right	385	B	15.5	103	C	20.7	123
	Westbound Approach		B	14.9		B	19.6	
	Westbound Left/Thru/Right	265	B	14.9	75	B	19.6	84
	Northbound Approach		A	9.9		B	10.4	
	Northbound Left	160	A	8.5	13	A	8.7	16
	Northbound Thru/Right	425	B	10.1	124	B	10.6	205
	Southbound Approach		B	12.4		B	14.7	
	Southbound Left	230	A	8.3	9	A	8.0	10
	Southbound Thru/Right	655	B	12.5	196	B	14.9	303
3	Chain Bridge Road (NS) & West Drive (EW) Overall Intersection (Signalized)		C	22.2		C	20.2	
	Eastbound Approach		E	55.4		E	55.6	
	Eastbound Left	210	E	56.3	60	E	56.5	75
	Eastbound Thru/Right	300	D	54.9	0	D	54.9	0
	Westbound Approach		E	55.9		E	55.9	
	Westbound Left	115	E	55.9	12	E	56.0	15
	Westbound Thru/Right	115	E	55.9	0	E	55.9	0
	Northbound Approach		C	23.0		B	17.7	
	Northbound Left	165	B	11.2	34	C	24.1	91
	Northbound Thru/Right	530	C	23.3	#903	B	17.1	417
	Southbound Approach		B	15.5		A	19.0	
	Southbound Left	110	B	17.6	m0	A	3.2	m1
	Southbound Thru/Right	670	B	15.5	187	B	19.1	#959
4	Chain Bridge Road (NS) & Armstrong Street (EW) Overall Intersection (Signalized)		B	14.4		C	25.4	
	Westbound Approach		E	65.4		E	76.3	
	Westbound Left/Right	590	E	65.4	120	E	76.3	#338
	Northbound Approach		B	13.0		C	29.3	
	Northbound Thru/Right	650	B	13.0	327	C	29.3	475
	Southbound Approach		A	7.9		B	13.4	
	Southbound Left	80	D	45.5	94	B	13.6	61
	Southbound Thru	245	A	1.4	47	B	13.3	236
5	Chain Bridge Road (NS) & Judicial Drive (EW) Overall Intersection (Signalized)		C	26.0		C	25.4	
	Eastbound Approach		D	51.2		D	47.5	
	Eastbound Left	410	E	61.3	108	E	58.0	171
	Eastbound Right	660	D	48.2	82	D	44.3	147
	Northbound Approach		B	17.9		C	28.3	
	Northbound Left	170	B	18.6	233	E	64.0	m#339
	Northbound Thru	240	B	17.7	396	B	14.4	166
	Southbound Approach		C	34.0		B	11.7	
	Southbound Thru	475	B	30.4	265	E	12.4	546
	Southbound Right	240	E	61.5	69	A	2.1	m13

Table 6: Future with Development (2028) – Intersection Analysis

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour			PM Peak Hour		
			LOS	Delay (sec/veh)	95th % Queue (ft.) [2] [3]	LOS	Delay (sec/veh)	95th % Queue [2] [3]
			Synchro			Synchro		
6	Chain Bridge Road (N/S) & FCJC Entrance/Driveway (E/W) Overall Intersection (Signalized)		B	15.4		C	22.1	
	Eastbound Approach		C	32.2		D	43.9	
	Eastbound Left	120	C	32.2	43	D	40.3	90
	Eastbound Thru/Right	120	C	32.3	0	D	45.4	60
	Westbound Approach		E	68.0		D	53.4	
	Westbound Left/Thru/Right	100	E	68.0	0	D	53.4	12
	Northbound Approach		A	6.1		A	3.1	
	Northbound Left	280	B	20.0	117	C	23.3	66
	Northbound Thru	480	A	3.2	367	A	1.7	313
	Northbound Right	480	A	3.1	0	A	1.7	0
	Southbound Approach		C	32.6		C	34.6	
	Southbound Left	250	C	24.3	3	A	0.0	0
	Southbound Thru	475	C	32.6	292	C	34.7	440
	Southbound Right	475	C	32.6	0	C	34.5	0
7	Chain Bridge Road (N/S) & New Service Drive (E/W) Overall Intersection (Unsignalized)							
	Westbound Approach		C	15.2		B	12.0	
	Westbound Right	200	C	15.2	10	B	12.0	5
8	University Drive (N/S) & New Service Drive (E/W) Overall Intersection (Unsignalized)							
	Eastbound Approach		B	10.7		B	12.4	
	Eastbound Right	200	B	10.7	5	B	12.4	5

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[3] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

The intersection capacity analysis results show that all movements operate at acceptable LOS under Future Conditions with Development (2028) except for the following intersections/movements:

- Intersection 3: Chain Bridge Road and West Drive
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
- Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
- Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Westbound Approach (AM Peak)

Based on the queuing analysis performed for the future conditions with development, the turning movements at the study intersections are expected to have 95th percentile queues that can be accommodated within the available storage lengths of the turn bays after mitigations, except for the following movements:

- Intersection 3: Chain Bridge Road and West Drive
 - Northbound Thru/Right (AM Peak)
 - Southbound Thru/Right (PM Peak)
- Intersection 4: Chain Bridge Road and Armstrong Street

- Southbound Left (AM Peak)
- Intersection 5: Chain Bridge Road and Judicial Drive
 - Northbound Left (AM and PM Peaks)
 - Northbound Thru (AM Peak)
 - Southbound Thru (PM Peak)

The intersection capacity analysis results are similar to existing and background conditions. The same three (3) intersections that currently operate below acceptable levels of service are expected to continue to operate unacceptably, and the same movements that have 95th percentile queues greater than the storage lengths are expected to do so under Future Conditions with Development (2028).

It is to be noted that no signal timings adjustment has been proposed as a mitigation measure for the signalized intersections along Chain Bridge Road. This is because all signals along Chain Bridge Road are coordinated, and the side street movements run under split phasing. Any adjustment would impact the overall performance of the intersection and the corridor. These conditions are typical for commuter corridors in Northern Virginia and reflect the prioritization of traffic along the mainlines in order to accommodate the largest possible volume in the area. Therefore, it has a better overall traffic operation than prioritizing all movements equally.

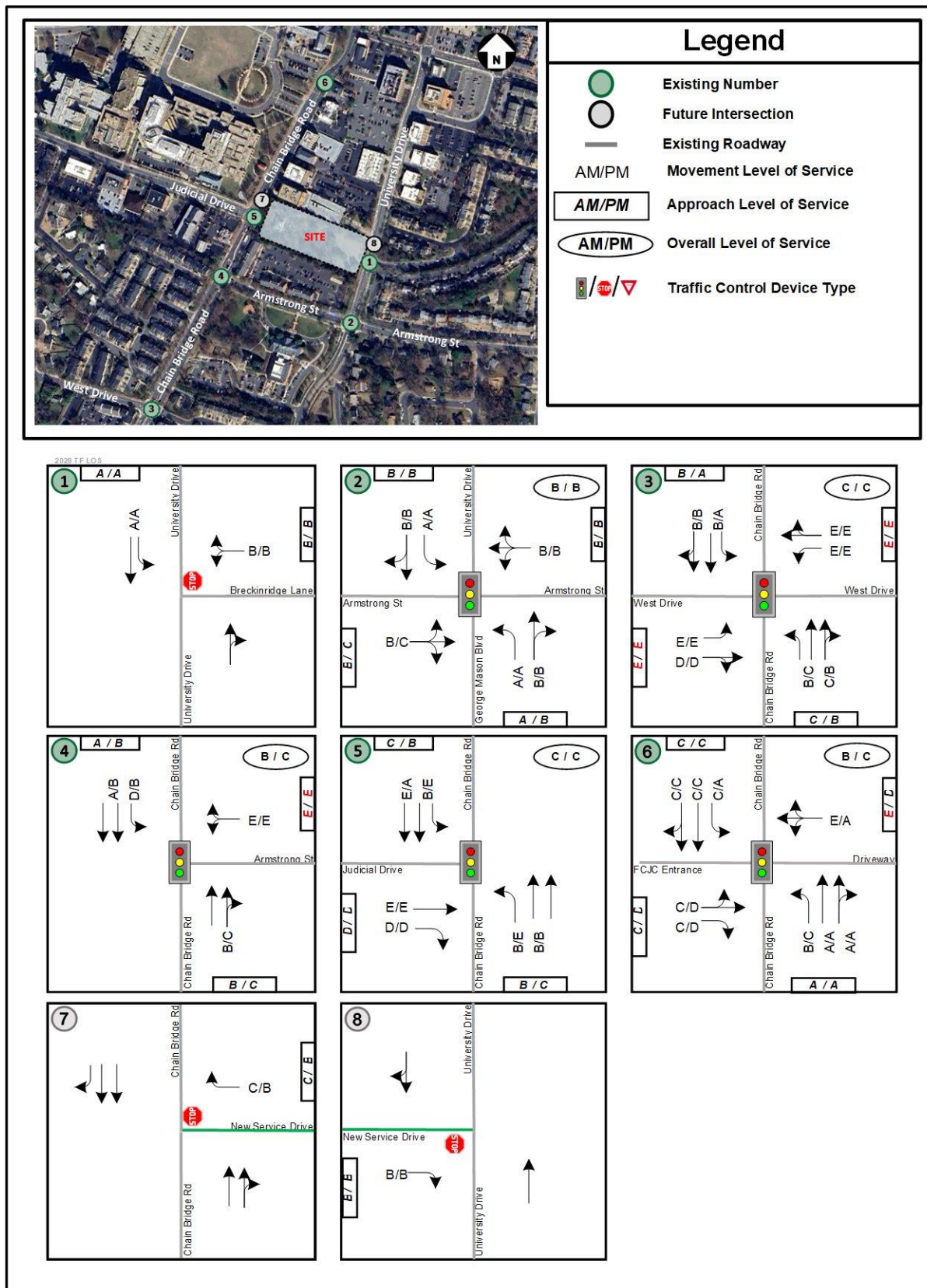


Figure 27: Future with Development (2028) – Levels of Service

Overall Comparison of Intersection Capacity and Queuing Analysis Results

As described in the previous sections, vehicular capacity analysis was performed for the following seven scenarios:

- **Existing (2024) Scenario** – assumes existing traffic volume based on the counts.
- **Future without Development (2028)** – assumes exiting traffic volume plus additional traffic due to a 1% annual growth rate plus traffic due to planned yet unbuilt three background developments.
- **Future with Development (2028)** – assumes existing traffic plus additional traffic due to a one percent annual growth rate plus traffic due to planned yet unbuilt background developments plus traffic generated by the 4131 Chain Bridge Road site.

A comparison of the delays and LOS results is presented in Table 7 and the queue comparison for the study scenarios is included in Table 8.

Table 7: Delay Comparison Table

No.	Intersection (Movement)	Level of Service (LOS) (Sec./Veh.)					
		AM Peak Hour			PM Peak Hour		
		2024 Existing	2028 FB	2028 TF	2024 Existing	2028 FB	2028 TF
1	University Drive (N/S) & Breckinridge Ln (E/W)						
	Overall Intersection (Unsignalized)						
	Westbound Approach	B (11.6)	B (11.6)	B (11.8)	B (13.9)	B (13.9)	B (14.2)
	Westbound Left/Right	B (11.6)	B (11.6)	B (11.8)	B (13.9)	B (13.9)	B (14.2)
	Southbound Approach						
2	Armstrong Street (E/W) & University Drive/ George Mason Boulevard (N/S)						
	Overall Intersection (Signalized)						
	Eastbound Approach	B (12.8)	B (12.7)	B (12.5)	B (14.4)	B (14.1)	B (14.5)
	Eastbound Left/Thru/Right	B (16.1)	B (15.7)	B (15.5)	B (19.6)	B (19.8)	C (20.7)
	Westbound Approach	B (15.5)	B (15.1)	B (14.9)	B (18.5)	B (18.8)	B (19.6)
	Westbound Left/Thru/Right	B (15.5)	B (15.1)	B (14.9)	B (18.5)	B (18.8)	B (19.6)
	Northbound Approach	B (10.1)	B (10.3)	A (9.9)	B (10.9)	B (10.7)	B (10.4)
	Northbound Left	A (8.2)	A (8.2)	A (8.5)	A (8.7)	A (8.5)	A (8.7)
	Northbound Thru/Right	B (10.3)	B (10.5)	B (10.1)	B (11.1)	B (10.8)	B (10.6)
	Southbound Approach	B (12.4)	B (12.4)	B (12.4)	B (14.3)	B (14)	B (14.7)
	Southbound Left	A (8.1)	A (8.2)	A (8.3)	A (8.3)	A (8)	A (8)
	Southbound Thru/Right	B (12.6)	B (12.5)	B (12.5)	B (14.5)	B (14.2)	B (14.9)
3	Chain Bridge Road (N/S) & West Drive (E/W)						
	Overall Intersection (Signalized)	B (19.6)	C (22.2)	C (22.2)	B (19.7)	C (20.6)	C (20.2)
	Eastbound Approach	E (55.4)	E (55.4)	E (55.4)	E (55.6)	E (55.6)	E (55.6)
	Eastbound Left	E (56.3)	E (56.3)	E (56.3)	E (56.5)	E (56.5)	E (56.5)
	Eastbound Thru/Right	D (54.9)	D (54.9)	D (54.9)	D (54.9)	D (54.9)	D (54.9)
	Westbound Approach	E (55.9)	E (55.9)	E (55.9)	E (55.9)	E (55.9)	E (55.9)
	Westbound Left	E (56)	E (55.9)	E (55.9)	E (56)	E (56)	E (56)
	Westbound Thru/Right	E (55.9)	E (55.9)	E (55.9)	E (55.9)	E (55.9)	E (55.9)
	Northbound Approach	C (20.6)	C (22.9)	C (23)	B (17)	B (17.6)	B (17.7)
	Northbound Left	B (11.1)	B (11.1)	B (11.2)	B (19.2)	C (23.8)	C (24.1)
	Northbound Thru/Right	C (20.8)	C (23.2)	C (23.3)	B (16.7)	B (16.9)	B (17.1)
	Southbound Approach	B (11.6)	B (15.7)	B (15.5)	A (18.3)	A (19.7)	A (19)
4	Chain Bridge Road (N/S) & Armstrong Street (E/W)						
	Overall Intersection (Signalized)	B (11.4)	B (13.5)	B (14.4)	C (24.8)	C (23.2)	C (25.4)
	Westbound Approach	E (64.9)	E (64.9)	E (65.4)	E (74)	E (73.2)	E (76.3)
	Westbound Left/Right	E (64.9)	E (64.9)	E (65.4)	E (74)	E (73.2)	E (76.3)
	Northbound Approach	B (10.5)	B (12.8)	B (13)	C (26.8)	C (27.7)	C (29.3)
	Northbound Thru/Right	B (10.5)	B (12.8)	B (13)	C (26.8)	C (27.7)	C (29.3)
	Southbound Approach	A (4.7)	A (7.4)	A (7.9)	B (14.8)	B (12.1)	B (13.4)
	Southbound Left	C (21.3)	D (43.6)	D (45.5)	B (13.1)	B (11.6)	B (13.6)
	Southbound Thru	A (1.5)	A (1.2)	A (1.4)	B (15)	B (12.1)	B (13.3)
5	Chain Bridge Road (N/S) & Judicial Drive (E/W)						
	Overall Intersection (Signalized)	C (22.7)	C (25.8)	C (26)	C (32.2)	C (24.7)	C (25.4)
	Eastbound Approach	D (51.2)	D (51.2)	D (51.2)	D (46.6)	D (47)	D (47.5)
	Eastbound Left	E (60.7)	E (61)	E (61.3)	E (55.9)	E (57.1)	E (58)
	Eastbound Right	D (48.6)	D (48.6)	D (48.2)	D (44.1)	D (44.3)	D (44.3)
	Northbound Approach	B (17.9)	B (17.7)	B (17.9)	C (26)	C (27.9)	C (28.3)
	Northbound Left	B (18.5)	B (17.9)	B (18.6)	D (49.8)	E (61.4)	E (64)
	Northbound Thru	B (17.8)	B (17.6)	B (17.7)	B (14.7)	B (14.6)	B (14.4)
	Southbound Approach	B (18.9)	C (33.8)	C (34)	C (29.6)	B (11.2)	B (11.7)
	Southbound Thru	B (19.3)	B (30.1)	B (30.4)	D (30.2)	E (11.8)	E (12.4)
	Southbound Right	B (16.6)	E (61.2)	E (61.5)	C (22.4)	A (2.1)	A (2.1)
6	Chain Bridge Road (N/S) & FCJC Entrance/Driveway (E/W)						
	Overall Intersection (Unsignalized)						
	Eastbound Approach	F (58.7)	-- (--)	-- (--)	E (35)	-- (--)	-- (--)
	Eastbound Left	F (101.8)	-- (--)	-- (--)	F (81.9)	-- (--)	-- (--)
	Eastbound Right	B (10.9)	-- (--)	-- (--)	B (13.9)	-- (--)	-- (--)
	Westbound Approach	B (11.8)	-- (--)	-- (--)	E (49.7)	-- (--)	-- (--)
	Westbound Left/Thru/Right	B (11.8)	-- (--)	-- (--)	E (49.7)	-- (--)	-- (--)
	Northbound Approach						
	Northbound Left	B (10.4)	-- (--)	-- (--)	B (10)	-- (--)	-- (--)
	Southbound Approach						
	Southbound Left	B (10)	-- (--)	-- (--)	A (0)	-- (--)	-- (--)

Table 7: Delay Comparison Table

No.	Intersection (Movement)	Level of Service (LOS) (Sec./Veh.)					
		AM Peak Hour			PM Peak Hour		
		2024 Existing	2028 FB	2028 TF	2024 Existing	2028 FB	2028 TF
6	Chain Bridge Road (N/S) & FCJC Entrance/Driveway (EW)						
	Overall Intersection (Signalized)	-- (--)	C (21.5)	B (15.4)	-- (--)	C (22.4)	C (22.1)
	<i>Eastbound Approach</i>	-- (--)	C (26.3)	C (32.2)	-- (--)	D (43.9)	D (43.9)
	Eastbound Left	-- (--)	C (26.2)	C (32.2)	-- (--)	D (40.3)	D (40.3)
	Eastbound Thru/Right	-- (--)	C (26.3)	C (32.3)	-- (--)	D (45.4)	D (45.4)
	<i>Westbound Approach</i>	-- (--)	E (68)	E (68)	-- (--)	D (53.4)	D (53.4)
	Westbound Left/Thru/Right	-- (--)	E (68)	E (68)	-- (--)	D (53.4)	D (53.4)
	<i>Northbound Approach</i>	-- (--)	B (10.1)	A (6.1)	-- (--)	A (2.9)	A (3.1)
	Northbound Left	-- (--)	C (25.4)	B (20)	-- (--)	C (23.2)	C (23.3)
	Northbound Thru	-- (--)	A (6.7)	A (3.2)	-- (--)	A (1.5)	A (1.7)
	Northbound Right	-- (--)	A (6.7)	A (3.1)	-- (--)	A (1.4)	A (1.7)
	<i>Southbound Approach</i>	-- (--)	D (42.7)	C (32.6)	-- (--)	C (34.6)	C (34.6)
	Southbound Left	-- (--)	C (30.8)	C (24.3)	-- (--)	A (0)	A (0)
	Southbound Thru	-- (--)	D (42.7)	C (32.6)	-- (--)	C (34.7)	C (34.7)
	Southbound Right	-- (--)	D (42.8)	C (32.6)	-- (--)	C (34.5)	C (34.5)
7	Chain Bridge Road (N/S) & New Service Drive (EW)						
	Overall Intersection (Unsignalized)						
	<i>Westbound Approach</i>	-- (--)	-- (--)	C (15.2)	-- (--)	-- (--)	B (12)
	Westbound Right	-- (--)	-- (--)	C (15.2)	-- (--)	-- (--)	B (12)
8	University Drive (N/S) & New Service Drive (EW)						
	Overall Intersection (Unsignalized)						
	<i>Eastbound Approach</i>	-- (--)	-- (--)	B (10.7)	-- (--)	-- (--)	B (12.4)
	Eastbound Right	-- (--)	-- (--)	B (10.7)	-- (--)	-- (--)	B (12.4)

Table 8: Queue Comparison Table

No.	Intersection (Movement)	95th Percentile Queues (ft.)						
		Effective Storage Length (ft.)	AM Peak Hour			PM Peak Hour		
			2024 Existing	2028 FB	2028 TF	2024 Existing	2028 FB	2028 TF
1	University Drive (N/S) & Breckinridge Ln (EW)							
	Overall Intersection (Unsignalized)							
	Westbound Approach							
	Westbound Left/Right	400	3	3	3	3	3	3
	Southbound Approach							
2	Armstrong Street (EW) & University Drive/ George Mason Boulevard (N/S)							
	Overall Intersection (Signalized)							
	Eastbound Approach							
	Eastbound Left/Thru/Right	385	108	104	103	123	123	123
	Westbound Approach							
	Westbound Left/Thru/Right	265	76	75	75	84	84	84
	Northbound Approach							
	Northbound Left	160	12	12	13	15	14	16
	Northbound Thru/Right	425	121	124	124	201	205	205
	Southbound Approach							
3	Chain Bridge Road (N/S) & West Drive (EW)							
	Overall Intersection (Signalized)							
	Eastbound Approach							
	Eastbound Left	210	60	60	60	75	75	75
	Eastbound Thru/Right	300	0	0	0	0	0	0
	Westbound Approach							
	Westbound Left	115	14	12	12	15	15	15
	Westbound Thru/Right	115	0	0	0	0	0	0
	Northbound Approach							
	Northbound Left	165	34	34	34	75	90	91
4	Chain Bridge Road (N/S) & Armstrong Street (EW)							
	Overall Intersection (Signalized)							
	Westbound Approach							
	Westbound Left/Right	590	86	90	120	290	284	338
	Northbound Approach							
	Northbound Thru/Right	650	245	323	327	431	465	475
	Southbound Approach							
	Southbound Left	80	52	85	94	69	57	61
	Southbound Thru	245	49	44	47	263	236	236
	5	Chain Bridge Road (N/S) & Judicial Drive (EW)						
Overall Intersection (Signalized)								
Eastbound Approach								
Eastbound Left		410	103	100	108	158	159	171
Eastbound Right		660	87	82	82	148	146	147
Northbound Approach								
Northbound Left		170	228	211	233	#352	320	339
Northbound Thru		240	362	377	396	121	155	166
Southbound Approach								
Southbound Thru		475	218	265	265	436	547	546
6	Chain Bridge Road (N/S) & FCJC Entrance/Driveway (EW)							
	Overall Intersection (Unsignalized)							
	Eastbound Approach							
	Eastbound Left	120	38	--	--	80	--	--
	Eastbound Right	120	3	--	--	28	--	--
	Westbound Approach							
	Westbound Left/Thru/Right	100	0	--	--	3	--	--
	Northbound Approach							
	Northbound Left	280	25	--	--	5	--	--
	Southbound Approach							
6	Southbound Left	480	0	--	--	0	--	--

Table 8: Queue Comparison Table

No.	Intersection (Movement)	95th Percentile Queues (ft.)						
		Effective Storage Length (ft.)	AM Peak Hour			PM Peak Hour		
			2024 Existing	2028 FB	2028 TF	2024 Existing	2028 FB	2028 TF
6	Chain Bridge Road (N/S) & FCJC Entrance/Driveway (EW)							
	Overall Intersection (Signalized)							
	Eastbound Approach							
	Eastbound Left	120	--	43	43	--	90	90
	Eastbound Thru/Right	120	--	0	0	--	60	60
	Westbound Approach							
	Westbound Left/Thru/Right	100	--	0	0	--	12	12
	Northbound Approach							
	Northbound Left	280	--	123	117	--	68	66
	Northbound Thru	480	--	335	367	--	307	313
	Northbound Right	480	--	0	0	--	0	0
	Southbound Approach							
	Southbound Left	250	--	3	3	--	0	0
Southbound Thru	475	--	292	292	--	440	440	
Southbound Right	475	--	0	0	--	0	0	
7	Chain Bridge Road (N/S) & New Service Drive (EW)							
	Overall Intersection (Unsignalized)							
	Westbound Approach							
	Westbound Right	200	--	--	10	--	--	5
8	University Drive (N/S) & New Service Drive (EW)							
	Overall Intersection (Unsignalized)							
	Eastbound Approach							
	Eastbound Right	200	--	--	5	--	--	5

Conclusions

This report presented the findings of a Transportation Impact Study (TIS) conducted for the proposed development of the 4131 Chain Bridge site in the City of Fairfax, Virginia.

The analysis presented in this report supports the following major findings:

- The intersection capacity analysis results for the Future Conditions with Development are similar to Existing and Future Conditions without Development. Therefore, the development will have a minimal impact on the traffic operations and safety of the street network.

Additional assumptions, findings, and conclusions are as follows:

TIA Components

- As determined based on discussions with the City, 1.0% regional growth was applied to the Chain Bridge Road / University Drive mainline through movements at the intersection of Chain Bridge Road at Judicial Street as well as at the intersection of University Boulevard/George Mason Boulevard at Armstrong Street volumes.
- A mode split/TDM reduction of 15 percent was applied to the residential and office uses, as agreed upon with the City.
- The internal trip reduction is based on 10 percent trips between residential, office, and commercial uses, as agreed upon with the City.
- The proposed development is anticipated to generate approximately 115 new trips during the AM peak hour, 142 new trips during the PM peak hour, and 1,505 new daily trips on a typical weekday.

Infrastructure

- Existing vehicular access is provided via one driveway on Chain Bridge Road.
- Access to the site will be provided via two partial-movement right-in/right-out (RIRO) entrances along Chain Bridge Road and University Drive, each connected via an internal new service drive on-site.
- A traffic signal at the future intersection of Chain Bridge Road and Fairfax County Judicial Complex (FCJC) Entrance is the only planned improvement in the study area that will be completed by 2028. The signal at this intersection has already been approved and therefore a signal warrant is not required.

Non-SOV Elements

- Five (5) bus routes provide service in the vicinity of the site, providing regional access to the area.

Analysis Results

- Three (3) intersections within the study area operate below acceptable levels of service under Existing Conditions (2024):
 - Intersection 3: Chain Bridge Road and West Drive
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
 - Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
 - Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Eastbound Approach (AM and PM Peaks)

- Westbound Approach (PM Peak)
- The intersection of Chain Bridge Road and the Fairfax County Judicial Complex Entrance will be signalized by 2028 improving traffic conditions at that intersection. Therefore, the following intersections have approaches that operate below acceptable levels of service under Future Conditions without Development (2028) and continue to do so in Future Conditions with Development (2028):
 - Intersection 3: Chain Bridge Road and West Drive
 - Eastbound Approach (AM and PM Peaks)
 - Westbound Approach (AM and PM Peaks)
 - Intersection 4: Chain Bridge Road and Armstrong Street
 - Westbound Approach (AM and PM Peaks)
 - Intersection 6: Chain Bridge Road and FCJC Entrance/Driveway
 - Westbound Approach (AM Peak)
- The intersection capacity analysis results for the Future Conditions with and without Development are similar to Existing Conditions.
- Based on the queuing analysis performed for Future Conditions with Development, the turning movements at the study intersections are anticipated to have 95th percentile queues that can be accommodated within the available storage lengths of the turn bays, except for turn bays at three (3) intersections.
 - Intersection 3: Chain Bridge Road and West Drive
 - Northbound Thru/Right (AM Peak)
 - Southbound Thru/Right (PM Peak)
 - Intersection 4: Chain Bridge Road and Armstrong Street
 - Southbound Left (AM Peak)
 - Intersection 5: Chain Bridge Road and Judicial Drive
 - Northbound Left (AM and PM Peaks)
 - Northbound Thru (AM Peak)
 - Southbound Thru (PM Peak)
- No signal timing adjustment has been proposed as a mitigation measure for the signalized intersections along Chain Bridge Road. This is because all signals along Chain Bridge Road are coordinated and the side street movements run under split phasing. Any adjustment would impact the overall performance of the adjacent intersection and the entire corridor. The side street delays are typical for commuter corridors in Northern Virginia and reflect the prioritization of traffic along the mainlines in order to accommodate the largest possible volume in the area. Therefore, the corridor has a better overall traffic operation than prioritizing all movements equally.