FENTON STREET BIKEWAY STUDY

SILVER SPRING, MARYLAND

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4 Executive Summary

The Fenton Street Bikeway is a proposed 0.7-mile separated two-way cycle track along Fenton Street from Gist Avenue to Cameron Street in Silver Spring, Maryland. The purpose and need for the bikeway are as follows:

1. *Improve bicycle and pedestrian safety and comfort in the Fenton Street corridor.*
2. *Improve bicycle connectivity within and beyond downtown Silver Spring.*
3. *Provide balanced, multi-modal transportation options for all Fenton Street users.*

The proposed bikeway would become a key link in a network of bicycle routes and facilities that locally include Gist Avenue, Sligo Avenue, Wayne Avenue (Silver Spring Green Trail), Second Avenue, and Cameron Street, and regionally includes Sligo Creek Trail, Capital Crescent Trail, and Metropolitan Branch Trail.

Existing Fenton Street is a 44- to 48-ft wide closed-section roadway within the study area. Existing right-of-way widths vary from 64- to 80-ft. The speed limit along Fenton Street is 25 mph and the average daily traffic volume is 10,571. The ultimate planned right-of-way width for the corridor is 80-ft. Generally, the roadway has one northbound lane, one southbound lane, parking lanes on both sides, and sidewalks on both sides. Specifically, the block between Ellsworth Drive and Colesville Road (US 29) has two northbound lanes and two southbound lanes. The two southbound lanes extend to Wayne Avenue.

There are eight signalized intersections in the corridor, with two additional pedestrian hybrid beacons or "HAWK" signals planned. Two of the existing signalized intersections, Fenton Street at Wayne Avenue (MD 594A) and Fenton Street at Colesville Road (US-29) are owned and maintained by the Maryland Department of Transportation (MDOT) State Highway Administration (SHA). There are existing street trees that line the street throughout and existing utility poles along the west side of the street from Gist Avenue to Bonifant Street. Underground utilities include water, sanitary sewer, storm drain, gas, electric, and telecommunications. Both RideOn and WMATA operate bus routes in the corridor and the future Purple Line intersects the corridor at Wayne Avenue.

The corridor is divided into three districts: the Fenton Village District to the south, Ellsworth District in the middle, and the North Silver Spring District to the north. Fenton Street within the Fenton Village District is a commercial corridor characterized by small businesses with storefronts that rely heavily on the street frontage for vehicular and pedestrian access, on-street parking, sidewalk cafes, and truck loading activities. The Ellsworth District is also primarily commercial but is more urbanized with businesses relying less on the street frontage for vehicular access and on-street parking. There are no sidewalk cafes in the Ellsworth District. The North Silver Spring District has only a few businesses that front on Fenton Street, however, on-street parking is heavily utilized.

The study herein is founded on topographic survey, utility records, traffic data and analysis, as-built drawings, right-of-way plat research, site investigation, and public/stakeholder input. During the study, impacts to parking and truck loading within the Fenton Village District were determined to be two of the most important issues. To gain a thorough understanding of the challenges and to plan for mitigation measures, the study team performed a parking utilization study and interviewed many business owners, managers, and employees within the area to determine specific needs and concerns. The average on-street parking utilization for Fenton Street was 78% as compared with the broader study area (within one-block), which was measured at 76% and truck loading occurred on every block.

The study team has prepared and evaluated seven alternatives that include both roadway widening and non-widening approaches, as well as alternatives to separately favor bicycling, parking, and traffic. Additional alternatives were derived that combine all priorities and balance impacts across all competing demands and interests within the corridor. Each alternative is a combination of typical sections and traffic scenarios. To meet the first project objective of improving bicycle safety and comfort, signalized intersections were planned with dedicated/exclusive left-turning lanes where vehicles would come into conflict with the two-way cycle track to the extent possible. The following is a list of the proposed alternatives:

- **Alternative A – Widening in Fenton Village; Favors on-street parking**. This alternative favors on-street parking by combining all turning and thru movements into one shared lane within Fenton Village.
- **Alternative B – Widening in Fenton Village; Impacts to parking in favor of motorists and bicyclists.** This alternative favors motorists and bicyclists by providing exclusive left-turn lanes for vehicles. This provides queuing space for left-turning vehicles and protection for bicyclists from collisions with left-turning vehicles.
- **Alternative C – Widening in Fenton Village; Impacts to motorists in favor of bicyclists and parking.** This alternative provides a balanced approach by providing exclusive NB left-turns, which benefits bicyclist safety. It provides a shared SB travel lane, which benefits parking but impacts traffic.
- **Alternative D – No widening in Fenton Village; Favors on-street parking.** This alternative favors on-street parking by combining all turning and thru movements into one shared lane within Fenton Village.
- **Alternative E – No widening in Fenton Village; Impacts to parking in favor of motorists and bicyclists.** This alternative favors motorists and bicyclists by providing exclusive left-turn lanes for vehicles. This provides queuing space for left-turning vehicles and protection for bicyclists from collisions with left-turning vehicles.
- **Alternative F – Combination of widening and no widening in Fenton Village; Impacts to motorists in favor of parking and bicyclists, No NB Left-turns at Thayer Avenue.** This alternative is a variation of Alternative C.
- **Alternative G – Combination of widening and no widening in Fenton Village; Impacts to motorists in favor of parking and bicyclists, No NB Left-turns at Silver Spring Avenue.** This alternative is a variation of Alternative C.

All alternatives include impacts to traffic, transit, utilities, right-of-way, and street trees. All but one of the alternatives includes impacts to parking. There are no property displacements. Impacts to cultural/historical properties, wetlands/waters, or rare/threatened/endangered species are anticipated. Preliminary cost estimates range from $10.9 to $13.7 million, for construction beginning in 2023. Based on impacts analysis, **the study team recommends progressing Alternative G**, as it provides the most benefit, and has the most equitable distribution of impacts. If Alternative G is found to be undesirable, **Alternative C would provide a similar combination of benefits and impacts**.

5 Study Overview

The Fenton Street Bikeway study was prepared between Fall 2019 and Fall 2020 by the Montgomery County Department of Transportation (MCDOT) to evaluate alternatives for the implementation of a bikeway along the west side of Fenton Street from Gist Avenue to Cameron Street (0.7 miles). The study area is located within the Silver Spring Central Business District Bicycle and Pedestrian Priority Area (BiPPA), one of 34 designated BiPPAs throughout the County. The study builds upon previous work that was completed in 2017 by expanding the scope of alternatives to include roadway widening to accommodate the bikeway. The overall purpose of the Fenton Street Bikeway is to improve bicyclist and pedestrian safety and comfort, bicycle connectivity, and to provide a balanced, multi-modal corridor for all transportation users.

The study is founded on detailed topographic survey data, utility mapping records, traffic data, as-built drawings, right-of-way plat research, and site investigation. Furthermore, the study recommendations are supported by detailed traffic analyses and extensive public-stakeholder input. Lastly, the study considers several on-going and adjacent projects and how they will interface with the bikeway.

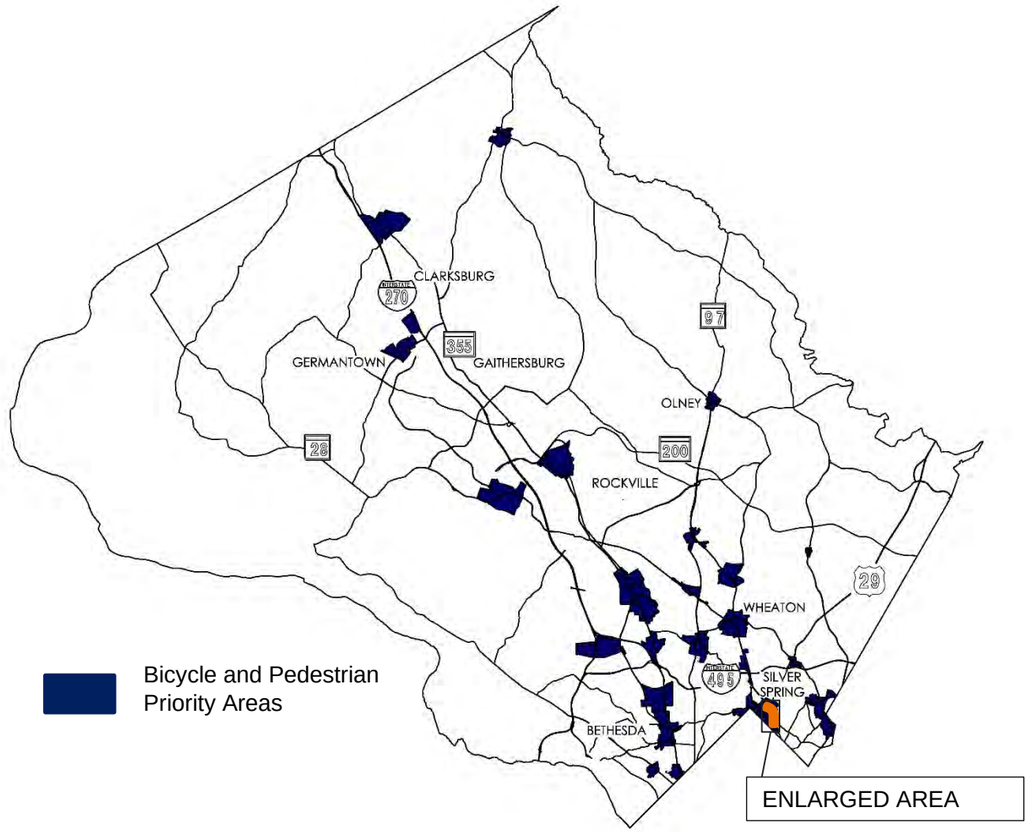


Figure 1 – Study Area Location, Silver Spring, Montgomery County, Maryland

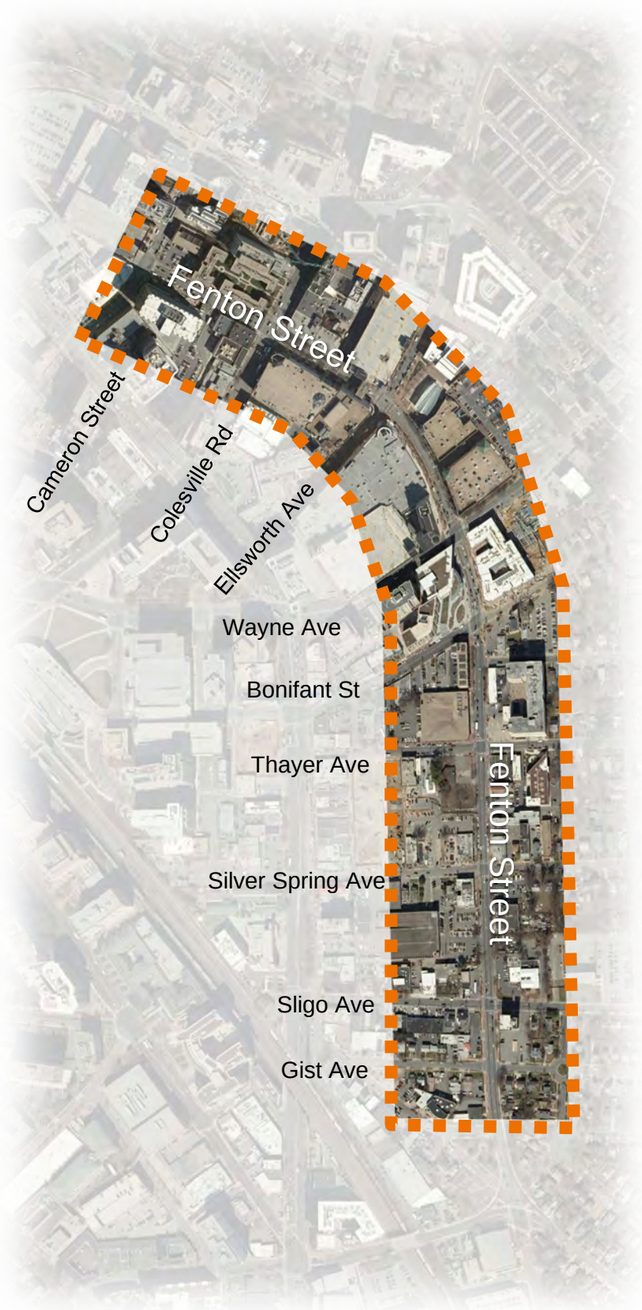


Figure 2 – Enlarged Area: Fenton Street Bikeway Study Limits

6 Purpose and Need

1. Improve bicycle and pedestrian safety and comfort in the Fenton Street corridor.

The primary purpose of the Fenton Street Bikeway is to improve bicyclist and pedestrian safety and comfort in the corridor. Currently, bicyclists use the vehicular travel lanes and are susceptible to collisions with vehicular traffic, particularly adjacent to parking lanes and at intersections with cross streets, alleys, and driveways. Proposed improvements are needed to provide a physically separated bikeway, protected movements at signalized intersections, and mitigation of conflicts at all other uncontrolled access points by means of consistent, intuitive, and highly visible signing and marking treatments.

2. Improve bicycle connectivity within and beyond downtown Silver Spring.

At present, bicyclists use the vehicular travel lanes or sidewalks along Fenton Street to travel to and from destinations within and beyond downtown Silver Spring, as the corridor provides a direct, continuous north-south axial route that ties together communities, businesses, employers, retailers, civic buildings, and various other transportation facilities. A separated bikeway will connect bicyclists in the immediate area with existing bicycle facilities such as the Spring Street separated bikeway, Cameron Street bicycle lanes, the Silver Spring Green Trail, as well as the Sligo Avenue and Gist Avenue shared roadways.

Beyond Silver Spring, the Fenton Street Bikeway will provide an important link in the regional bicycle network connecting the Capital Crescent Trail, Metropolitan Branch Trail, and Sligo Creek Trail. The Fenton Street Bikeway will also connect with a number of facilities that are either currently planned or under construction including the Cameron Street to Planning Place Bikeway, Fenton Street and MD 410 intersection improvements, the Grove Street Neighborhood Greenway, and the Purple Line station at the Silver Spring Library on the southwest corner of Fenton Street and Wayne Avenue.

Figure 3 - Bicyclist in traffic, looking south along Fenton Street from Ellsworth Drive

3. Provide balanced, multi-modal transportation options for all Fenton Street users.

Another purpose of the Fenton Street Bikeway project is also about re-balancing the corridor to align with modern complete street principles. In addition to bicyclists, Fenton Street has many competing user demands, including motorists, pedestrians, transit, businesses, parking, truck loading, driveway access, overhead/underground utilities, landscaping, and various other amenities. With so many demands on the corridor, it is not possible to make improvements focused on one travel mode without affecting other travel modes and uses of the public right-of-way. The bikeway improvements need to be carefully balanced with other transportation modes and uses of the public right-of-way. Additionally, the corridor is located within the central business district and is subject to aesthetic requirements.

Figure 4 - The proposed Fenton Street Bikeway will provide an important link in the regional trail system. Source: capitaltrailscoalition.org

7 Existing Conditions

7.1 Project Area

Fenton Street from Gist Avenue to Cameron Street is a bustling urban, commercial, multi-modal corridor located in Silver Spring, Montgomery County, Maryland. The corridor serves a wide range of needs for the East Silver Spring community. Primarily it serves as a transportation route for local and commuter vehicular traffic, bicyclists, pedestrians, transit users, and business patrons. The corridor includes metered, on-street parking within the public right-of-way throughout the corridor except for the blocks between Ellsworth Drive and Colesville Road (US-29). Nearby public off-street parking includes 5 garages and 3 surface lots with access to-from Fenton Street or intersecting cross streets. Many private properties, especially to the south include off-street surface parking as well. Fenton Street is predominantly fronted by commercial and mixed-use properties such as retail stores, restaurants, cafes, grocery stores, markets, dry cleaners, salons, gas stations, offices, apartment buildings, the Ellsworth Place shopping mall, a movie theater, library, civic center/plaza, and various other small businesses. To the west of the study area is the urban core of Silver Spring, which is centered on Georgia Avenue (US-29/MD 97) and Colesville Road (US-29/MD 384). To the east lies a residential community comprised primarily of single-family detached homes. The planned Purple Line intersects the corridor at Wayne Avenue with a station under construction on the southwest corner at the Silver Spring Library.

Fenton Street is an attractive, inviting street for pedestrians and bicyclists as it is lined with mature street trees, planter beds, potted plants, and a combination of streetscape elements such as brick paver sidewalks and crosswalks, cobblestones, curb extensions, ornamental fencing, cast iron tree grates, decorative light poles, sidewalk café seating, bike racks, bikeshare stations, benches, and trash/recycling receptables. There are various types of roadway and pedestrian lighting including utility pole mounted cobra-head luminaires, Washington Globes, and rectilinear luminaires mounted on traffic signal poles. The blocks between Wayne Avenue and Ellsworth Drive include teardrop luminaires mounted on 16-foot and 26-foot poles.

The Fenton Street public right-of-way is owned and maintained by the Montgomery County Department of Transportation (MCDOT). According to the Montgomery County Master Plan of Highways and Transitways, dated 4/30/2019, Fenton Street is designated as arterial route A-264 with an 80-ft right-of-way, two-lanes plus parking, and a target speed of 25 mph. Per the American Association of State Transportation Officials (AASHTO) Green Book, Fenton Street should be classified as an urban major collector. The Maryland Department of Transportation (MDOT) State Highway Administration (SHA) designates Fenton Street as CO-629. Fenton Street intersects with thirteen roads within the study area including three state routes: Colesville Road (US-29), Wayne Avenue (MD 594A), and Bonifant Street (MD

Figure 5 - Fenton Street, looking south at Bonifant Street. The proposed improvements will need to balance various demands on the corridor including those from bicyclists, pedestrians, motorists, transit, parking, truck loading, and businesses.

Figure 6 - Fenton Street, looking northbound from Sligo Avenue.

594C). Colesville Road is a six-lane urban principal arterial with average daily traffic volumes around 28,000 vehicles per day. Wayne Avenue and Bonifant Street were recently transferred to the State by the County in 2016 and are both currently under reconstruction to accommodate the Purple Line light rail track. Other important routes in the area include Georgia Avenue (US-29/MD 97) paralleling Fenton Street to the west, which is a six-lane urban principal arterial with an average daily traffic volume of 33,000 vehicles per day. Also, Burlington Avenue/East-West Highway (MD 410) intersects Fenton Street to the immediate south of the study area. Improvements are also currently planned for this intersection as part of a related MCDOT project. The only bridge structure in the study corridor is an enclosed overhead pedestrian bridge just north of the Fenton Street & Ellsworth Drive intersection, that connects the Town Square Garage (MCDOT garage #61) to the Ellsworth Place shopping mall.

Various WMATA and RideOn bus routes operate throughout the entire length of the corridor with 14 bus stops along Fenton Street. There is also a Greyhound Bus terminal located at the northwest corner of Fenton Street and Sligo Avenue.

There are existing overhead utilities primarily along the west side of street. The poles are equipped with overhead electric, telecom, and roadway lighting. Existing traffic signals are mounted to steel mast arms and poles. Underground utility infrastructure includes water, sanitary sewer, gas, electrical, telecom, and storm drainage. There are also existing storm water management facilities throughout the project area.

Topographic survey of the corridor was performed in 2017 and updated in 2020. Based on available information, the corridor was improved with a major streetscape project in the late 1990's.

Figure 7 – East side of Fenton Street, looking south toward Thayer Avenue.

Table 1 - Study Area Roadway Inventory

Road Name	Designation	Owner	Lanes	Functional Classification	Traffic Control	Average Annual Daily Traffic (vehicles per day)
Fenton Street	A-264	MCDOT	2+TWLTL*+ Parking	Urban Major Collector	-	10,571
Gist Avenue	B-15	MCDOT	2+Parking	Business	Stop controlled on minor legs only	
Sligo Avenue	B-26	MCDOT	2	Business	Signalized	5,390
Silver Spring Avenue	B-25	MCDOT	2	Business	Signalized	
Ripley Street	B-22	MCDOT	2	Business	Stop controlled on minor legs only	
Thayer Avenue	B-27	MCDOT	2+Parking	Business	Signalized	
Easley Street	-	MCDOT	2	-	Stop controlled on minor leg only	
Bonifant Street, West of Fenton Street	MD 594C	MDOT SHA	2 EB only + light rail track	Urban Local / Transitway	Signalized	
Bonifant Street, East of Fenton Street	B-7	MCDOT	2	Business	Signalized	
Wayne Avenue, west of Fenton St	MD 594A	MDOT SHA	4	Urban Major Collector	Signalized	14,730
Wayne Avenue, east of Fenton St	MD 594A	MDOT SHA	4 + light rail track	Urban Major Collector / Transitway	Signalized	14,730
Pershing Drive, east of Fenton Street	-	Private	2 WB only	Alley	Stop control; HAWK signal planned	
Ellsworth Drive	B-12	MCDOT	2	Business	Signalized	
Roeder Road, east of Fenton Street	B-23	MCDOT	2	Business	Stop control; HAWK signal planned	
Colesville Road	US-29	MDOT SHA	6	Urban Principal Arterial	Signalized	28,000
Cameron Street	B-28	MCDOT	2+Parking	Business	Signalized	8,180

*TWLTL = Two-way left-turn lane

7.2 Typical Section

The entire length of the Fenton Street corridor is a closed section with an asphalt pavement, concrete curb and gutter, and concrete/brick paver combination sidewalks. The curb-to-curb width along Fenton Street from Gist Avenue to Roeder Road is 44 feet wide, and from Roeder Road to Cameron Street is 48 feet wide. Travel lanes in the corridor vary from 10 to 16 feet. Parking lanes vary from 7 to 8 feet. Sidewalks generally include a landscape buffer and are generally 10 feet wide or more.

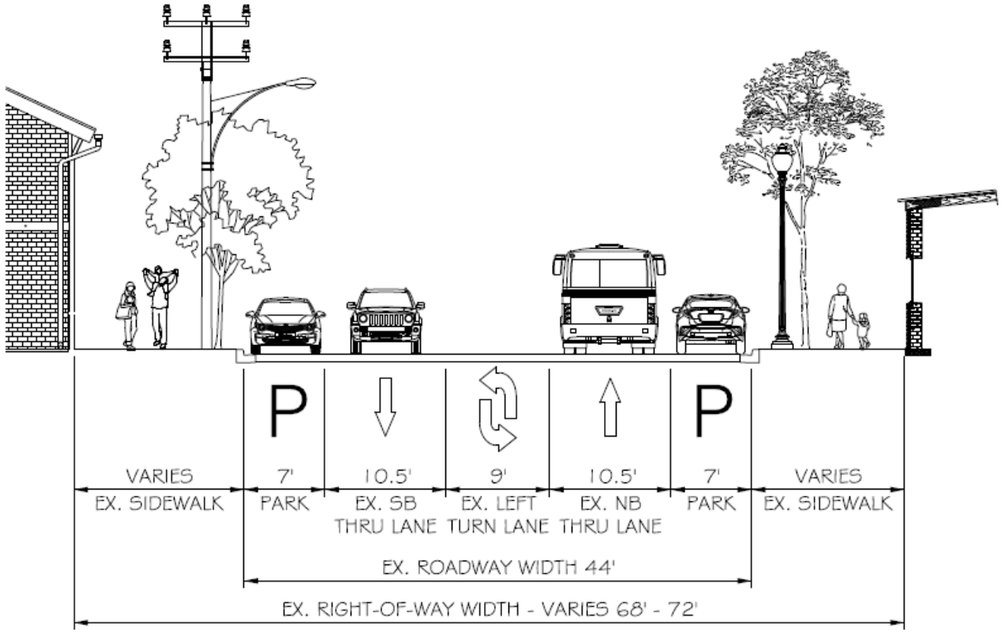


Figure 8 - Fenton Street: Existing Typical Section, from Gist Avenue to Bonifant Street.

From Gist Avenue to Bonifant Street (MD 594C), the roadway typical section is two 10.5-ft travel lanes (one northbound and one southbound), a 9-ft wide two-way left-turn lane, 7-ft wide parking lanes on both sides with curb extensions at intersections, and sidewalks which include a landscape buffer. The functional width of the sidewalk is located between the landscape buffer and building faces. Sidewalk width varies based on right-of-way width.

From Bonifant Street (MD 594C) to Wayne Avenue (MD 594A) there is one southbound thru-lane and a pocket southbound left-turn lane at Bonifant Street. Along the northbound approach to Wayne Avenue (MD 594A), there is one northbound left-turn lane, one northbound thru-lane, one northbound right-turn lane, and sidewalks with landscaped buffers on both sides. This block was recently redeveloped by the Silver Spring Library to the west and a mixed-use development to the east.

From Wayne Avenue (MD 594A) to Ellsworth Drive, the typical section varies. There are two southbound lanes. One of the lanes drops at Wayne Avenue (MD 594A) as a left-turn lane. The other southbound lane operates as a thru-right lane through the intersection. In the northbound direction, there is one thru-lane

Figure 9 - Looking south along Fenton Street, from Bonifant Street.

and a parking lane. There are sidewalks with landscaping buffers on both sides. There is also a hotel valet stand and short pull-off area on the west side of the road just north of Wayne Avenue.

From Ellsworth Drive to Colesville Road (US-29), there are two northbound lanes, two southbound lanes, and sidewalks with landscape buffers on both sides. Lane designations on the approaches to Colesville Road (US-29) and Ellsworth Drive are not signed or marked.

From Colesville Road (US-29) to Cameron Street, there is one 16-ft northbound lane, one 16-ft southbound lane, one 8-ft northbound parking lane, one 8-ft southbound parking lane. At the Colesville Road (US-29) intersection, the parking lane transitions to a thru-right lane. Lane designations on the Fenton Street approach to Colesville Road (US-29) is not signed or marked. The sidewalk on the west side includes a landscape buffer, however, the sidewalk on the east side is immediately adjacent to the curb. The roadway pavement section in this area appears to be a composite section (concrete base with asphalt wearing course).

7.3 Right-of-Way

Right-of-way widths vary from 64-ft to 80-ft (see Figure 10), however, the ultimate right-of-way width planned for the corridor is 80-ft. As properties redevelop, they are generally required to dedicate right-of-way to meet the ultimate width. Existing right-of-way widths are more constrained south of Bonfant Street.

For the purposes of this study, a property mosaic was developed utilizing a combination of GIS data, plat review, and field evidence (property corners found by surveyor).

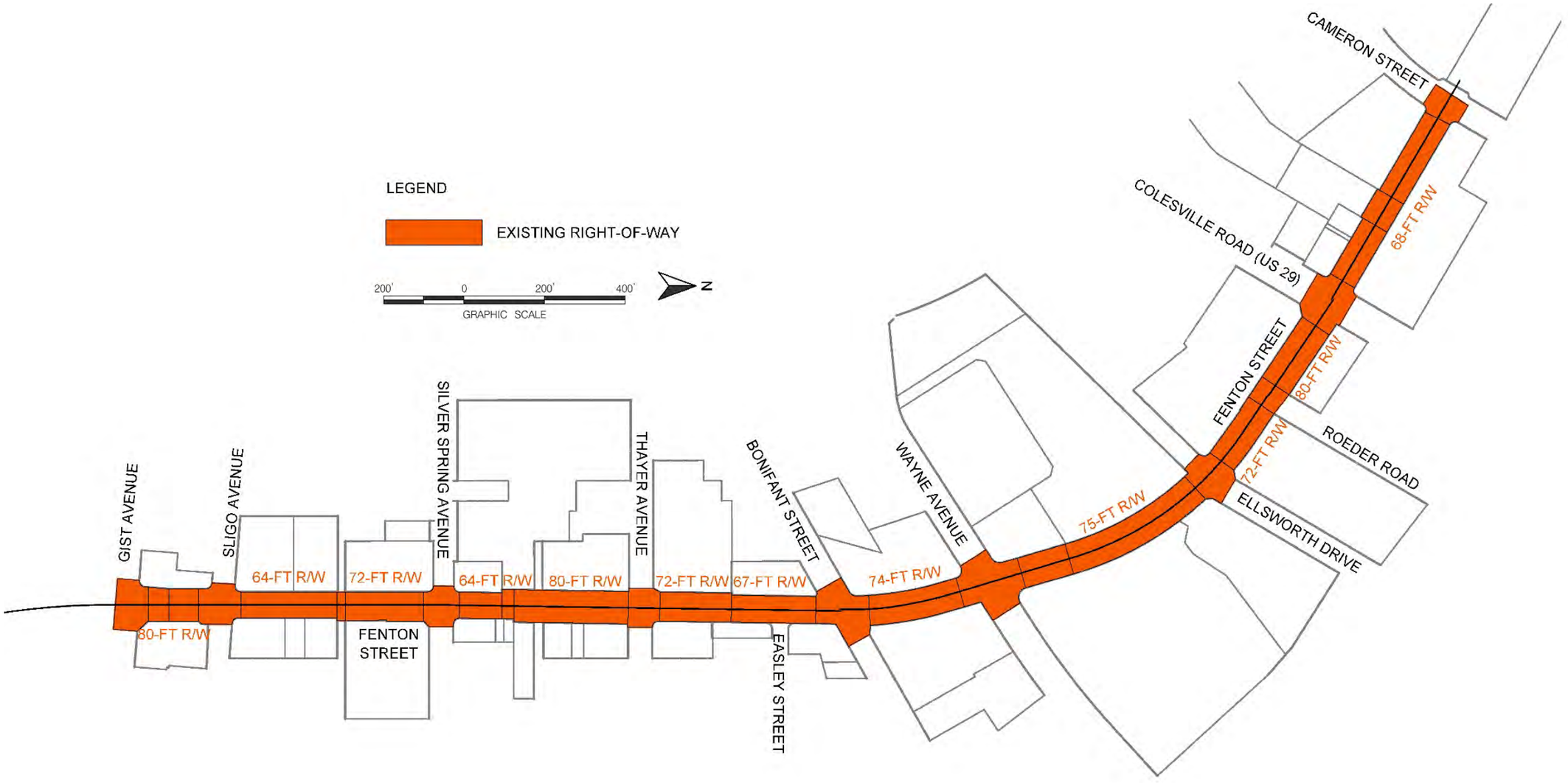


Figure 10 - Fenton Street - Existing Right-of-Way Widths

7.4 Utilities

The corridor includes a moderate to heavy amount of utility congestion. Overhead utility lines are located along the west side of the street from Gist Avenue to Bonifant Street. The lines transition across the intersection of Fenton Street and Bonifant Street to an alignment that continues eastward along Bonifant Street. North of the Fenton Street and Bonifant intersection, all utility infrastructure is located underground. Electrical vaults are in the southbound roadway and sidewalk in the blocks between Ellsworth Drive and Cameron Street. From 2017-2020, the Potomac Edison Power Company (PEPCO) performed installation of additional underground electrical infrastructure in the roadway for the length of the corridor. The new ducts will add capacity. PEPCO does not plan to remove overhead lines and utility poles on the west side of the corridor between Gist Avenue to Bonifant Street.

Washington Gas owns underground mains along Fenton Street from Sligo Avenue to Wayne Avenue, and from Colesville Road to Cameron Street.

The Washington Suburban Sanitary Commission (WSSC) owns water mains along Fenton Street from Sligo Avenue to Bonifant Street, and from Ellsworth Drive to Cameron Street. WSSC also owns a sanitary sewer main from Silver Spring Avenue to Cameron Street.

The project corridor's storm drain and sanitary sewers are separated. Fenton Street is a closed drainage system. MCDOT owns and maintains the storm drain system. The watershed drains to Sligo Creek to the west, which runs south to the Northwest Branch of the Anacostia River.

Based on as-built drawing review, telecommunications infrastructure primarily runs underground and overhead along the west side of Fenton Street from Sligo Avenue to Colesville Road, underground along both sides of Fenton Street from Colesville Road to Cameron Street, and also crosses Fenton Street at nearly every intersection. South of Bonifant Street, telecoms appear to lease space on the existing utility poles with pole drops to underground conduits connecting to adjacent properties. Underground conduit was recently installed under the sidewalk for the development on the west side of Fenton Street between Silver Spring Avenue and Thayer Avenue.

Traffic signal and street lighting infrastructure also exist throughout the corridor. MDOT SHA owns traffic signals at Colesville Road (US-29), Wayne Ave (MD 594C), and Bonifant Street (MD 594A), however, MCDOT is responsible for signal operations on both County and State roads. MCDOT will also be responsible for signal operations where the Purple Line operates. Street lighting is a combination of roadway luminaires mounted on utility poles, Washington Globe pedestrian lighting, teardrop roadway/pedestrian combination lighting, and rectilinear luminaires mounted on signal poles. The Washington Globe luminaires were recently retrofitted/upgraded from high-pressure sodium fixtures to LEDs.

Figure 11 - PEPCO undergrounding work at Fenton Street and Thayer Avenue in July 2020.

Figure 12 - Overhead utilities present a significant constraint in the Fenton Village District.

7.5 Intersections

7.5.1 Operations

There are eight existing signalized intersections within the study corridor. MCDOT plans to add pedestrian hybrid beacons (also known as HAWK signals) at two additional intersections. These signals will only operate when actuated by pedestrians. Right-turns on red are prohibited throughout the corridor.

Fenton Street and Gist Avenue is stop controlled on the minor approaches. The Fenton Street northbound and southbound approaches include one thru-right lane and one dedicated left-turn lane, while side street approaches include one general purpose lane in each direction.

Signalized intersection operations in Fenton Village, south of Bonifant Street, including Sligo Avenue, Silver Spring Avenue, and Thayer Street are fairly standard. At these three intersections, the Fenton Street northbound and southbound approaches include one thru-right lane and one dedicated, permissive left-turn lane, while side street approaches include one general purpose lane in each direction. The only side street with a dedicated left-turn lane is the east leg of Sligo Avenue. There are no exclusive phases at these intersections for turning vehicles in the existing condition. There are crosswalks on all four legs of each intersection with pedestrian APS/CPS signals and curb ramps. Silver Spring Avenue is a shared roadway and includes sharrow markings for bicyclists in each direction.

Fenton Street and Ripley Street is a four-leg, uncontrolled intersection located halfway between Silver Spring Avenue and Thayer Avenue. Ripley Street is a narrow two-way alley that provides access to adjacent properties. It is not a thru street to the west but connects with Grove Street to the east.

Figure 13 - Fenton Street at Sligo Avenue, looking northwest

Fenton Street and Easley Street is a three-leg intersection with no traffic signal controls. The minor leg is a two-way street and is stop-controlled on the westbound approach to Fenton Street. There is one marked crosswalk on the east leg.

The Fenton Street and Bonifant Street (MD 594C) intersection operation is similar to the Fenton Village intersections, however, will soon change due to the implementation of the Purple Line. The west leg of Bonifant Street will operate one-way eastbound. The east leg of Bonifant Street will continue to operate with one lane in each direction.

The Wayne Avenue (MD 594A) intersection operations will also change once the Purple Line is complete. The directional configuration of vehicular traffic will not change; however, the light rail vehicles will begin operating through this intersection when the Purple Line is opened. Eastbound light rail vehicles will leave the Bonifant Street alignment, stop at the Silver Spring Library station on the southwest corner of Fenton Street and Wayne Avenue, cross the Fenton/Wayne intersection diagonally, then head eastbound along the median of Wayne Avenue (and vice versa for westbound vehicles). Headways will vary from 7-1/2 to 12 minutes in each direction depending upon the time of day. There are currently and will continue to be crosswalks on all four legs of the intersection.

Pershing Drive (driveway to Whole Foods surface lot) is a three-leg intersection with no traffic signal controls. The Fenton Street approaches include one thru lane in the northbound direction and two thru lanes in the southbound direction. The Pershing Drive minor leg is a one-way alley with two eastbound lanes. There are no stop controls on the Fenton Street approaches. There are crosswalks on the south and east legs. The crosswalk on the south leg is marked and uncontrolled. There is a high pedestrian movement across Fenton Street and pedestrians are susceptible to the “multiple-threat” crash at this intersection. According to FHWA, a multiple-threat crash involves a driver stopping in one lane of a multilane road to permit pedestrians to cross, and an oncoming vehicle (in the same direction) strikes the pedestrian who is crossing in front of the stopped vehicle. This crash type involves both the pedestrian and driver failing to see each other in time to avoid the collision. MCDOT is currently planning to construct a HAWK signal as a separate project at this location to mitigate this threat.

The Fenton Street and Ellsworth Drive intersection operates with one thru-left lane and one thru-right lane in both the Fenton Street northbound and southbound directions. The Ellsworth Drive legs operate with one general purpose lane in each direction, however, the west leg is typically closed to vehicular traffic, to provide a comfortable pedestrian promenade for shopping. The east leg is a shared roadway and includes sharrow markings in each direction. There are crosswalks with pedestrian APS/CPS signals and curb ramps on all four legs of the intersection.

Fenton Street and Roeder Road is another three-leg intersection with no traffic signal controls. Roeder Road, the minor leg, is a two-way street and is stop-controlled on the westbound approach to Fenton Street. There are crosswalks on all three legs. Similar to Pershing Drive, the crosswalks on the north and south legs are marked and uncontrolled. There is a high pedestrian movement across Fenton Street as the parking garage and a bus stop are located on the east side of the street and the mall entrance is located on the west side of the street. Pedestrians are susceptible to the “multiple-threat” crash at this intersection as well. MCDOT also plans to construct a HAWK signal at this location, as a separate project.

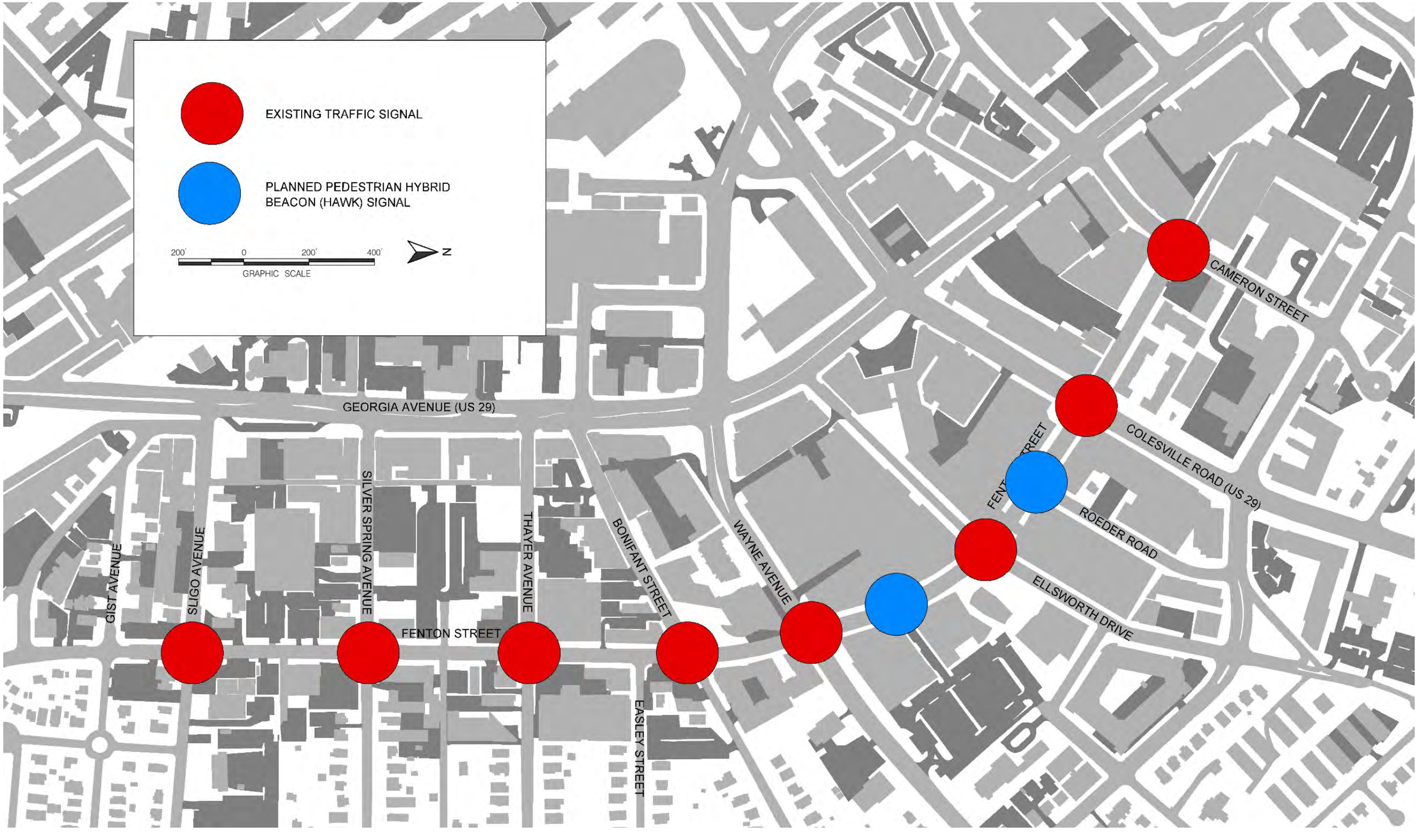


Figure 14 - Existing and Planned Signalized Intersections in the study corridor.

Figure 15 - Fenton Street at Roeder Road, looking northbound. Pedestrians are susceptible to the multiple-threat at this intersection. MCDOT is planning to implement a pedestrian hybrid beacon (HAWK) signal here.

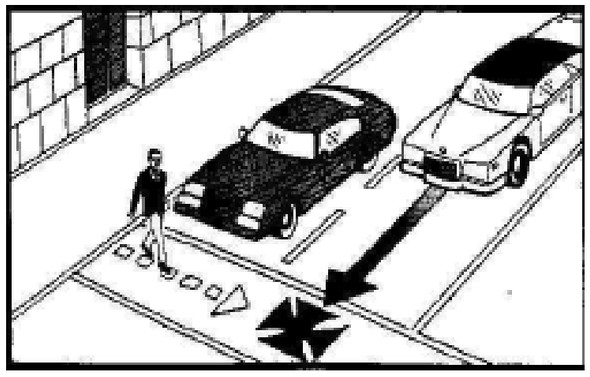


Figure 16 - Illustration of the multiple-threat pedestrian crash (Source: FHWA).

At the Fenton Street and Colesville Road (US-29) intersection, Fenton Street is the minor street as Colesville Road (US-29) carries more the twice the traffic volume of Fenton Street. Although the Fenton Street approaches include two travel lanes, there are no dedicated, exclusive movements on these legs. Motorists typically use the inside lane to make thru movements and permissive left-turns. The outside lane is used to make thru and right-turn movements. Colesville Road (US-29) is a six-lane section where the inside two lanes operate as reversible lanes. Overhead gantries implement dynamic lane assignments depending peak directional traffic demand. The AM peak demand is in the southbound direction and the PM peak demand is in the northbound direction. The Colesville Road (US-29) north leg of the intersection includes a leading southbound exclusive left-turn movement to Fenton Street, followed by a permissive left-turn, however, there is no dedicated left-turn lane. CCTV and camera detection are used to monitor and regulate traffic flow along Colesville Road. The intersection includes crosswalks on all four legs equipped with APS/CPS pedestrian signals and curb ramps.

Figure 17 - CHART Colesville Road (US 29) Camera 24. The planned bikeway will cross parallel with the crosswalk in the middleground.

Fenton Street terminates at Cameron Street, however, there are signalized northbound and southbound movements to-from the Cameron Street garage on the north side of the intersection. The Fenton Street northbound approach operates with one thru-left lane and one thru-right lane, however, neither is assigned. The opposing southbound alley, which is an exit for the parking garage includes a dedicated left-turn lane and a thru-right lane. However, these lanes will be reconfigured as part of a separate project into one lane to provide width for the Cameron Street to Planning Place Bikeway, which will ultimately connect with the Fenton Street bikeway. There are APS/CPS pedestrian signals, crosswalks, and curb ramps on all four legs of the intersection. Cameron Street includes existing bike lanes and bike boxes in each direction.

7.5.2 Geometry

The horizontal geometry of the corridor consists of two long tangents joined by a left-hand horizontal curve. From Gist Avenue to Bonifant, the roadway runs along a north-south axis on the grid. However, at Bonifant Street, the corridor bends approximately 45 degrees to the northwest, with the point of curve located roughly at Bonifant Street and point of tangent.

The vertical geometry of the corridor includes sag vertical curves (sumps) at Silver Spring Avenue, Easley Street, and Ellsworth Drive. Crest vertical curves are located Sligo Avenue, south of Easley Street, Wayne Avenue, and Colesville Road. The longitudinal grades in the corridor range from 0.1% to 6.8%.

Curb returns at intersections are generally range from 20- to 30-ft radii. South of Bonifant Street, there are existing curb extensions in the at signalized intersection corners, so curb returns are closer to 30-ft radii.

7.6 Traffic Data

Peak hour turning movement counts (TMCs) were collected from March 25th, 2017 thru April 8th, 2017 for vehicles and pedestrians at the following intersections on a weekday (Tuesday - Thursday) (6:30 AM to 9:30 AM and 3:30 PM to 6:30 PM) and on Saturday (1:00 PM to 4:00 PM).

- Fenton Street and Cameron Street
- Fenton Street and Colesville Road (US 29)
- Fenton Street and Ellsworth Drive
- Fenton Street and Wayne Avenue
- Fenton Street and Bonifant Street
- Fenton Street and Thayer Avenue
- Fenton Street and Silver Spring Avenue
- Fenton Street and Sligo Avenue

Bicycle counts were collected at the intersections along Fenton Street and along Grove Street. Grove Street was counted because it is an existing parallel north-south designated bikeway. The bicycle volumes along Fenton Street were approximately four (4) to five (5) bicycles per hour for each direction for all three (3) peak periods. The bicycle volumes along Grove Street were approximately three (3) bicycles per hour for each direction during the AM peak period and Saturday peak period. The PM peak period had approximately one (1) per hour.

Refer to the appendix for detailed traffic counts and speed data.

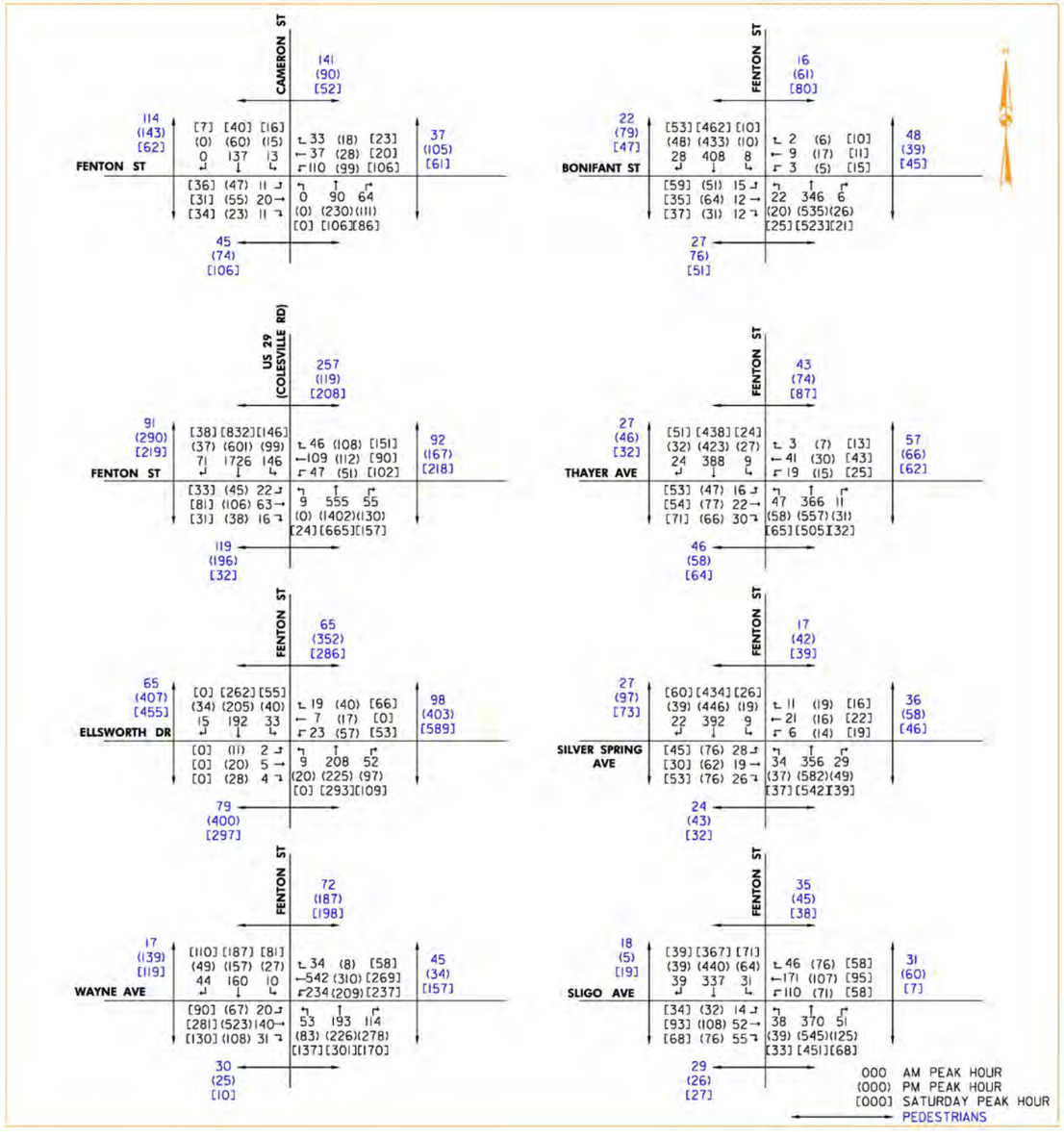


Figure 18 - Existing Traffic Volumes 2017

7.7 Crash Data

Crash data for the Fenton Street corridor from Gist Avenue to Cameron Street was obtained from Montgomery County. Between January 1, 2017 and December 31, 2019, 68 crashes were documented within the study area. Of the 68 crashes, 59 (87%) involved only vehicles, 7 (10%) involved pedestrians, and 2 (3%) involved bicycles. The severity of 68 crashes comprised 51 (75%) which involved property damage only and 17 (25%) which had recorded injuries. There were zero fatalities. The highest frequency of crashes occurred between 12 PM and 1 PM. The location where the highest number of crashes (17) occurred was at the intersection of Fenton Street and Wayne Avenue. The road conditions when the 68 crashes occurred were 47 (69%) dry pavement, 13 (19%) wet pavement, 1 (2%) on snow covered pavement, and 7 (10%) did not have information recorded for the pavement conditions. The lighting conditions when the 68 crashes occurred were 46 (68%) daylight, 20 (29%) dark but streetlights were on, and 2 (3%) were at dusk.

Both bicyclist-involved crashes occurred during daylight hours with clear weather. One of the crashes occurred at Silver Spring Avenue and involved a left-turning vehicle. The other occurred along the sidewalk near Cameron Street. In neither crash was the bicyclist at fault.

The seven pedestrian-involved crashes occurred during daylight hours. In four out of seven crashes, the pedestrian was not at fault. Four of the seven crashes occurred at intersections where the pedestrian was in a crosswalk.

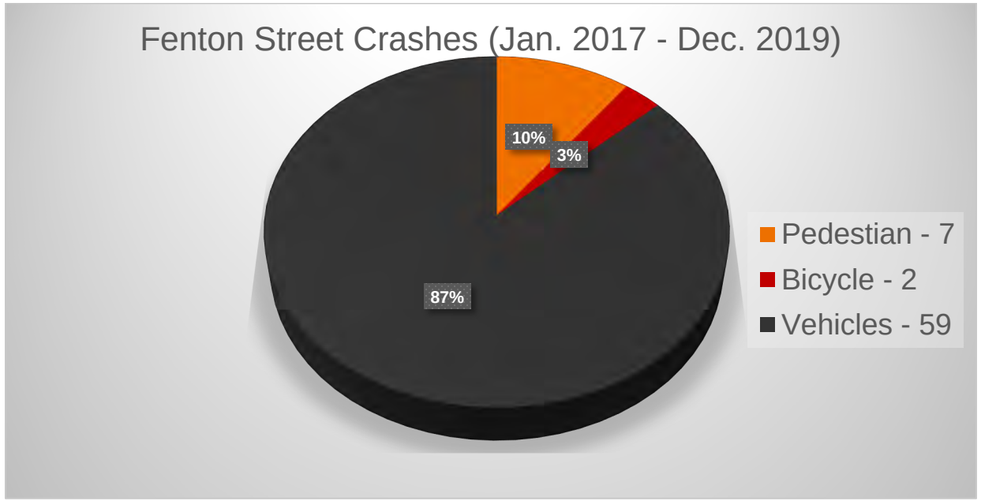


Figure 19 - Fenton Street Crashes (Jan. 2017 - Dec. 2019)

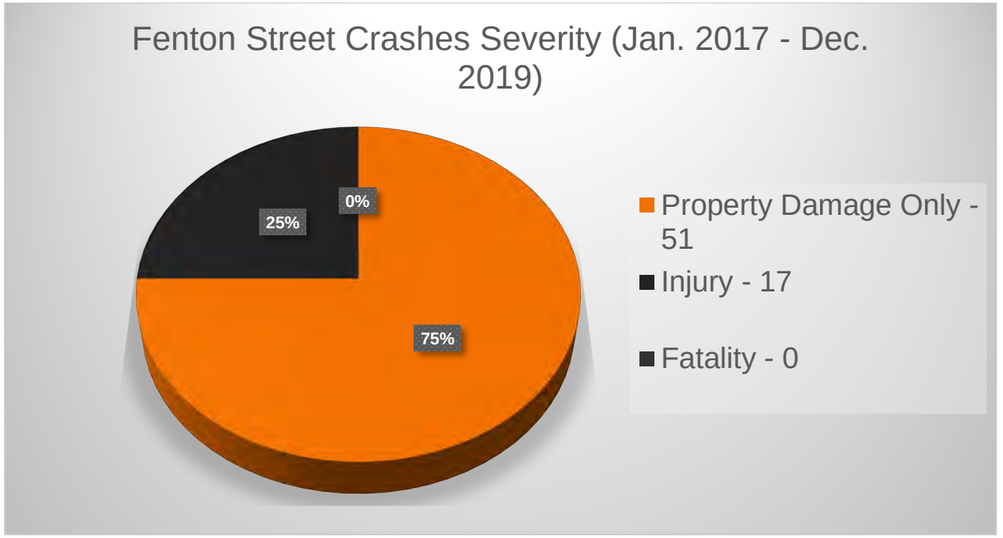


Figure 20 - Fenton Street Crash Severity (Jan. 2017 - Dec. 2019)

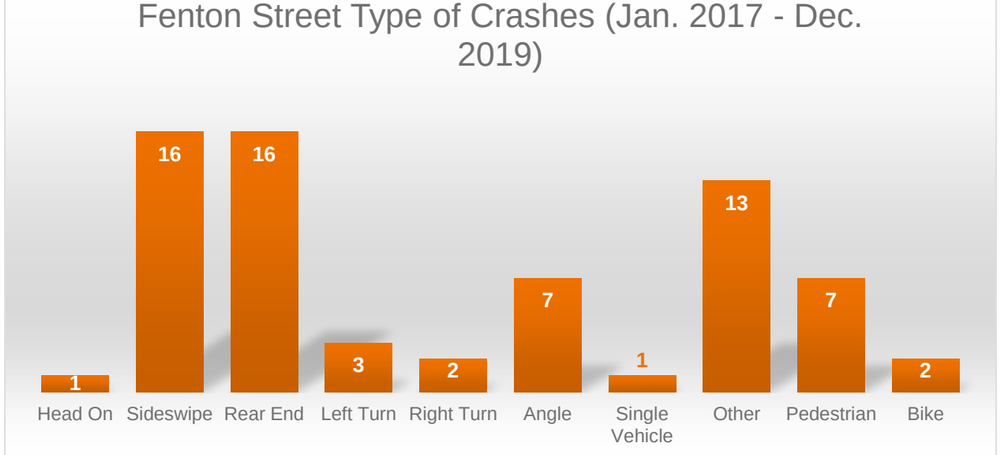


Figure 21 - Fenton Street Type of Crashes (Jan. 2017 - Dec. 2019)

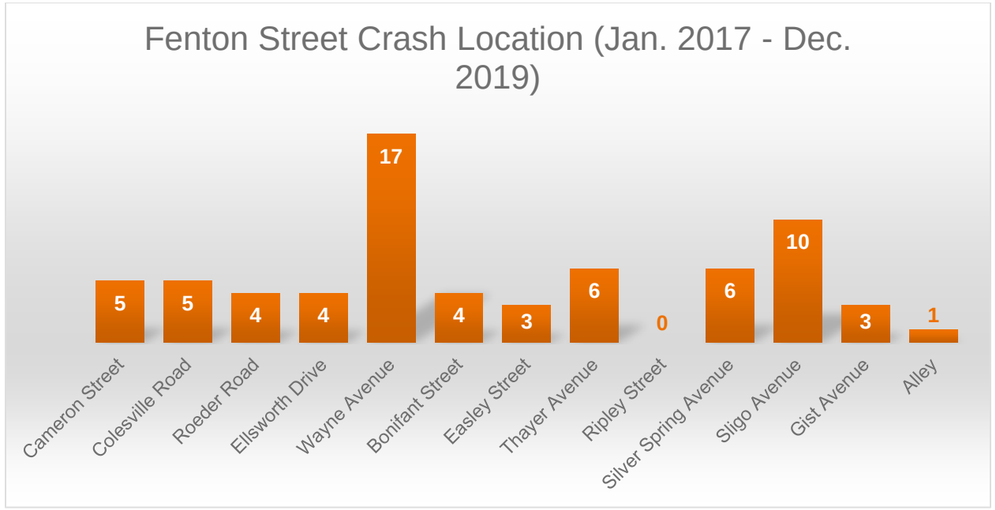


Figure 22 - Fenton Street Crash Locations (Jan. 2017 - Dec. 2019)

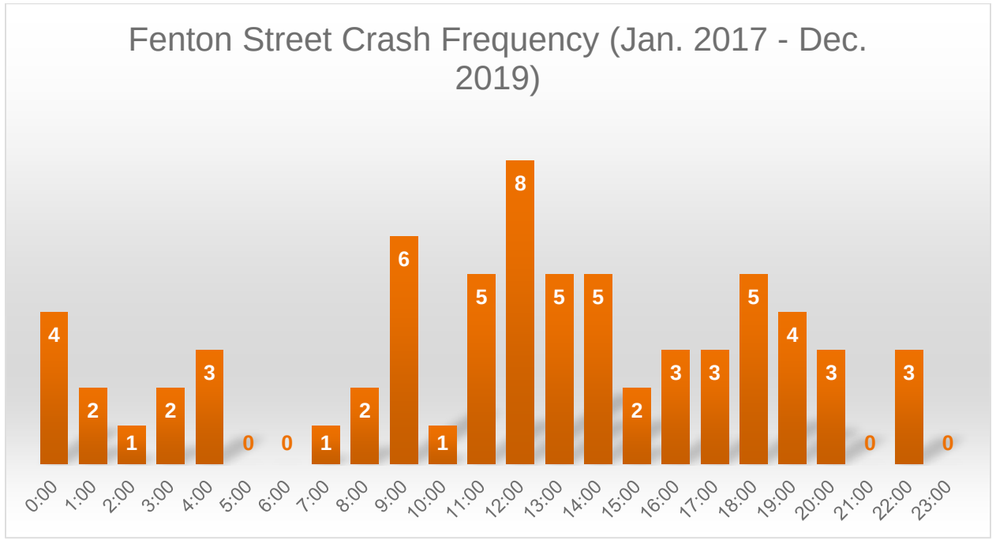


Figure 23 - Fenton Street Crash Frequency (Jan. 2017 - Dec. 2019)

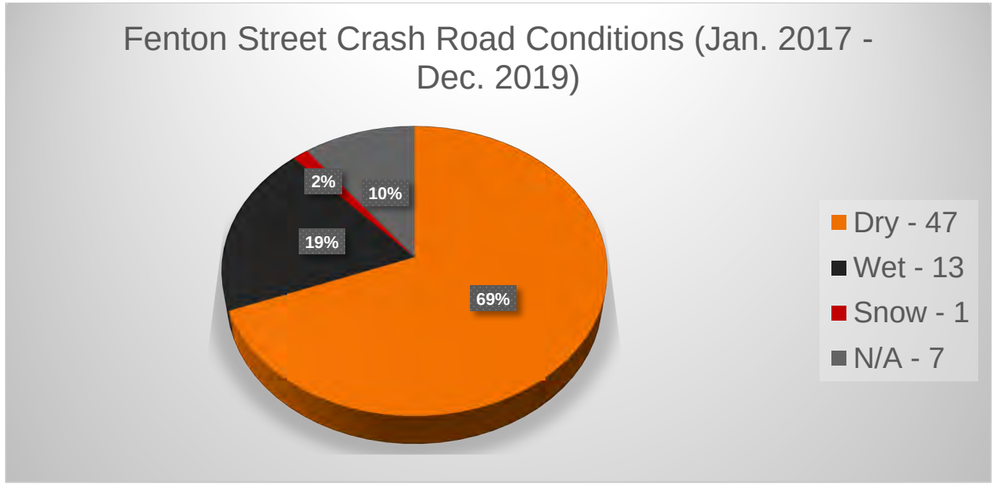


Figure 24 - Fenton Street Crash Road Conditions (Jan. 2017 - Dec. 2019)

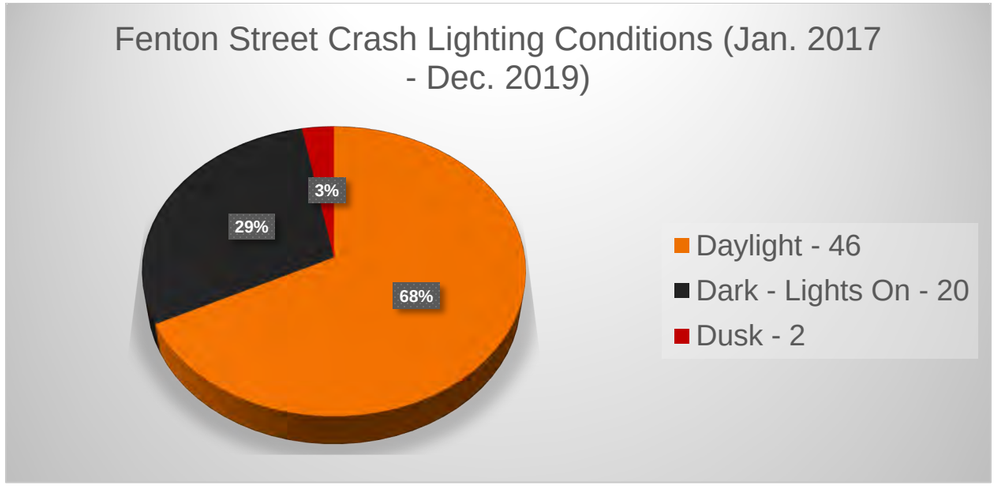


Figure 25 - Fenton Street Crash Lighting Conditions (Jan. 2017 - Dec. 2019)

7.8 Existing Land Use

The Fenton Street Bikeway will span three subdistricts within Silver Spring: the Fenton Village District, the Ellsworth District, and the North Silver Spring District.

The Fenton Village District, the southern segment of the corridor, includes lower density urban commercial and mixed-use land uses. In this area, Fenton Street is fronted by small commercial properties such as restaurants, cafes, dry cleaners, a laundromat, deli/markets, salons, tailors, a locksmith, and gas stations. The area also includes a grocery store, apartment buildings, office buildings, and public parking garages/lots. A Greyhound Bus station is located at the northwest corner of Fenton Street and Sligo Avenue. The Silver Spring Library and future Purple Line station is located at the north boundary of this subdistrict. Buildings that front on Fenton Street are typically 1 – 2 stories with traditional storefront access to the sidewalk. Many of the businesses rely on direct access to the street and parallel parking along Fenton Street for customer convenience and truck deliveries, as well as sidewalk café seating. To the east lies a large single family detached home residential community. To the west lies mostly commercial properties such as offices, auto shops, restaurants, and gyms. Some high-density residential is also present in the blocks to the west.

The Ellsworth District, the central segment of the corridor, includes high density commercial, mixed-use, and civic property uses including retail stores, restaurants, offices, a hotel, a grocery store, a hardware store, the Ellsworth Place shopping mall, a movie theater, an ice-skating rink, and public parking garages. Ellsworth Place and Downtown Silver Spring combine to form a high-density retail and shopping area, which occupies an entire city block bounded by Fenton Street, Ellsworth Drive, Colesville Road (US-29), and Georgia Avenue (US-29). The west leg of Ellsworth Drive is a pedestrian promenade lined with ground level retail shopping. The Silver Spring Civic Building at Veterans Plaza is located on the southeast corner of Fenton Street and Ellsworth Drive.

Lastly, the North Silver Spring District, the northern segment of the corridor, includes the Montgomery Center on the west side, which is an office building with ground floor retail and restaurants. On the east side of the street is the Montgomery Arms Apartment complex, which has been designated as a historic property (refer to section 7.15). There is a gym on the northwest corner of Fenton Street and Cameron Street and a public parking garage on the northeast corner.

East Silver Spring Elementary School is located to the east of the study area at 631 Silver Spring Avenue.

The Montgomery College - Takoma Park/Silver Spring Campus is located to the south of the study area at 7600 Takoma Avenue.

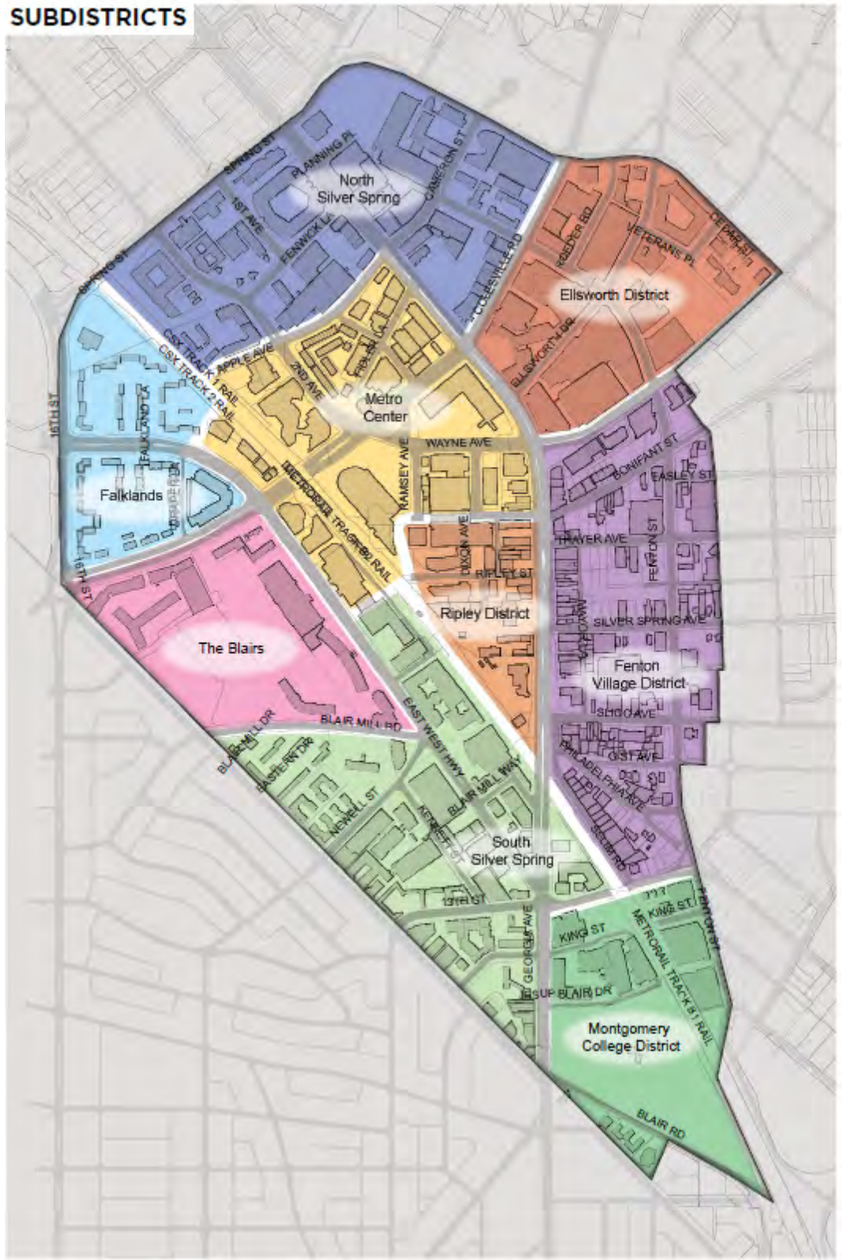


Figure 26 - Silver Spring Subdistricts (Source: M-NCPPC)

Figure 27 - Fenton Street - Existing Land Use

7.9 Adjacent Projects / Developments

The most significant other project in the corridor is the Purple Line project, which intersects Fenton Street at Wayne Avenue. Improvements are currently under construction with scheduled completion due in 2023. The track alignment will cross Wayne Avenue diagonally. The Fenton Street Bikeway should be designed to interface with the Purple Line station located under the Silver Spring Library on the southwest corner of Fenton Street and Wayne Avenue.

Figure 28 – Silver Spring Library, looking southwest across the intersection of Fenton Street and Wayne Avenue; existing condition (top), proposed condition with Purple Line improvements (bottom, source: MTA).

Other projects that are either planned or under construction include:

1) Urby Silver Spring, Plan no. 1-20130020A
2) 850 Sligo Ave, Plan no. 1-2019009
3) Pepco Sligo to Takoma Underground Transmission Line
4) Silver Spring Park, Plan no. 9-20100030
5) Fenton Village Center, 8227 Fenton Street, R. Holt Easley's subdivision, Plan no. 8-20070210
6) Cameron Street to Planning Place Bikeway
7) Fenton Street and MD 410 Intersection Improvements
8) 908 Ellsworth Drive - Peterson Companies and Foulger-Pratt

7.10 Parking

Public parking along the Fenton Street study corridor is provided by metered on-street parking, permit parking, parking garages, and surface lots.

Public parking in Fenton Village, the southern section of Fenton Street from Gist Avenue to Wayne Avenue, is provided by limited on-street parking, parking garages, and surface lots. Parking is used by small businesses, offices, shops, apartments, and restaurants. On-street parking meters in Fenton Village allow 1-hour from 7 am to 6 pm except Sunday. At other times, parking is free and is not time limited.

Public parking in the Ellsworth District, central section of Fenton Street from Wayne Avenue to Colesville Road is provided by limited on-street parking and MCDOT parking garages. On-street parking meters in the Ellsworth District allow 1-hour from 9 am to 6 pm except Sunday. Parking is free and is not time-limited at other times.

Public parking in the North Silver Spring District, northern section of Fenton Street from Colesville Road to Cameron Street, is provided by limited on-street parking and a MCDOT parking garage. On-street parking meters in the North Silver Spring District allow 1-hour from 9 am to 6 pm except Sunday. Parking is free and is not time-limited at other times.

The County-owned parking garages and lots charge for parking from 7 am to 7 pm, Monday through Friday. Permit parking is available for long-term users.

Capacity and utilization data for garages and surface lots were provided by MCDOT for an eight-month period during fiscal year 2020 (July 2019 thru February 2020).

For on-street parking, three days of data collection were performed from Thursday, September 10th thru Saturday, September 12th, 2020. The study area included Fenton Street and side streets within one block. Counts were taken during roughly the same five hours each the day: 8 – 9 am, 12 -1 pm, 3 – 4 pm, 6 - 7 pm, and 9 – 10 pm. Most parking within the study area is either a 1- or 2-hr parking limit every day except for Sunday.

The observed Fenton Street on-street parking utilization ranged from 59% to 95%, with an average utilization of 78%. The broader study area utilization ranged from 55% to 95%, with an average of 76%. Of the fifteen hours observed (Thursday, Friday, and Saturday), peak utilization occurred on Friday at 9 pm and Saturday at 3 pm. Generally, utilization was lower in the morning and increased as the day went on. The highest utilization was observed on the blocks along Fenton Street from Silver Spring to Thayer Avenue (88%), Wayne Avenue to Ellsworth Drive (83%), and Colesville Road (US 29) to Cameron Street (91%). The latter was consistently utilized throughout the day. All but one block along Fenton Street reached 100% utilization multiple times. Construction work between 8 am – 6 pm was blocking 10 meters along Fenton Street SB in the vicinity of Silver Spring Avenue. These meter spaces were conservatively assumed to be and counted as utilized. Utilization for these meters likely would have been slightly lower during normal operation. Vehicles were observed regularly throughout the corridor parking illegally or standing in a no parking zone but were not counted, but especially along Fenton Street from Ellsworth Drive to Colesville Road (US 29).

Two carsharing parking spaces are provided on the east side of the block between Wayne Avenue and Ellsworth Drive. Two carsharing spaces are provided on the east side of the block between Colesville Road (US 29) and Cameron Street.

Bikeshare stations are located at the northeast corner of Fenton Street and Gist Avenue, as well as the northeast corner of Fenton Street and Ellsworth Drive.

There are more than 40 bike racks located along the corridor.

Refer to the tables and figures below, as well as the appendix for detailed parking data.

Figure 29 - Dash Cam Screenshot from Parking Utilization Data Collection task, looking southbound on Fenton Street toward Wayne Avenue

Table 2 - Fenton Village District Parking Summary

Type	Name/Location	No. of Spaces				Utilization	Notes
		Meter	Permit	Accessible	Bike		
On-Street	Fenton Street from Gist Ave to Wayne Ave	57			9	73% (avg)	1-hr Parking, 7 am – 6 pm ex. Sunday
	Side Streets (within 1 block)	102	29	1		79% (avg)	1- to 2-hr Parking 9 am – 6 pm ex. Sunday
Garages	#3 Thayer-Silver Spring 919 Silver Spring Ave	155		6	28	33%	
	#4 Fenton Village 8100 Fenton Street	295		18	0	61%	
Surface Lots	#29 Bonifant-Easley 809 Easley Street	66				86%	
	#38 Bonifant 920 Bonifant Street	21				98%	

Table 3 - Ellsworth District Parking Summary

Type	Name/Location	No. of Spaces				Utilization	Notes
		Meter	Permit	Accessible	Bike		
On-Street	Fenton Street from Wayne Ave to Colesville Rd	12			20	83% (avg)	1-hr Parking 9 am – 6 pm ex. Sunday
	Side Street (within 1 block)	76				66% (avg)	
Garages	#60 Wayne 921 Wayne Ave	1,633		29	0	60%	
	#61 Town Square 786 Ellsworth Drive	1,241		24	4	59%	

Table 4 - North Silver Spring District Parking Summary

Type	Name/Location	No. of Spaces				Utilization	Notes
		Meter	Permit	Accessible	Bike		
On-Street	Fenton Street from Colesville Rd to Cameron Street	22			0	91% (avg)	1-hr Parking 9 am – 6 pm ex. Sunday
	Side Street (within 1 block)	29				83% (avg)	
Garages	#2 Spring-Cameron 8700 Cameron Street	1,311		33	5	65%	
Surface Lots	#2 Planning Place	19		4		88%	

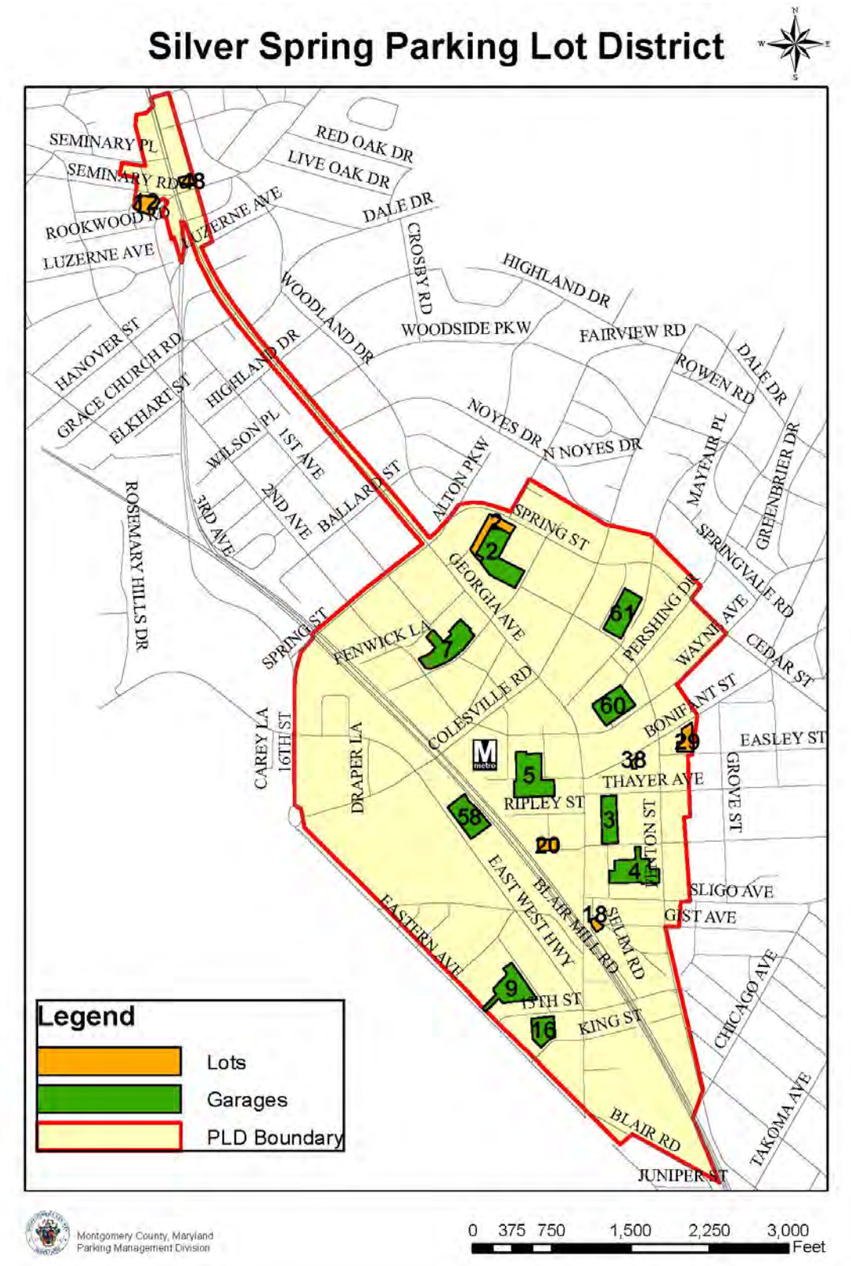


Figure 30 - Silver Spring Parking Lot District (Source: MCDOT)

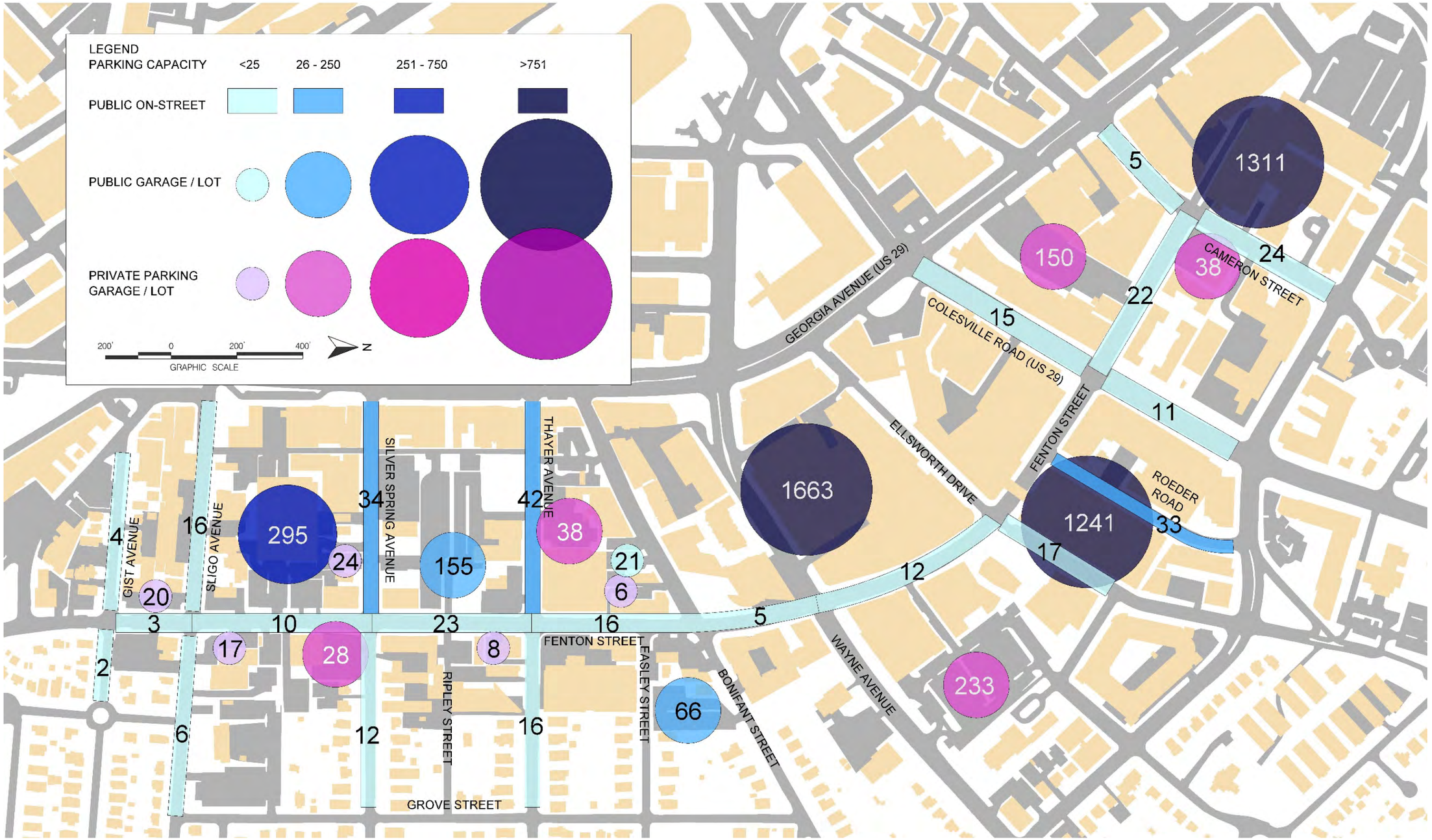


Figure 31 - Existing Parking Capacity within one block of the Fenton Street study corridor.

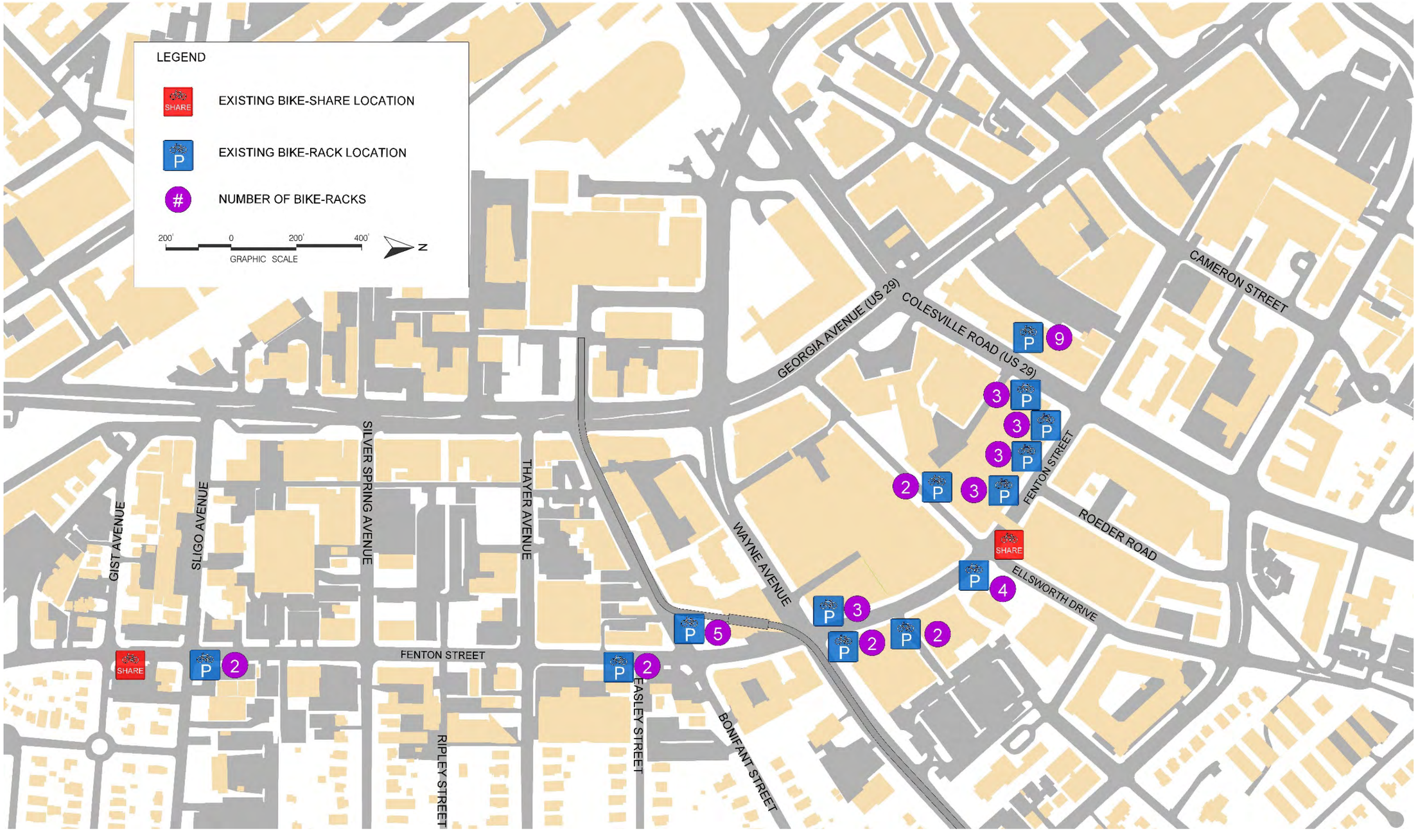


Figure 32 – Existing Bike Rack and Bikeshare Locations

7.11 Truck Loading and Parking for Businesses

Truck deliveries, loading/unloading, and parking are a specific concern in the Fenton Village District and Ellsworth District. MCDOT made three separate visits to Fenton Street specifically to interview business owners, managers, and/or employees for feedback on truck loading and on-street parking needs. Generally, deliveries to most businesses can occur any time during business hours. Delivery vehicle sizes vary in size from vans, to single unit box trucks, to large tractor trailers. The following is a summary of key points discussed:

7.11.1 Gist Avenue to Sligo Avenue

- There is a laundromat on this block, however, it has off-street parking. MCDOT visited the laundromat but was not able to meet with management. Due to low parking utilization on this block, truck loading is not anticipated to be an issue.

7.11.2 Sligo Avenue to Silver Spring Avenue

- The strip mall on the northeast corner of Fenton Street and Sligo Avenue has a carry-out restaurant, convenience store, market, and check cashing business. The convenience store was the only business with notable truck loading activity; however, deliveries are normally received off-street in the parking lot.
- There is a deli/market and electronics store on the east side of the block. The former receives truck deliveries throughout the week and relies on on-street parking for carry out customers.
- The café on the southwest corner of Fenton Street and Silver Spring Avenue receives two liquor deliveries and one food delivery per week from the street. Delivery drivers use the ramp to the building that faces Fenton Street. Deliveries are made with box trucks and tractor trailers.
- The American Legion Post 41 receives deliveries off-street.

7.11.3 Silver Spring Avenue to Thayer Avenue

- There is a café on the northwest corner of Fenton Street and Silver Spring Avenue. MCDOT visited the café but was not able to meet with ownership.
- The apartment building on the west side of the street receives parcels from Fenton Street. They have a loading dock for tenants moving in and out. Their tenants park in the County-owned lots and garages.
- A restaurant on the northeast corner receives pallet deliveries, typically from a tractor trailer that parks on Silver Spring Avenue and leaves through the neighborhood to the east.
- Along the east side of the block:
    - A tailor business and a leather repair business rely on on-street parking.
    - A security company has 6 or 7 vans that stop by at least once per day to pick up materials. There is no rear loading area. They sometimes receive deliveries from large trucks.
    - A pack and ship center needs short- and long-term parking for customers.
    - There is also a spa that receives infrequent deliveries; they can use the alley for short-term loading.
    - The dry cleaner on the southeast corner of Fenton Street and Thayer Avenue has off-street parking and does not use the on-street parking.

7.11.4 Silver Spring Avenue to Thayer Avenue

- MCDOT met with representatives from the grocery store located on the northwest corner of Fenton Street and Thayer Avenue. Trucks back into the garage from Fenton Street. Most deliveries are made from 6 am to 12 pm, however, deliveries can arrive any time of day. Smaller vendors typically make deliveries to the front of the store. Larger vehicles use the rear loading dock in the garage, with access from Fenton Street. Once the vehicle backs into the garage, it does not obstruct the street.
- The gas station on the northeast corner of Fenton Street and Thayer Avenue receives fuel tank deliveries 1 to 2 times per week. They also have a box truck that comes periodically to collect used motor oil and to deliver heating oil. These deliveries all take place off-street. Deliveries are usually on weekdays.
- Along the east side of the block:
    - A tailor and alterations business has a van they use to pick up and deliver clothes. They need a place to load clothes in the van. This can happen Monday through Saturday at any time during business hours (9 am – 7 pm).
    - A café gets deliveries two to three times a week, mornings, or afternoons, during regular business hours (open 7 days a week). Deliveries are usually in a box truck.
    - A comic bookstore has employees that park in the Wayne Ave garage mostly but would prefer to be able to park more closely in long-term parking. They cannot use Lot 29 due to the 2-hr limit. Customers often must leave store to feed meters. Parcel deliveries are typically made from Fenton Street or from Easley Street any time of day.

7.11.5 Thayer Avenue to Bonifant Street

- The gas station on the east side of this block does vehicle repair on site. Most of the cars parked on the site are awaiting repair. The gas station is affected during construction because people avoid Fenton Street.

7.11.6 Bonifant Street to Wayne Avenue

- On the east side of the street:
    - The apartment building main entrance faces Fenton Street. They receive regular food and parcel deliveries through this entrance. Tenants move in using a loading dock in the building. There are several existing or anticipated commercial tenants on the ground floor facing Fenton Street including a restaurant, nail salon, two gyms, and a coffee shop. It is anticipated that these businesses will receive deliveries from the street.
    - The gym on the northeast corner of Fenton Street and Bonifant Street receives occasional parcel deliveries. Their members use the County-owned parking lot.

7.11.7 Wayne Avenue to Ellsworth Drive

- The grocery store on the northeast corner of Fenton Street and Wayne Avenue receives deliveries off-street from its loading dock.
- On the east side of the street:
    - A restaurant north of Pershing Drive receives deliveries in the mornings on Monday, Wednesday, and Friday from tractor trailers that park on Fenton Street for 10-15 minutes.
    - The pharmacy / convenience store takes deliveries from the alley. Customers use the rear parking lot and on-street parking.
- The hotel on the northwest corner has a drop-off area on the west side of Fenton Street that is used for passenger drop-off/pick-up, food deliveries, and taxi/Uber. It is used more frequently on the weekends. Their shuttle uses this drop-off/pick-up area, as it does not meet the clearance to use the rear entrance in the garage. Navigation apps bring people to the drop off area. The doors enter an elevator lobby. This is not a full-service hotel, so there is no doorman. Other vehicles that

cannot meet the garage clearance will temporarily park in drop-off/pick-up area. The building has a back alley loading dock. Guests do not typically use on-street parking.

- On the west side of the street:
  - There are two fast casual restaurants. Food delivery services temporarily park in the outside travel lane to pick up orders. They receive bulk food deliveries from the rear dock.
  - A men's clothing store and beauty supply store both receive deliveries from the rear dock.

7.11.8 Ellsworth Drive to Colesville Road (US 29)

- There is no existing parking on this block.
- Vehicles regularly stop, stand, and temporarily park on both sides of the street, as it is near the mall entrance.
- The fast food restaurant on the northeast corner of Fenton Street and Ellsworth Drive receives bread and produce deliveries from Fenton in the mornings. All other deliveries are made from Ellsworth Drive.
- The restaurant on the southeast corner of Fenton Street and Roeder Road receives parcel deliveries from Fenton Street once per week.
- A fast food restaurant receives deliveries in the front from a large truck on Wednesday mornings.
- The sushi restaurant receives deliveries in the back.
- There is a mattress store on the southeast corner of Fenton Street and Colesville Road (US 29). Deliveries come on Mondays anytime from box trucks that park on Fenton and delivery through the side door. There is no loading dock. Customers rarely buy mattress directly from the store, but rather have them delivered from a warehouse.

7.12 Building Frontage and Access

The Fenton Village District has several buildings and businesses with traditional storefront access directly to the sidewalk, as well as sidewalk café seating. The following is a list of properties with entrances that may present challenges with the proposed improvements, depending on which typical section is used:

- 8113 Fenton Street ~ Pedestrian ramp, stair access, and sidewalk café seating
- 8120 Fenton Street ~ Existing pedestrian ramp access
- 8200 Fenton Street ~ Existing pedestrian ramp, stair access, and sidewalk café seating
- 8233 Fenton Street ~ Existing sidewalk café seating
- 8307 Fenton Street ~ Existing sidewalk café seating
- 8311 Fenton Street ~ Existing sidewalk café seating

Figure 33 - Delivery truck backing into Safeway loading dock from Fenton Street, looking south toward Thayer Avenue.

Figure 34 - Single unit truck making delivery along Fenton Street near Silver Spring Avenue.

7.13 Transit

Both MCDOT RideOn and the Washington Metropolitan Area Transit Authority (WMATA) operate bus services within the corridor. Bus routes turn onto and off the corridor at Sligo Avenue, Thayer Avenue, Colesville Road, and Cameron Street. Buses also cross Fenton Street at Wayne Avenue. MCDOT recently started operating the FLASH bus rapid transit (BRT) route that crosses Fenton Street at Colesville Road. A FLASH BRT station is located near the intersection.

In 2023, the Purple Line light rail will also begin service that crosses Fenton Street at Wayne Avenue.

According to MDOT MTA, light rail trains will operate in each direction every 7 1/2 minutes during peak periods, and every 10-12 minutes in off-peak hours depending on time of day.

The following tables include a summary of transit routes, headways, and ridership in the corridor. Refer to the appendix for detail ridership data.

Figure 35 - WMATA Metrobus route F4 operates in the Fenton Street corridor.

Table 5 - MCDOT RideOn Routes

Route #	Directions and Limits within Fenton Street corridor	Weekday AM/PM Peak Headway
16	NB/SB from Colesville Road to Sligo Ave	12 - 20 minutes
17	NB/SB from Colesville Road to Philadelphia Ave	20 – 31 minutes
20	NB/SB from Colesville Road to Thayer Ave	9 – 32 minutes
28 (Circulator)	SB only from Cameron Street to Thayer Ave	15 – 20 minutes

Table 6 – MCDOT FLASH Bus Rapid Transit (Planned)

Route #	Directions and Limits within corridor	Weekday AM/PM Peak Headway
FLASH US29	NB/SB from Colesville Road to Philadelphia Ave	11 – 30 minutes

Table 7 - WMATA Metrobus Routes

Route #	Directions and Limits within corridor	Weekday AM/PM Peak Headway
F4	NB/SB from Colesville Road to Philadelphia Ave	11 – 30 minutes

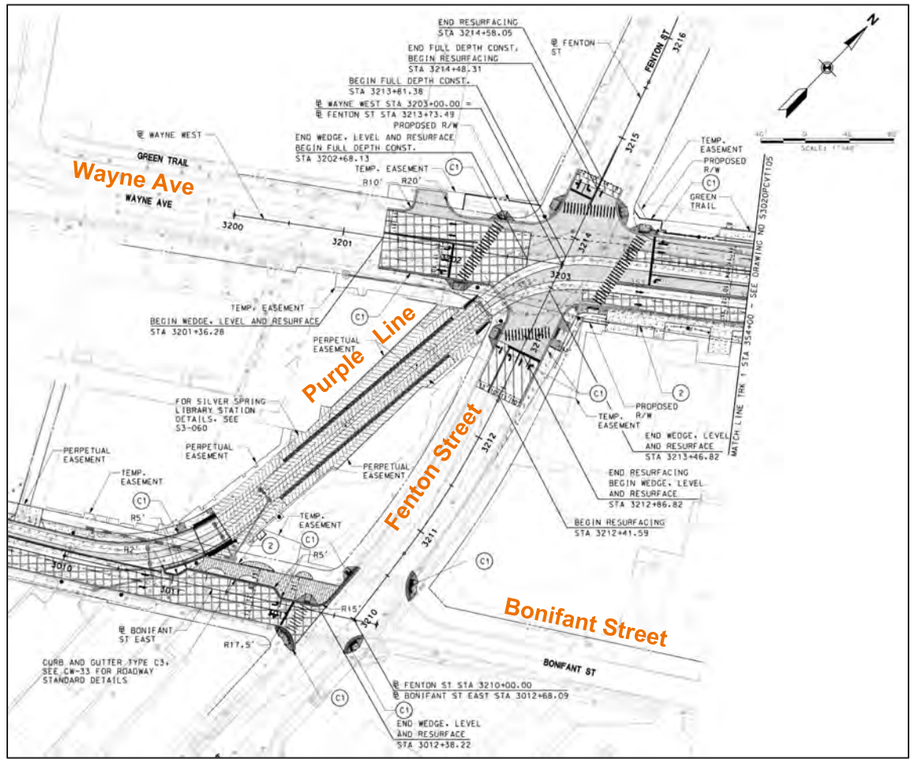


Figure 36 - Proposed Purple Line improvements adjacent to Fenton Street.

Table 8 - Bus Stop Locations, Types, and Ridership

Bus Stop ID	Direction and Location within Fenton Street corridor	Serviced by		Type	Shelter	Ridership*	
		WMATA Route	RideOn Route			On	Off
28526	SB, south of Cameron Street	-	28 (circulator)	Farside	No	11	27
17159	SB, north of Colesville Road	-	28 (circulator)	Nearside	No	0	0
16038	SB, south of Colesville Road	F4	16, 17, 20, 28	Mid-block	Yes	591	48
14874	NB, north of Ellsworth Drive	F4	16, 17, 20	Farside	No	83	779
16011	SB, south of Ellsworth Drive	F4	16, 17, 20, 28	Farside	Yes	554	115
22170	NB, south of Wayne Ave (Silver Spring Library, Purple Line transfer)	F4	16, 17, 20	Nearside	No	16	214
22178	SB, north of Bonifant Ave (Silver Spring Library, Purple Line transfer)	F4	16, 17, 20, 28	Nearside	Yes	273	105
22168	NB, south of Bonifant Ave	F4	16, 17, 20	Nearside	No	20	79
17552	SB, north of Thayer Ave (Safeway)	F4	16, 17, 20, 28	Nearside	No	63	57
22166	NB, south of Thayer Ave (Safeway)	F4	16, 17	Nearside	No	24	77
22182	SB, south of Silver Spring Ave	F4	16, 17	Midblock	Yes	81	28
22164	NB, south of Silver Spring Ave	F4	16, 17	Nearside	No	25	58
22184	SB, south of Sligo Ave	F4	17	Farside	No	23	14
22162	NB, south of Sligo Ave	F4	17	Nearside	No	10	42

*Ridership data from Fall 2018

Figure 37 - RideOn and Metrobus Routes

7.14 Environmental Resources

According to the Maryland Environmental Resource and Land Information Network (MERLIN), there are no environmental resources in the study area. There are no wetlands or waters of the US within the project area. There are no 100-year floodplains within the project area.

The project watershed drains to Sligo Creek (MDE watershed number 021402) to the east, which runs south to the Northwest Branch of the Anacostia River.

There are no rare, threatened, or endangered species anticipated within the project area, but this will be confirmed during the early design phase. This should be confirmed with the Maryland Department of Natural Resources (MD-DNR) and US Fish and Wildlife Service (USFWS).

The entire project area is comprised of previously disturbed, urban soils.

There are 197 street trees in the study area, 50 which are greater than 12-inch diameter. A natural resource inventory should be performed to characterize all street trees.

7.15 Historic and Cultural Resources

According to the Maryland Historic Trust (MHT) MEDUSA GIS database, there are records for the following addresses and/or districts, which either overlap with or are contiguous with the study corridor:

Table 9 - Summary of Maryland Historic Trust Records

Description	Address/Location	Status	Record Number	Notes
Silver Spring Park	Overlaps Fenton Street from Sligo Avenue to Bonifant Street	Listed on MIHP	M: 36-86	
Modernist commercial office building	8307-8317 Fenton Street	Eligible	DOE-MO-0228	
Service station	8240 Fenton Street	Eligible	DOE-MO-0225	This property was recently redeveloped.
Service station	8333 Fenton Street	Eligible	DOE-MO-0229	
First Baptist Church of Silver Spring	Southeast corner of Fenton Street and Wayne Avenue	Listed on MIHP	M:36-61	This property was recently redeveloped.
Armory Place site	925 Wayne Ave, NW corner of Fenton Street and Wayne Ave	Listed on MIHP	M: 36-14	The Armory was demolished in 1998, but some architectural elements were kept on site.
Eugene A. Smith's additions to Silver Spring	SE corner of Fenton St. and Ellsworth Dr.	Listed on MIHP	M: 36-85	
City Place site	West side of Fenton St. from Ellsworth Dr. to Colesville Rd.	Listed on MIHP	M: 36-7-4	
Montgomery Arms Apartments	8627 Fenton Street	Listed on MIHP	M: 36-7-2	
Old Silver Spring Commercial Area	Overlaps Fenton St. from Ellsworth Dr. to south of Cameron St.	Listed on MIHP	M: 36-7	

Multiple properties are listed in the Maryland Inventory of Historic Places (MIHP). There are no properties listed on the National Register of Historic Places (NRHP).

Although there are several records in the corridor, no adverse effects are anticipated at this time based on the current scope of improvements. Further coordination should be initiated with MHT and M-NCPPC as the study progresses.

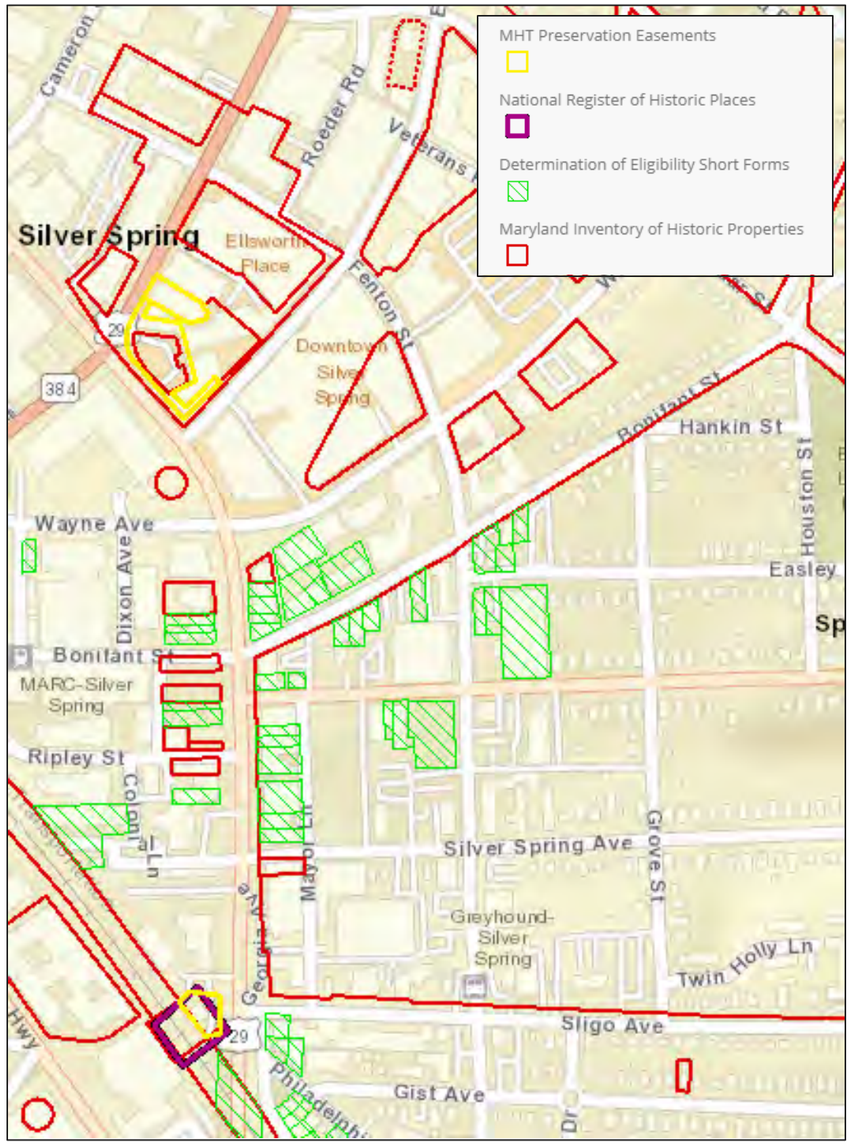


Figure 38 - Historic Properties in the Study Area (Source: MEDUSA)

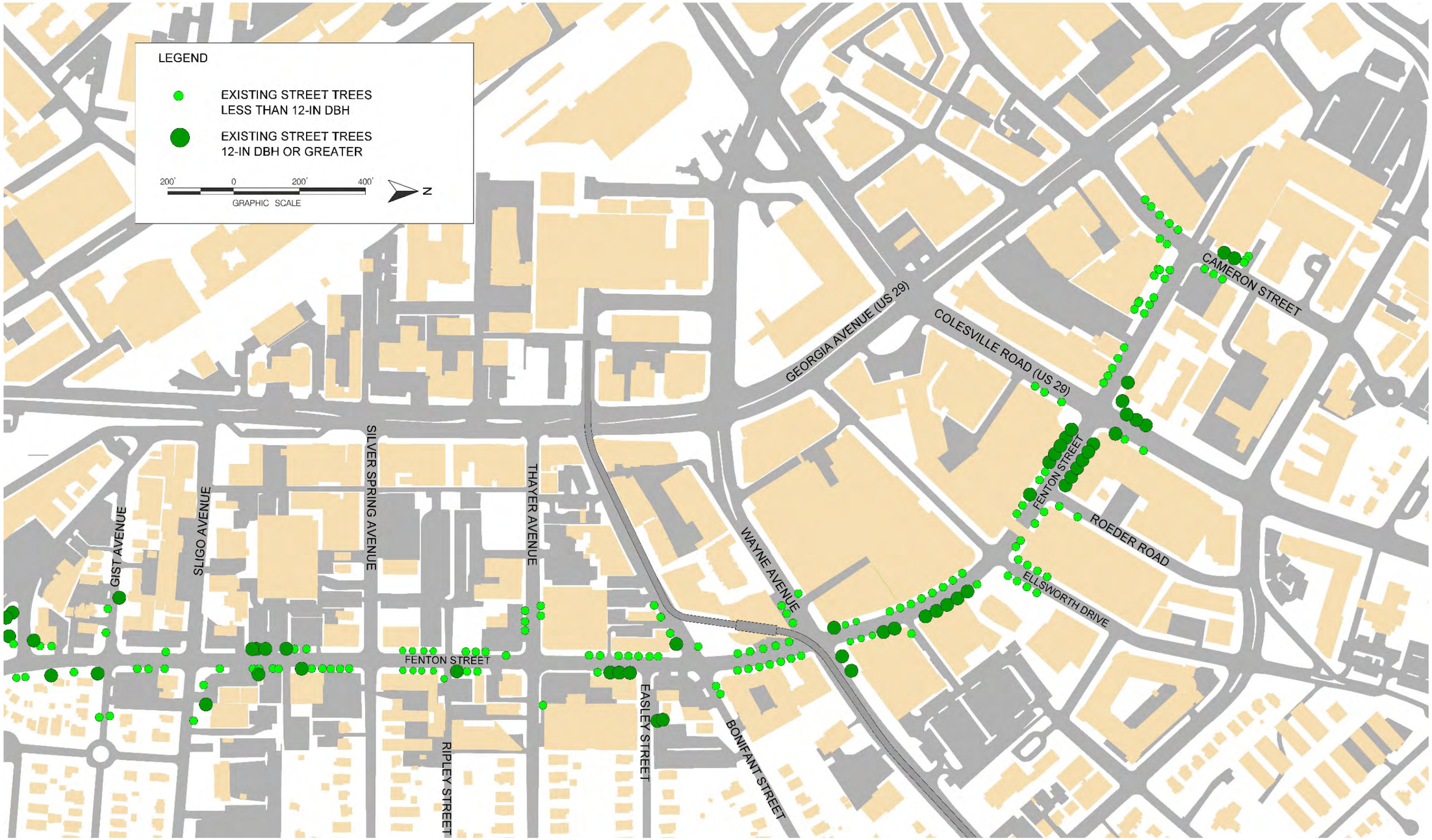


Figure 39 - Existing Street Trees

8 Master Plan Summary

8.1 Bicycle Master Plan (2018)

According to the Maryland National Capital Park and Planning Commission (M-NCPPC), the Fenton Street Bikeway lies within its high priority network of bicycle improvements. The 2018 Bicycle Master Plan recommends a bikeway along Fenton Street from Spring Street to Ellsworth Drive as part of the Glenmont to Silver Spring Breezeway. Additional recommendations include a bikeway along Fenton Street from Ellsworth Drive to King Street.

The bikeway will connect with multiple other existing and proposed master planned bikeways, improve connectivity between regional trail systems such as the Metropolitan Branch Trail, Capital Crescent Trail, the Silver Spring Green Trail, and Sligo Creek Trail, and provide an important north-south link between the District of Columbia, Silver Spring, and Wheaton. The District of Columbia is currently progressing plans to the south to implement segments of the Metropolitan Branch Trail from John McCormack Drive NW to Eastern Ave NW. Once all of these improvements are complete, bicyclists will be able to ride comfortably from Wheaton to the National Mall (15 miles). The proposed Fenton Street Bikeway also lies within the eastern and northeastern portions of the Silver Spring Central Business District Bicycle and Pedestrian Priority Area (BiPPA), designated by the County.

Figure 40 - M-NCPPC Bicycle Master Plan

8.2 Silver Spring CBD Sector Plan (2000)

The Silver Spring CBD does not include Fenton Street as a recommended bikeway. However, it does include recommended bikeways to the north and south of the study corridor, which are currently being designed. However, the recommendations of the 2000 Silver Spring CBD Plan are superseded by the Bicycle Master Plan. M-NCPPC is currently in the process of updating the Silver Spring CBD Master Plan.

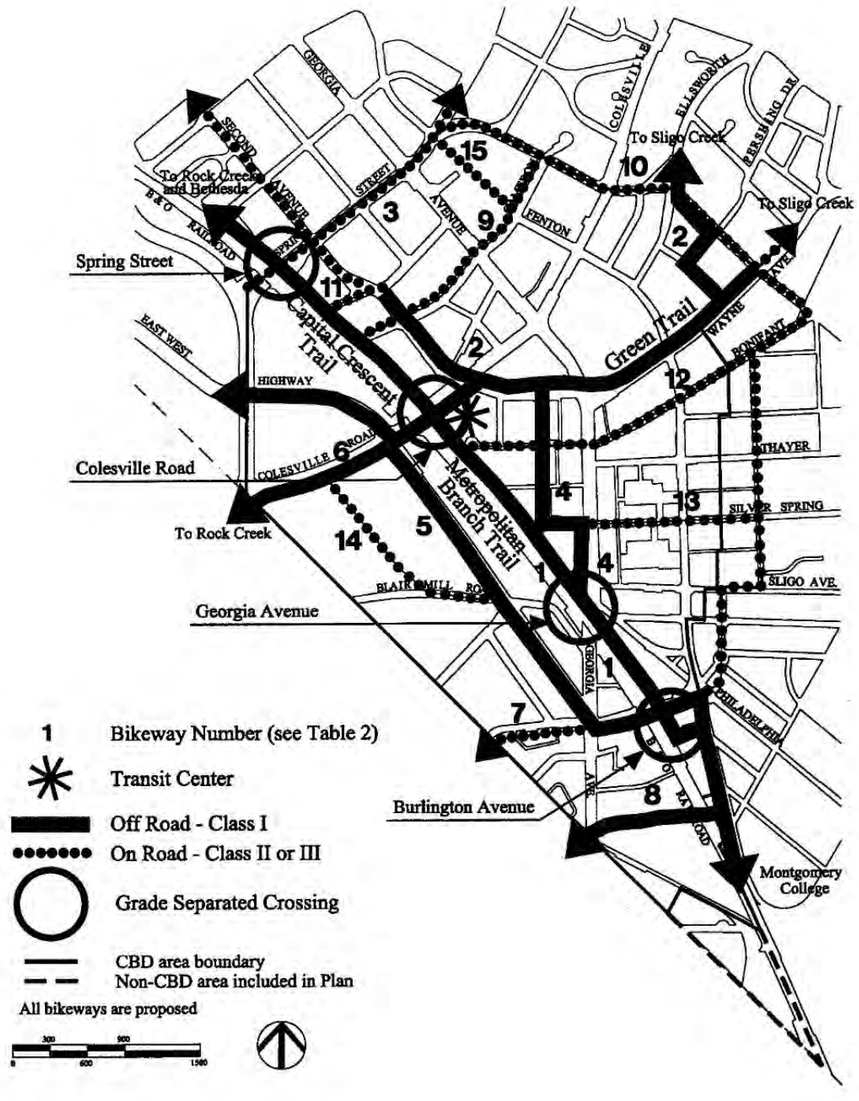


Figure 41 - CBD Bikeway Network Map (Source: Silver Spring CBD Sector Plan)

9 Public Outreach

The Montgomery County Department of Transportation (MCDOT) held a public meeting for three projects planned for downtown Silver Spring on January 21st, 2020 from 7 – 9 pm at East Silver Spring Elementary School. Projects included the Fenton Street Bikeway Study, Grove Street Neighborhood Pilot, and Fenton Street and MD 410 intersection improvements. A 30-minute presentation was provided by MCDOT covering all three projects. Roll maps depicting plan views of existing conditions and display boards depicting typical section and intersection options were available for viewing throughout the entire meeting. The meeting was covered by local media outlets. Questions and comments were taken during the meeting and afterwards for a period of three weeks.

Stakeholders included residents, bicyclists, motorists, pedestrians, business and property owners, advocacy and civic group representatives, disabled persons, as well as County planners, engineers, managers, elected officials, and planning and design professionals.

Figure 42 - Public Meeting held on January 21st, 2020 at East Silver Spring Elementary School

A total of 97 written comments were received by MCDOT. Most commenters were supportive of the project (77 total). For supportive comments, the most commonly occurring themes were bicyclist safety, a desire to move the project forward more quickly, favoring a protected/separated bicycle facility, removing parking to accommodate a bicycle facility, and improving bicycle connectivity. Some comments were interpreted as neutral (9 total) because they discussed issues not directly related to the project and/or deferred until more information was available. For opposing comments (11 total), the most commonly occurring themes were concerned with negative impacts to small/local/minority-owned businesses, parking, and traffic congestion.

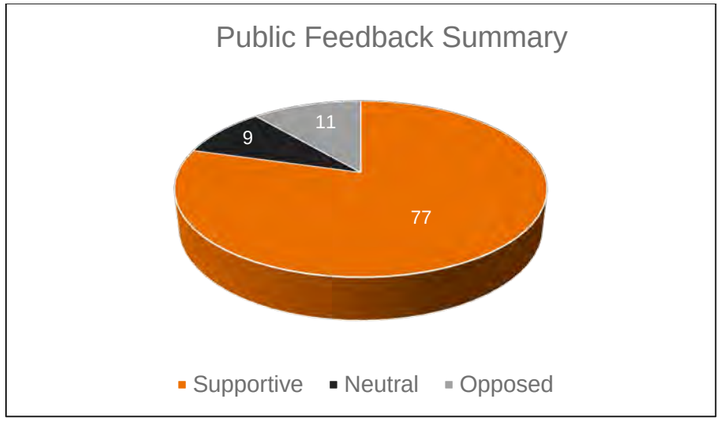


Figure 43 - Public Feedback Summary

Comments were received in written formats including email, US mail, MCDOT comment form, and post-it notes on the roll maps. A Streetmix application station was also set up at the meeting to allow attendees to build their own typical section graphics.

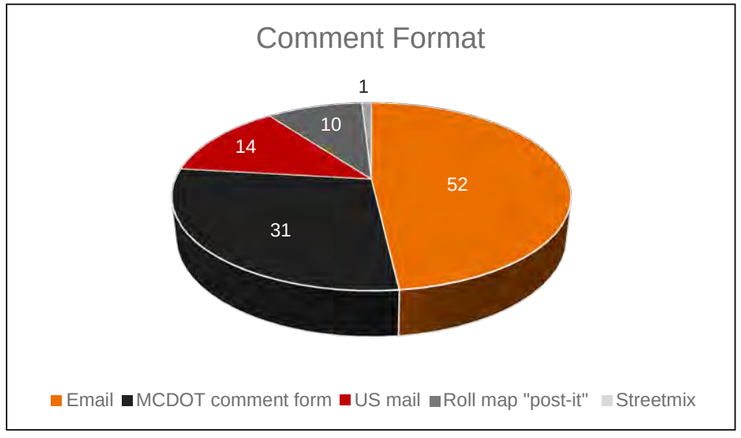


Figure 44 - Public Comment Format

The comments were broad ranging and touched on multiple issues. Stantec received, compiled, reviewed, interpreted, and categorized comments into roughly 40 categories. Some written comments were not entirely legible, however, the overall context of the comment was used to interpret the intent as closely as possible. A number of comments directly endorse the project. Many comments make supportive recommendations without directly endorsing the project. It was noted that many of the email comments received after the meeting had similar language that appears to have been provided by the Washington Area Bicyclists Association, a bicycling advocacy group that is active in the area and supportive of the project.

The graphic below is a tally of how many times each “topic” received a “mention” in the comments received.

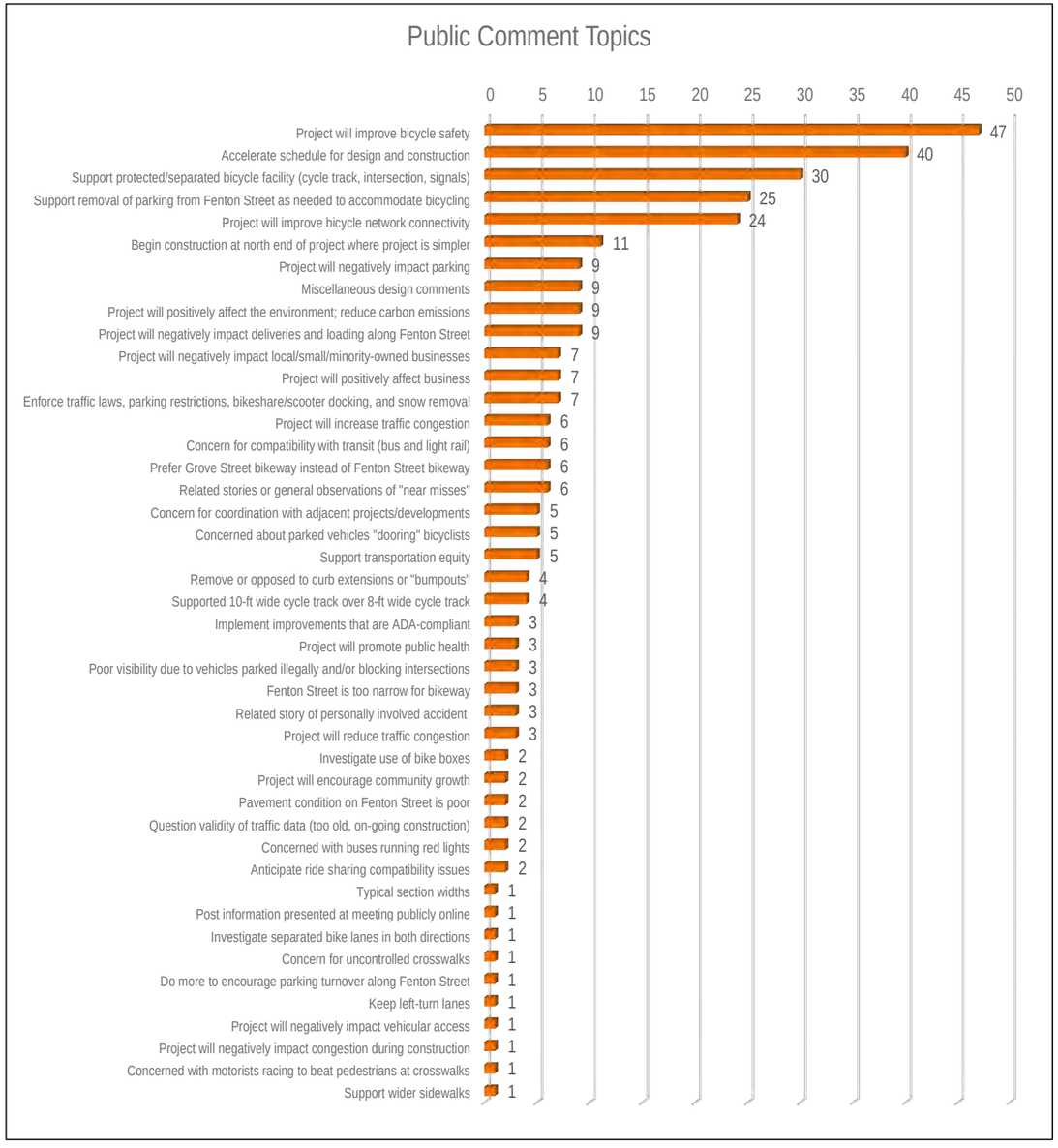


Figure 45 - Public Comments by Topic

10 Basis of Design

Based on the urban setting of the corridor, competing priorities of use, and the complex interaction between different design elements of the project, it will be essential to establish a basis of design during the study phase. Design criteria should remain consistent with the purpose and need of the project.

M-NCPPC prepared the Silver Spring Streetscape Standards in 2019, which cover Fenton Street. These standards should be relied upon throughout the design process for selection of various features. According to the streetscape standards, Fenton Street is a "typical street", which includes an 8-ft min. pedestrian zone, 8-ft min. planter/furnishing zone. Standards for lighting, plantings, stormwater management best management practices, paving features, and furnishings are included.

Critical to developing a typical roadway section that requires numerous features will be to assure there is required space for existing and proposed underground utilities. All of the roadway features must fit into the limited Right of Way.

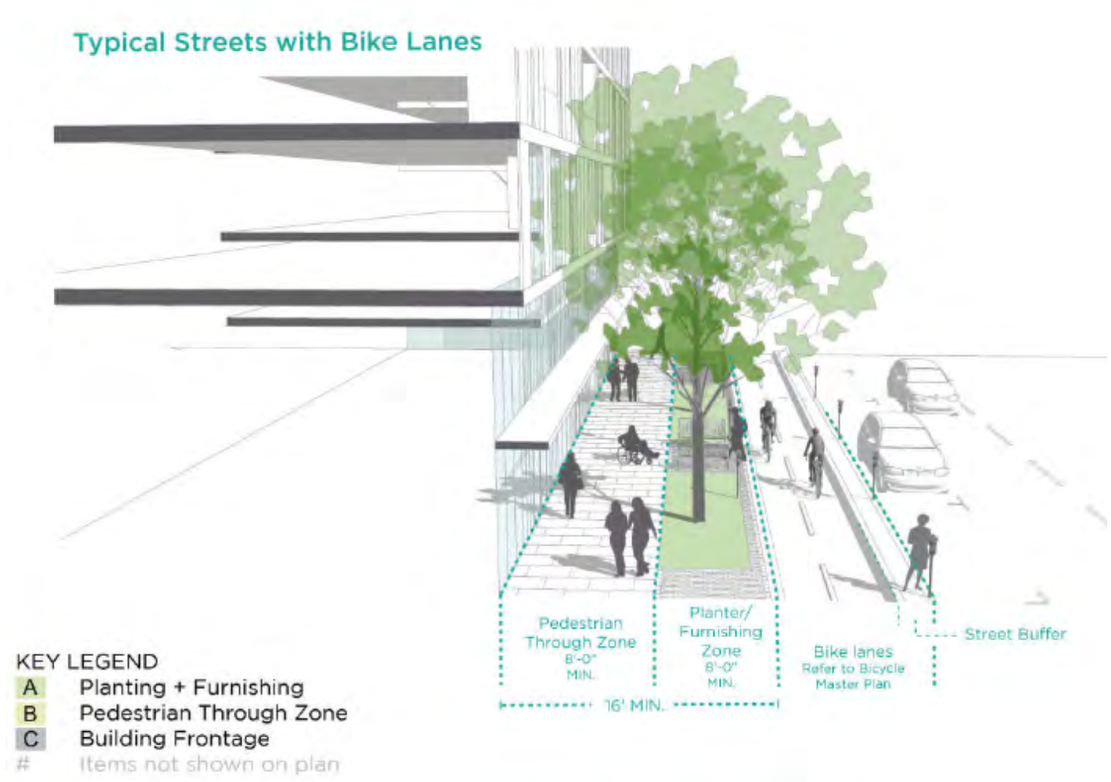


Figure 46 - Recommended Typical Section per M-NCPPC Silver Spring Streetscape Standards

10.1 Typical Section Elements

Generally, the project goal is to implement a bikeway on the west side of the Fenton Street corridor within the existing right-of-way. It is also desirable to maintain all existing functionalities within the existing right-of-way, including northbound and southbound travel lanes, parking lanes, turning lanes, sidewalks, planting / furnishing buffers, and utilities. Therefore, it is anticipated that impacts will be spread across the entire width of the right-of-way and all travel modes. In other words, the recommended solution will likely involve a compromise for all users.

Although most projects are planned using typical sections, it will be difficult to summarize the planned work this way. Each block has unique characteristics and constraints, which will require variations in the proposed roadway section. Also, mid-block typical sections will differ from intersection approach typical sections. Spacing between the intersections is generally short, especially in the Fenton Village District, and because the functional limits of each intersection start well ahead of the intersecting cross street, the mid-block typical sections will only apply for short segments between intersections.

The proposed bikeway will have a minimum width of 8 feet, however 10 feet is desirable. Adjacent to parking lanes, the bikeway buffer will be a minimum of 2 feet in width, with a desirable width of 3 feet or greater. In constrained locations with no parking, the buffer width may be as little as 1 foot, however 2 feet or greater is preferred. A combination of physical barriers and flex post bollards will be used to separate the bikeway. Proposed travel lanes will be a minimum 10-ft width, but desirably 11-ft wide. Parking lanes will be a minimum 7-ft width, but desirably 8-ft. Where travel lanes are adjacent to parking lanes, the sum of the travel lane width and parking lane width must not be less than 18-ft. Turning lane widths will be a minimum 9-ft width, but desirably 10-ft wide. Sidewalks will include a minimum 5-ft clear with. The remaining available space will be dedicated to a planting/furnishing zone width.

The following is a detailed tabulation of typical section criteria that will be used for the project:

Table 10 - Design Criteria: Typical Section Elements

Criterion	Existing	Absolute	Desired	Reference
Cycle track widths	N/A	8-ft min.	10-ft	AASHTO
Vehicle lane widths Thru Lanes Thru Lanes, adj to parking Thru Lanes, adj to curb Turn Lanes Two-way left-turn lane	 11-ft 10.5-ft 9-ft	 10-ft min. 11-ft (with 7-ft parking) 11-ft 9-ft min. N/A	 11-ft 10-ft (with 8-ft parking) 10-ft	MC Road Code
Parking Lane widths	7-ft	7-ft	8-ft	
Bus pad width		11-ft		
Bus pad length		90-ft		
Bus stop landing width x depth (not including curb)		5-ft x 8-ft		
Cycle track buffer width Adj to parking lane Adj. to travel lane	 N/A N/A	 2-ft 1-ft	 3-ft 2-ft	
Shy strip, adj. to parking	1.5-ft	2-ft		
Horizontal clearance to obstructions	1.5-ft	1.5-ft		
Sidewalk clear widths	3-ft to 10-ft	5-ft	6-ft	
Curb extension width	6-ft	4-ft	6-ft	
Landscape/BMP zone	5-ft	3-ft	5-ft	
Street Tree spacing	35-ft to 60-ft			
Café zone		8-ft		
Driveway width				
Cross slope		2% max.		
Vertical clearance Sidewalk Bikeway Roadway		 7-ft 8-ft 14-ft	 10-ft	
Utility pole dia.		18-in		

10.2 Geometric Elements

The following table outlines proposed geometric criteria for the project:

Table 11 - Design Criteria: Geometric Elements

Criterion	Existing	Absolute	Desired	Reference
Design Speed Bicycles Pedestrians Vehicles	 N/A 3.5 fps 30 mph	 15 mph 3.5 fps 30 mph		 AASHTO BG MUTCD AASHTO GB
Posted Speed	25 mph	25 mph		AASHTO GB
Stopping Sight Distance	200-ft	200-ft		AASHTO GB Table 5-3
Max. Vertical Grade	6.8%	7.0%	5%	AASHTO GB / BG
Curb return radii Adjacent to travel lane Adjacent to parking lane Adjacent to bikeway	30-ft		15-ft min.	MC Road Code
Curb extensions	6-ft	4-ft	6-ft	
Shifting taper			L = DxS^2 / 60, posted or 85th percentile operating speed	MUTCD MDOT SHA
Islands/aprons at intersections w/ obstacle markers		4-ft min.	6-ft min.	
Driveways Grade breaks Min. K-value Width		 6% max. 4 25-ft (commercial)		
Curb and gutter		6-in height; 1-ft gutter width		MC Road Code
Curb ramps Width Running slope Cross slope Landing dimensions Push button locations		 5-ft min. 12:1 max. 2% max. 5-ft x 5-ft 18-in max from land; 10-ft min. b/w push buttons	Match ped zone	ADA guidelines 2010
Parallel Parking Lane Length	21-ft	21-ft		Montgomery County Zoning Ordinance S 59-E-2.22
No parking in front of hydrant	20-ft	20-ft		Montgomery County Code S 31-20
No Parking adjacent to Driveway (ft)	5-ft	5-ft		Montgomery County Code S 31-19
No Parking adjacent to cross street (ft)	35-ft	35-ft		Montgomery County Code S 31-17

10.3 Design Vehicles

Various design vehicles will need to be considered during design process. Transit vehicles, emergency vehicles, and trucks will all play a role in determining the geometric layout and design of the project. Buses will need to be considered for turning movements and bus stop design. Emergency vehicles will need to be considered for turning movements and access. Montgomery County uses a specific design vehicle based on a tower truck used in the County. Turning movement simulations will be run for large design vehicles at all intersections during the design phase, especially where turning lanes are immediately adjacent to the curb and where left-turning vehicles may encroach on the opposing lane stop bar.

Figure 47 - Montgomery County Fire and Rescue Service ladder truck navigating an intersection in Silver Spring, MD

Table 12 - Design Vehicles

Description	Vehicle Class	Applicability	Characteristics	Source
Tower Truck	Emergency Vehicle	Turning movements	50-ft length; 8-ft width; 21.75-ft wheelbase; 10-ft from front axle to front overhang	MCFRS
Single Unit / Delivery truck	SU-30	Turning movements; Loading zones		AASHTO
WMATA Metrobus / articulated bus	A-BUS	Bus stops		AASHTO
Montgomery County RideOn Bus	CITY-BUS	Turning movements; Bus stops		AASHTO
Greyhound Bus	BUS-40	Greyhound terminal		AASHTO

10.4 Intersections

Fenton Street is located in a central business district and is essentially part of an urban grid. Two-way cycle tracks, which are similar to a sidepath, located in urban grids are generally not ideal due to the number of conflicts with cross streets and driveways. However, with slower speeds along Fenton Street and properly signalized intersections, the risk of collisions and severity can be mitigated.

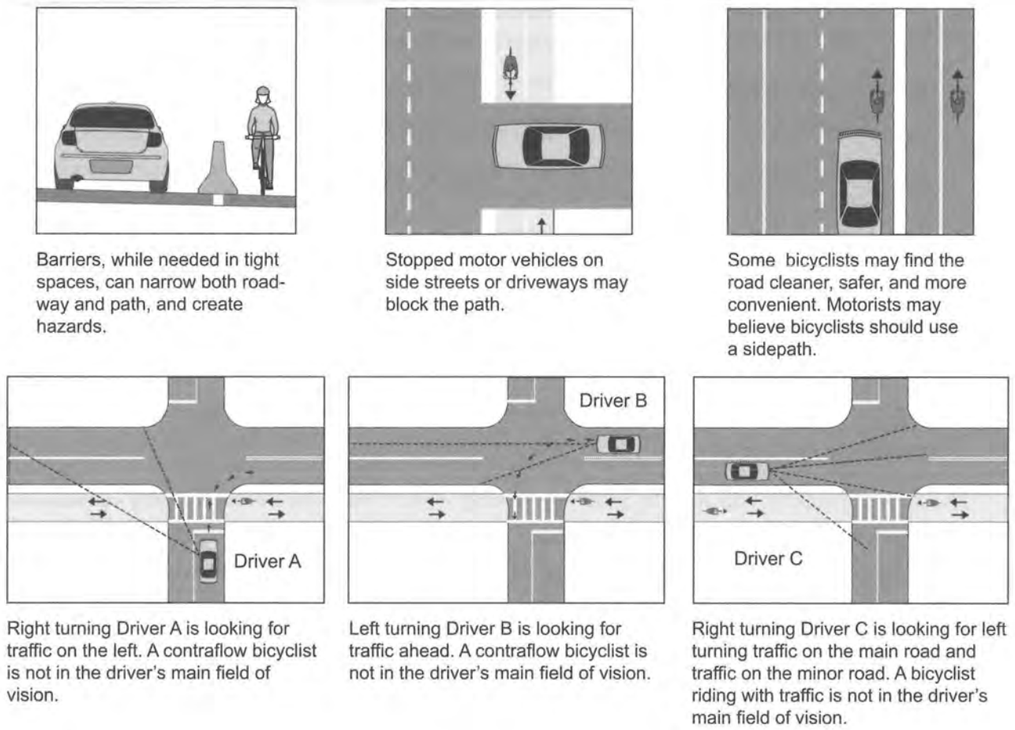


Figure 48 - Common Sidepath Conflicts. Source: AASHTO, Bike Guide

10.4.1 Intersection Signalization and Traffic Control Measures

Bicyclists are subject to the same traffic laws as motor vehicles, therefore, planning for traffic signal modifications at each signalized intersection is critical to facilitate safe implementation and operation of a two-way cycle track. Ideally, the proposed signal phasing will eliminate all conflicting movements between bicyclists and motorists. However, a practical approach must be weighed against safety considerations so as not to create unreasonable delays or restrictions for any one travel mode. The following is discussion of the proposed signalization and traffic control measures for the project.

Figure 49 - Signal Section used with a shared lane that has no turning movement controls. Source: MD-MUTCD

Shared lanes; no turning movement controls – This treatment requires less width in the roadway because all movements through the intersection are made via a shared lane, however, this may result in longer queues and delay to motorists, especially when a left-turning vehicle is stopped and waiting for a gap in traffic coming from the opposing direction. Uncontrolled or permissive turning movements across the two-way cycle track also present hazards to bicyclists as discussed in section 10.4. Permissive left-turns across the cycle track should generally be avoided due to the risk of collision. Permissive right-turns are more commonly used in combination with two-way cycle tracks, especially adjacent to crosswalks across the minor street where motorists are accustomed to yielding to pedestrians. However, bicyclists remain vulnerable to the "right-hook" crash (see Driver C scenario in Figure 48). Signing indicating right-turning drivers to yield to bicyclists / pedestrians should be used to mitigate this risk.

Dedicated turning lanes; permissive left-turns and/or right-turns – This is the existing condition at many intersections in Silver Spring. A dedicated turn lane is provided to allow vehicles to queue without impeding through traffic. Motorists then wait for a gap in traffic before making a permissive turning movement. However, additional width is needed to provide for a dedicated turn lane.

Dedicated turn lanes; exclusive left-turns and/or right-turns – This treatment provides a dedicated lane with queuing space for turning vehicles. Typically, an exclusive (also known as protected) traffic signal phase is provided for turning movements, eliminating the need for a motorist to decide when to turn. When combined with a pedestrian or bicycle signal, this treatment would effectively eliminate conflicting movements between bicyclists, pedestrians, and motorists. Where implementation is possible, from a safety standpoint, this is the most ideal intersection operation for two-way cycle tracks as it provides the highest level of safety for bicyclists. However, this approach also requires additional width within the roadway and may create additional delays to users, therefore, should not be used indiscriminately or without detailed study.

Dedicated turn lanes; exclusive/permissive left-turns and/or right-turns – This treatment provides a dedicated lane with queuing space for turning vehicles. Typically, a leading exclusive (also known as protected) traffic signal phase is provided for turning movements, followed by a permissive phase. This benefits motorists by providing an exclusive turn movement under heavy traffic conditions when gaps in opposing traffic may be limited, but also a permissive movement when traffic is lighter, so as not to cause unnecessary delays to turning motorists. This approach also requires additional width within the roadway. As with the shared lane discussion above, permissive left-turns across the cycle track should generally be avoided due to the risk of collision. Permissive right-turns should be used with signing indicating right-turning drivers to yield to bicyclists / pedestrians should be used to mitigate the risk of collision.

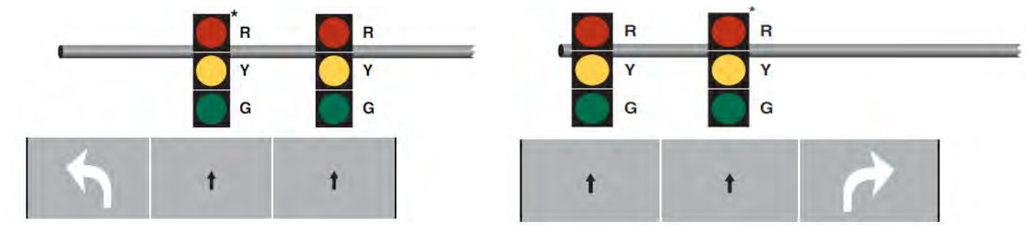


Figure 50 - Typical Positions and Arrangements of Shared Signal Faces for Permissive Only Turn Modes. Source: MD-MUTCD

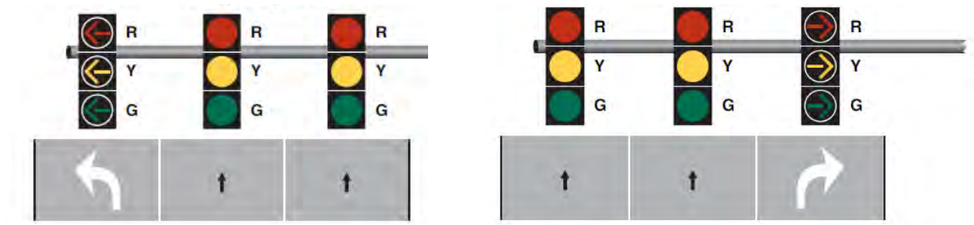


Figure 51 - Typical Positions and Arrangements of Separate Signal Faces for Exclusive Only Turn Modes. Source: MD-MUTCD

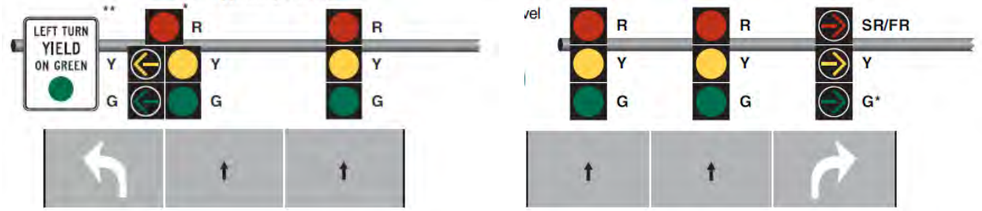


Figure 52 - Typical Positions and Arrangements of Signal Faces for Exclusive/Permissive Turn Modes. Source: MD-MUTCD

The following additional signal phasing enhancements should be considered for protecting bicyclists at intersections:

Bike signals - Ideally, bike signals should be used at all intersections to provide a uniform indication for bicyclists to follow. However, bike signals should be used only where exclusive movements for bicyclists can be provided. Permissive vehicular turning movements cannot be used in combination with a bike signal. According to FHWA Interim Approval IA-16, bike signal use shall be limited to situations where bicycles moving on a green or yellow signal indication in a bicycle signal face are not in conflict with any simultaneous motor vehicle movement at the signalized location, including right (or left) turns on red. There are no traffic signal warrants specific to the use of bicycle signals. Bike signals cannot be used with pedestrian hybrid beacons or with shared lane markings.

Figure 53 - Bicycle signal at Second Ave / Wayne Ave & Colesville Road (MD 384)

Leading interval - Provides an advanced green indication for the bike signal. Lead interval may provide 3 to 7 seconds of green time for bicycles prior to the green phase for the concurrent vehicle traffic. Lead bike intervals may typically be provided concurrently with lead pedestrian intervals (Source: MassDOT Separate Bike Lane Planning and Design Guide).

Volume thresholds for providing a separated bicycle phase or leading interval at a signalized intersection are provided in Table 13. These volume-based signalization thresholds are intended to mitigate the risk of collisions, while minimizing impacts to parking or the costs of widening the road to accommodate a dedicated lane.

Table 13 - Protected signalization thresholds for sidepaths.
Source: MassDOT Separated Bike Lane Planning and Design Guide

Sidepath Protected Signalization Thresholds	Motor Vehicles per Hour Crossing Two-way Sidepath
Right-turn	100
Left-turn across one lane	50

Bicycle Detection - Bicycle detection is used at traffic signals to alert the signal controller to bicycle demand on a particular approach. Properly located detection enables the length of green time to fluctuate based on demand (Source: MassDOT Separate Bike Lane Planning and Design Guide).

Bicyclists Use Pedestrian Signal (MUTCD R9-5) – This sign can be used in combination with permissive vehicular turning movements when it is not practical to provide an exclusive bicycle movement.

Figure 54 - Bicyclists Use Ped Signal (R9-5)

Turning restrictions – Full-time turning restrictions are generally only appropriate where turning movement volumes are very low and/or there are other alternatives for accessing the destination street. In some locations, it may be necessary to restrict turns during the peak hour if there is insufficient storage for queuing vehicles, which creates excessive delay to thru movements.

Due to heavy pedestrian volumes, No-Right-Turns-On-Red are implemented throughout Silver Spring and along the Fenton Street corridor under the existing condition. This existing policy will benefit bicyclist safety along the Fenton Street Bikeway.

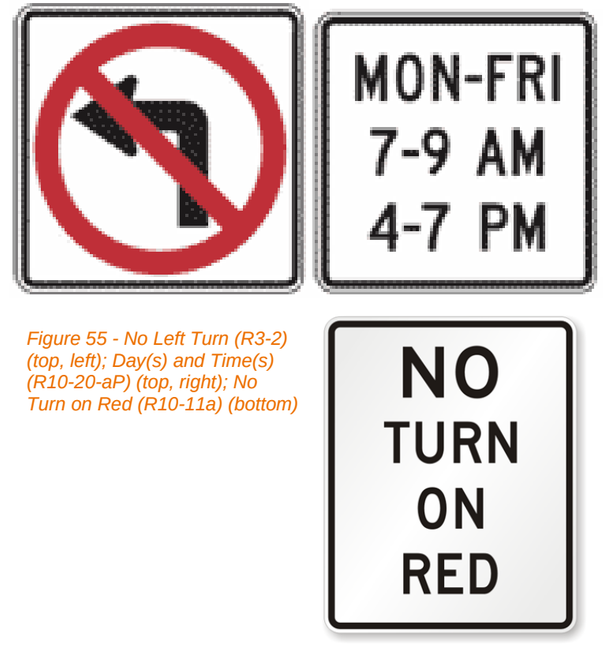


Figure 55 - No Left Turn (R3-2) (top, left); Day(s) and Time(s) (R10-20-aP) (top, right); No Turn on Red (R10-11a) (bottom)

Uncontrolled access –. Driveways and alleys should be given specific focus where in conflict with the cycle track. A distinctive signing and marking treatments should be consistently used along the corridor that alerts motorists turning across the two-way cycle track.

10.5 MUTCD Experimental Treatments

One potential treatment for mitigating collision risks associated with permissive right-turns across the bikeway include flashing yellow arrow signal heads that caution motorists and flashing yellow bike signals that warn cyclists of the conflict. This is an MUTCD experimental treatment currently deployed in St. Paul, MN that may have beneficial implications for the Fenton Street project.

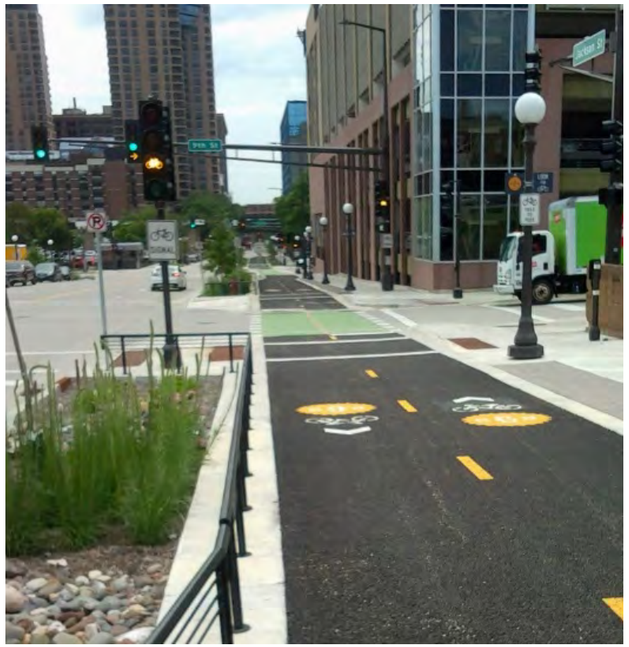


Figure 56 – Two-way cycle track with MUTCD experimental flashing yellow signal treatment in St. Paul, MN.

10.6 Traffic Analysis

The traffic analysis, provided herein, evaluates existing and proposed conditions using the principles and methods defined in the Highway Capacity Manual for intersection capacity and queuing. To develop the existing conditions analysis, AM, PM and Saturday traffic counts were applied to a Synchro network with the most-recent signal timings for the Downtown Silver Spring area. For proposed improvements, various traffic scenarios were developed by modifying the existing Synchro base model and running an analysis to understand impacts to capacity and delay. Level of Service of D or better is considered acceptable.

10.7 Signing and Marking

10.7.1 Conflict zones

MCDOT utilizes green epoxy paint to delineate bikeway conflicts at driveways. To limit maintenance, thermoplastic should be utilized at MDOT SHA intersections and County intersections. Green markings should be placed with a 2' long green segment and a 4' long gap, except at MDOT SHA intersections, where the markings shall be 3' green segment and 3' gap.

Figure 57 - Green paint conflict zone at Second Ave / Wayne Ave and Colesville Road (MD 384)

10.7.2 Intersections

For crosswalks, MCDOT uses continental or “piano” striping at major roadway intersections to enhance motorists’ visibility of the crosswalk. Generally, crosswalks should be 10-ft wide at Fenton Street intersections. Crosswalks on the minor legs of unsignalized intersections such as Easley Street can utilize 8-ft wide parallel bars. Alternatively, if aesthetic appearance of the crosswalks is desirable, preformed thermoplastic impressed surface products are available which are made to simulate the appearance of brick pavers but withstand traffic.

Stop bar placements should be established based on turning movement simulations. Due to the constraints within the corridor, it will be necessary to set back stop bars on inside lanes from the intersection to accommodate larger design vehicle turns.

Thicker 6-in longitudinal markings should be used to promote slower speeds in the corridor as well.

Flex post bollards should not be used for the sole purpose of creating barrier between vehicles and bicyclists, without the expectation of needing perform routine maintenance. MCDOT uses a combination of physical barriers and flex post bollards to effectively at separate bicycle and vehicular traffic.

Bike boxes and two-stage queue boxes should be considered where intersecting bikeways will connect with the Fenton Street Bikeway, such as at Silver Spring Avenue, Ellsworth Drive, and Cameron Street. At other intersections bicycles should either transition to the vehicular travel lanes to turn from Fenton Street or use crosswalks to perform turning maneuvers.

Right-turning vehicles yield to bikes/peds signs should be used at intersections where exclusive movements cannot be provided to separate conflicting bicyclist and vehicular movements. Signing should also alert motorists of the two-way cycle track, particularly indicating that bike traffic is moving in both directions.

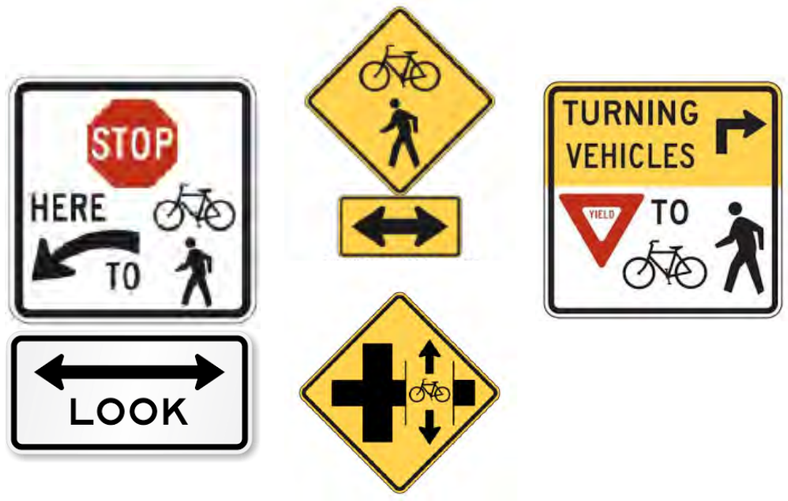


Figure 58 – Recommended sign combination for facing vehicles entering Fenton Street from uncontrolled access points adjacent to two-way cycle track (R1-5b-MOD, R15-8, left); caution signing to alert motorists of two-way / contra-flow bicycle traffic (middle); Yield signing with permissive right-turns should be used along Fenton Street to mitigate against the risk of “right-hook” crashes (R1-15b, right).

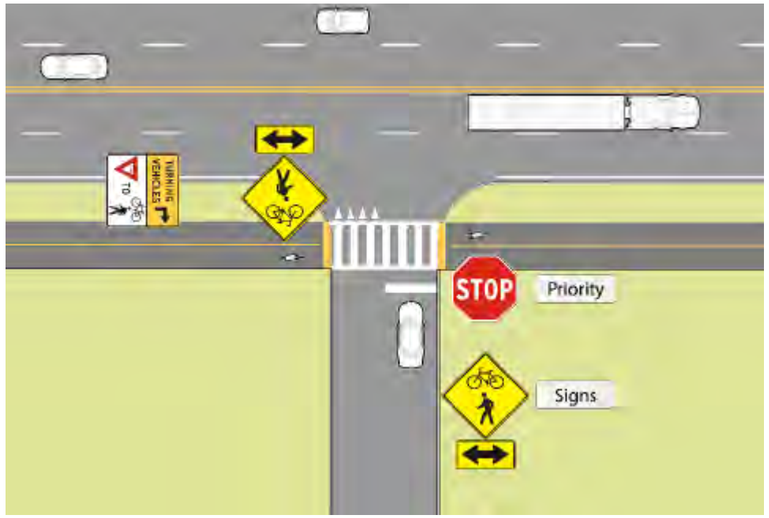


Figure 59 - Example treatment at side street intersection with sidepath (Michigan DOT).

Parking restrictions near intersections/driveway entrances and fire hydrants should adhere to Montgomery County regulations. Intersection sight distance should be checked and maintained based on the established design speed for the project.

Most of the intersections in the corridor are signalized, which will allow the designer to clearly establish and control the right-of-way. However, unsignalized cross streets, alleys, and driveways on the west side of Fenton Street will pose a particularly challenging hazard between bicyclists and motorists. Bicyclists should be clearly assigned the right-of-way. To mitigate the risk of collisions, green paint conflict markings and advance signing instructing motorists crossing the cycle track and entering Fenton Street from unsignalized locations to stop ahead of the cycle track and first look both ways for bicyclists before proceeding onto Fenton Street. A combination of transverse striping and stenciled messaging can also be used to caution bicyclists approaching unsignalized locations. Clear sight lines should be checked and maintained at conflict points as well. A consistent approach should be developed and utilized throughout the corridor to clearly establish and reinforce user expectancy.

Figure 60 - Example treatment at side street intersection with a one-way cycle track in Cambridge, MA.

Figure 61 - Silver Spring CBD standard lighting: Dual Combination teardrops and Pedestrian teardrops (left) and Washington Globe pedestrian light poles (right).

10.8 Lighting

According to the Silver Spring Streetscape Standards, proposed lighting from Gist Avenue to Wayne Avenue and from Colesville Road to Cameron Street should be Washington Globe LEDs. MCDOT recently retrofitted existing poles with Washington Globe LED luminaires throughout the study corridor.

Lighting in the Ellsworth District, from Wayne Avenue to Colesville Road should be the Silver Spring dual combination tear drop and pedestrian teardrop luminaires mounted on 26-ft and 16-ft (respectively) cast aluminum and steel posts on 22" clamshell bases. Proposed lighting designs layouts should be supported by a photometric analysis. Light pole locations should be coordinated with tree spacing, underground utilities, furnishings, and other amenities.

10.9 Storm Water Management

It is assumed that the project will disturb more than 20,000 square feet throughout the corridor, therefore, will require both storm water management concept approval and erosion & sediment control approvals from the Montgomery County Department of Permitting Services (MCDPS). Generally, the bikeway project will not add new impervious surfaces to the existing corridor but will redevelop impervious surfaces.

The landscape buffer should be used to meet storm water management goals for the project. BMP types, sizes, and locations should be determined early in the design process in concurrence with MCDPS. Permeable pavements (with overdrains) and vegetated planter/tree boxes should be evaluated.

Erosion and sediment control will consist primarily of inlet protection measures.

10.10 Drainage

The entire corridor drains to a closed system. Although the project will likely not create significant changes to existing drainage patterns, the existing condition should be modeled using the rational method and verified to meet MCDOT standards. Points of investigation (POIs) and drainage areas should be established for each existing inlet. The 15-year design storm and 5-minute time of concentration should be used for the basis of design.

Inlet structures should be located as needed to limit spread from encroaching more than half the width of a travel lane. MCDOT standard inlets should be used throughout the corridor, except for the intersections with Wayne Avenue and Colesville Road, where MDOT SHA standards should be used. Drainage grates located within the bikeway should be designed for bicycle compatibility. Openings should be limited to 1-inch max.

Proposed storm drains, especially on new alignments, should be checked thoroughly for conflicts with existing underground utilities. If horizontal conflicts cannot be avoided, test holes should be taken to design for vertical avoidance.

Care should be taken to prevent surface run-off from entering private property, however, because the project is a closed section, this is likely not a concern.

10.11 Sidewalks

Sidewalks should be designed to provide a minimum 5-ft continuous concrete sidewalk, clear of obstacles.

Curb ramps should be as wide as the pedestrian zone.

10.12 Parking

Parallel parking space dimensions should be designed for 21- to 22-ft length. Parking should be restricted in the vicinity of entrances, intersections, and fire hydrants in accordance with Montgomery County regulations.

If more than 50% of the existing pedestal parking meters are impacted, MCDOT should consider converting to kiosk meters.

Additional parking restrictions and/or curbside parking management should be considered on a block-by-block basis.

10.13 Transit and Loading zones

Standard bus stops should be designed with a 5'x8' clear space for ramp deployment.

Bus stop lengths should be 40-ft long designed to accommodate WMATA buses and RideOn buses. All bus stops should be designed to have room and foundation for roughly 5'W x 12'L x 9'H shelters.

Concrete bus pads should be 90-ft long and the full width of the travel lane or 11-ft minimum. The pavement section should be a 10- to 12-inch reinforced concrete.

According to the NACTO Urban Design Guide, "streets with both heavy freight and parking demand, as well as on-street bike lanes, benefit from dedicated loading zones near the intersection. Loading zones help reduce obstruction of the bike lane and make deliveries easier for businesses. Loading zones can be striped and signed, or managed for off-peak deliveries."

10.14 Utilities

Utility pole diameters should be assumed to be 18-inches. Permanent cut around a utility pole should be assumed to be 1-ft max. Clearances between overhead/underground utilities and proposed features such as stormwater management facilities and trees should be confirmed by utility companies prior to beginning design. The table below provides guidelines for utility clearances criteria between stormwater management facilities and utilities. These requirements should be confirmed by utility companies during the design phase.

Table 14 - SWM BMP Clearances from Utilities

	Horizontal Clearance	Vertical Clearance	Remarks
Power / Telecom • In concrete conduit • Not in concrete conduit • Utility Poles • Manholes	 N/A 2-ft	 N/A 6-in	 May run through BMP facilities Can be located in permeable pavement Can be located in permeable pavement but not bioretention
Gas • Gas lines	2-ft	2-ft	6-in to 2-ft requires shield; Less than 6-in requires shield and sleeve Underdrains: 12-in min. clearance
Water • Mains • Laterals • Hydrants • Cleanouts, valves, manholes	 N/A N/A 3-ft clear on sidewalk; 4-ft x 20-ft clear along street.	 12-in N/A N/A	 Provide concrete collars
Sewer • Mains • Laterals	 N/A N/A	 12-in 12-in	
Street Lights • Poles • Conduit	 N/A	 N/A	 Can be located in BMPs

10.15 Landscape/Streetscape

Refer to the Silver Spring Streetscape Standards (Dec. 2019) for guidance on the following:

- Planting/furnishing zone
  - Tree species, spacing
  - Tree grates and guards
  - Shrubs
  - Moveable planters
- Frontage Zone
- Sidewalk Zone
  - Paving
- Wayfinding/Branding
- Furnishings
  - Bicycle racks
  - Benches
  - Trash receptables

Refer to Montgomery County Department of Permitting Services Requirements for Outdoor Café Seating.

Figure 62 - Custom hoop racks in Silver Spring, MD.

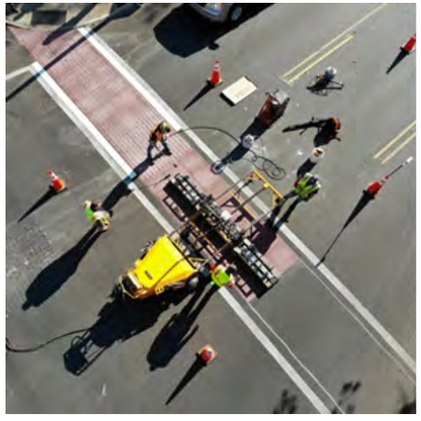


Figure 63 – Brick pattern crosswalk using preformed thermoplastic impressed into asphalt pavement

10.16 Special considerations

10.16.1 Property access: ADA compliance

Access to adjacent buildings must meet or exceed existing conditions with respect to ADA compliance.

Where the right-of-way is located at the building face and door entrances are not recessed within the building face, a 3- to 4-ft buffer should be maintained between the building and the clear sidewalk width to avoid conflicts between pedestrians and doors that swing open toward the street.

Figure 64 - Existing ADA ramp access to restaurant/cafe on the NW corner of Fenton Street and Silver Spring Ave

10.16.2 Purple Line track hazards

The angle between the bikeway and tracks at the light rail crossing should be between 60 – 90 degrees. The Purple Line will be constructed with flangeway fillers. Special signing could be considered to warn bicyclists of the hazard of riding parallel with the tracks as well.

Figure 65 - Example caution signing from Portland, OR used to warn bicyclists of the hazard associated with riding parallel to light rail tracks in the roadway (left); Example of flangeway filler used to fill gap between track and pavement (right).

10.16.3 Floating Bus Stops

Floating bus stops should be used to eliminate conflicts between boarding transit users and bicyclists. The minimum width of the floating bus stop, not including the top of curb, should be 9-ft to accommodate deployment of the buses' retractable ramp for wheelchair users. The length of the floating bus stop should be designed to accommodate both WMATA and RideOn buses. Shelter widths and lighting locations should also be taken into consideration. The entire facility should be ADA compliant. Hand railings and detectable warning surfaces should be used to direct visually impaired users to the bus door. The bus flag should be located immediately ahead of where the bus door will come to a stop. It may be necessary to eliminate the planting / furnishing zone within the limits of the floating bus stop to accommodate the minimum cycle track width.

Figure 66 - Floating bus stop located at Second Avenue, north of Colesville Road, Silver Spring, MD.

Figure 67 – Example Bicyclist footrest (Source: Bicycling.com)

11 Proposed Improvements

As stated in section 6, the purpose and need for the project is to:

1. Improve bicycle and pedestrian safety and comfort in the Fenton Street corridor;
2. Improve bicycle connectivity within and beyond downtown Silver Spring;
3. Provide balanced, multi-modal transportation options for all Fenton Street users.

To meet the first objective, MCDOT's approach is to provide a separated bicycle facility that minimizes conflicts between users. According to the National Association of City Transportation Officials (NACTO), "a separated bicycle facility is a bikeway within or adjacent to the roadway and separated from moving traffic by barriers or curbs, parking lanes, striped buffers, and other means." Furthermore, it was established at the beginning of the study that the bikeway would be located on the west side of the roadway to connect with similar facilities to the north and south that are also located on the west side of the roadway. It is not possible or practical to eliminate all conflicts between users, especially within an urban area. Therefore, to minimize conflicts, the proposed improvements and recommendations rely on sound engineering principles and best practices with respect to signalization, separation, signing, and pavement marking in the context of a constrained urban right-of-way.

The second objective is primarily met by simply constructing the bikeway and connecting with adjacent bikeway facilities. All of the alternatives, except the no-build alternative, meet this goal.

To meet the third objective, it is necessary to evaluate the entire right-of-way based on complete streets principles. According the Montgomery County Complete Streets Design Guide, "Complete Streets are roadways that are designed and operated to provide safe, accessible, and healthy travel for all users of our roadway system, including pedestrians, bicyclists, transit riders, and motorists. On a Complete Street, it is intuitive and safe to cross the street, walk to shops, and bicycle to school."

With these objectives in mind, alternatives were developed and analyzed based upon the design criteria in the previous section in the context of the following goals and considerations:

- Implement a safe, continuous, separated bikeway facility,
- Minimize impacts to existing parking,
- Minimize short- and long-term economic impacts to commercial interests,
- Maximize vehicular and pedestrian traffic movement,
- Meet accessibility/ADA-compliance requirements and improve accessibility to the maximum extent,
- Minimize impacts to existing street trees; implement new landscape features,
- Accommodate transit, loading, and property access,
- Implement storm water management to the maximum extent practicable,
- Minimize right-of-way and utility impacts, and
- Minimize construction costs.

In areas of the corridor where these considerations conflict with one another, multiple alternatives have been developed and progressed. The ultimate goal is to strike a balance where all users are accommodated in a practical manner and the design meets the absolute minimum requirement where the project is constrained. In unconstrained locations, the design will more comfortably accommodate user demands and meet or exceed the minimum criteria.

11.1 Alternatives Summary

Based on review of project objectives, existing conditions, constraints, master plans, public feedback, and design criteria, seven alternatives (A through G) were developed and analyzed for the study. The following is a list of alternatives:

- **Alternative A – Widening in Fenton Village; Favors on-street parking**. This alternative favors on-street parking by combining all turning and thru movements into one shared lane within Fenton Village.
- **Alternative B – Widening in Fenton Village; Impacts to parking in favor of motorists and bicyclists.** This alternative favors motorists and bicyclists by providing exclusive left-turn lanes for vehicles. This provides queuing space for left-turning vehicles and protection for bicyclists from collisions with left-turning vehicles.
- **Alternative C – Widening in Fenton Village; Impacts to motorists in favor of bicyclists and parking.** This alternative provides a balanced approach by providing exclusive NB left-turns, which benefits bicyclist safety. It provides a shared SB travel lane, which benefits parking but impacts traffic.
- **Alternative D – No widening in Fenton Village; Favors on-street parking.** This alternative favors on-street parking by combining all turning and thru movements into one shared lane within Fenton Village.
- **Alternative E – No widening in Fenton Village; Impacts to parking in favor of motorists and bicyclists.** This alternative favors motorists and bicyclists by providing exclusive left-turn lanes for vehicles. This provides queuing space for left-turning vehicles and protection for bicyclists from collisions with left-turning vehicles.
- **Alternative F – Combination of widening and no widening in Fenton Village, impacts to motorists in favor of parking and bicyclists, No NB Left-turns at Thayer Avenue.** This alternative is a variation of Alternative C.
- **Alternative G – Combination of widening and no widening in Fenton Village, impacts to motorists in favor of parking and bicyclists, No NB Left-turns at Silver Spring Avenue.** This alternative is a variation of Alternative C.

A conceptual plan for each Alternative is provided in the appendix and will be posted on the MCDOT website.

Because this is an urban area and intersections are spaced relatively close together, the roadway typical section dimensions vary significantly within any given block. At intersections, the roadway dimensions often need to deviate from the typical section in order accommodate turning movement operations and queue storage. In other words, it would be incorrect to simply evaluate one typical section for an entire block. Therefore, each alternative is comprised a set of mid-block typical sections and a set of intersection treatments, the latter which is collectively referred to as a traffic scenario as multiple intersection treatments often need to be coordinated to achieve a given objective for a given alternative.

The typical sections are presented in section 11.2 and the traffic scenarios are presented in section 11.3. These building blocks or components were used to develop and analyze impacts associated with each alternative. The following table summarizes the alternatives, comprised of combinations of typical sections and traffic scenarios:

Table 15 - Summary of Alternatives (Typical Sections + Traffic Scenarios)

	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Fenton Street at:	**Typical Section**	**Traffic Scenario**	**Typical Section**	**Traffic Scenario**	**Typical Section**	**Traffic Scenario**	**Typical Section**	**Traffic Scenario**	**Typical Section**	**Traffic Scenario**	**Typical Section**	**Traffic Scenario**	**Typical Section**	**Traffic Scenario**
Fenton Village District														
Gist Ave														
Mid-block	2		2		2		4		4		4		4	
Sligo Ave														
Mid-block	2		2		2		4		4		4		4	
Silver Spring Ave														
Mid-block	2	2	2	4	2	6	4	2	4	6	2	7	2	8
Thayer Ave														
Mid-block	2		2		2		4		4		2		2	
Bonifant Street														
Mid-block	2		2		2		4		4		2		2	
Wayne Ave														
Ellsworth District														
Mid-block	6		6		6		6		6		6		6	
Ellsworth Drive														
Mid-block	7	2	7	4	7	6	7	2	7	6	7	7	7	8
Colesville Road														
North Silver Spring District														
Mid-block	8		8		8		8		8		8		8	
Cameron Street		2		4		6		2		6		7		8

11.2 Typical Sections

Initially, seven typical sections were developed for the Fenton Village District, two for the Ellsworth District, and one for the North Silver Spring District.

For the Fenton Village District, one of the seven typical sections (widening 2-ft to the west side) was eliminated early in the study due to impacts and is not discussed further herein. The remaining six typical sections were reviewed more closely and are presented below. Typical sections 1, 3, and 5 were presented to the public, but were not retained for detailed study based on a high level review that determined these typical sections were not aligned with the purpose and need, due to disproportionate impacts to either sidewalks, traffic, parking, street trees, or utilities. Typical sections 2 and 4 were retained.

For the Ellsworth District, there are two typical sections but for separate blocks. Both were retained.

For the North Silver Spring District, only one typical section was developed and retained.

Table 16 – Typical Sections Summary

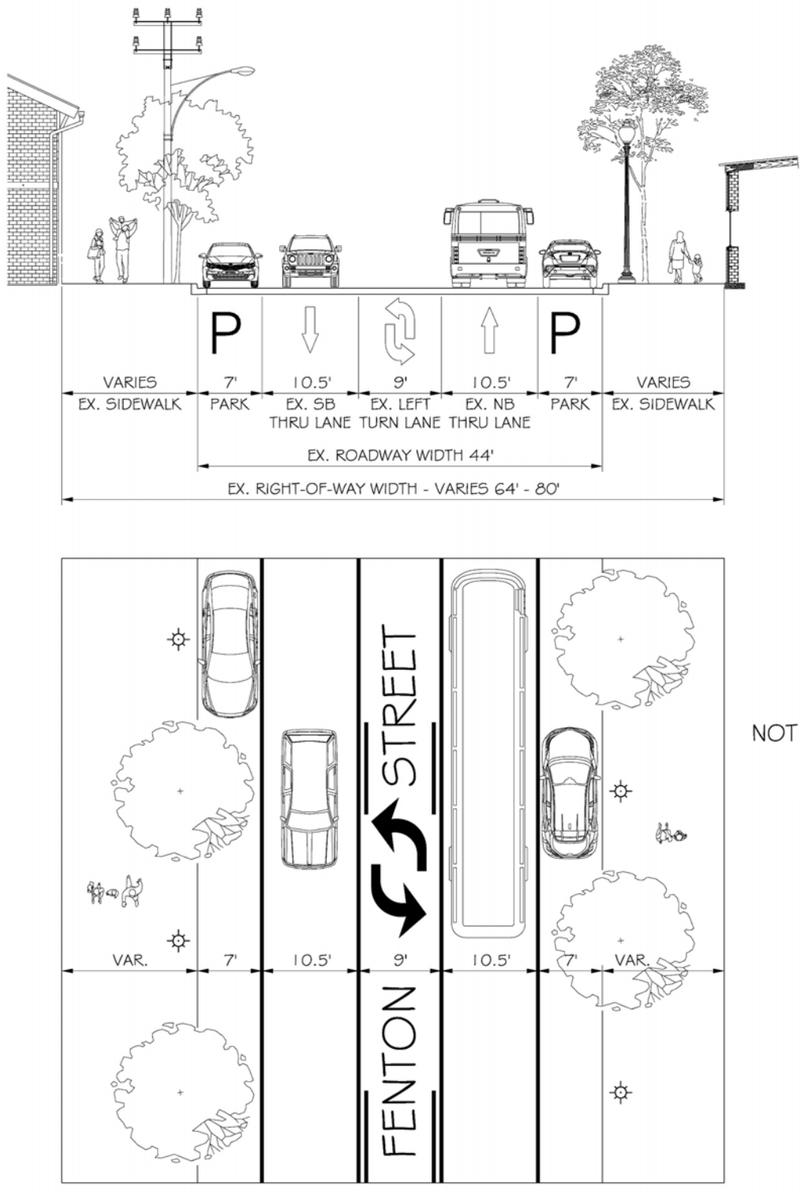
Proposed Typical Sections	Description	Status
Fenton Village District		
From Gist Avenue to Wayne Avenue		
1	Roadway widening to both sides (4-ft total)	Not Retained
2	Roadway widening to east side (2-ft) (includes variation with tree shadow boxes)	Retained
3	No Roadway widening, remove two-way left-turns	Not Retained
4	No Roadway widening, remove two-way left-turns and SB parking	Retained
5	No Roadway widening, remove two-way left-turns and NB parking	Not Retained
Ellsworth District		
From Wayne Avenue to Ellsworth Drive		
6	No Roadway widening, remove one SB travel lane	Retained
From Ellsworth Drive to Colesville Road (US-29)		
7	No Roadway widening, remove SB travel lane	Retained
North Silver Spring District		
From Colesville Road (US-29) to Cameron Street		
8	No Roadway widening, reduce travel and parking lane widths	Retained

11.2.1 Fenton Village District

Fenton Street from Gist Avenue to Wayne Avenue

Five proposed typical sections were developed for the Fenton Village District. Three of the five (3, 4, and 5) were originally developed with the first iteration of this study based on no roadway widening of the Fenton Street corridor from Gist Avenue to Cameron Street (other than removal of the curb extensions). Based on extensive on-street parking impacts in the Fenton Village District associated with these typical sections, MCDOT expanded the study to evaluate typical sections 1 and 2, which include roadway (curb-to-curb) widening from Gist Avenue to Wayne Avenue. It is important to make the distinction between no widening and widening improvements in the Fenton Village District because roadway widening creates additional potential impacts to storm drains, utilities, traffic signals, sidewalks, street trees, and street lighting. However, widening may allow MCDOT to retain more on-street parking, which in turn benefits commercial interests.

Figure 68 - Existing Typical Section, Fenton Street from Gist Avenue to Wayne Avenue

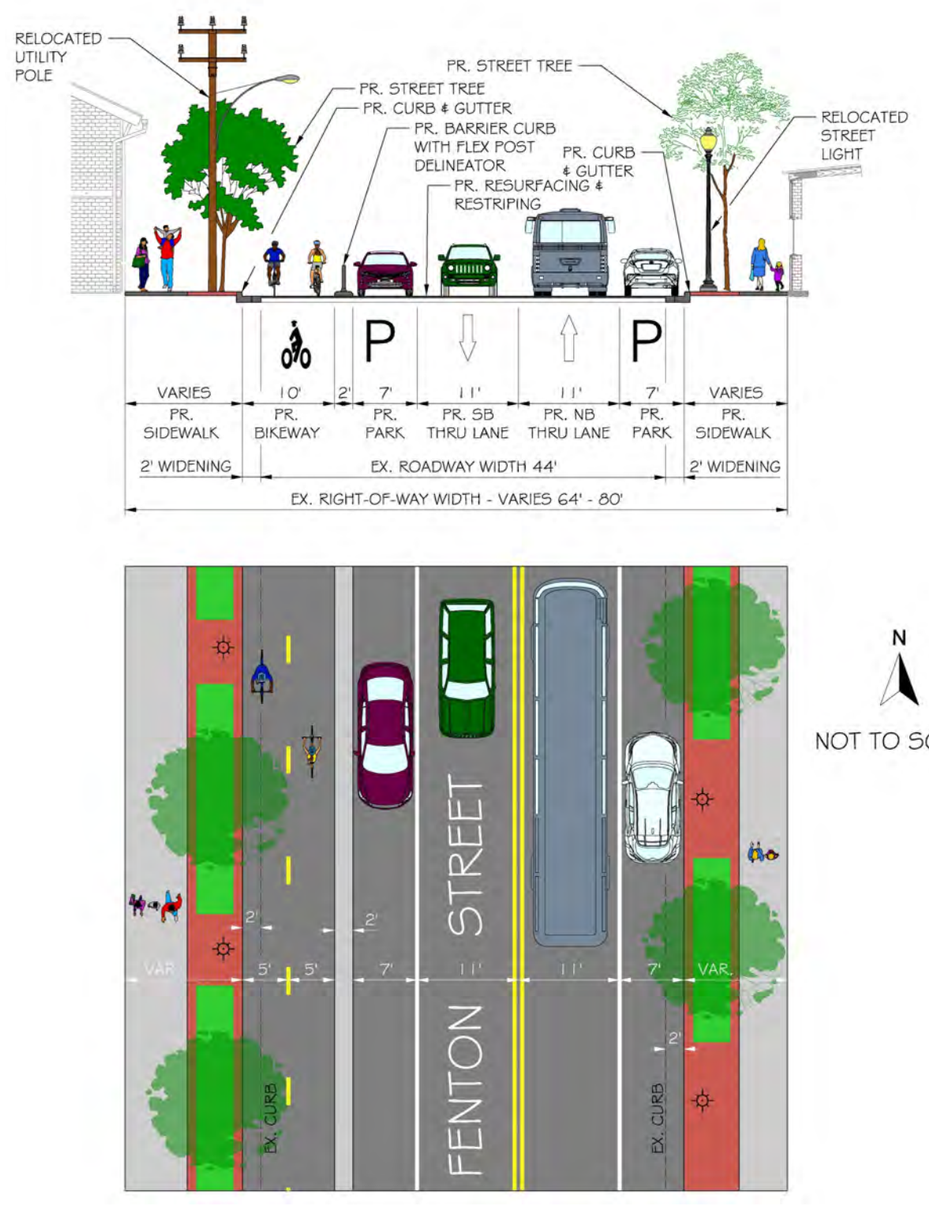


Proposed Typical Section 1 – NOT RETAINED
Fenton Street from Gist Avenue to Wayne Avenue
Roadway Widening to Both Sides (4-ft total)

This typical section includes widening the roadway 2-ft to the west site and 2-ft to the east side of Fenton Street from Gist Avenue to Wayne Avenue. The existing roadway would be widened from 44-ft to 48-ft. The curb extensions at intersections between Gist Avenue and Bonifant Street would be eliminated. However, curb extensions could be added to corners along the side streets to provide additional space for furnishings. This Typical Section would provide enough roadway width for a 10-ft wide bikeway, a 2-ft buffer, two 7-ft parking lanes, and two 11-ft travel lanes. Sidewalk widths would vary but would be wide enough to accommodate the frontage zone, the pedestrian clear zone, and the planting/furnishing zone. Right-of-way acquisitions would need to be considered that expand the right-of-way width to 80-ft (refer to section 12.5). This would be the most impactful and expensive typical section as it would require full depth widening, reconstruction of the sidewalks, lighting, and storm drain structures, replacement of street trees, and implementation of stormwater management BMPs on both sides of the street. This typical section would include relocation and/or undergrounding of utility poles and isolated relocations of underground utilities.

This typical section was not retained because widening both sides of the roadway includes extensive impacts beyond what is necessary to achieve the project objectives.

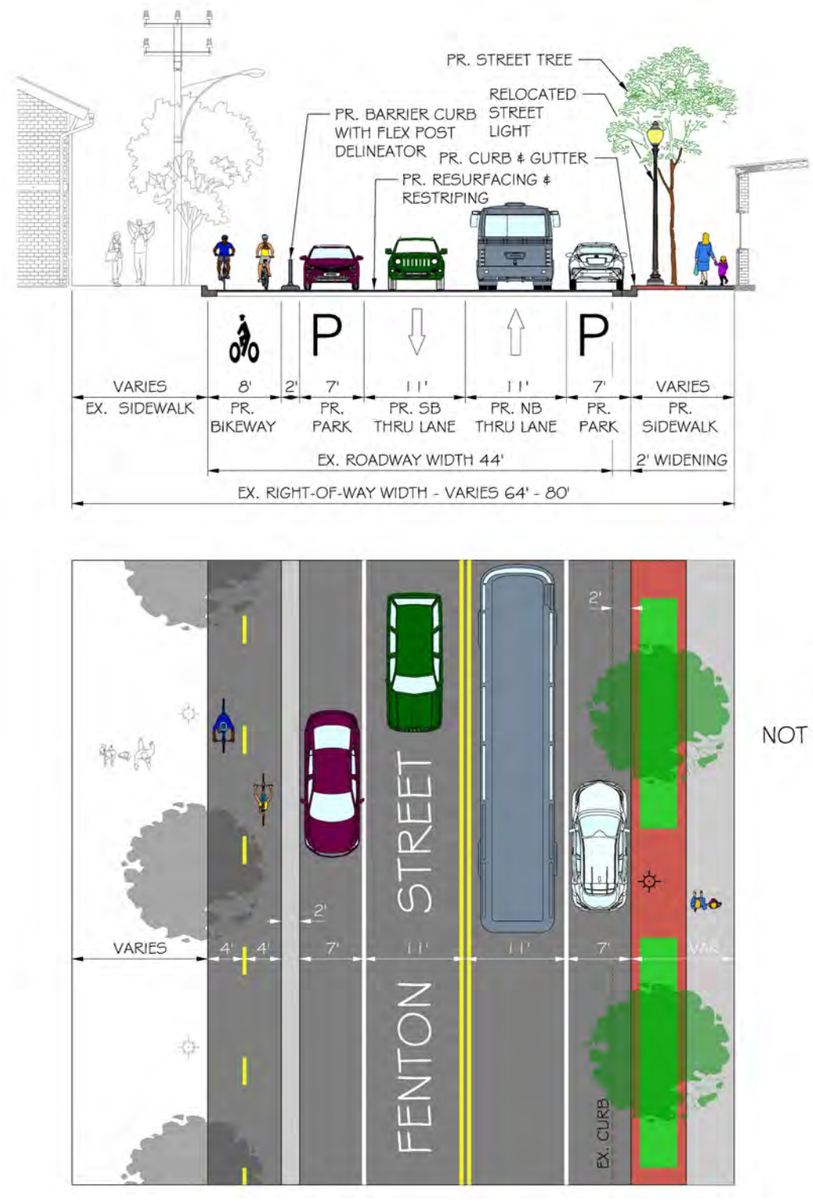
Figure 69 - Proposed Typical Section 1, Fenton Street from Gist Avenue to Wayne Avenue



Proposed Typical Section 2 - RETAINED
Fenton Street from Gist Avenue to Wayne Avenue
Roadway Widening to East Side (2-ft)

This typical section includes widening the roadway 2-ft to the east side of Fenton Street from Gist Avenue to Wayne Avenue. The existing roadway would be widened from 44-ft to 46-ft. The curb extensions at intersections between Gist Avenue and Bonifant Street would be eliminated. However, curb extensions could be added to corners along the side streets to provide additional space for furnishings. This Typical Section would provide enough roadway width for an 8-ft wide bikeway, a 2-ft buffer, two 7-ft parking lanes, and two 11-ft travel lanes. Right-of-way acquisitions would need to be considered that expand the right-of-way width to 80-ft (refer to section 12.5). This typical section would require full depth widening, reconstruction of the sidewalk, lighting, and storm drain structures, replacement of street trees, and implementation of stormwater management BMPs on the east side of the street. This typical section would not include impacts to mid-block utility poles. Underground utilities could be impacted depending on the extent of storm drain reconstruction.

Figure 70 - Proposed Typical Section 2, Fenton Street from Gist Avenue to Wayne Avenue



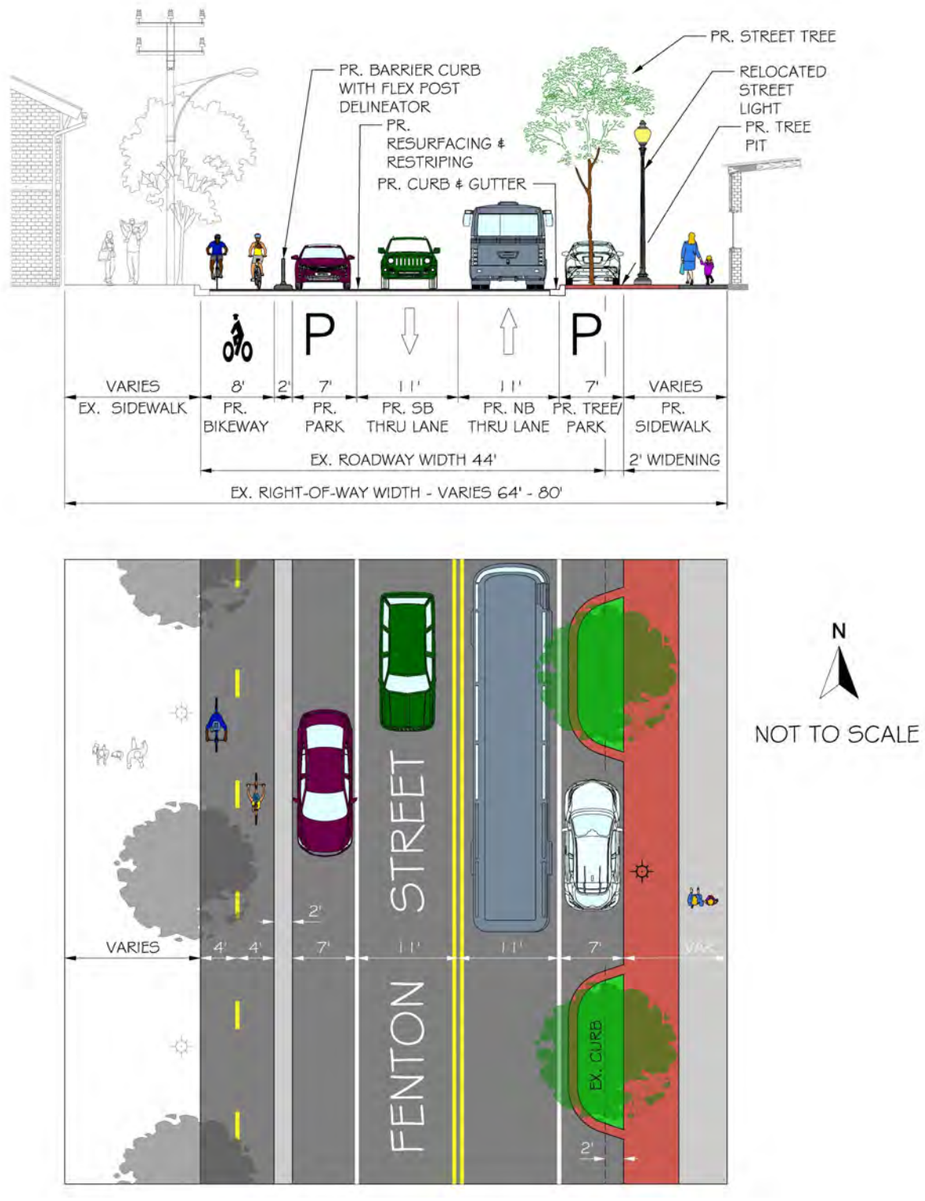
Proposed Typical Section 2 (with Tree Shadow Boxes) - RETAINED

Fenton Street from Gist Avenue to Wayne Avenue

Roadway Widening to East Side (2-ft) with Tree Shadow Boxes

This typical section includes widening the roadway 2-ft to the east side of Fenton Street from Gist Avenue to Wayne Avenue. The existing roadway would be widened from 44-ft to 46-ft. The curb extensions at intersections between Gist Avenue and Bonifant Street would be eliminated. However, tree shadow boxes would be added at mid-block and curb extensions could be added to corners along the side streets to provide additional space for furnishings. This typical section would provide enough roadway width for an 8-ft wide bikeway, a 2-ft buffer, two 7-ft parking lanes, and two 11-ft travel lanes. Right-of-way acquisitions would need to be considered that expand the right-of-way width to 80-ft (refer to section 12.5). This typical section would require full depth widening, reconstruction of the sidewalk, lighting, and storm drain structures, replacement of street trees, and implementation of stormwater management BMPs on the east side of the street. This typical section would not include impacts to mid-block utility poles. Underground utilities could be impacted depending on the extent of storm drain reconstruction.

Figure 71 - Proposed Typical Section 2 (with Tree Shadow Boxes), Fenton Street from Gist Avenue to Wayne Avenue



Proposed Typical Section 3 – NOT RETAINED

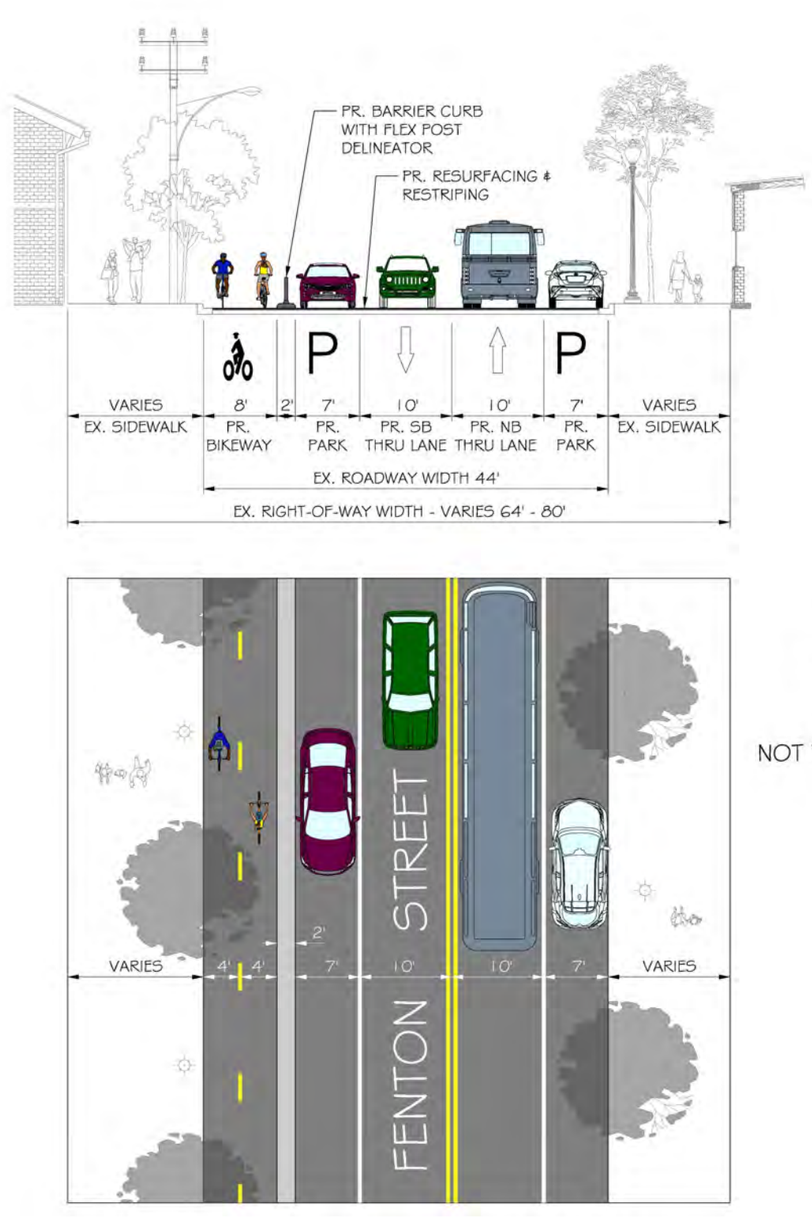
Fenton Street from Gist Avenue to Wayne Avenue

No Roadway Widening, Remove Two-Way Left-Turn Lanes

This typical section includes resurfacing and re-striping only of Fenton Street from Gist Avenue to Wayne Avenue. The existing roadway width would be held at 44-ft from curb-to-curb. The curb extensions at intersections between Gist Avenue and Bonifant Street would be eliminated. This typical section would provide enough roadway width for an 8-ft wide bikeway, a 2-ft buffer, two 7-ft parking lanes, and two 10-ft travel lanes. The existing sidewalks would remain. Right-of-way acquisitions would be minimal. Implementation of stormwater management BMPs would be minimal due to the limited amount of disturbance. Utility impacts would be minimal.

This typical section includes narrow parking lanes adjacent to narrow travel lanes, which is generally not acceptable in Montgomery County. Therefore, this typical section was not retained due to safety concerns.

Figure 72 - Proposed Typical Section 3, Fenton Street from Gist Avenue to Wayne Avenue



Proposed Typical Section 4 - RETAINED

Fenton Street from Gist Avenue to Wayne Avenue

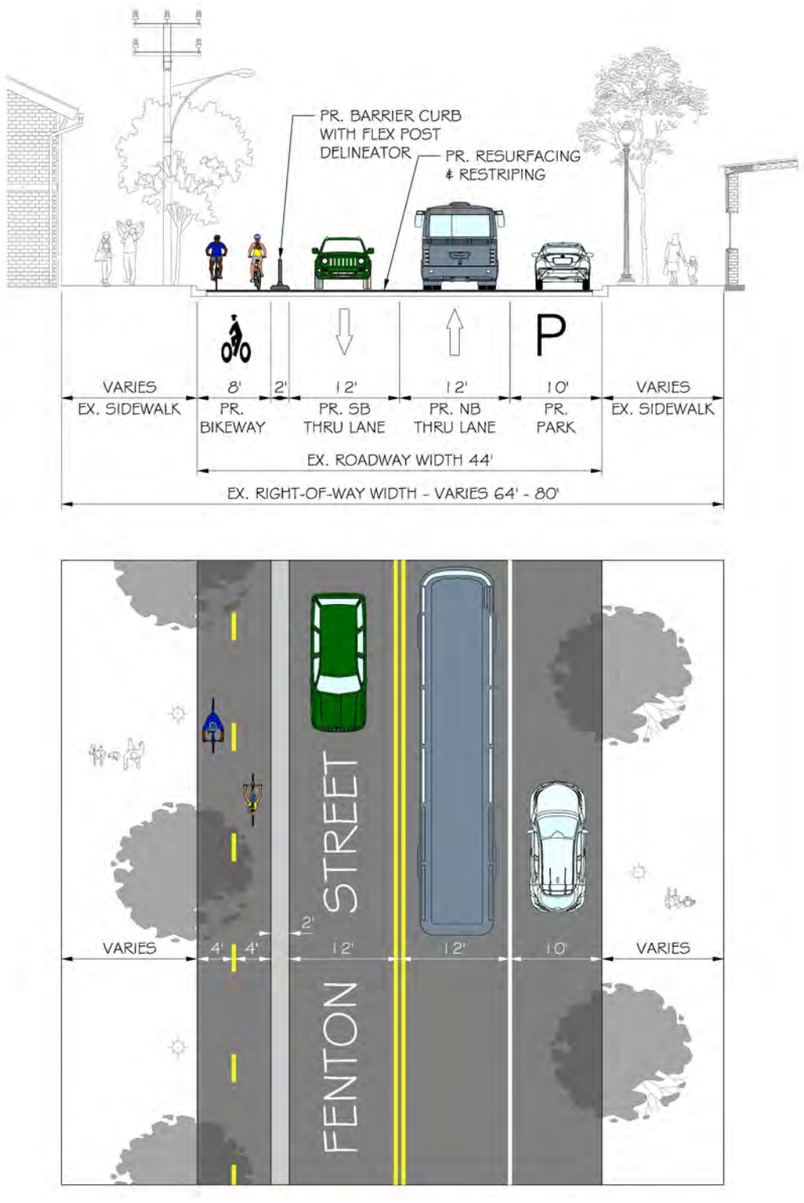
No Roadway Widening, Remove Two-Way Left-Turn Lanes and Southbound Parking

This typical section includes resurfacing and re-striping only of Fenton Street from Gist Avenue to Wayne Avenue. The existing roadway width would be held at 44-ft from curb-to-curb. The curb extensions at intersections between Gist Avenue and Bonifant Street would be eliminated. This typical section would provide enough roadway width for an 8-ft wide bikeway, two 12-ft travel lanes, and one 10-ft parking lane. The existing sidewalks would remain. Right-of-way acquisitions would be minimal. Implementation of stormwater management BMPs would be minimal due to the limited amount of disturbance. Utility impacts would be minimal.

This typical section would include loss of on-street parking along southbound Fenton Street, which would reduce the risk of collisions between bicyclists and motorists exiting their parked vehicles. Parking would be located on the northbound side of Fenton Street where motorists can more safely exit their vehicles.

Wider travel lanes allow for easier operation of passenger vehicles, trucks, and buses. However, trucks stopping to unload will find less available parking lane length to do so.

Figure 73 - Proposed Typical Section 4, Fenton Street from Gist Avenue to Wayne Avenue



Proposed Typical Section 5 – NOT RETAINED

Fenton Street from Gist Street to Wayne Avenue

No Roadway Widening, Remove Two-Way Left-Turn Lanes and Northbound Parking

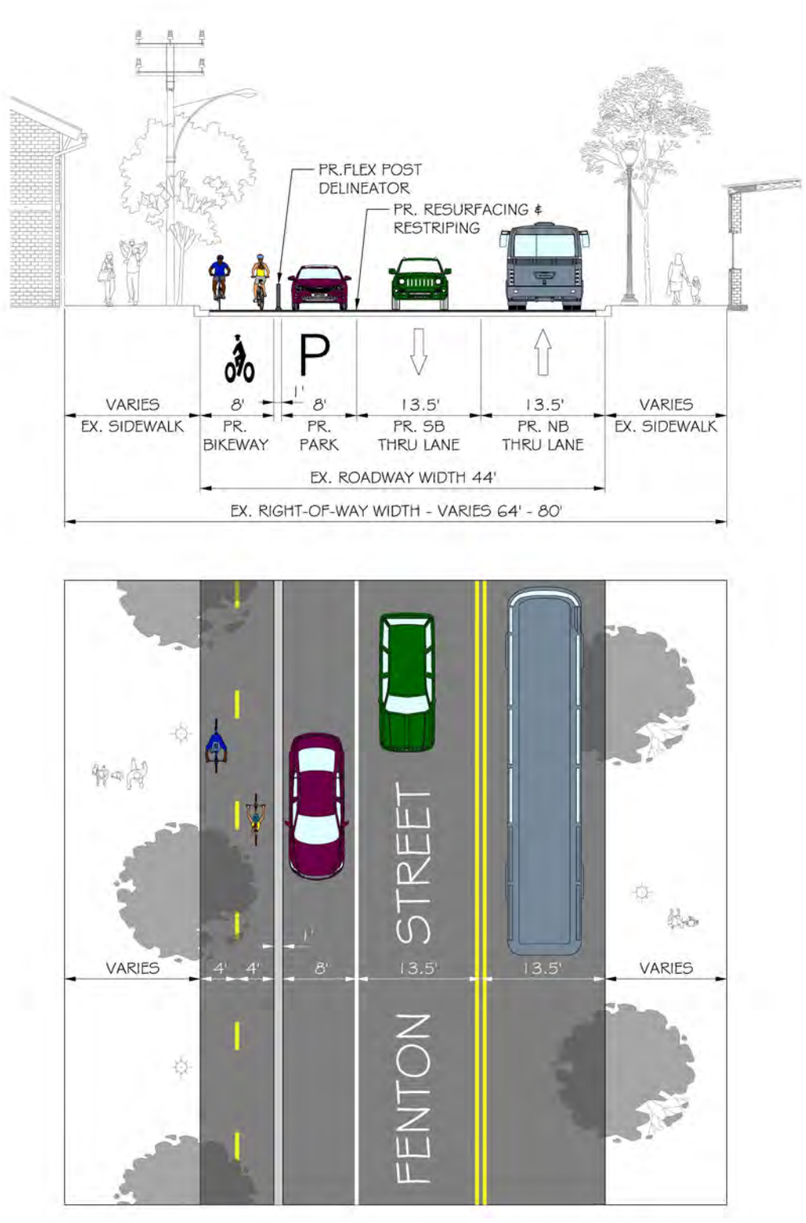
This typical section includes resurfacing and re-striping only of Fenton Street from Gist Avenue to Wayne Avenue. The existing roadway width would be held at 44-ft from curb-to-curb. The curb extensions at intersections between Gist Avenue and Bonifant Street would be eliminated. This typical section would provide enough roadway width for an 8-ft wide bikeway, a 2-ft buffer, one 8-ft parking lane, and two 13.5-ft travel lanes. The existing sidewalks would remain. Right-of-way acquisitions would be minimal. Implementation of stormwater management BMPs would be minimal due to the limited amount of disturbance. Utility impacts would be minimal.

This typical section would include loss of on-street parking along northbound Fenton Street. Parking along the southbound direction would be provided and serve as an additional buffer between the travel lane and bikeway.

Wider travel lanes allow for easier operation of passenger vehicles, trucks, and buses. However, trucks stopping to unload will find less available parking lane length to do so. Trucks may also choose to stop temporarily in the northbound travel lane, blocking traffic.

This typical section was not retained due to extensive parking impacts and ineffective utilization of the available roadway widths.

Figure 74 - Proposed Typical Section 5, Fenton Street from Gist Avenue to Wayne Avenue



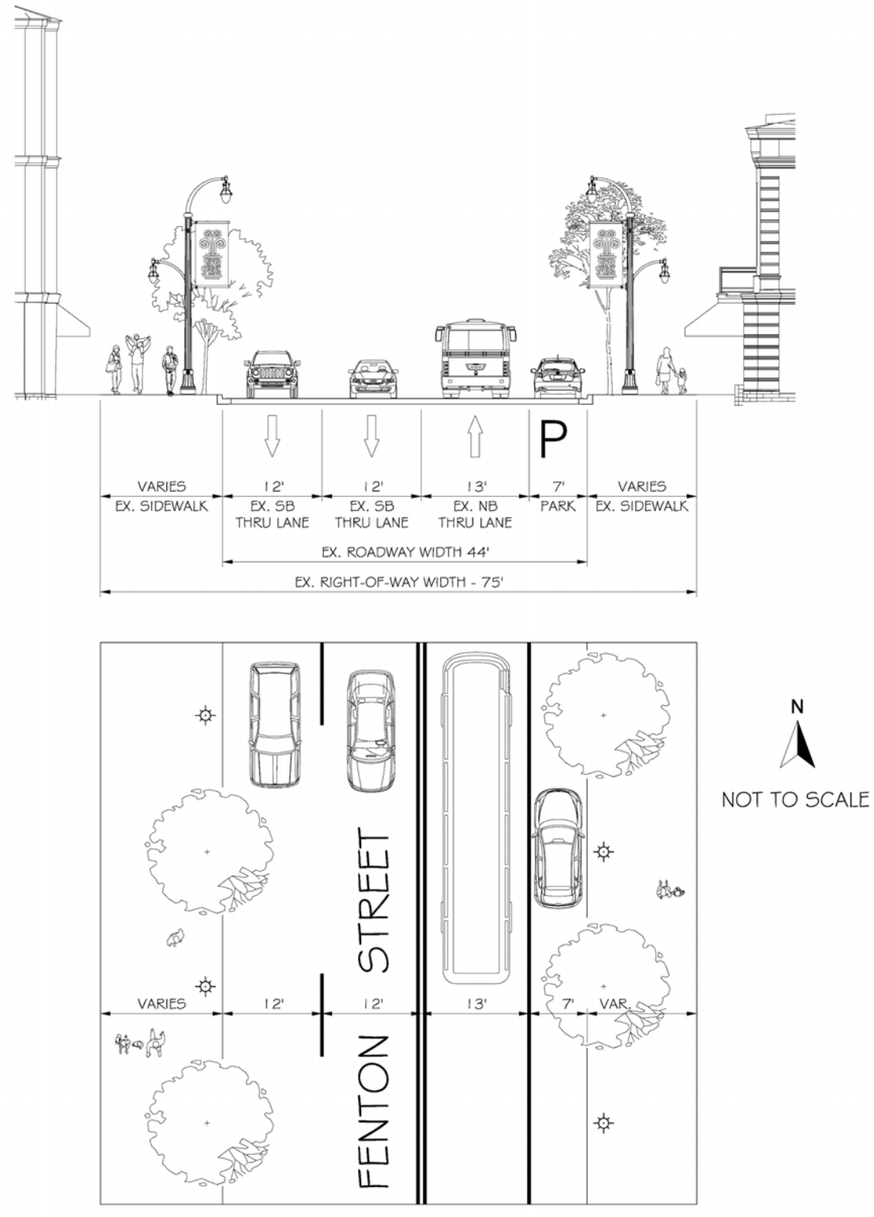
11.2.2 Ellsworth District

Fenton Street from Wayne Avenue to Ellsworth Drive

The curb-to-curb width is also 44-ft wide along this segment. However, the two southbound lanes are travel lanes. There is one travel lane and a parking along the northbound side of Fenton Street from Wayne Avenue to a point south of Ellsworth Drive, as there are relatively few on-street spaces and several large parking garages are located in the area.

One proposed typical section was developed for this segment.

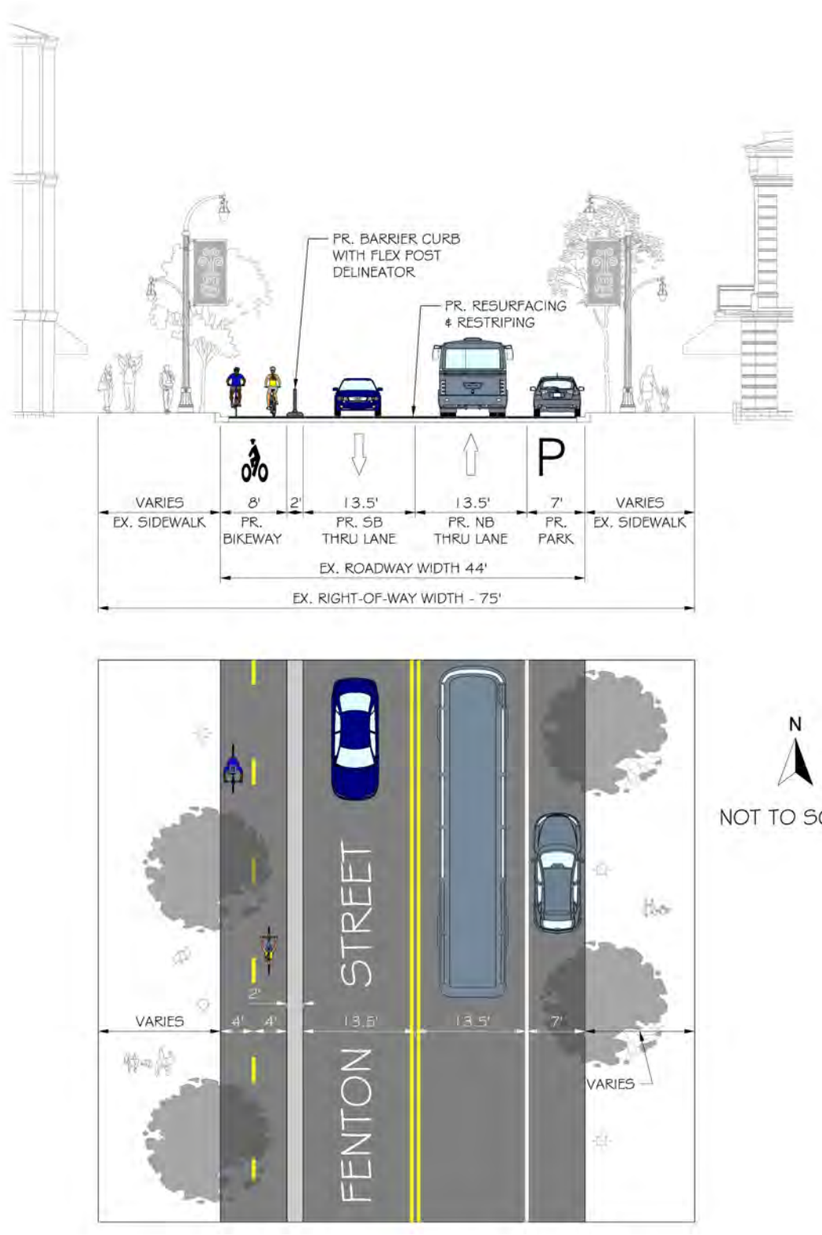
Figure 75 - Existing Conditions, Fenton Street from Wayne Avenue to Ellsworth Drive



Proposed Typical Section 6 - RETAINED
Fenton Street from Wayne Avenue to Ellsworth Drive
No Widening, Remove Southbound Travel Lane

This typical section includes conversion of the outside southbound travel lane to a bikeway. Resurfacing and re-striping of Fenton Street from Wayne Avenue to Ellsworth Drive would be necessary. The existing roadway width would be held at 44-ft from curb-to-curb. This typical section would provide enough roadway width for an 8-ft wide bikeway, a 2-ft buffer, two 13.5-ft travel lanes, and a 7-ft parking lane. The existing sidewalks would remain. Right-of-way and utility impacts would be minimal. Implementation of stormwater management BMPs would be minimal due to the limited amount of disturbance. One bus stop and a hotel drop-off area would require modifications along the west side of the street.

Figure 76 - Proposed Typical Section 6, Fenton Street from Wayne Avenue to Ellsworth Drive

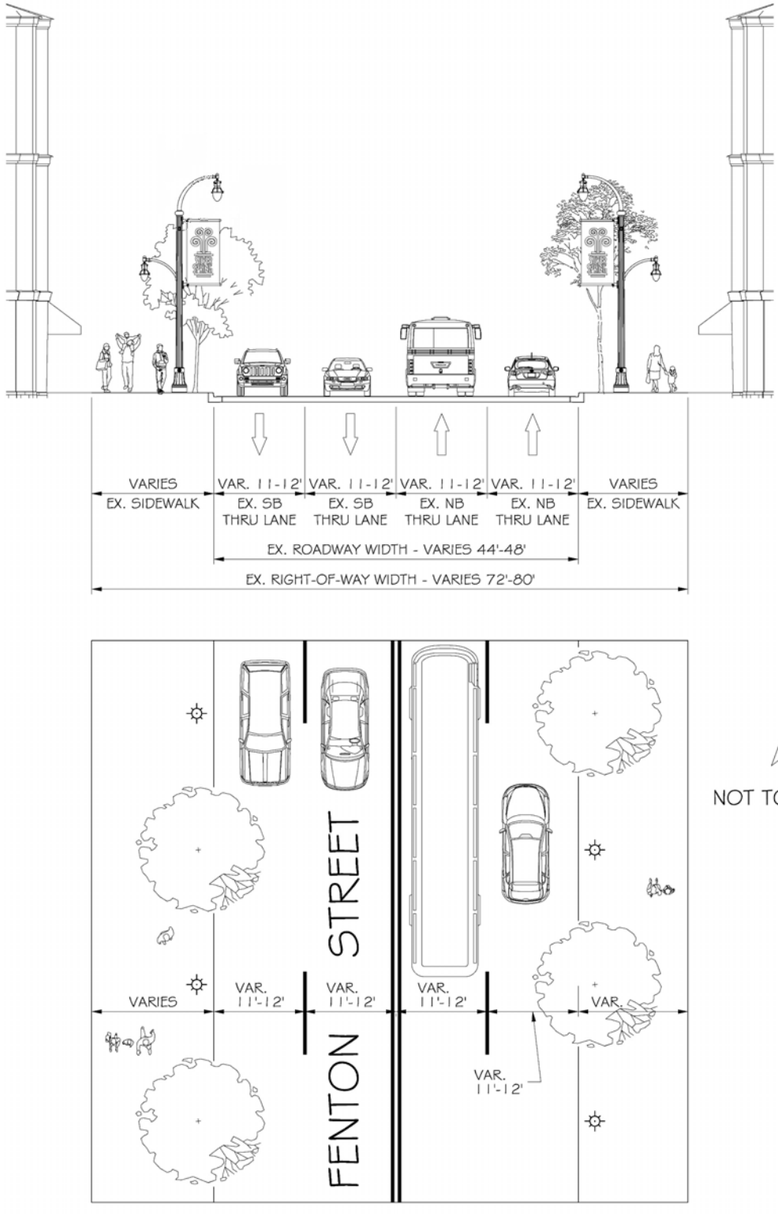


Fenton Street from Ellsworth Drive to Colesville Road (US-29)

The curb-to-curb width is 44-ft between Ellsworth Drive to Roeder Road. The curb-to-curb width from Roeder Road to Colesville Road (US-29) is 48-ft. There is no parking along this segment. The existing typical section is two northbound travel lanes and two southbound travel lanes.

One proposed typical section was developed for the Ellsworth District.

Figure 77 - Existing Typical Section, Fenton Street from Ellsworth Drive to Colesville Rd (US-29)



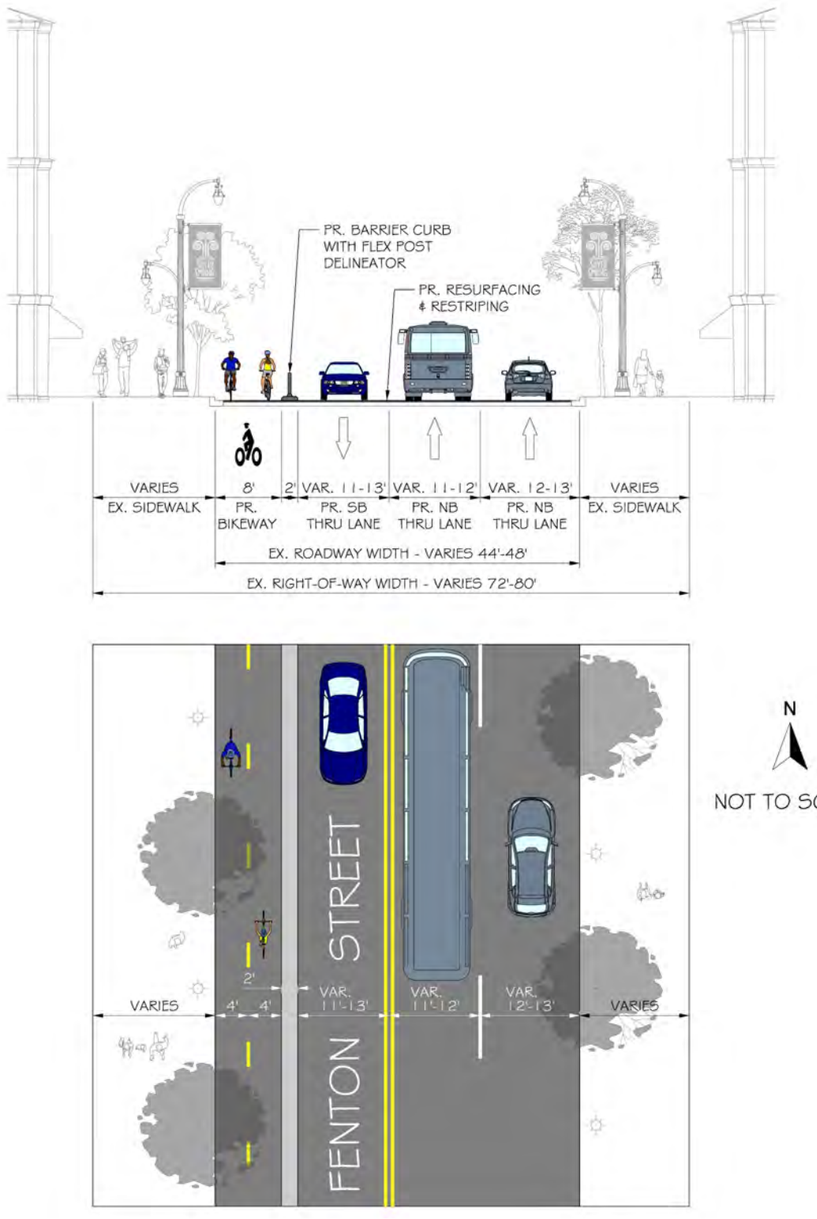
Proposed Typical Section 7 - RETAINED

Fenton Street from Ellsworth Drive to Colesville Road (US-29)

No Widening, Remove One Southbound Travel Lane

This typical section includes conversion of the outside southbound travel lane to a bikeway. Resurfacing and re-striping of Fenton Street from Ellsworth Drive to Colesville Road (US-29) would be necessary. The existing roadway width would be held at 44-ft from curb-to-curb. This typical section would provide enough roadway width for an 8-ft wide bikeway, a 2-ft buffer, one 11- to 13-ft southbound travel lane, and two 11- to 13-ft wide northbound travel lanes. The existing sidewalks would remain. Right-of-way and utility impacts would be minimal. Implementation of stormwater management BMPs would be minimal due to the limited amount of disturbance. One bus stop would require modifications along the west side of the street.

Figure 78 - Proposed Typical Section 7, Fenton Street from Ellsworth Dr to Colesville Rd (US-29)



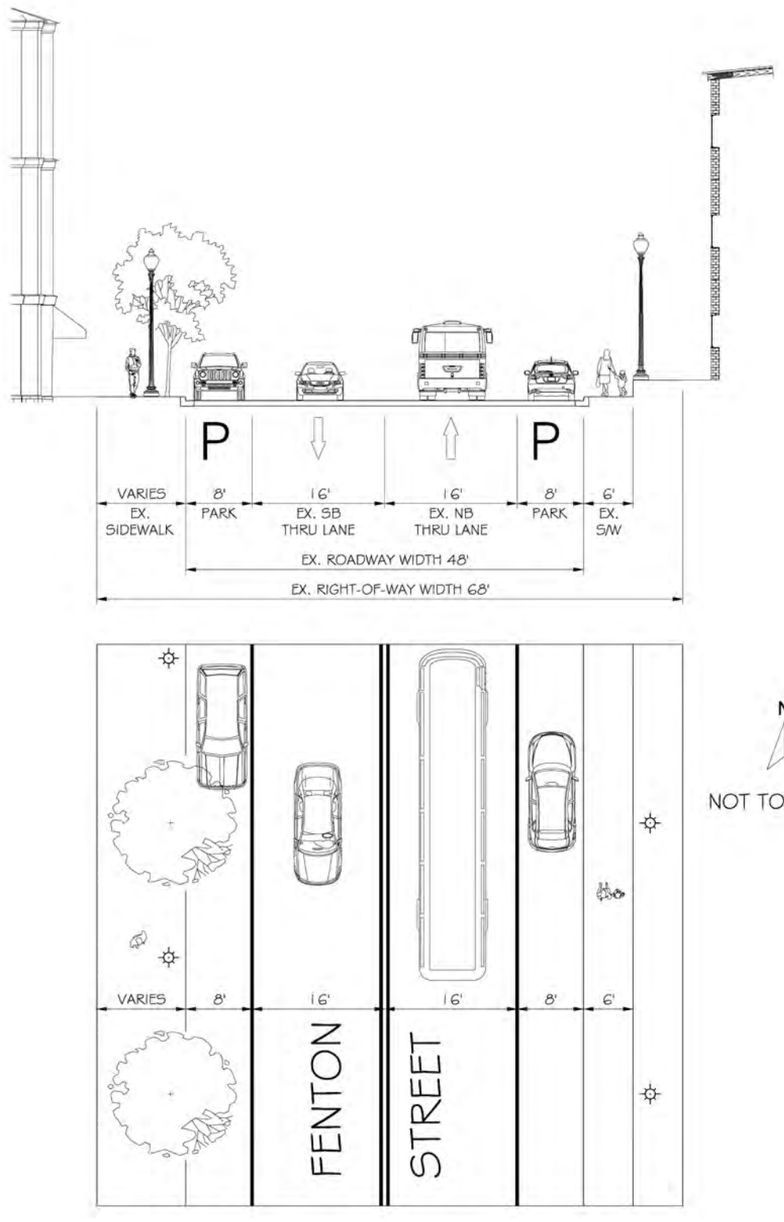
11.2.3 North Silver Spring District

Fenton Street from Colesville Road (US-29) to Cameron Street

The curb-to-curb width is 48-ft wide along this segment. There is parking along both sides of the street, except near intersection approaches.

One proposed typical section was developed for the North Silver Spring District.

Figure 79 - Existing Typical Section, Fenton Street from Colesville Road to Cameron Street



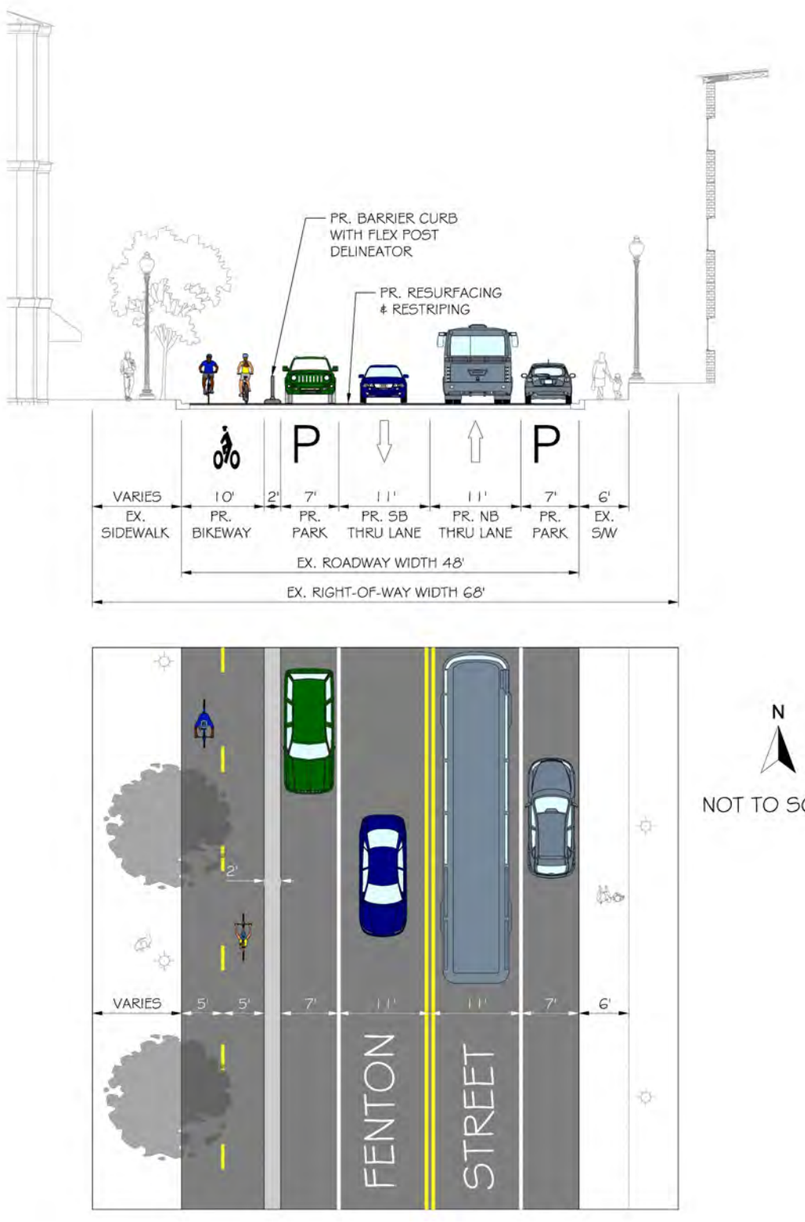
Proposed Typical Section 8 - RETAINED

Fenton Street from Colesville Road (US-29) to Cameron Street

No Widening, Reduce Travel and Parking Lane Widths

This typical section includes conversion of the outside southbound travel lane to a bikeway. Resurfacing and re-striping of Fenton Street from Colesville Road (US-29) to Cameron Street would be necessary. The existing roadway width would be held at 48-ft from curb-to-curb. This typical section would provide enough roadway width for a 10-ft wide bikeway, a 2-ft buffer, a southbound 7-ft parking lane, two 11-ft travel lanes, and a northbound 7-ft parking lane. The existing sidewalks would remain. Right-of-way and utility impacts would be minimal. Implementation of stormwater management BMPs would be minimal due to the limited amount of disturbance. Two bus stops would require modifications along the west side of the street.

Figure 80 - Proposed Typical Section 8, Fenton Street from Colesville Rd (US-29) to Cameron St



11.3 Traffic Scenarios

During the brainstorming process, intersection operational options were evaluated exclusive of the typical sections. For demonstration purposes, three initial scenarios were developed putting operational favor on 1) bikes/peds 2) parking and 3) traffic. Additional traffic scenarios (4, 5, 6, 7, and 8) were developed based on the findings – see Table 17. Each traffic scenario is a combination of intersection configurations. For typical intersection configurations, see Figure 81.

Following analysis, scenarios 2, 4, 6, 7, and 8 were retained for further study. Scenarios 1, 3, and 5 were not retained. The reason that scenarios 1 and 3 were not retained is that they were only intended to provide a look at what happens when the intersection operations control in favor of one mode of travel to see how it impacts the others. Although scenario 1 would be ideal for bicyclists from a safety standpoint and does not affect intersection level of service and delay, it is not practical to ban all vehicular left-turns in the corridor based on property access needs. Also, it is doubtful that drivers would comply with a left-turn ban, which is safety concern. Similarly, scenario 3 provides the most freedom of movement for vehicles but compromises bicycle safety at intersections where drivers making permissive left-turns come into conflict with bicyclists crossing the intersection. Scenario 5 was not retained because it is considered more important to provide exclusive SB left-turns (scenario 4) instead of exclusive SB right-turns. It is not practical based on right-of-way constraints to provide a scenario with both.

Table 17 – Traffic Scenarios

Traffic Scenarios	Description	Entire Corridor
1 - Favors Bikes/Peds	SB right turns and NB left turns banned across bikeway	Not retained
2 - Maximize Parking/Loading (No Dedicated Turn Lanes)	NB/SB Shared left-thru-right lanes	Retained
3 - Favors vehicular traffic (Exclusive/Permissive Turns)	NB/SB Dedicated Left-turn lane (Exclusive/Permissive); NB/SB Shared Thru-right-turn lane (Permissive)	Not retained
4 – Exclusive Lefts	Dedicated NB/SB left-turn lanes (Exclusive); Shared NB Thru-right lane (Permissive); Shared SB Thru-right lane (Permissive);	Retained
5 – Exclusive SB Rights	Dedicated SB right-turn lane (Exclusive); Shared SB Thru-left-turn lane (Permissive); Dedicated NB left-turn lane (Exclusive); Shared NB Thru-right lane (Permissive);	Not retained
6 – Exclusive NB Lefts/Permissive SB Rights	Shared SB Thru-right/left-turn lane (Permissive); Shared NB Thru-right-turn lane (Permissive); Dedicated NB left-turn lane (Exclusive);	Retained
7 – Exclusive NB lefts-turns; No NB Left-turn at Thayer Ave	Shared SB Thru-right/left-turn lane (Permissive); Shared NB Thru-right-turn lane (Permissive); Dedicated NB left-turn lane (Exclusive); NB Left-turn banned at Thayer Avenue	Retained
8 – Exclusive NB lefts-turns; No NB Left-turn at Silver Spring Ave	Shared SB Thru-right/left-turn lane (Permissive); Shared NB Thru-right-turn lane (Permissive); Dedicated NB left-turn lane (Exclusive); NB Left-turn banned at Silver Spring Avenue	Retained

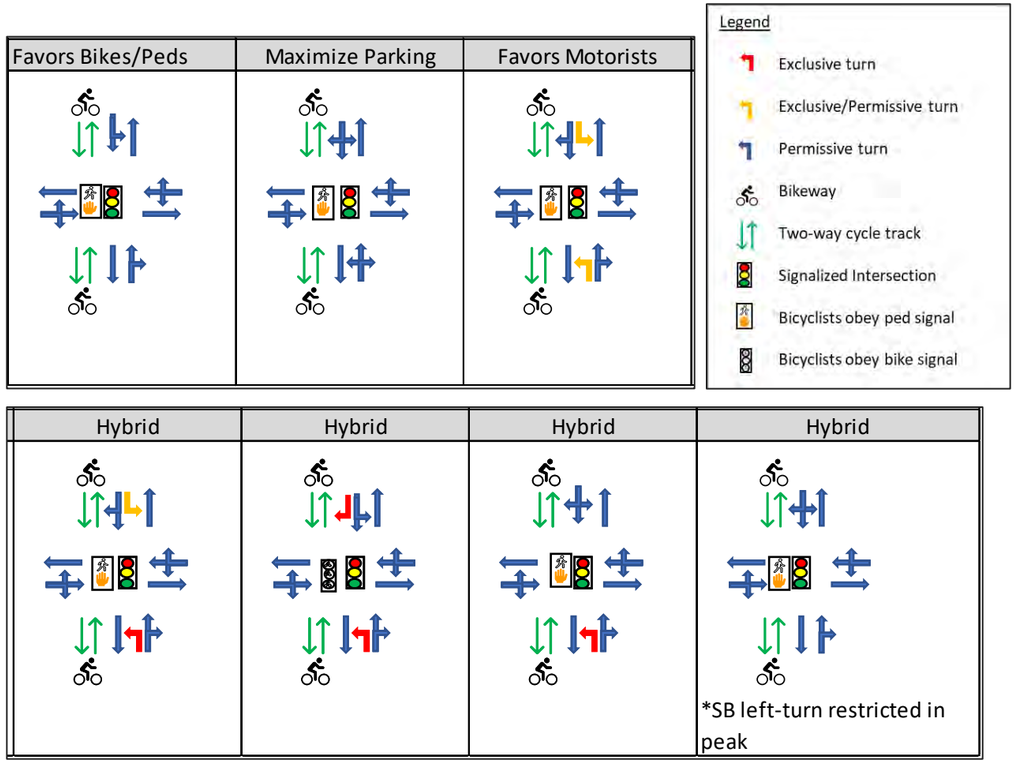


Figure 81 - Typical Intersection Configurations

The following schematic maps show both existing conditions and proposed traffic scenarios 1 thru 8. Each traffic scenario is a combination of intersection configurations. Typical intersection configurations are shown in Figure 81.

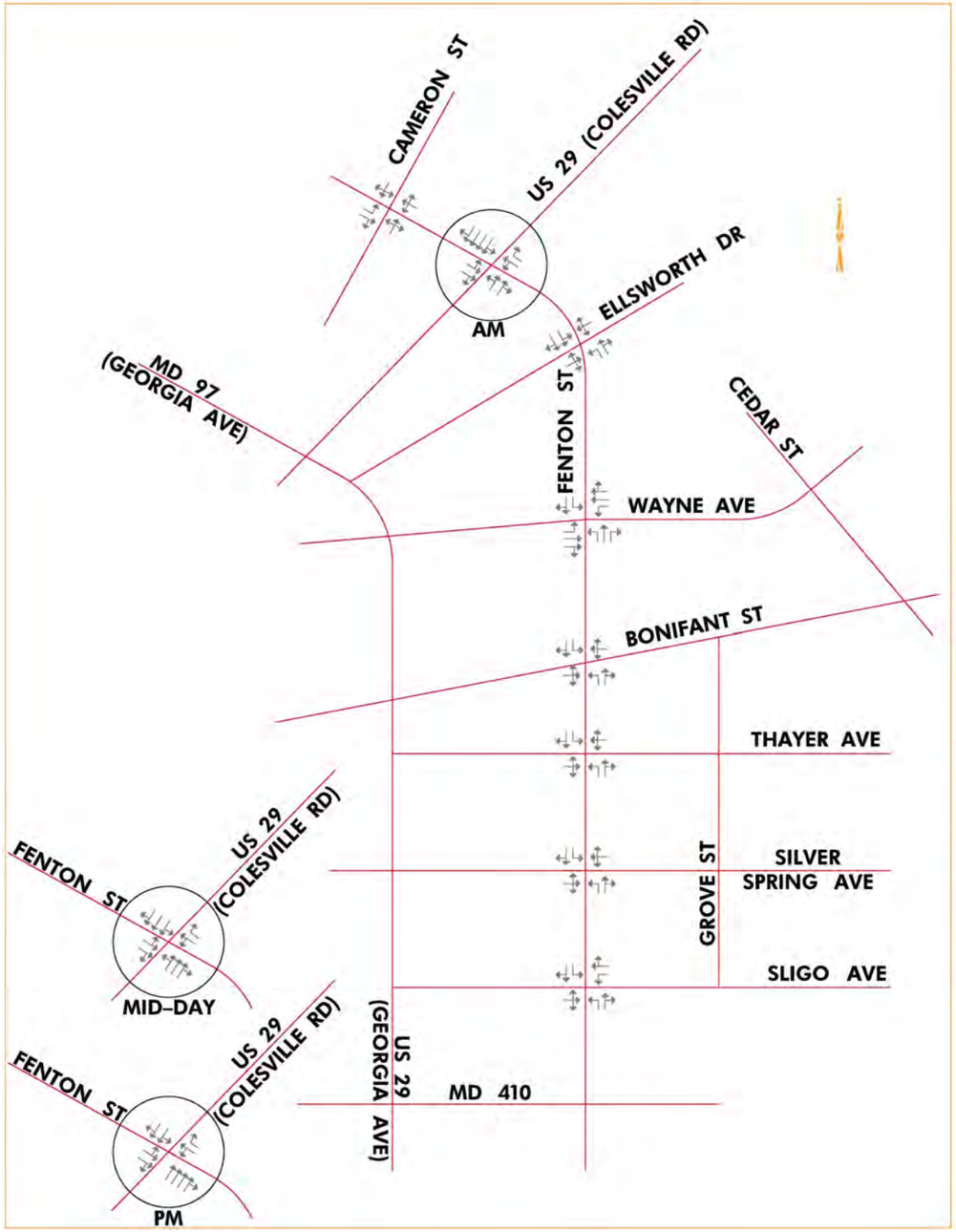


Figure 82 - Existing Lane Configurations

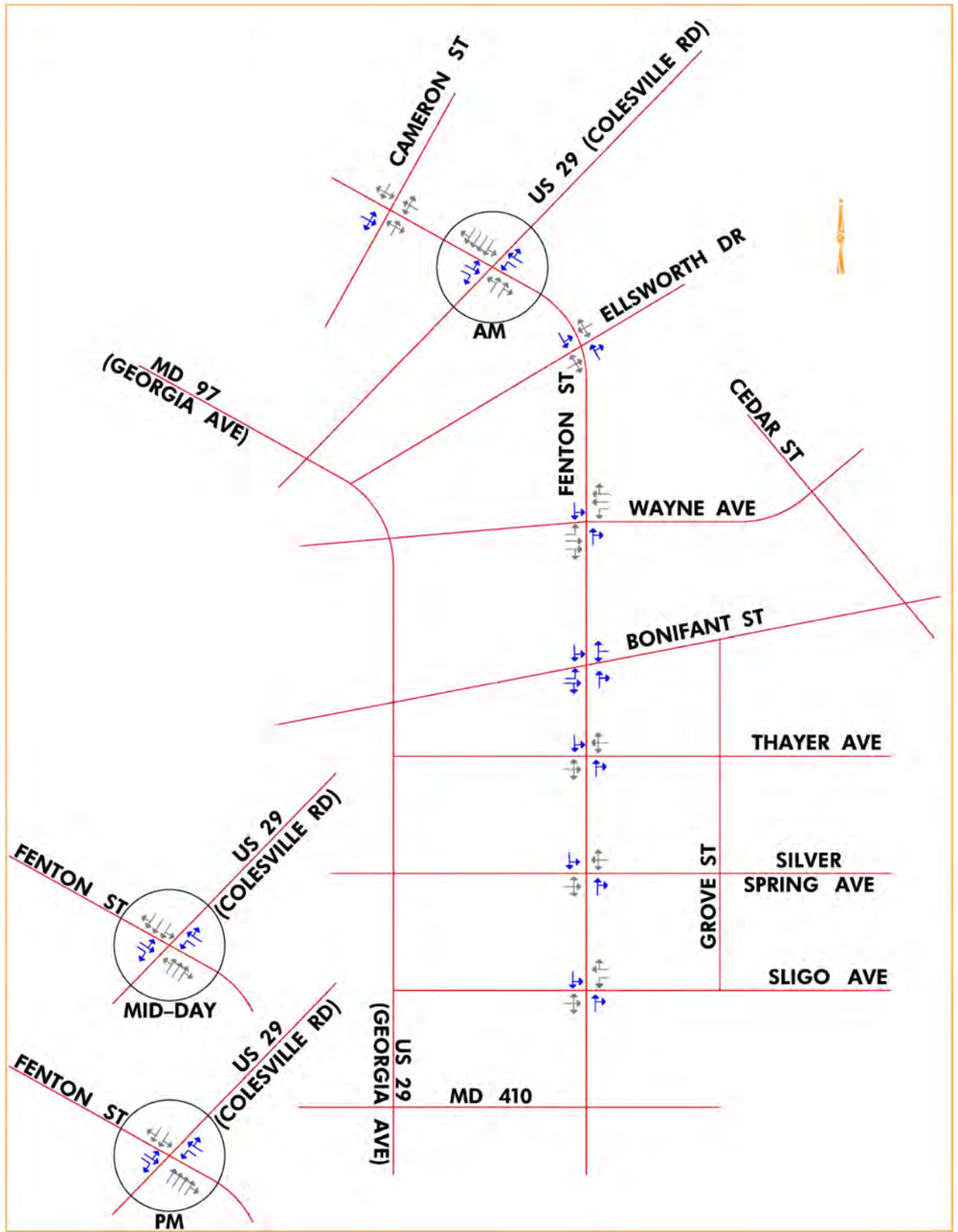


Figure 83 - Scenario 1 (Favors Bikes/Peds) Lane Configuration

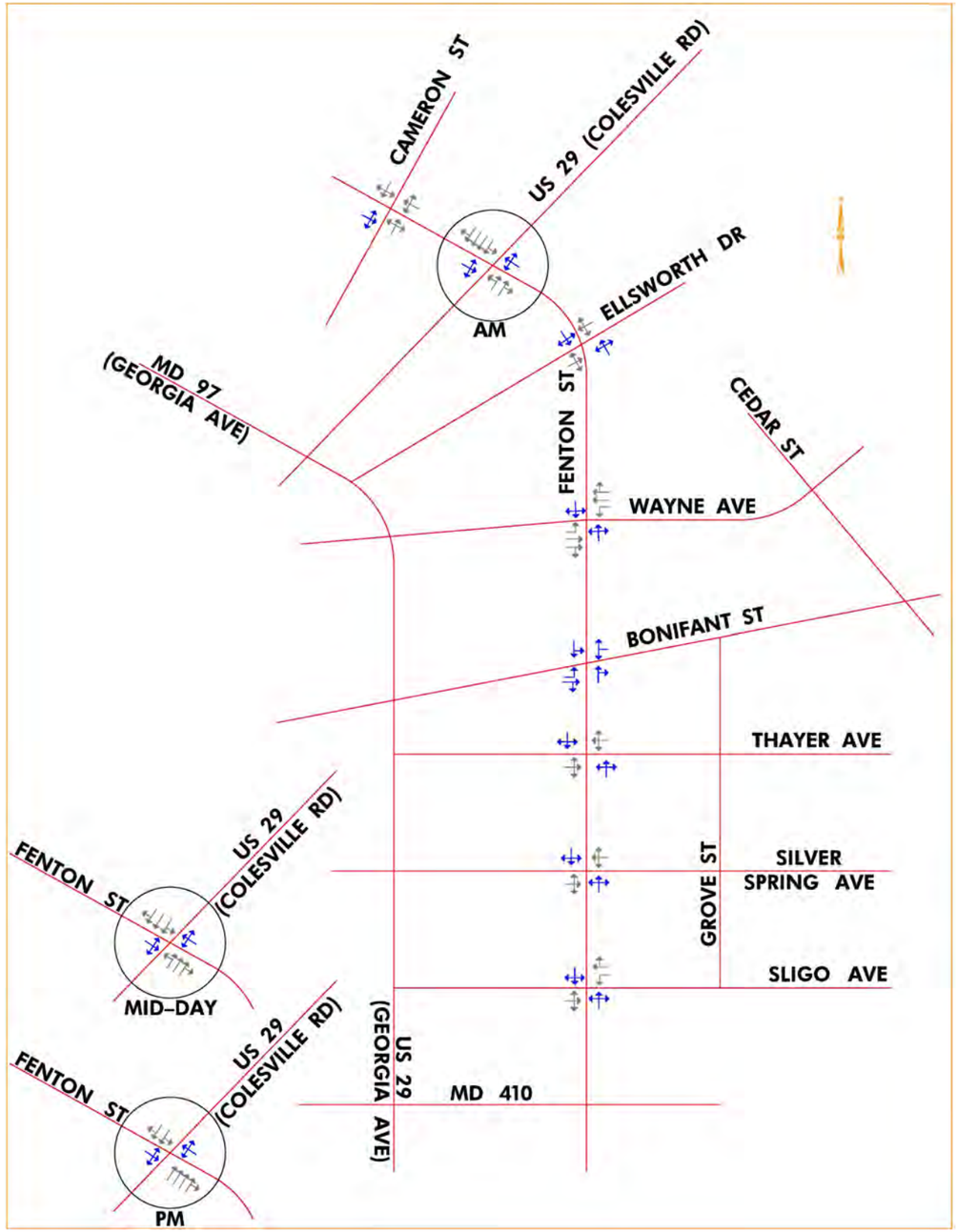


Figure 84 - Scenario 2 (Maximize Parking/Loading) Lane Configuration

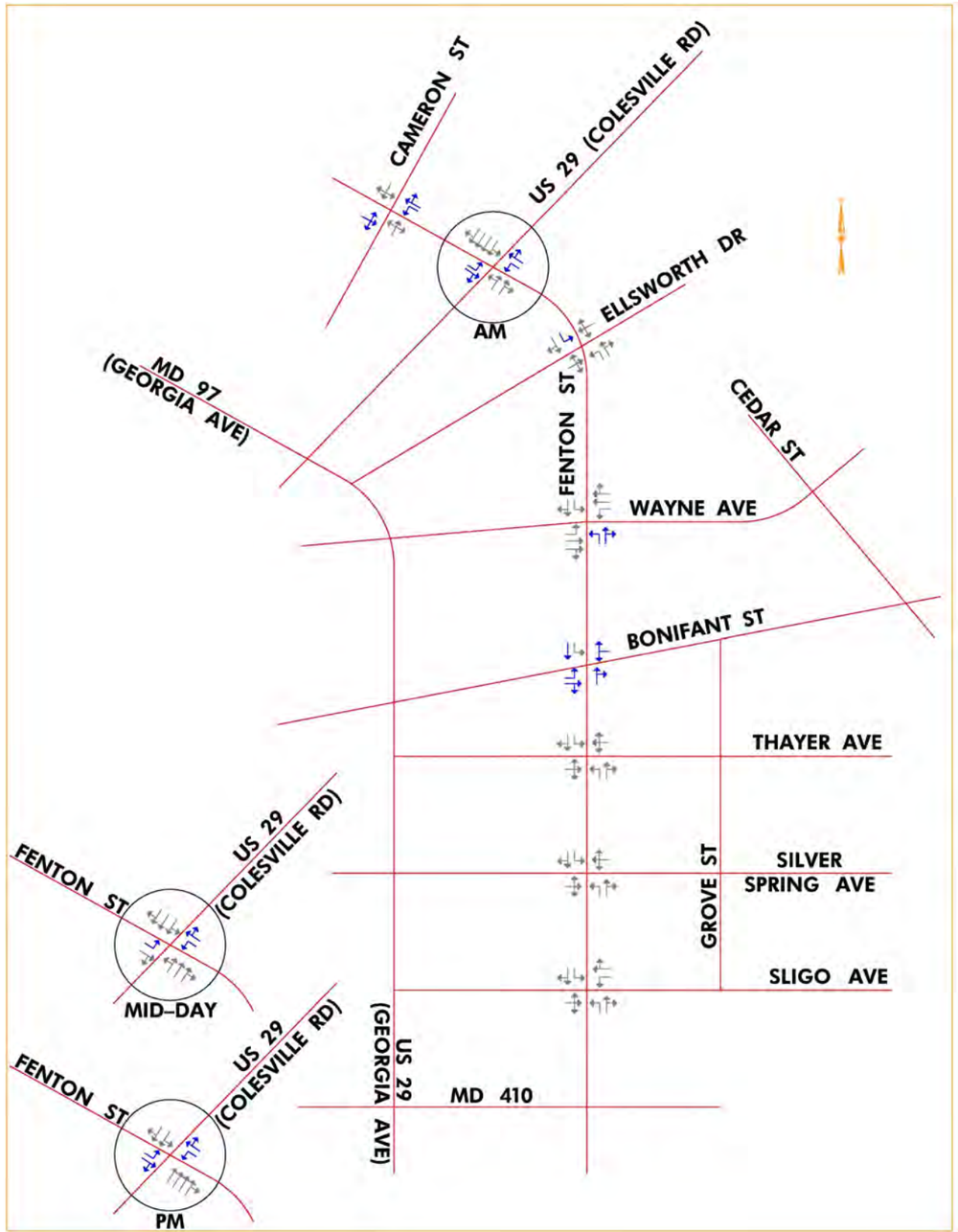


Figure 85 - Scenario 3 (Favors Vehicular Traffic) Lane Configuration

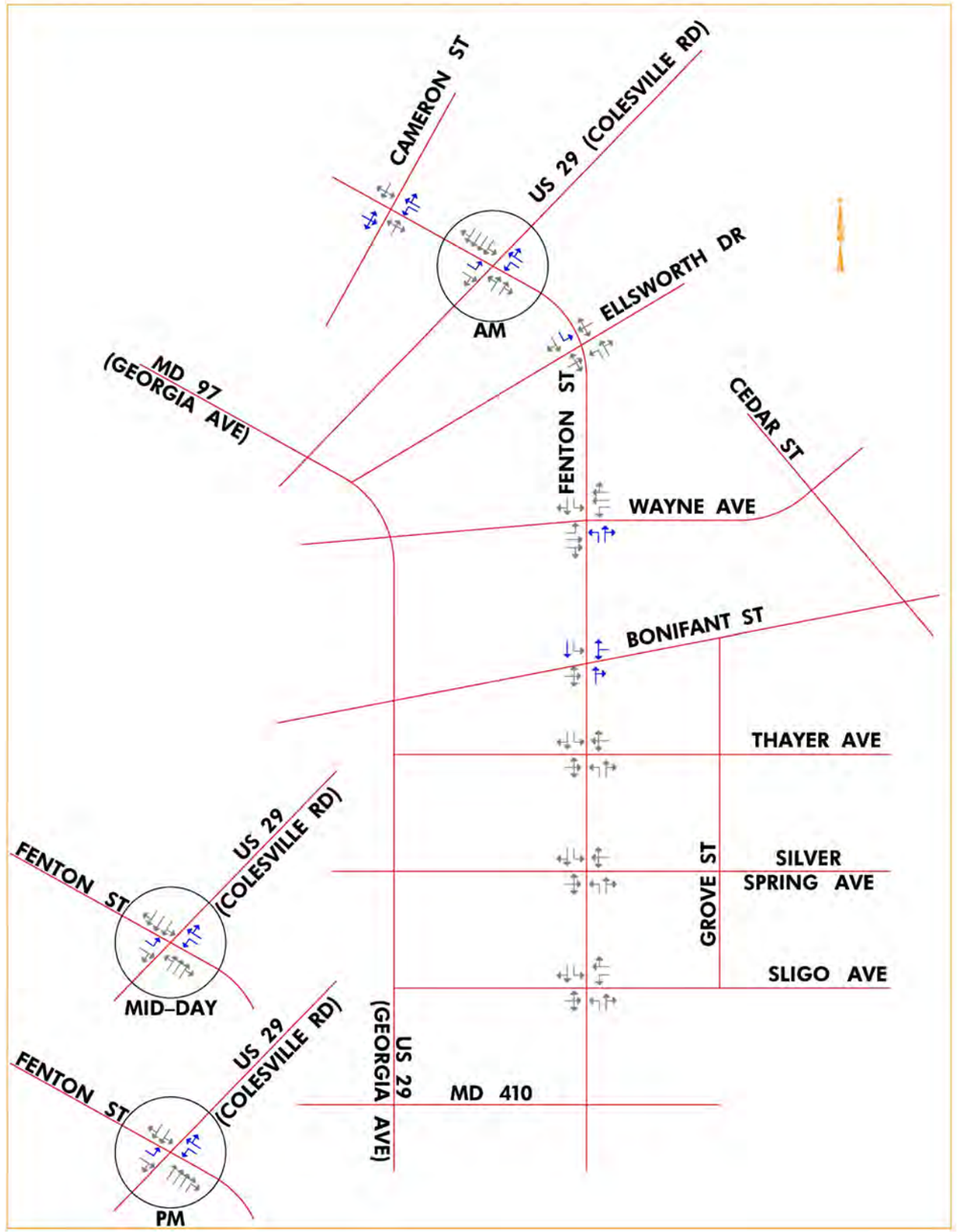


Figure 86 - Scenario 4 (NB/SB Exclusive Left-turns) Lane Configuration

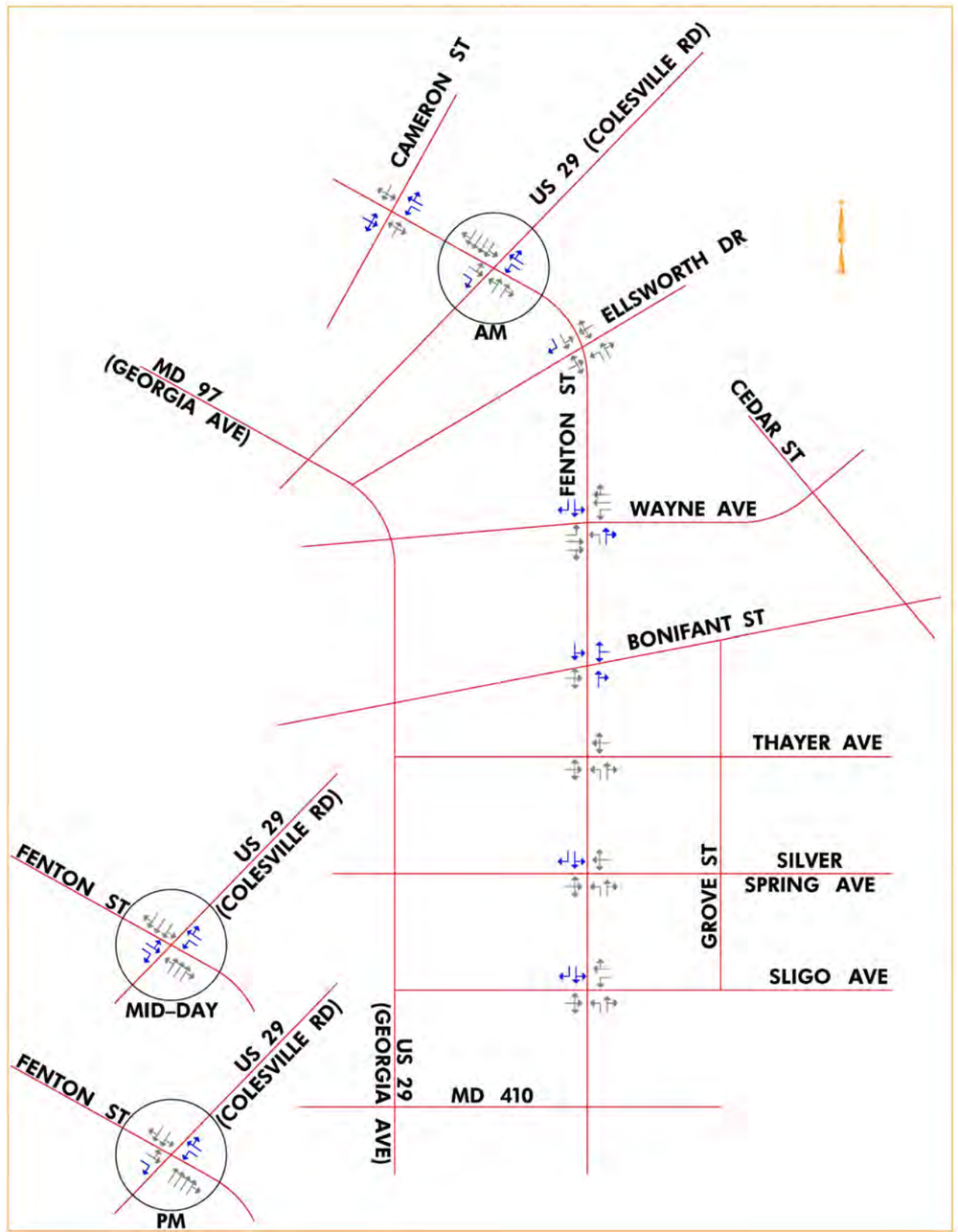


Figure 87 - Scenario 5 (SB Exclusive Right-turns; NB Exclusive Left-turns) Lane Configurations

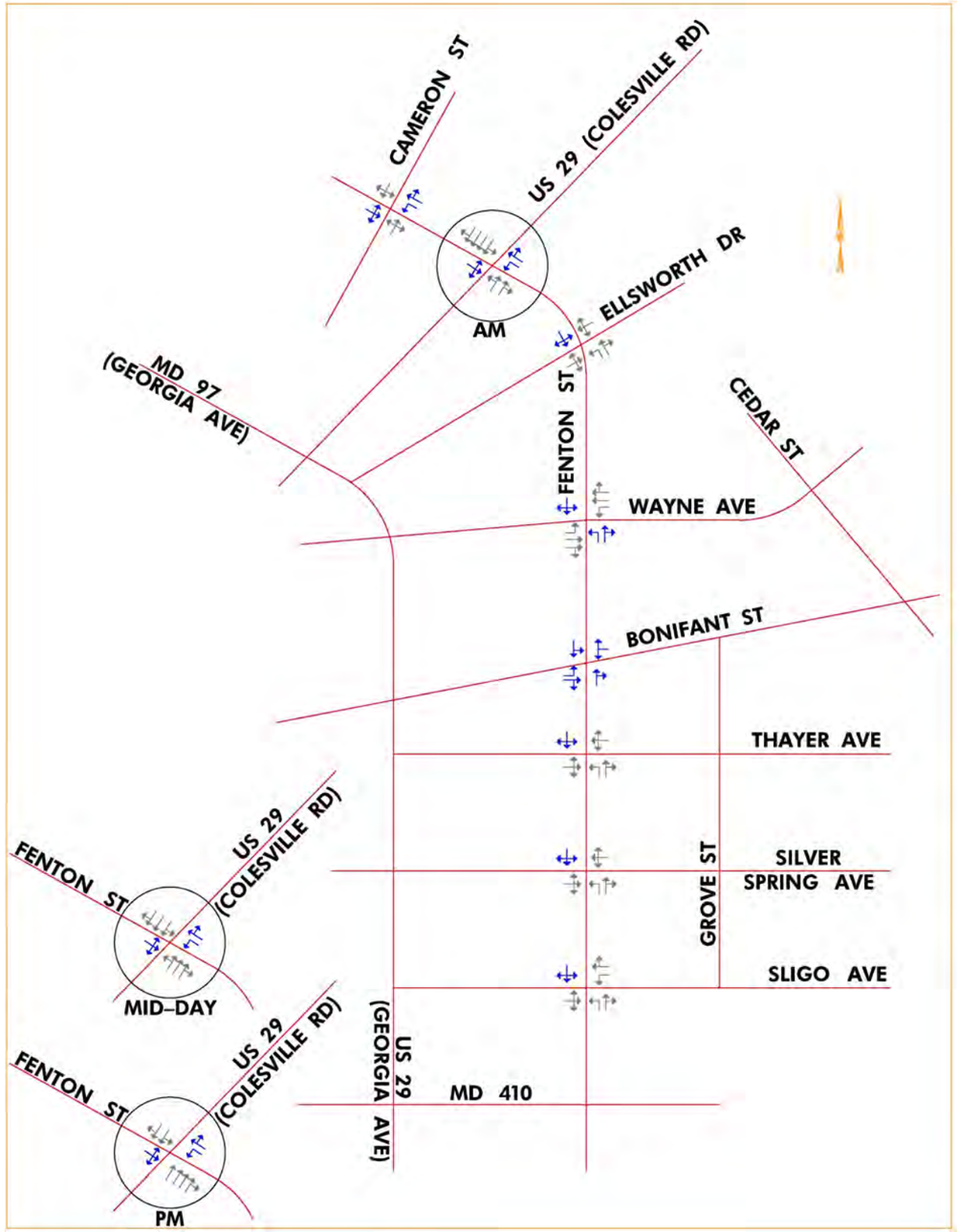


Figure 88 - Scenario 6 (NB Exclusive Left-turns) Lane Configurations

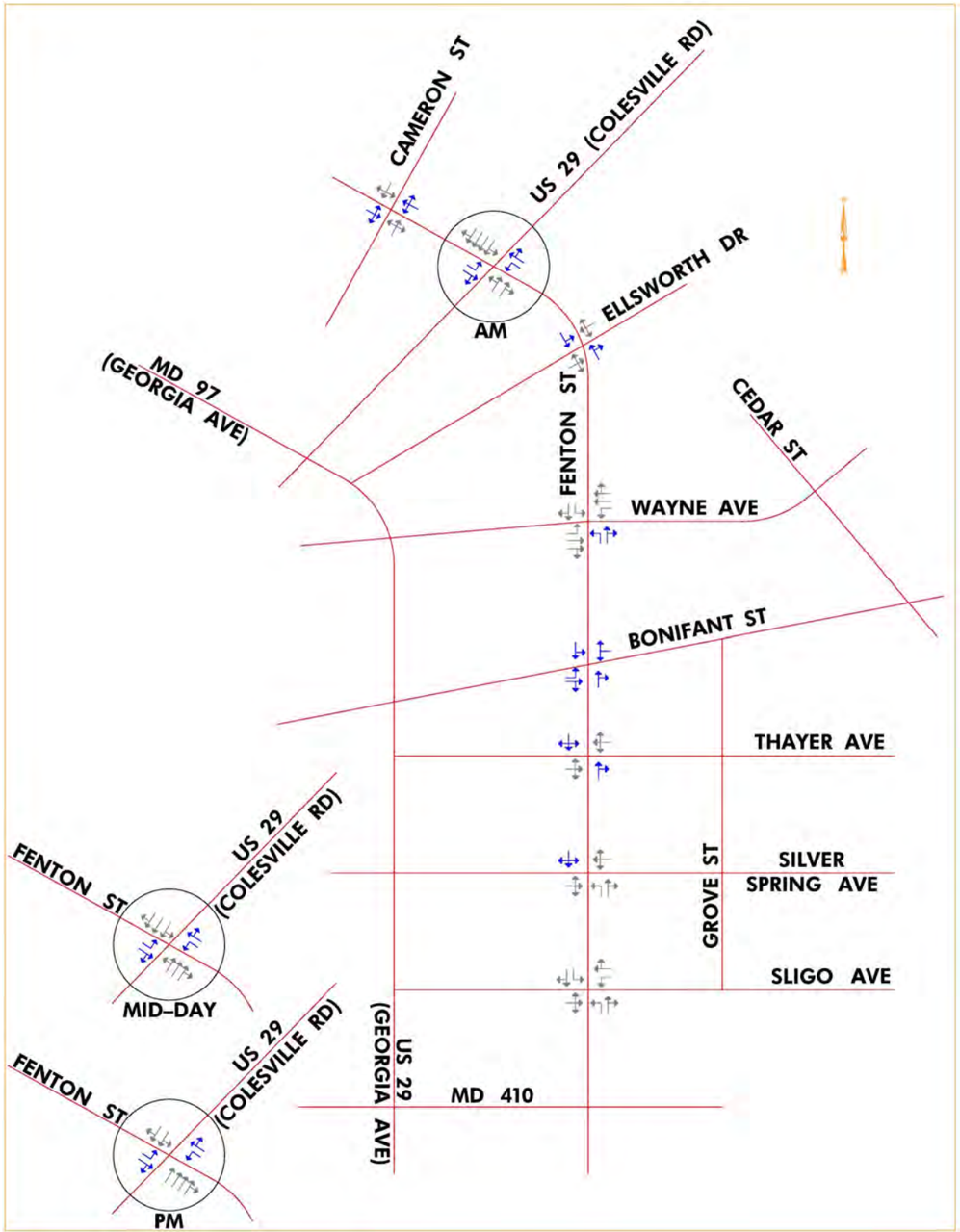


Figure 89 – Scenario 7 (NB Exclusive Lefts, No NB Left-turn at Thayer Avenue) Lane Configurations

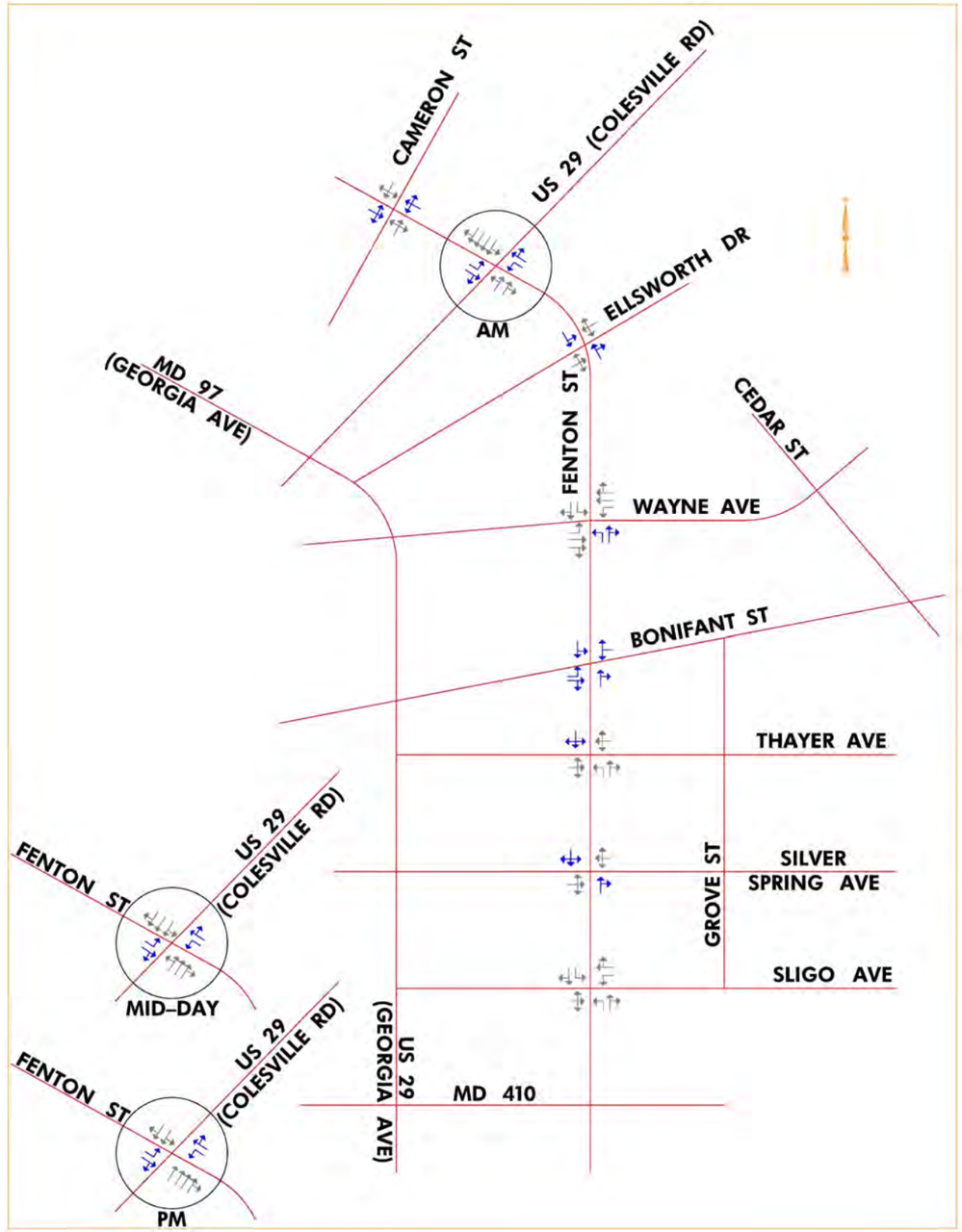


Figure 90 - Scenario 8 (NB Exclusive Left-turns, No NB Left-turn at Silver Spring Avenue) Lane Configurations

12 Impacts Analysis and Summary

12.1 Parking

On-street parking in the corridor is highly utilized, especially along Fenton Street between Sligo Avenue and Ellsworth Drive, and from Colesville Road (US 29) to Cameron Street. Refer to the appendix for parking utilization.

Alternative A, which was specifically developed to maximize on-street parking and loading along Fenton Street, would have the least impact with a net gain of 3 spaces in the Ellsworth District.

Alternative B and E, which were developed to favor motorists and bicyclists, but impact parking, would have the highest impact to on-street parking along Fenton Street with a net loss of 48 parking spaces.

Table 18 - Net Change in On-Street Parking Spaces along Fenton Street

	Fenton Village District	Ellsworth District	North Silver Spring District	Net change
Fenton Street Existing On-Street Parking Spaces	57	12	22	-
Alternative A	0	+3	0	+3
Alternative B	-22	-5	-21	-48
Alternative C	-18	+2	-10	-26
Alternative D	-33	+3	0	-30
Alternative E	-40	+2	-10	-48
Alternative F	-21	-5	-11	-37
Alternative G	-19	-5	-11	-35

12.2 Truck Loading

Based on interviews with property owners, tenants, and employees, loading needs vary widely from block to block and from business to business. Generally, all the alternatives will have some level of impact on existing loading activities that occur in Fenton Street. It is not possible to quantify those impacts, but based on field observations, delivery vehicles utilize existing parking when it is available. Loading activities that occur early in the day will likely continue unaffected, as parking utilization is lighter in the AM. However, as the day goes on, parking utilization increases, and delivery vehicles will need to choose whether to temporarily stop in the travel lane or on side streets. If vehicles decide to stop in the travel lane, the existing two-way left-turn lane, which motorists can currently use to pass stopped vehicles, will no longer be available with any of the proposed alternatives, which will compound congestion and create an inherent safety hazard as motorists will likely use the opposing travel lane to pass the stopped delivery vehicle.

12.3 Transit

The table below is a summary of proposed modifications to bus stops in the corridor. MCDOT is currently coordinating with RideOn and WMATA regarding these potential changes, therefore, the proposed changes should not be considered final. Work on these changes will continue during the design phase.

Table 19 - Bus Stop Impacts

Bus Stop ID	Direction and Location within Fenton Street corridor	Proposed Changes
28526	SB, south of Cameron Street	Convert to floating bus stop or relocate to Cameron Street
17159	SB, north of Colesville Road	Eliminate or convert to floating bus stop
16038	SB, south of Colesville Road	Relocate to Colesville Road (US 29)
14874	NB, north of Ellsworth Drive	None
16011	SB, south of Ellsworth Drive	Convert to floating bus stop
22170	NB, south of Wayne Ave (Silver Spring Library, Purple Line transfer)	None
22178	SB, north of Bonifant Ave (Silver Spring Library, Purple Line transfer)	Convert to floating bus stop
22168	NB, south of Bonifant Ave	Eliminate, redirect riders to use bus stop ID 22170, which is one block north
17552	SB, north of Thayer Ave (Safeway)	Convert to floating bus stop and relocate to south side of intersection
22166	NB, south of Thayer Ave (Safeway)	None
22182	SB, south of Silver Spring Ave	Convert to floating bus stop
22164	NB, south of Silver Spring Ave	None
22184	SB, south of Sligo Ave	Convert to floating bus stop
22162	NB, south of Sligo Ave	None

12.4 Traffic Analysis

Level of service (LOS) and delay for existing and proposed conditions for each traffic scenario were calculated based on AM, PM, and Saturday peak hour traffic volume counts. Generally, all intersections within the project limits operate within acceptable levels of service in the existing condition. Proposed conditions add delays in all of the alternatives; however, alternatives B, C, E, F, and G maintain acceptable LOS at all intersections in the corridor.

Based on the results of the traffic analysis alternative A would have the least impact to travel time in the Fenton Street corridor, however, it would not be practical to eliminate all NB left turns. Therefore, alternative G would be the second least impactful and likely the desirable alternative from a traffic impact standpoint. The following table is a summary of total travel time in Fenton Street corridor for existing conditions and each alternative:

Table 20 - Fenton Street Travel Time (Minutes)

	Travel Time (Minutes)							
Alternative	NB AM	SB AM	NB PM	SB PM	NB Sat	SB Sat	Average	Cumulative
Existing	3.6	3.6	4.8	4.8	4.0	3.9	4.1	24.7
Alternative A	5.0	3.9	21.2	5.1	5.5	4.2	7.5	44.9
Alternative B	3.8	4.2	4.7	4.4	8.2	4.5	5.0	29.8
Alternative C	3.8	4.4	4.3	6.6	4.5	4.9	4.8	28.5
Alternative D	5.0	3.9	21.2	5.1	5.5	4.2	7.5	44.9
Alternative E	3.8	4.4	4.3	6.6	4.5	4.9	4.8	28.5
Alternative F	4.2	4.3	4.8	4.5	6.3	4.5	4.8	28.6
Alternative G	4.1	2.3	4.9	4.5	7.7	4.5	4.7	28.0

Refer to the LOS summary maps below. A detailed traffic analysis can be found in the appendix.

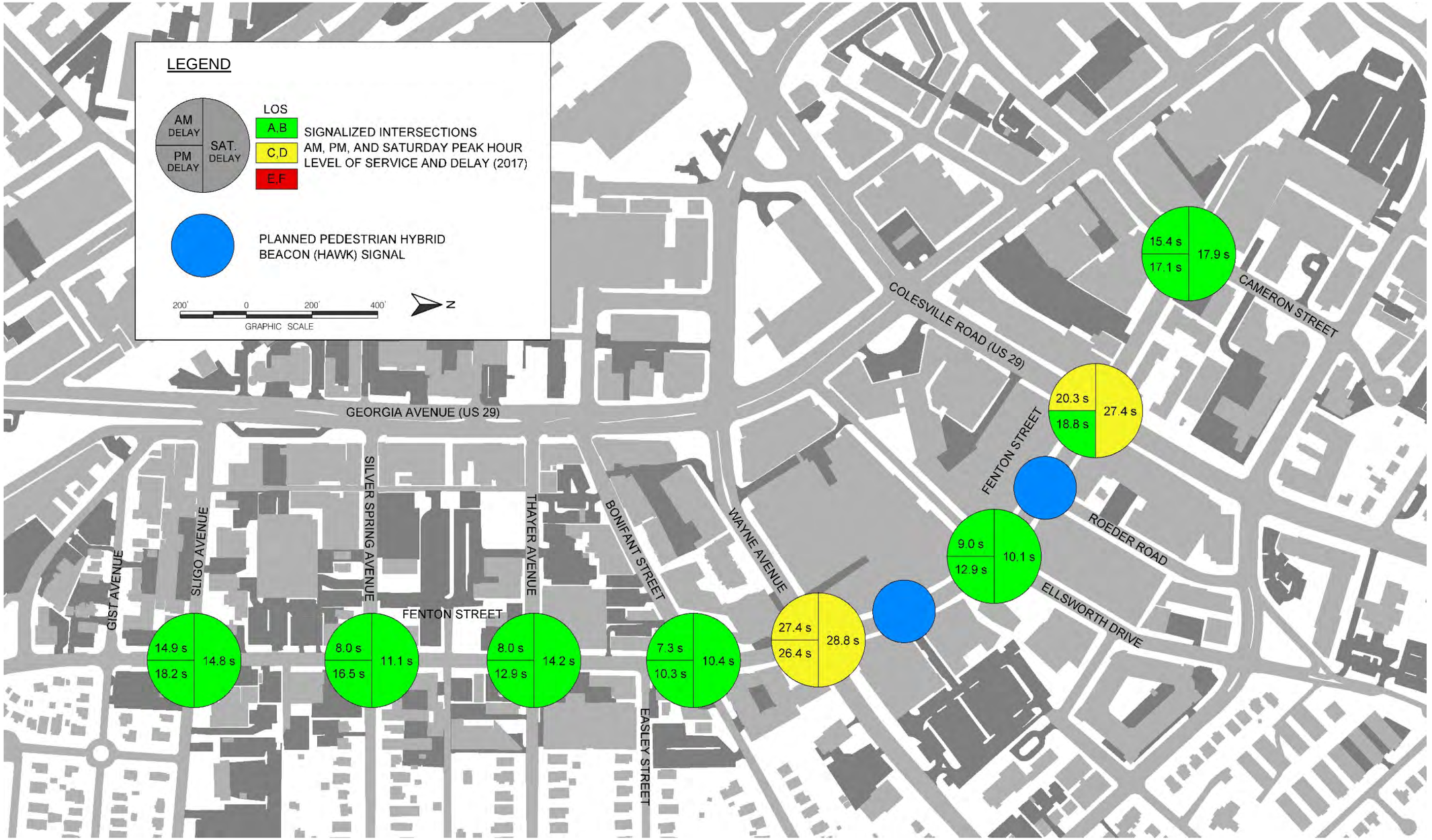


Figure 91 - Existing Traffic Conditions (2017) AM, PM, and Saturday Level of Service and Delay

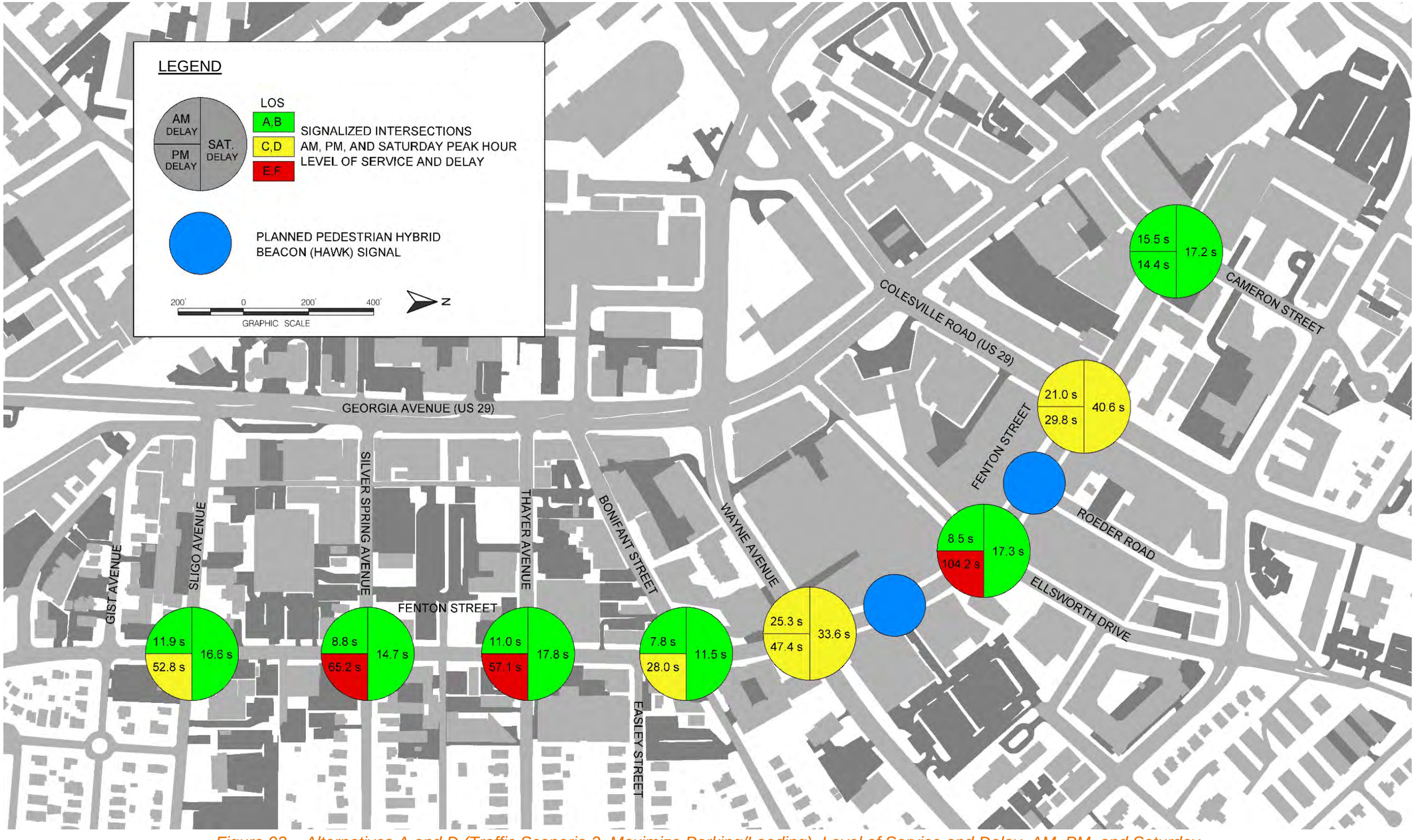


Figure 92 – Alternatives A and D (Traffic Scenario 2, Maximize Parking/Loading), Level of Service and Delay, AM, PM, and Saturday

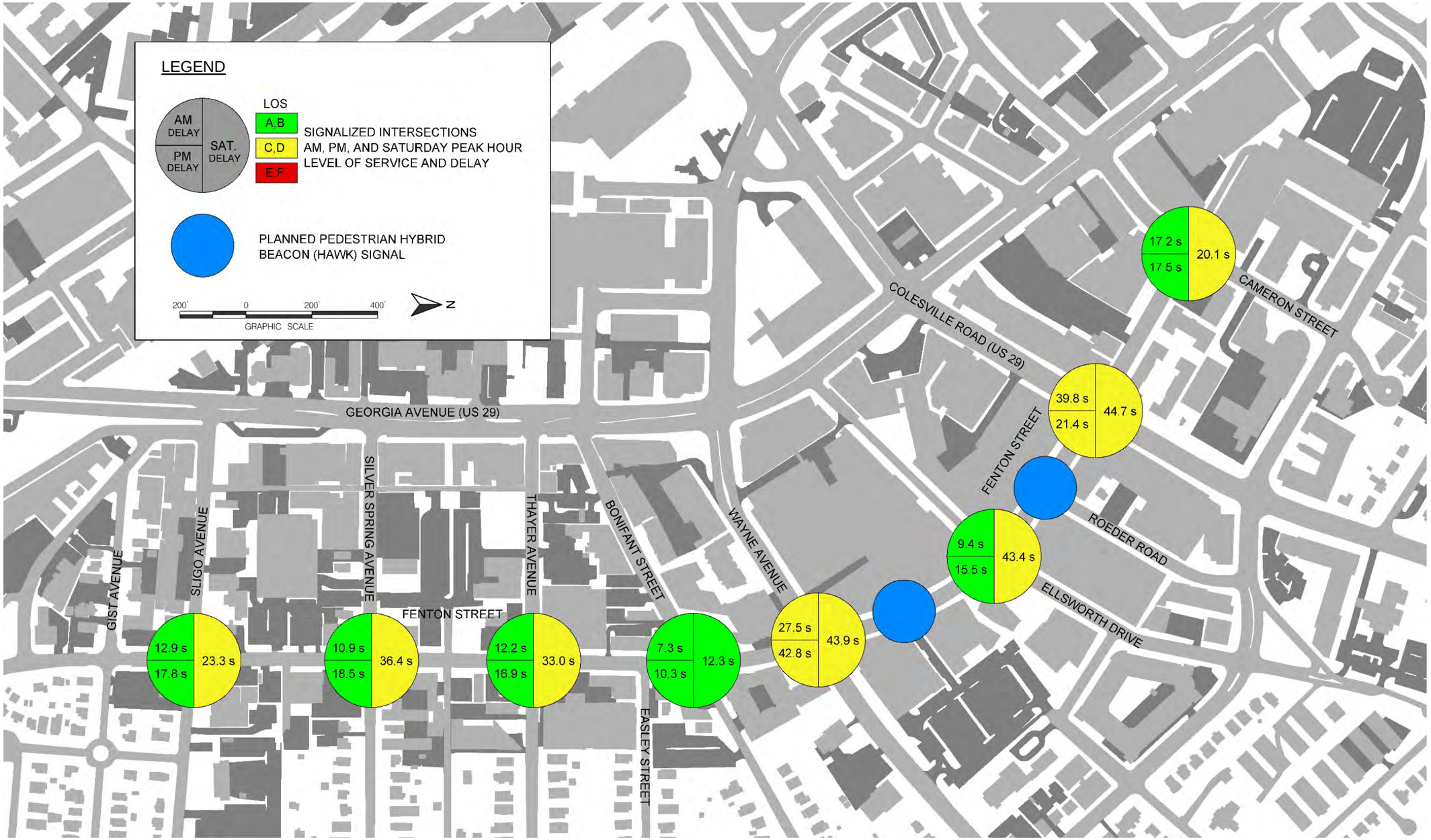


Figure 93 – Alternative B (Traffic Scenario 4, NB/SB Exclusive Left-turns), Level of Service and Delay, AM, PM, and Saturday

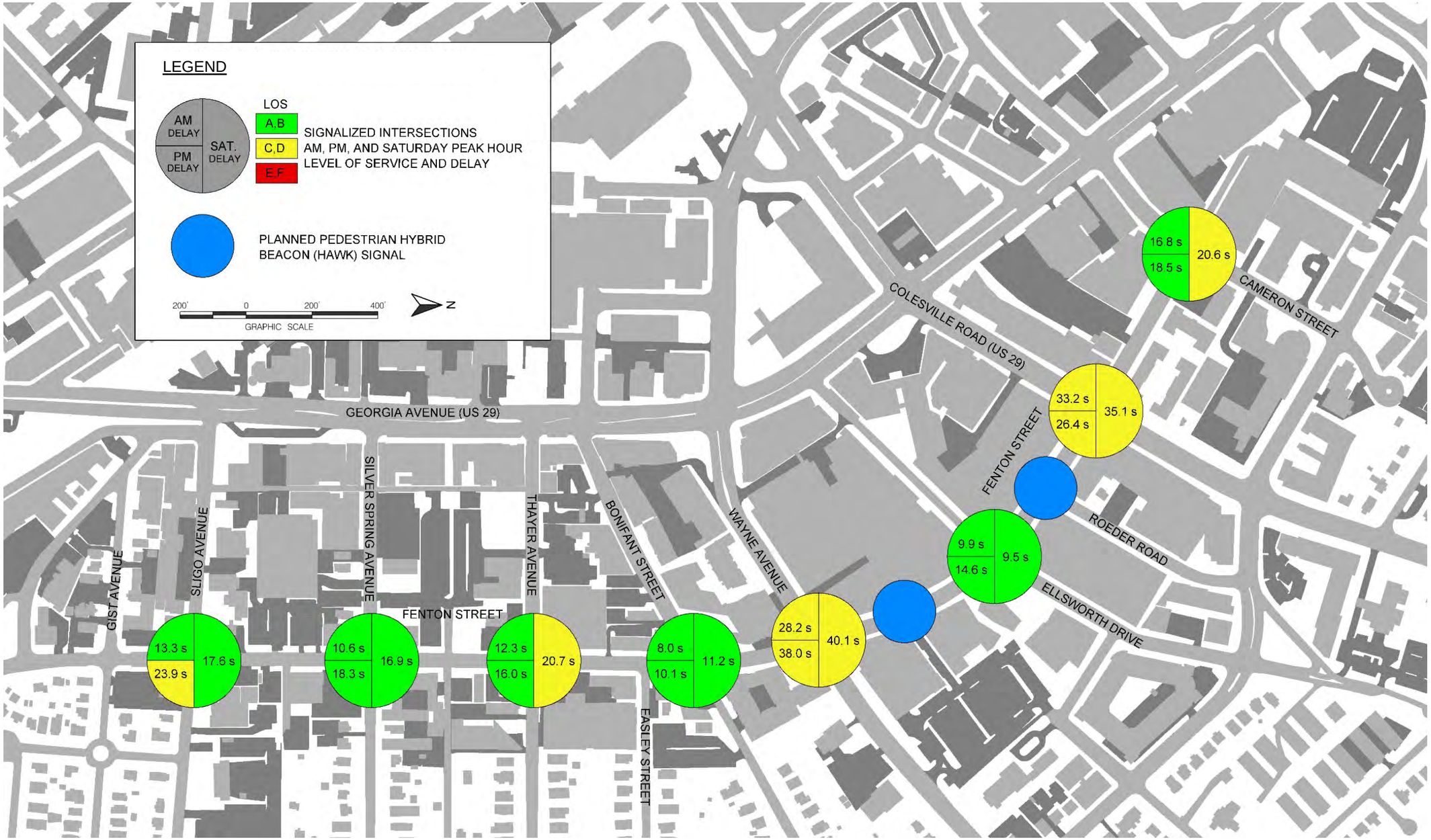


Figure 94 – Alternative C and E (Traffic Scenario 6, NB Exclusive Left-turns), Level of Service and Delay, AM, PM, and Saturday

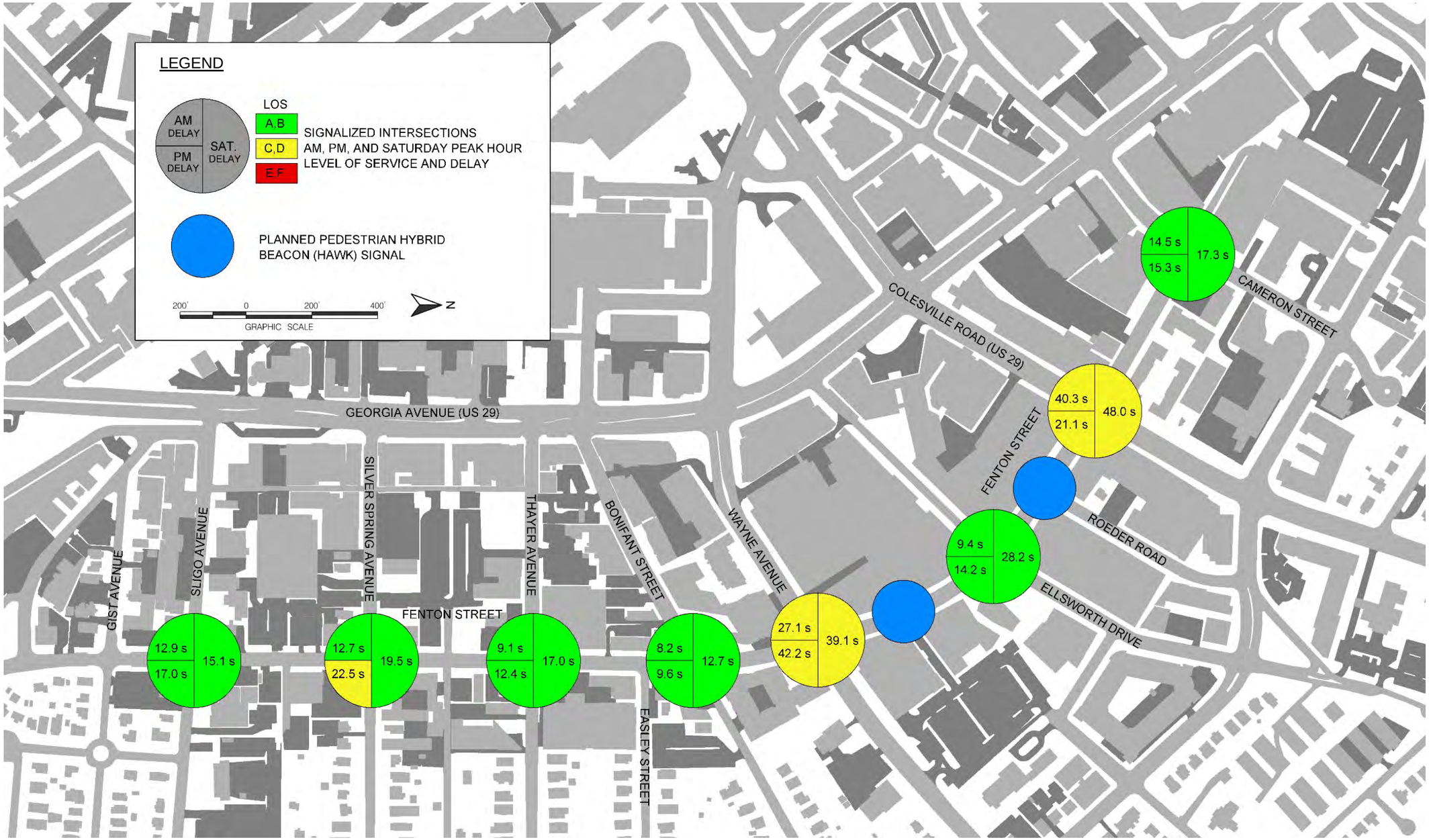


Figure 95 – Alternative F, (Traffic Scenario 7, NB Exclusive Left-turns, No NB Left-turn at Thayer Ave), Level of Service and Delay, AM, PM, and Saturday

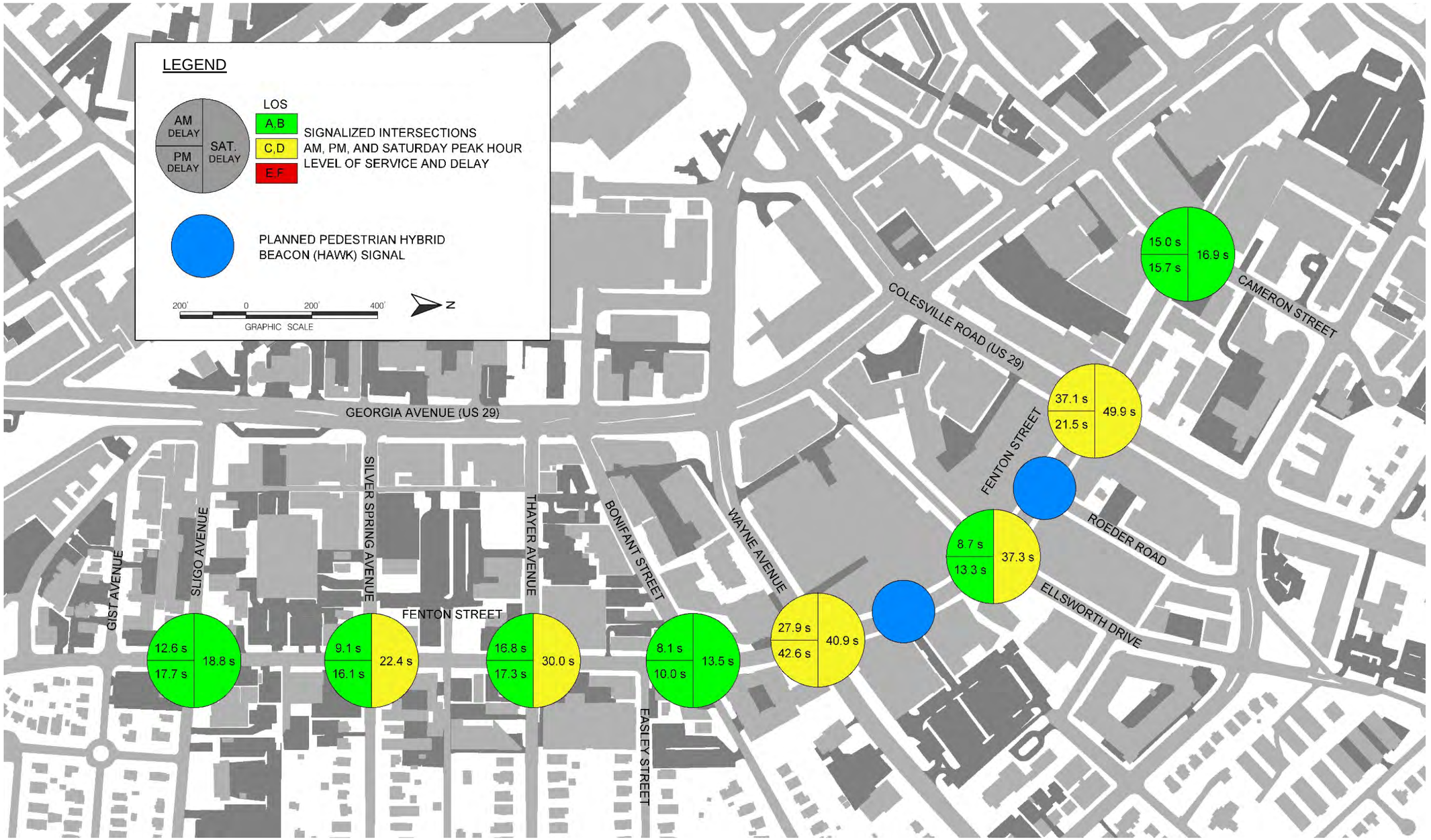


Figure 96 – Alternative G, (Traffic Scenario 8, NB Exclusive Left-turns, No NB Left-turn at Silver Spring Ave), Level of Service and Delay, AM, PM, and Saturday

12.5 Street Trees

Alternatives with widening are anticipated to have great street tree impacts. Street trees would be replaced where possible. The following table summarizes impacts to street trees:

Table 21 - Street Tree Impacts

	Fenton Village District	Ellsworth District	North Silver Spring District	Total
Alternative A	33	4	3	40
Alternative B	33	4	3	40
Alternative C	33	4	3	40
Alternative D	9	4	3	16
Alternative E	9	4	3	16
Alternative F	20	4	3	27
Alternative G	20	4	3	27

12.6 Utilities

Utility impacts will be an inevitable component of the project as well. Early coordination with utilities will be essential to successful design development and construction.

There are several utility poles that will conflict with the proposed design, regardless of which typical section or intersection option is selected. It is assumed that these utility poles will be relocated. For locations, where relocation of a utility pole is not possible due to constraints, MCDOT should seek to “underground” the electric and telecom utilities located on these poles, specifically at the NW corner of Fenton/Silver Spring.

Roadway widening has greater impacts to fire hydrants, utility poles, and light poles. Manhole and valve adjustments will be necessary where there are grade changes. Underground utility conflicts and impacts will be determined during the design phase.

It is assumed that the same number of traffic signals will be reconstructed and/or modified regardless of the typical section or intersection option.

12.7 Right-of-way and Property Access

Right-of-way widths are sufficient throughout most of the corridor to accommodate the proposed improvements. However, in the Fenton Village District, frontage zones, sidewalk café seating, and elevation differences between the sidewalk and building doorway entrances may complicate access to businesses for typical sections and intersection options that include widening. Acquisition of right-of-way to the ultimate planned 80-ft width will allow for ped ramp, stair, and sidewalk reconstruction in front of these buildings that meets or exceeds existing conditions with respect to ADA compliance. Sidewalk café seating should be rearranged and may require reductions in some areas based on the redistribution of the typical section. Providing a continuous, clear width sidewalk should be the highest priority.

For widening typical sections and/or intersection options, the following is a list of properties where MCDOT should consider ROW acquisitions. There are no displacements proposed with this project.

Table 22 - Summary of Potential Right-of-Way Impacts, Widening Typical Sections/Options

Address	Acquisition Type	Area	Comments
8120 Fenton Street	Fee simple or easement	1708 SF	Reconstruct and maintain ped ramp and stair access. Expands ROW to ultimate planned 80-ft width.
8200 Fenton Street	Fee simple or easement	917 SF	Reconstruct and maintain ped ramp and stair access. Expands ROW to ultimate planned 80-ft width.
8201 Fenton Street	Fee simple or easement	794 SF	Reconstruct sidewalk to building face. Expands ROW to ultimate planned 80-ft width.
8213 Fenton Street	Fee simple or easement	160 SF	Reconstruct sidewalk to building face. Expands ROW to ultimate planned 80-ft width.
8215 Fenton Street	Fee simple or easement	200 SF	Reconstruct sidewalk to building face. Expands ROW to ultimate planned 80-ft width.
8305 - 8317 Fenton Street	Fee simple or easement	1139 SF	Reconstruct sidewalk to building face. Expands ROW to ultimate planned width on east side of street.

Additionally, driveway entrance modifications will need to be evaluated during the design phase, especially for typical section that widen the road. Temporary construction easements may be needed to tie-in driveways. Grade-breaks at the back of the driveway apron should be limited to 6% and crest vertical curve min K-values should not be less than 4. Existing driveway aprons are generally not ADA compliant, and if replaced, should include a 2% max cross slope for a minimum 4-ft width that aligns with the adjacent sidewalks. There are no driveway closures or relocations proposed with this study.

Also, an ADA-accessible and paratransit loading zone will be needed in front of the Montgomery Center, on the west side of Fenton Street, south of Cameron Street.

The hotel drop-off area at the northwest corner of Fenton Street and Wayne Avenue should also be maintained. Special treatments including green markings, yield markings in the bikeway, and/or bollards should be used to clearly demarcate the conflict zone. A buffer between the drop-off area and cycle track should be used to prevent doors from opening into the cycle track.

During the study, plats and field evidence were used to establish the location of the existing right-of-way. However, a boundary survey should be performed by a licensed survey during the design phase to establish the exact location of the right-of-way line at locations where the proposed improvements will need to interface with building entrances.

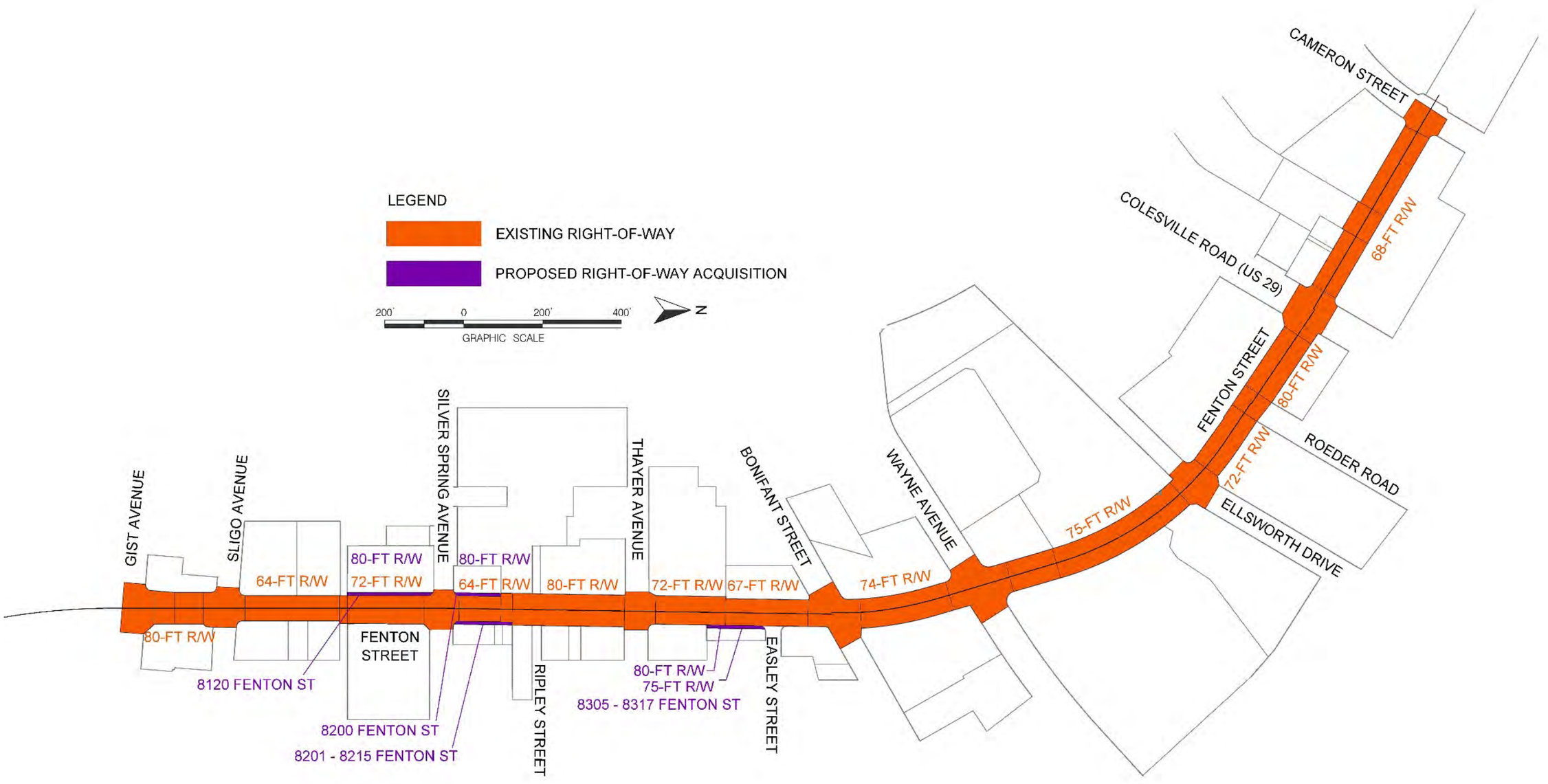


Figure 97 - Proposed Right-of-Way Impacts (Ultimate 80-ft width) for Widening Alternatives

12.8 Preliminary Costs

Preliminary costs were developed based on Alternatives A thru G. The order of magnitude ranges from roughly $10.9 million to $13.7 million depending on the scope of improvements. Alternatives with roadway widening improvements are in the upper range. Escalation of 3% was assumed for three years until the anticipated construction start in 2023. Costs were developed based guidance and methodology from the MDOT SHA Cost Estimating Manual (2015) and the most current MDOT SHA Price Index, which includes unit pricing for common pay items. A 40% contingency is included to account for unknown costs. A conservative estimate of right-of-way costs was also included. Refer to the appendix for detailed cost estimates.

Fenton Street Bikeway - Preliminary Cost Estimate Summary					
Alternative	**A**	**B and C**	**D and E**	**F**	**G**
Category 1 - Mobilization, MOT	$1,162,000	$1,170,000	$970,000	$1,095,000	$1,096,000
Category 2 - Excavation	$37,300	$40,200	$22,600	$31,600	$31,600
Category 3 - Drainage / SWM	$1,307,000	$1,316,000	$1,092,000	$1,232,000	$1,233,000
Category 5 - Paving	$747,148	$768,175	$647,473	$705,057	$706,667
Category 6 - Sidewalks, C&G	$2,119,712	$2,114,894	$1,754,901	$1,999,784	$1,999,784
Category 7 - Landscape/Amenities	$291,000	$293,000	$243,000	$274,000	$274,000
Category 8 - Traffic	$2,682,500	$2,682,500	$2,312,500	$2,412,500	$2,412,500
3% Escalation (2023)	$773,960	$777,494	$653,027	$718,628	718,963
40% Contingency	$3,339,000	$3,354,000	$2,817,000	$3,100,000	$3,102,000
ROW Costs	$1,172,770	$1,172,770	$344,885	$670,795	$670,795
Total	**$13.6 million**	**$13.7 million**	**$10.9 million**	**$12.2 million**	**$12.2 million**

Table 23 - Fenton Street Bikeway - Impacts Summary

Fenton Street Bikeway - Impact Summary

Alternative		A			B			C			D			E			F			G		
District		FV	E	NSS	FV	E	NSS	FV	E	NSS	FV	E	NSS	FV	E	NSS	FV	E	NSS	FV	E	NSS
	Roadway Length, mi	0.41	0.22	0.11	0.41	0.22	0.11	0.41	0.22	0.11	0.41	0.22	0.11	0.41	0.22	0.11	0.41	0.22	0.11	0.41	0.22	0.11
Right-of-Way Impacts	Number of Parcels Impacted	14	0	0	14	0	0	14	0	0	4	0	0	4	0	0	9	0	0	9	0	0
	Right-of-Way Acquired, SF	10198	0	0	10198	0	0	10198	0	0	2999	0	0	2999	0	0	5833	0	0	5833	0	0
	Displaced Properties	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Driveways Impacted (during construction)	18	1*	0	18	1*	0	18	1*	0	8	1*	0	8	1*	0	12	1*	0	12	1*	0
	Café Zone Impacted	3	0	0	3	0	0	3	0	0	1	0	0	1	0	0	2	0	0	2	0	0
Potential Relocations	Storm Drains	17	5	0	17	5	0	17	5	0	15	5	0	15	5	0	17	5	0	17	5	0
	Utility Poles	11	0	0	11	0	0	11	0	0	7	0	0	7	0	0	7	0	0	7	0	0
	Fire Hydrants	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1
	Street Lights	44	5	0	44	5	0	44	5	0	23	5	0	23	5	0	34	5	0	34	5	0
Potenial Enviornmental Impacts	Street Trees	33	4	3	33	4	3	33	4	3	9	4	3	9	4	3	20	4	3	20	4	3
	Rare, Threatened, or Endangered Species Impacts	Impacts not anticipated																				
	Historic and Cultural Impacts	Impacts not anticipated																				
	Wetlands/Waters of the US	N/A																				
	Soil Contamination Issues	Impacts not anticipated																				
	Floodplain Impacts	N/A																				
	Parkland Impacts	N/A																				
	Cultural Impacts	Impacts not anticipated																				
Traffic Impacts	Acceptable Level of Service (D or greater) at all intersections	No			Yes			Yes			No			Yes			Yes			Yes		
	Average Travel Time (Change from Existing), min	7.5 (+3.4)			5 (+0.9)			4.8 (+0.7)			7.5 (+3.4)			4.8 (+0.7)			4.8 (+0.7)			4.7 (+0.6)		
	Reconstruct Traffic Signal	4	0	1	4	0	1	4	0	1	4	0	1	4	0	0	4	0	1	4	0	1
	Modify Traffic Signal	0	3	0	0	3	0	0	3	0	0	3	0	0	3	1	0	3	0	0	3	0
Parking Impacts	Change In On-Street Parking Spots	0	+3	0	-22	-5	-21	-18	+2	-10	-33	+3	0	-40	+2	-10	-21	-5	-11	-19	-5	-11
	Cost	$13.6 million			$13.7 million			$13.7 million			$10.9 million			$10.9 million			$12.2 million			$12.2 million		

* - Hotel drop-off area

FV - Fenton Village, Fenton Street from Gist Avenue to Wayne Avenue

E - Ellsworth District, Fenton Street from Wayne Avenue to Colesville Road

NSS - North Silver Spring District, Fenton Street from Colesville Road to Cameron Street

13 Permits and Approvals

A natural resource inventory (NRI), which will mostly consist of street trees, should be prepared for M-NCPPC review and approval. Once the NRI is approved, DPS will review the storm water management concept. Once the SWM concept is approved, detailed storm water management design can begin as well as, erosion and sediment control design.

At 30%, the project will be required to submit to M-NCPPC for mandatory referral.

The project will require an access permit from MDOT SHA for improvements at the intersections of Fenton Street and Bonifant Street, Fenton Street and Wayne Avenue, and Fenton Street and Colesville Road. The first step will be obtaining approval of the traffic impact study (TIS). Following TIS approval, a design request should be submitted to MDOT SHA Office of Traffic Safety through the District 3 office for traffic signal plan development. MDOT SHA will also review 30%, 65%, and 90% submittals. Once the plans have been reviewed and approved, MCDOT can apply for the access permit.

Utility clearances should also be obtained from all utility owners with facilities in the project area.

Coordination should also occur with the Maryland Historic Trust regarding any potential impacts to cultural and historic resources identified herein.

Although the project is in an urban area, the Maryland Department of Natural Resources should be contacted to rule out environmental impacts.

14 Construction Phasing and Considerations

Construction phasing is subject to change, but is currently planned to occur as follows:

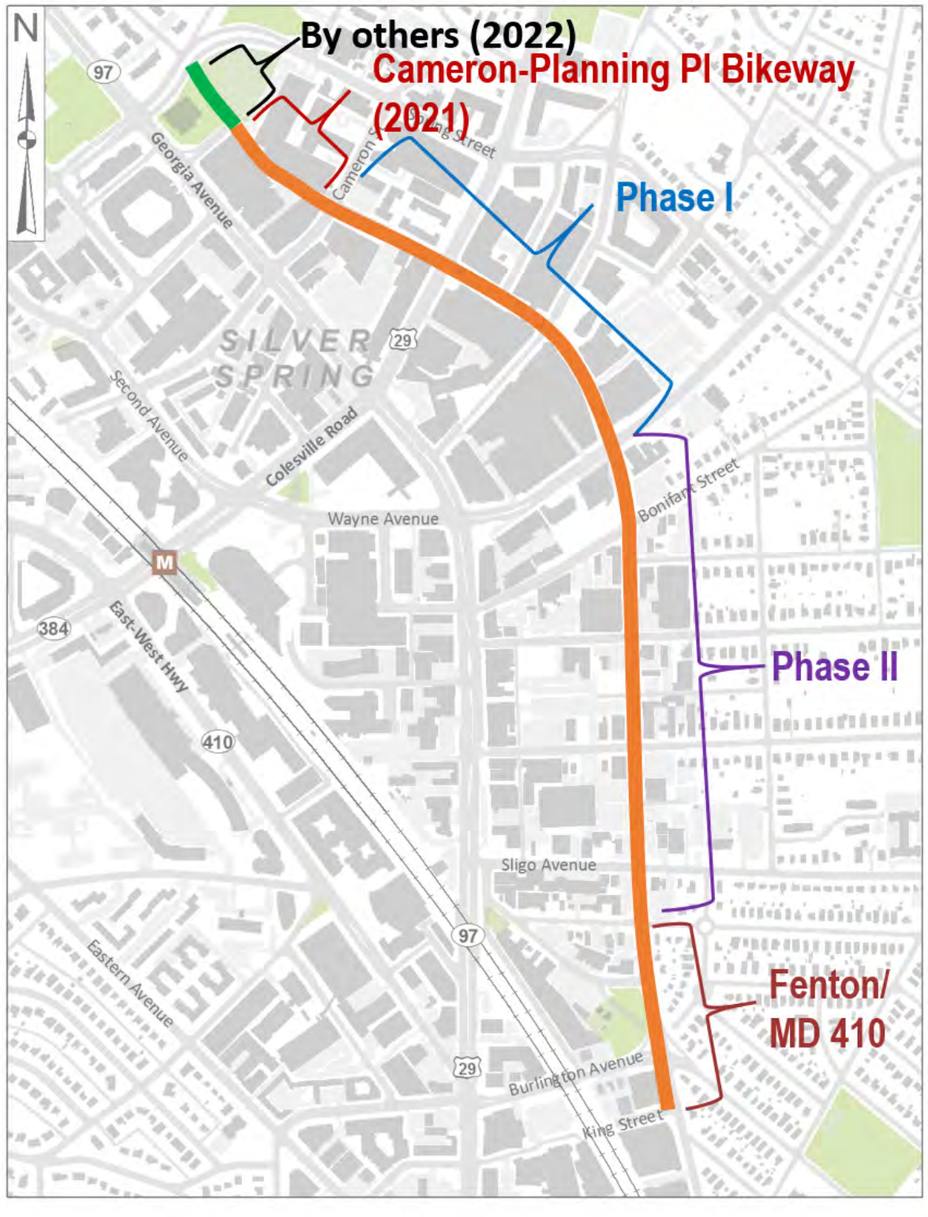


Figure 98 - Construction Phasing

15 Recommendations

Based on review and analysis of the purpose and need, existing conditions, master plans, public and stakeholder input, design guidance and best practices, MCDOT has developed proposed improvements (including alternatives A thru G) and quantified the associated impacts. The alternatives developed herein should not be considered exhaustive or definitive, rather, these alternatives are a work in progress.

With those points considered, **it is recommended at this time that the following alternative be progressed to the design phase:**

- **Alternative G – Combination of widening and no widening in Fenton Village, impacts to motorists in favor of parking and bicyclists, No NB Left-turns at Silver Spring Avenue**

This alternative meets the objectives stated in the purpose and need, while providing the most equitable distribution of impacts to parking, traffic, transit, and business interests. Specifically, this alternative proposes to implement a separated two-way bikeway along the west side of Fenton Street by:

- **Widening the roadway by 2-ft in Fenton Village;**
- **Protecting bicyclists from left-turning vehicles with left-turn signalization;**
- **Preserving 62% of on-street parking in the corridor;**
- **Increasing average end-to-end travel time by 36 seconds;**
- **Removing and replacing up to 27 street trees;**
- **Relocating and/or undergrounding up to 7 utility poles;**
- **Maintaining bus transit service with modifications to bus stops;**
- **Providing loading zones on each block in Fenton Village;**
- **Maintaining all property access;**
- **Limiting right-of-way acquisitions to sidewalk areas only (5833 SF).**

The **preliminary cost estimate for Alternative G** is in the middle range of the alternatives at **$12.2 million**.

To absorb the parking impact, there are 207 on-street parking spaces within one block of the corridor and a number of under-utilized County-owned parking garages and lots. It may also be possible to create additional parking on side streets such as Easley Street and Silver Spring Avenue to offset the loss of parking on Fenton Street. Currently, meters on side streets allow 2-hour parking, however, meters closest to Fenton Street could be converted to 1-hour parking to affect higher turn-over.

Loading zones with parking restrictions should be located on each block. Alternatively, side street loading zones with parking restrictions should be created on the north (westbound) side of the street on blocks between Fenton Street and Georgia Avenue.

Bus stops on the west side of the street should be converted to floating bus stops. Additional coordination with RideOn and WMATA will be needed to determine if specific bus stops can be eliminated or consolidated.

If it is determined that eliminating NB left-turns at Silver Spring Avenue is not desirable, then **Alternative C** would provide similar improvements with a similar distribution of impacts.

16 Conclusion

As stated in the beginning of this study, the overall purpose of the Fenton Street Bikeway is to improve bicyclist and pedestrian safety and comfort, bicycle connectivity, and to provide a balanced, multi-modal corridor for all transportation users.

It is anticipated that with other local and regional bicycle facilities coming online recently and over the next few years, combined with the completion of the Purple Line and various private developments, the importance of providing bicycle connectivity and alternative transportation modes will affect a higher demand for a north-south bicycling route in East Silver Spring. This separated bikeway route has also been designated in the Montgomery County Bicycle Master Plan.

This study has demonstrated that the Fenton Street corridor is a complex, urban arterial that serves the needs of many types of users. Implementation of a bikeway will certainly add to those complexities. But as with almost any transportation project, there are trade-offs and compromises. MCDOT has performed a thorough investigation of the existing conditions and has herein presented proposed improvements and their associated impacts, resulting in what it considers a viable alternative that meets the purpose and need.

The goal of this study process is to develop and produce a preferred alternative that MCDOT, the project stakeholders, and the public have built a consensus around through an open discourse. Once a preferred alternative is finalized and confirmed, it will be progressed and continue to evolve throughout the subsequent design phase.

17 References

1) Montgomery County Road Code and Standard Drawings
2) Silver Spring Streetscape Standards – December 2019
3) Montgomery County Bicycle Master Plan – 2018
4) Silver Spring CBD Sector Plan – 2000
5) AASHTO Green Book - 2018
6) AASHTO Guide to Development of Bicycle Facilities - 2012
7) MDOT SHA Cost Estimating Manual – 2015
8) MDOT SHA Price Index – 2020
9) MassDOT Separated Bike Lane Planning and Design Guide
10) Michigan DOT Sidepath Intersection & Crossing Treatment Guide – June 2018
11) NACTO Urban Bikeway Design Guide
12) Highway Capacity Manual
13) FHWA Manual on Uniform Traffic Control Devices / Maryland Manual on Uniform Traffic Control Devices
14) FHWA Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines

19 Appendix - Preliminary Cost Estimates

Fenton Street Bikeway - Alternative A

Date: Fall 2020

CONCEPT COST ESTIMATE

Item No.	Cat Code	Description	Quantity	Unit	Unit Price	Cost
		CATEGORY 1 - PRELIMINARY (MOT/MOBILIZATION)				
1001	100000-A	PRELIMINARY (MOT/MOBILIZATION)	1	LS	$1,162,000.00	$1,162,000.00
CAT 1 SUBTOTAL						**$1,162,000.00**
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	746	CY	$50.00	$37,300.00
CAT 2 SUBTOTAL						**$37,300.00**
		CATEGORY 3 - DRAINAGE/SWM				
3001	300000-A	DRAINAGE/SWM	1	LS	$1,307,000.00	$1,307,000.00
CAT 3 SUBTOTAL						**$1,307,000.00**
		CATEGORY 5 - PAVING				
5001	500000-A	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 1	115	TON	$145.00	$16,675.00
5002	500000-B	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 1	192	TON	$130.00	$24,960.00
5003	504500	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 2	2,405	TON	$145.00	$348,725.00
5004	504580	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 2	170	TON	$130.00	$22,100.00
5005	508003	STANDARD MILLING ASPHALT PAVEMENT OVER 1 INCH TO 2.5 INCH DEPTH	20,552	SY	$5.00	$102,760.00
5006	520111	4 INCH GRADED AGGREGATE BASE COURSE	1,409	SY	$20.00	$28,180.00
5007	520113	6 INCH GRADED AGGREGATE BASE COURSE	1,558	SY	$25.00	$38,950.00
5008	549401	5 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	4,335	LF	$1.50	$6,502.50
5009	549403	5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	8,000	LF	$1.50	$12,000.00
5010	549409	12 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	115	LF	$5.00	$575.00
5011	549417	16 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	6,500	LF	$6.50	$42,250.00
5012	549419	24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	707	LF	$10.00	$7,070.00
5013	549620	WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LEGENDS AND SYMBOLS	193	SF	$20.00	$3,860.00
5014	549622	BIKE LANE PREFORMED THERMOPLASTIC PAVEMENT MARKING WITH ARROW	423	SF	$37.00	$15,651.00
5015	561119	6 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9	699	SY	$110.00	$76,890.00
CAT 5 SUBTOTAL						**$747,148.50**
		CATEGORY 6 - SHOULDERS				
6001	600000-A	MCDOT CURB AND GUTTER	4,621	LF	$40.00	$184,840.00
6002	600000-B	MCDOT CURB	4,111	LF	$38.00	$156,218.00
6003	634344	STANDARD TYPE D COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	547	LF	$40.00	$21,880.00
6004	648210	MONOLITHIC CONCRETE MEDIAN 2 FEET 0 INCH WIDE TYPE B-3	1,462	LF	$85.00	$124,270.00
6005	655105	5 INCH CONCRETE SIDEWALK	32,137	SF	$12.00	$385,644.00
6006	655120	DETECTABLE WARNING SURFACE FOR CURB RAMPS	942	SF	$45.00	$42,390.00
6007	655383	BRICK SIDEWALKS	39,953	SF	$30.00	$1,198,590.00
6008	670210	POST MOUNTED DELINEATOR	147	EA	$40.00	$5,880.00
CAT 6 SUBTOTAL						**$2,119,712.00**
		CATEGORY 7 - LANDSCAPING/AMENITIES				
7001	7001	LANDSCAPE/AMENITIES	1	LS	$291,000.00	$291,000.00
CAT 7 SUBTOTAL						**$291,000.00**
		CATEGORY 8 - TRAFFIC				
8001	800000-A	RECONSTRUCT SLIGO AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8002	800000-B	RECONSTRUCT SILVER SPRING AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8003	800000-C	RECONSTRUCT THAYER AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8004	800000-D	RECONSTRUCT BONIFANT STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8005	800000-E	MODIFY WAYNE AVENUE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8006	800000-F	MODIFY ELLSWORTH DRIVE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8007	800000-G	MODIFY COLESVILLE ROAD TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8008	800000-H	RECONSTRUCT CAMERON STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8009	800000-I	ORNAMENTAL STREET LIGHT	47	EA	$10,000.00	$470,000.00
8010	800000-J	UTILITY POLE RELOCATION	11	EA	$45,000.00	$495,000.00
8011	800000-K	RELOCATE FIRE HYDRANT	5	EA	$7,500.00	$37,500.00
CAT 8 SUBTOTAL						**$2,682,500.00**
SUBTOTAL - ALL CATEGORIES						**$8,346,660.50**
3% ESCALATION FOR FY 2023 CONSTRUCTION						**$773,960.79**
CONTINGENCY (40%)						**$3,339,000.00**
Right-of-Way COSTS						**$1,172,770.00**
					TOTAL CONSTRUCTION COST	**$13,632,391.29**

*** DOES NOT INCLUDE U/G UTILITY RELOCATIONS OR ADMINISTRATIVE COSTS**

Fenton Street Bikeway - Alternatives B and C

Date: Fall 2020

CONCEPT COST ESTIMATE

Item No.	Cat Code	Description	Quantity	Unit	Unit Price	Cost
		CATEGORY 1 - PRELIMINARY (MOT/MOBILIZATION)				
1001	100000-A	PRELIMINARY (MOT/MOBILIZATION)	1	LS	$1,170,000.00	$1,170,000.00
CAT 1 SUBTOTAL						**$1,170,000.00**
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	804	CY	$50.00	$40,200.00
CAT 2 SUBTOTAL						**$40,200.00**
		CATEGORY 3 - DRAINAGE/SWM				
3001	300000-A	DRAINAGE/SWM	1	LS	$1,316,000.00	$1,316,000.00
CAT 3 SUBTOTAL						**$1,316,000.00**
		CATEGORY 5 - PAVING				
5001	500000-A	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 1	115	TON	$145.00	$16,675.00
5002	500000-B	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 1	192	TON	$130.00	$24,960.00
5003	504500	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 2	2,409	TON	$145.00	$349,305.00
5004	504580	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 2	193	TON	$130.00	$25,090.00
5005	508003	STANDARD MILLING ASPHALT PAVEMENT OVER 1 INCH TO 2.5 INCH DEPTH	20,377	SY	$5.00	$101,885.00
5006	520111	4 INCH GRADED AGGREGATE BASE COURSE	1,409	SY	$20.00	$28,180.00
5007	520113	6 INCH GRADED AGGREGATE BASE COURSE	1,768	SY	$25.00	$44,200.00
5008	549401	5 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	4,285	LF	$1.50	$6,427.50
5009	549403	5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	8,030	LF	$1.50	$12,045.00
5010	549409	12 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	115	LF	$5.00	$575.00
5011	549417	16 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	6,551	LF	$6.50	$42,581.50
5012	549419	24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	757	LF	$10.00	$7,570.00
5013	549620	WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LEGENDS AND SYMBOLS	620	SF	$20.00	$12,400.00
5014	549622	BIKE LANE PREFORMED THERMOPLASTIC PAVEMENT MARKING WITH ARROW	423	SF	$37.00	$15,651.00
5015	561119	6 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9	733	SY	$110.00	$80,630.00
CAT 5 SUBTOTAL						**$768,175.00**
		CATEGORY 6 - SHOULDERS				
6001	600000-A	MCDOT CURB AND GUTTER	4,658	LF	$40.00	$186,320.00
6002	600000-B	MCDOT CURB	4,111	LF	$38.00	$156,218.00
6003	634344	STANDARD TYPE D COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	547	LF	$40.00	$21,880.00
6004	648210	MONOLITHIC CONCRETE MEDIAN 2 FEET 0 INCH WIDE TYPE B-3	1,284	LF	$85.00	$109,140.00
6005	655105	5 INCH CONCRETE SIDEWALK	31,398	SF	$12.00	$376,776.00
6006	655120	DETECTABLE WARNING SURFACE FOR CURB RAMPS	942	SF	$45.00	$42,390.00
6007	655383	BRICK SIDEWALKS	40,567	SF	$30.00	$1,217,010.00
6008	670210	POST MOUNTED DELINEATOR	129	EA	$40.00	$5,160.00
CAT 6 SUBTOTAL						**$2,114,894.00**
		CATEGORY 7 - LANDSCAPING/AMENITIES				
7001	7001	LANDSCAPE/AMENITIES	1	LS	$293,000.00	$293,000.00
CAT 7 SUBTOTAL						**$293,000.00**
		CATEGORY 8 - TRAFFIC				
8001	800000-A	RECONSTRUCT SLIGO AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8002	800000-B	RECONSTRUCT SILVER SPRING AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8003	800000-C	RECONSTRUCT THAYER AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8004	800000-D	RECONSTRUCT BONIFANT STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8005	800000-E	MODIFY WAYNE AVENUE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8006	800000-F	MODIFY ELLSWORTH DRIVE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8007	800000-G	MODIFY COLESVILLE ROAD TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8008	800000-H	RECONSTRUCT CAMERON STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8009	800000-I	ORNAMENTAL STREET LIGHT	47	EA	$10,000.00	$470,000.00
8010	800000-J	UTILITY POLE RELOCATION	11	EA	$45,000.00	$495,000.00
8011	800000-K	RELOCATE FIRE HYDRANT	5	EA	$7,500.00	$37,500.00
CAT 8 SUBTOTAL						**$2,682,500.00**
SUBTOTAL - ALL CATEGORIES						**$8,384,769.00**
3% ESCALATION FOR FY 2023 CONSTRUCTION						**$777,494.48**
CONTINGENCY (40%)						**$3,354,000.00**
Right-of-Way COSTS						**$1,172,770.00**
					TOTAL CONSTRUCTION COST	**$13,689,033.48**

*** DOES NOT INCLUDE U/G UTILITY RELOCATIONS OR ADMINISTRATIVE COSTS**

Fenton Street Bikeway - Alternatives D and E

Date: Fall 2020

CONCEPT COST ESTIMATE

Item No.	Cat Code	Description	Quantity	Unit	Unit Price	Cost
		CATEGORY 1 - PRELIMINARY (MOT/MOBILIZATION)				
1001	100000-A	PRELIMINARY (MOT/MOBILIZATION)	1	LS	$970,000.00	$970,000.00
CAT 1 SUBTOTAL						**$970,000.00**
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	452	CY	$50.00	$22,600.00
CAT 2 SUBTOTAL						**$22,600.00**
		CATEGORY 3 - DRAINAGE/SWM				
3001	300000-A	DRAINAGE/SWM	1	LS	$1,092,000.00	$1,092,000.00
CAT 3 SUBTOTAL						**$1,092,000.00**
		CATEGORY 5 - PAVING				
5001	500000-A	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 1	115	TON	$145.00	$16,675.00
5002	500000-B	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 1	192	TON	$130.00	$24,960.00
5003	504500	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 2	2,300	TON	$145.00	$333,500.00
5004	504580	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 2	55	TON	$130.00	$7,150.00
5005	508003	STANDARD MILLING ASPHALT PAVEMENT OVER 1 INCH TO 2.5 INCH DEPTH	20,650	SY	$5.00	$103,250.00
5006	520111	4 INCH GRADED AGGREGATE BASE COURSE	1,409	SY	$20.00	$28,180.00
5007	520113	6 INCH GRADED AGGREGATE BASE COURSE	498	SY	$25.00	$12,450.00
5008	549401	5 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	3,148	LF	$1.50	$4,722.00
5009	549403	5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	7,912	LF	$1.50	$11,868.00
5010	549409	12 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	115	LF	$5.00	$575.00
5011	549417	16 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	6,405	LF	$6.50	$41,632.50
5012	549419	24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	682	LF	$10.00	$6,820.00
5013	549620	WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LEGENDS AND SYMBOLS	165	SF	$20.00	$3,300.00
5014	549622	BIKE LANE PREFORMED THERMOPLASTIC PAVEMENT MARKING WITH ARROW	423	SF	$37.00	$15,651.00
5015	561119	6 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9	334	SY	$110.00	$36,740.00
CAT 5 SUBTOTAL						**$647,473.50**
		CATEGORY 6 - SHOULDERS				
6001	600000-A	MCDOT CURB AND GUTTER	3,343	LF	$40.00	$133,720.00
6002	600000-B	MCDOT CURB	3,458	LF	$38.00	$131,404.00
6003	634344	STANDARD TYPE D COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	547	LF	$40.00	$21,880.00
6004	648210	MONOLITHIC CONCRETE MEDIAN 2 FEET 0 INCH WIDE TYPE B-3	1,461	LF	$85.00	$124,185.00
6005	655105	5 INCH CONCRETE SIDEWALK	18,506	SF	$12.00	$222,072.00
6006	655120	DETECTABLE WARNING SURFACE FOR CURB RAMPS	902	SF	$45.00	$40,590.00
6007	655383	BRICK SIDEWALKS	35,839	SF	$30.00	$1,075,170.00
6008	670210	POST MOUNTED DELINEATOR	147	EA	$40.00	$5,880.00
CAT 6 SUBTOTAL						**$1,754,901.00**
		CATEGORY 7 - LANDSCAPING/AMENITIES				
7001	7001	LANDSCAPE/AMENITIES	1	LS	$243,000.00	$243,000.00
CAT 7 SUBTOTAL						**$243,000.00**
		CATEGORY 8 - TRAFFIC				
8001	800000-A	RECONSTRUCT SLIGO AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8002	800000-B	RECONSTRUCT SILVER SPRING AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8003	800000-C	RECONSTRUCT THAYER AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8004	800000-D	RECONSTRUCT BONIFANT STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8005	800000-E	MODIFY WAYNE AVENUE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8006	800000-F	MODIFY ELLSWORTH DRIVE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8007	800000-G	MODIFY COLESVILLE ROAD TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8008	800000-H	RECONSTRUCT CAMERON STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8009	800000-I	ORNAMENTAL STREET LIGHT	28	EA	$10,000.00	$280,000.00
8010	800000-J	UTILITY POLE RELOCATION	7	EA	$45,000.00	$315,000.00
8011	800000-K	RELOCATE FIRE HYDRANT	5	EA	$7,500.00	$37,500.00
CAT 8 SUBTOTAL						**$2,312,500.00**
SUBTOTAL - ALL CATEGORIES						**$7,042,474.50**
3% ESCALATION FOR FY 2023 CONSTRUCTION						**$653,027.53**
CONTINGENCY (40%)						**$2,817,000.00**
Right-of-Way COSTS						**$344,885.00**
					TOTAL CONSTRUCTION COST	**$10,857,387.03**

*** DOES NOT INCLUDE U/G UTILITY RELOCATIONS OR ADMINISTRATIVE COSTS**

Fenton Street Bikeway - Alternative F

Date: Fall 2020

CONCEPT COST ESTIMATE

Item No.	Cat Code	Description	Quantity	Unit	Unit Price	Cost
		CATEGORY 1 - PRELIMINARY (MOT/MOBILIZATION)				
1001	100000-A	PRELIMINARY (MOT/MOBILIZATION)	1	LS	$1,095,000.00	$1,095,000.00
CAT 1 SUBTOTAL						**$1,095,000.00**
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	632	CY	$50.00	$31,600.00
CAT 2 SUBTOTAL						**$31,600.00**
		CATEGORY 3 - DRAINAGE/SWM				
3001	300000-A	DRAINAGE/SWM	1	LS	$1,232,000.00	$1,232,000.00
CAT 3 SUBTOTAL						**$1,232,000.00**
		CATEGORY 5 - PAVING				
5001	500000-A	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 1	115	TON	$145.00	$16,675.00
5002	500000-B	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 1	192	TON	$130.00	$24,960.00
5003	504500	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 2	2,352	TON	$145.00	$341,040.00
5004	504580	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 2	125	TON	$130.00	$16,250.00
5005	508003	STANDARD MILLING ASPHALT PAVEMENT OVER 1 INCH TO 2.5 INCH DEPTH	20,478	SY	$5.00	$102,390.00
5006	520111	4 INCH GRADED AGGREGATE BASE COURSE	1,409	SY	$20.00	$28,180.00
5007	520113	6 INCH GRADED AGGREGATE BASE COURSE	1,147	SY	$25.00	$28,675.00
5008	549401	5 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	3,670	LF	$1.50	$5,505.00
5009	549403	5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	7,942	LF	$1.50	$11,913.00
5010	549409	12 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	115	LF	$5.00	$575.00
5011	549417	16 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	6,482	LF	$6.50	$42,133.00
5012	549419	24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	732	LF	$10.00	$7,320.00
5013	549620	WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LEGENDS AND SYMBOLS	423	SF	$20.00	$8,460.00
5014	549622	BIKE LANE PREFORMED THERMOPLASTIC PAVEMENT MARKING WITH ARROW	423	SF	$37.00	$15,651.00
5015	561119	6 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9	503	SY	$110.00	$55,330.00
CAT 5 SUBTOTAL						**$705,057.00**
		CATEGORY 6 - SHOULDERS				
6001	600000-A	MCDOT CURB AND GUTTER	4,290	LF	$40.00	$171,600.00
6002	600000-B	MCDOT CURB	3,786	LF	$38.00	$143,868.00
6003	634344	STANDARD TYPE D COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	547	LF	$40.00	$21,880.00
6004	648210	MONOLITHIC CONCRETE MEDIAN 2 FEET 0 INCH WIDE TYPE B-3	1,462	LF	$85.00	$124,270.00
6005	655105	5 INCH CONCRETE SIDEWALK	27,398	SF	$12.00	$328,776.00
6006	655120	DETECTABLE WARNING SURFACE FOR CURB RAMPS	942	SF	$45.00	$42,390.00
6007	655383	BRICK SIDEWALKS	38,704	SF	$30.00	$1,161,120.00
6008	670210	POST MOUNTED DELINEATOR	147	EA	$40.00	$5,880.00
CAT 6 SUBTOTAL						**$1,999,784.00**
		CATEGORY 7 - LANDSCAPING/AMENITIES				
7001	7001	LANDSCAPE/AMENITIES	1	LS	$274,000.00	$274,000.00
CAT 7 SUBTOTAL						**$274,000.00**
		CATEGORY 8 - TRAFFIC				
8001	800000-A	RECONSTRUCT SLIGO AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8002	800000-B	RECONSTRUCT SILVER SPRING AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8003	800000-C	RECONSTRUCT THAYER AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8004	800000-D	RECONSTRUCT BONIFANT STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8005	800000-E	MODIFY WAYNE AVENUE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8006	800000-F	MODIFY ELLSWORTH DRIVE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8007	800000-G	MODIFY COLESVILLE ROAD TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8008	800000-H	RECONSTRUCT CAMERON STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8009	800000-I	ORNAMENTAL STREET LIGHT	38	EA	$10,000.00	$380,000.00
8010	800000-J	UTILITY POLE RELOCATION	7	EA	$45,000.00	$315,000.00
8011	800000-K	RELOCATE FIRE HYDRANT	5	EA	$7,500.00	$37,500.00
CAT 8 SUBTOTAL						**$2,412,500.00**
SUBTOTAL - ALL CATEGORIES						**$7,749,941.00**
3% ESCALATION FOR FY 2023 CONSTRUCTION						**$718,628.78**
CONTINGENCY (40%)						**$3,100,000.00**
Right-of-Way COSTS						**$670,795.00**
					TOTAL CONSTRUCTION COST	**$12,239,364.78**

*** DOES NOT INCLUDE U/G UTILITY RELOCATIONS OR ADMINISTRATIVE COSTS**

Fenton Street Bikeway - Alternative G

Date: Fall 2020

CONCEPT COST ESTIMATE

Item No.	Cat Code	Description	Quantity	Unit	Unit Price	Cost
		CATEGORY 1 - PRELIMINARY (MOT/MOBILIZATION)				
1001	100000-A	PRELIMINARY (MOT/MOBILIZATION)	1	LS	$1,096,000.00	$1,096,000.00
CAT 1 SUBTOTAL						**$1,096,000.00**
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	632	CY	$50.00	$31,600.00
CAT 2 SUBTOTAL						**$31,600.00**
		CATEGORY 3 - DRAINAGE/SWM				
3001	300000-A	DRAINAGE/SWM	1	LS	$1,233,000.00	$1,233,000.00
CAT 3 SUBTOTAL						**$1,233,000.00**
		CATEGORY 5 - PAVING				
5001	500000-A	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 1	115	TON	$145.00	$16,675.00
5002	500000-B	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 1	192	TON	$130.00	$24,960.00
5003	504500	SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE, PG 64S-22, LEVEL 2	2,352	TON	$145.00	$341,040.00
5004	504580	SUPERPAVE ASPHALT MIX 25.0MM FOR BASE, PG 64S-22, LEVEL 2	125	TON	$130.00	$16,250.00
5005	508003	STANDARD MILLING ASPHALT PAVEMENT OVER 1 INCH TO 2.5 INCH DEPTH	20,478	SY	$5.00	$102,390.00
5006	520111	4 INCH GRADED AGGREGATE BASE COURSE	1,409	SY	$20.00	$28,180.00
5007	520113	6 INCH GRADED AGGREGATE BASE COURSE	1,147	SY	$25.00	$28,675.00
5008	549401	5 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	3,839	LF	$1.50	$5,758.50
5009	549403	5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	7,913	LF	$1.50	$11,869.50
5010	549409	12 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	115	LF	$5.00	$575.00
5011	549417	16 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	6,482	LF	$6.50	$42,133.00
5012	549419	24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	734	LF	$10.00	$7,340.00
5013	549620	WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LEGENDS AND SYMBOLS	492	SF	$20.00	$9,840.00
5014	549622	BIKE LANE PREFORMED THERMOPLASTIC PAVEMENT MARKING WITH ARROW	423	SF	$37.00	$15,651.00
5015	561119	6 INCH PORTLAND CEMENT CONCRETE PAVEMENT FOR DRIVEWAY MIX 9	503	SY	$110.00	$55,330.00
CAT 5 SUBTOTAL						**$706,667.00**
		CATEGORY 6 - SHOULDERS				
6001	600000-A	MCDOT CURB AND GUTTER	4,290	LF	$40.00	$171,600.00
6002	600000-B	MCDOT CURB	3,786	LF	$38.00	$143,868.00
6003	634344	STANDARD TYPE D COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	547	LF	$40.00	$21,880.00
6004	648210	MONOLITHIC CONCRETE MEDIAN 2 FEET 0 INCH WIDE TYPE B-3	1,462	LF	$85.00	$124,270.00
6005	655105	5 INCH CONCRETE SIDEWALK	27,398	SF	$12.00	$328,776.00
6006	655120	DETECTABLE WARNING SURFACE FOR CURB RAMPS	942	SF	$45.00	$42,390.00
6007	655383	BRICK SIDEWALKS	38,704	SF	$30.00	$1,161,120.00
6008	670210	POST MOUNTED DELINEATOR	147	EA	$40.00	$5,880.00
CAT 6 SUBTOTAL						**$1,999,784.00**
		CATEGORY 7 - LANDSCAPING/AMENITIES				
7001	7001	LANDSCAPE/AMENITIES	1	LS	$274,000.00	$274,000.00
CAT 7 SUBTOTAL						**$274,000.00**
		CATEGORY 8 - TRAFFIC				
8001	800000-A	RECONSTRUCT SLIGO AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8002	800000-B	RECONSTRUCT SILVER SPRING AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8003	800000-C	RECONSTRUCT THAYER AVENUE TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8004	800000-D	RECONSTRUCT BONIFANT STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8005	800000-E	MODIFY WAYNE AVENUE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8006	800000-F	MODIFY ELLSWORTH DRIVE TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8007	800000-G	MODIFY COLESVILLE ROAD TRAFFIC SIGNAL	1	LS	$60,000.00	$60,000.00
8008	800000-H	RECONSTRUCT CAMERON STREET TRAFFIC SIGNAL	1	LS	$300,000.00	$300,000.00
8009	800000-I	ORNAMENTAL STREET LIGHT	38	EA	$10,000.00	$380,000.00
8010	800000-J	UTILITY POLE RELOCATION	7	EA	$45,000.00	$315,000.00
8011	800000-K	RELOCATE FIRE HYDRANT	5	EA	$7,500.00	$37,500.00
CAT 8 SUBTOTAL						**$2,412,500.00**
SUBTOTAL - ALL CATEGORIES						**$7,753,551.00**
3% ESCALATION FOR FY 2023 CONSTRUCTION						**$718,963.52**
CONTINGENCY (40%)						**$3,102,000.00**
Right-of-Way COSTS						**$670,795.00**
					TOTAL CONSTRUCTION COST	**$12,245,309.52**

*** DOES NOT INCLUDE U/G UTILITY RELOCATIONS OR ADMINISTRATIVE COSTS**

20 Appendix - Traffic Analysis

Fenton Street Cycle Track

Traffic Analysis of the Fenton Street Cycle Track from Gist Avenue to Cameron Street

Prepared for:
Montgomery County
Department of Transportation

Prepared by:
Stantec

November 3, 2020

Revision	Description	Author		Quality Check		Independent Review	

Sign-off Sheet

This document entitled Fenton Street Cycle Track was prepared by Stantec Inc. ("Stantec") for the account of Montgomery County Department of Transportation (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____

(signature)

Robert Milstead, PE

Reviewed by _____

(signature)

Steve Zeender, PE

Approved by _____

(signature)

Kathleen Walsh, PE

Approved by _____

(signature)

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Executive Summary

This Report provides a summary of the analysis to determine if a cycle track is feasible along the west side of Fenton Street from Cameron Street to Gist Avenue in the Silver Spring Central Business District (CBD) Bicycle and Pedestrian Priority Area (BiPPA). The existing condition of a signed bike route along Grove Street has not been effective for promoting safer biking in the area. Current bicycle counts reveal more bikers choose to travel along the more hostile Fenton Street, than do along the alternate Grove Street route. A cycle track along Fenton Street would provide a protected, north-south bikeway that would ultimately connect with the Spring Street separated bicycle lanes, Cameron Street bicycle lanes, the Silver Spring Green Trail, the Purple Line, and the Metropolitan Branch Trail, increasing both safety and connectivity through the area. The analysis evaluates existing and proposed traffic operations at impacted intersections. Intersection capacity, based on the Highway Capacity Manual (HCM) and intersection queuing, were compared for the existing conditions and the revised roadway geometry with the protected bike lanes. To develop the existing conditions analysis, AM, PM and Saturday traffic counts were applied to a Synchro network with the most-recent signal timings for the Downtown Silver Spring area. Stantec analyzed eight (8) scenarios of the roadway network to determine the impacts to traffic flow along the corridor.

Scenario 1 adds a two-way cycle track along the west side of Fenton street. This scenario will favor cyclist and will limit vehicles by prohibiting southbound right turns and northbound left turns across the two-way cycle track. Scenario 1 has the least traffic impact to Fenton Street corridor. However, this is due to the diversion of traffic turning across the cycle track. This will result in higher traffic volumes along Grove Street and Georgia Avenue.

Scenario 2 adds a two-way cycle track along the west side of Fenton street. This scenario will maximize parking and loading zones with no dedicated turn lanes along Fenton Street. Scenario 2 has an impact to traffic all along Fenton Street corridor. This is due to no turn lanes along Fenton Street.

Scenario 3 adds a two-way cycle track along the west side of Fenton street. This scenario will favor vehicular traffic and have northbound and southbound dedicated left-turn lanes with exclusive and permissive left-turn phasing. There will be a shared thru-right lane for northbound and southbound traffic along Fenton Street. Scenario 3 has an impact to traffic around the Ellsworth Drive and Wayne Avenue intersections.

Scenario 4 adds a two-way cycle track along the west side of Fenton street. This scenario will favor vehicular traffic and have northbound and southbound dedicated left-turn lanes with exclusive left-turn phasing. There will be a shared thru-right lane for northbound and southbound traffic along Fenton Street. All the intersections along Fenton Street operate at a LOS of D or better. The westbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay

and queues due to the reduction of lanes on this approach. There are five (5) intersections that have an approach LOS E or LOS F for the Scenario 4 conditions.

Scenario 5 adds a two-way cycle track along the west side of Fenton street. This scenario will favor vehicular traffic and have northbound dedicated left-turn lanes with exclusive left-turn phasing. There will be a shared thru-right lane for northbound traffic along Fenton Street. Southbound Fenton Street will have a dedicated right-turn lane and a thru-left lane. The southbound right turn will have exclusive phasing. All the intersections along Fenton Street operate at a LOS of D or better except the intersection of Wayne Avenue that operates at LOS E during the Saturday Peak hour. The US 29 (Colesville Road) intersection has the biggest increase in delay and queues due to the reduction of lanes on this approach.

Scenario 6 adds a two-way cycle track along the west side of Fenton street. This scenario will favor vehicular traffic and have northbound and southbound dedicated left-turn lanes with exclusive left-turn phasing. There will be a shared thru-right lane for northbound and southbound traffic along Fenton Street. All the intersections along Fenton Street operate at a LOS of D or better. The eastbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay and queues.

Scenario 7 adds a two-way cycle track along the west side of Fenton street. This scenario is a combination of the previous scenarios to maximize benefits for all users. Scenario 7 will have northbound dedicated left-turn lanes with exclusive left-turn phasing. Traffic will be prohibited from turning from Fenton Street to westbound Ellsworth Drive. Also, northbound left turns will be prohibited at Thayer Street. Since northbound left turns were prohibited at the intersection of Fenton Street and Thayer Street the Thayer Street intersection operation improves. However, the vehicles that were turning left at Thayer are now turning left at Silver Spring Avenue and the Fenton Street and Silver Spring Avenue intersection delay increases but still operates at a LOS C or better.

Scenario 8 adds a two-way cycle track along the west side of Fenton street. This scenario is a combination of the previous scenarios to maximize benefits for all users. Scenario 8 will have northbound dedicated left-turn lanes with exclusive left-turn phasing. Traffic will be prohibited from turning from Fenton Street to westbound Ellsworth Drive. Also, northbound left turns will be prohibited at Silver Spring Avenue. All the intersections along Fenton Street operate at a LOS of D or better. Since northbound left turns were prohibited at the intersection of Fenton Street and Silver Spring Avenue, the Silver Spring Avenue intersection operation improves. However, the vehicles that were turning left at Silver Spring Avenue are now turning left at Thayer Street and the Fenton Street and Thayer Street intersection delay increases but still operates at a LOS C or better.

Bicycle counts were collected at the intersections along Fenton Street and Grove Street. The bicycle volumes along Grove Street, a designated bikeway, were approximately three (3) bicycles per hour for each direction during the AM peak period and Saturday peak period. The PM peak period had approximately one (1) per hour. The bicycle volumes along Fenton Street were approximately four (4) to five (5) bicycles per hour for each direction for all three (3) peak periods. These bicycle counts indicate that despite the conditions along Fenton Street being not signed or marked for bicyclists there are more bicyclists using Fenton Street than Grove Street.

The Scenarios analyzed in this report are not exhaustive or final. These Scenarios were selected to best represent different options for the possible installation of a cycle track that would minimize impacts to traffic, businesses, and increase safety throughout the corridor. Any alterative moved forward to design will be updated to combine the best elements from the different tested alternatives and include changes based on community feedback.

1.0 INTRODUCTION

This Report provides a summary of the traffic analysis to determine if a cycle track is feasible along the west side of Fenton Street from Cameron Street to MD 410 in the Silver Spring Central Business District (CBD) Bicycle and Pedestrian Priority Area (BiPPA).The proposed cycle track would provide a protected, north-south bikeway that would ultimately connect with the Spring Street Separated bicycle lanes, Cameron Street bicycle lanes, the Silver Spring Green Trail, the Purple Line, and Metropolitan Branch Trail. The analysis evaluates existing and proposed traffic operations at impacted intersections. Intersection capacity, based on the HCM, as well as intersection queuing, were compared for the existing conditions and the revised roadway geometry with the protected bike lanes. To develop the existing conditions analysis, AM, PM and Saturday traffic counts were applied to a Synchro network with the most-recent signal timings for the Downtown Silver Spring area. (Refer to Figure 1 – Site Location).

2.0 EXISTING CONDITIONS

2.1 EXISTING ROADWAYS

Fenton Street is a Montgomery County Department of Transportation (MCDOT) maintained roadway through the Silver Spring CBD BiPPA, oriented primarily in a north-south direction between King Street and Ellsworth Drive and east-west from Ellsworth Drive to Cameron Street with a posted speed limit of 25 MPH. Fenton Street is a three-lane roadway with two though lanes and one center turn lane. It is an undivided closed section roadway from the southern BiPPA Boundary to Wayne Avenue with on-street parking on both sides that is enhanced by bulb-outs at the intersections. From Wayne Avenue to Cameron Street, Fenton Street is a 4 lane, undivided closed section roadway. There are overhead utilities on Fenton Street from the BiPPA boundary to King Street along the northbound side, from Sligo Avenue to Bonifant Street along the southbound side, and from Bonifant Street to Wayne Avenue on the northbound side. Existing street lighting is provided by teardrop luminaries mounted on pendant poles on both sides of Fenton Street.

Cameron Street is a MCDOT maintained roadway through the Silver Spring CBD BiPPA, oriented primarily in a north-south direction and extends from Second Avenue to just north of Spring Street. Cameron Street is a three-lane roadway; one lane in each direction and a center turn lane. It has parking on both sides of the street.

Figure 1 - Site Location

US 29 (Colesville Road) is a Maryland State Highway Administration (SHA) maintained roadway through the Silver Spring CBD BiPPA, oriented primarily in a north-south direction. US 29 (Colesville

Road) is a two-way, six-lane roadway that connects Washington DC to I-70, west of Baltimore. It consists of three travel lanes in both the north- and southbound directions during off-peak hours. At the intersection of US 29 (Colesville Road) and Fenton Street, all turns are from shared lanes except for the northbound left turn, which is restricted during the PM peak period. A reversible lane system controls US 29 (Colesville Road) to provide additional lane capacity for traffic traveling in the direction of the heaviest travel during the peak periods: southbound during the AM peak, and northbound during the PM peak.

Roeder Road is a MCDOT maintained roadway that runs from Spring Street to Fenton Street, oriented primarily in a north-south direction. Roeder Road is a two-way two-lane roadway with parking on both sides of the roadway.

Ellsworth Drive is a MCDOT maintained roadway north of Fenton Street, oriented primarily in a north-south direction. Ellsworth Drive is a two-way two-lane roadway with parking on both sides of the roadway north of Fenton Street. Ellsworth Drive south of Fenton Street, is controlled by the Downtown Silver Spring Development and has no parking on either side of the roadway. Ellsworth Drive south of Fenton Street is often closed to vehicles during the weekday lunch period and during special events held on weekends.

Wayne Avenue is a MCDOT-maintained roadway east of Georgia Avenue and SHA maintained roadway west of Georgia Avenue. Wayne Avenue is oriented primarily in an east-west direction with a posted speed limit of 30 MPH. Wayne Avenue is a 4-lane undivided roadway from approximately 290-feet east of Georgia Avenue to Fenton Street. East of Fenton Street Wayne Avenue is a five-lane roadway for approximately 500 feet and then transitions back to a four-lane roadway. There is a shared-use path along the westbound side of Wayne Avenue that is part of the Silver Spring Green Trail. The Purple Line is planned to be at grade and run along Wayne avenue east of Fenton Street.

Bonifant Street is a MCDOT roadway maintained through the Silver Spring CBD BiPPA, oriented primarily in an east-west direction. Bonifant Street is a two-way two-lane roadway with parking on both sides of the roadway west of Fenton Street. East of Fenton Street, Bonifant Street is primarily residential and parking is not allowed on either side of Bonifant Street. From Georgia Avenue to Fenton Street, the Purple line is planned to run along Bonifant Street and Bonifant Street will become one-way eastbound at that time.

Thayer Avenue is a MCDOT roadway maintained through the Silver Spring CBD BiPPA, oriented primarily in an east-west direction. Thayer Avenue is a two-way two-lane roadway with parking on both sides of the roadway. East of Fenton, Thayer Avenue is primarily residential.

Silver Spring Avenue is a MCDOT roadway maintained through the Silver Spring CBD BiPPA, oriented primarily in an east-west direction. Silver Spring Avenue is a two-way two-lane roadway with parking on both sides of the roadway west of Fenton Street. East of Fenton Street, Silver Spring Avenue is primarily residential with parking on the south side of Sliver Spring Avenue.

Sligo Avenue is a MCDOT roadway maintained through the Silver Spring CBD BiPPA, oriented primarily in an east-west direction. Sligo Avenue is a two-way two-lane roadway with parking on the north side of the roadway west of Fenton Street. East of Fenton Street, Sligo Avenue is primarily residential with parking on the south side of Sligo Avenue.

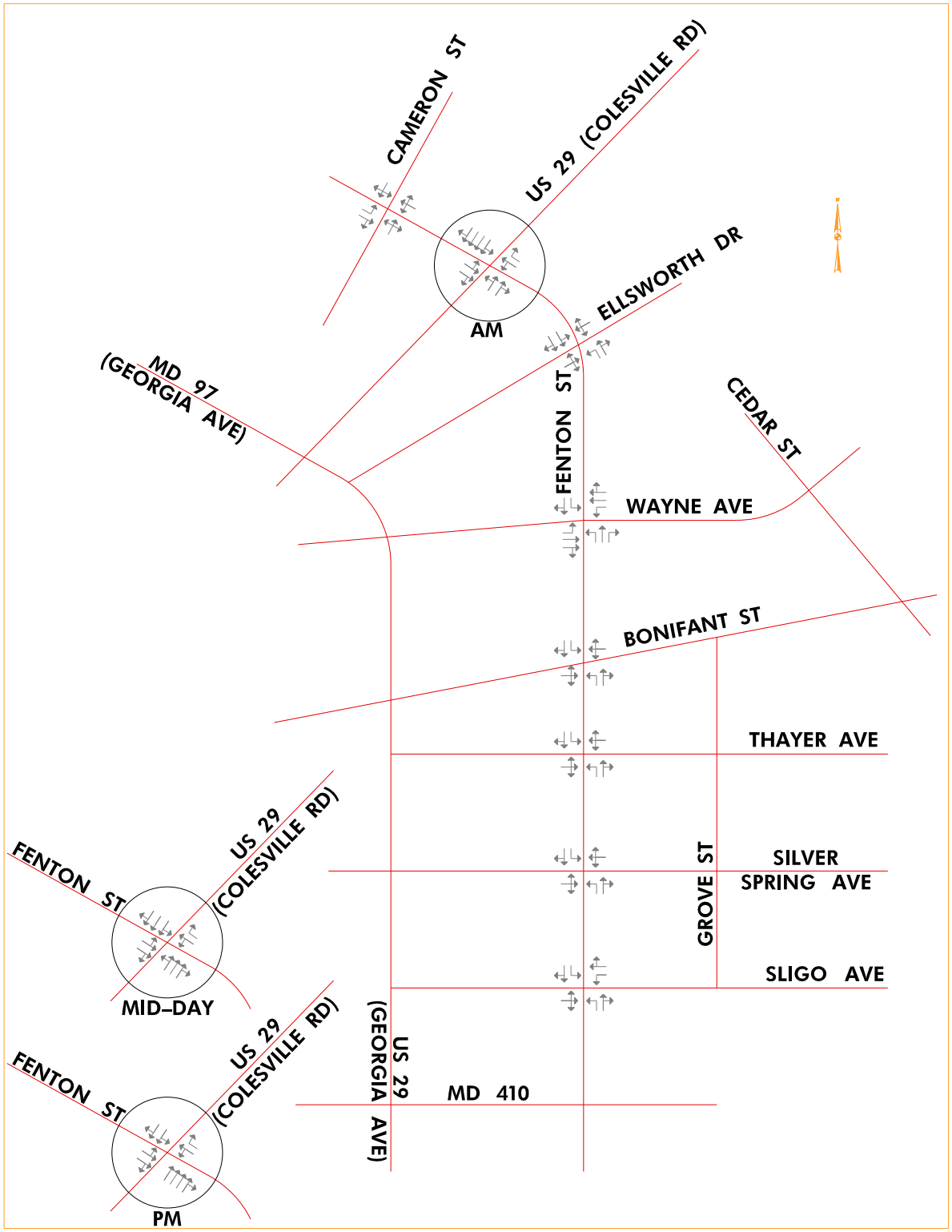

Figure 2 - Existing Lane Configurations

2.2 EXISTING BUS ROUTES

Public transportation is heavily utilized through the seven (7) bus stops located along Fenton Street in the study area. WMATA Metrobus route F4, and Montgomery County Ride On routes 16, 17, 20, and 28 (VanGo) have stops along Fenton Street within the study area. (Refer to Figure 3 – Existing Bus Routes). The proposed alternatives assume the existing bus routes will remain. However, bus stop locations have been shifted to best fit the proposed conditions.

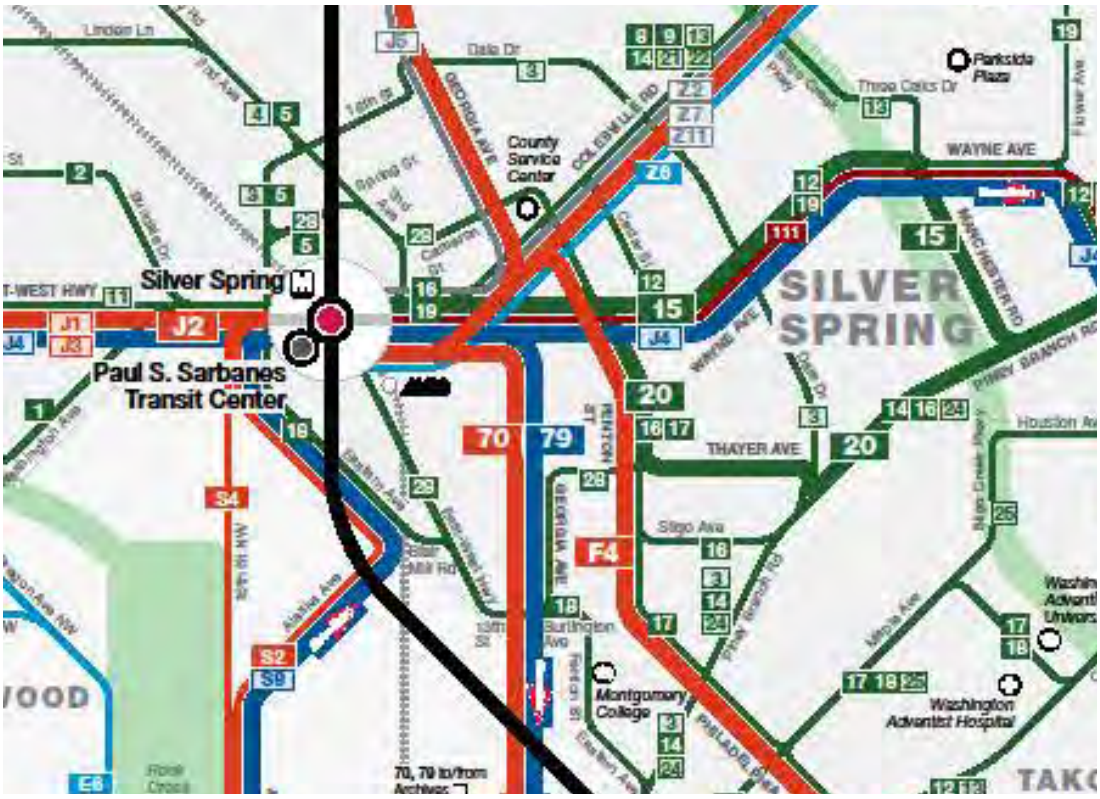

Figure 3 - Existing Bus Routes

2.3 PROPOSED PURPLE LINE

The Purple Line is a 16-mile light rail line that will extend from Bethesda in Montgomery County to New Carrollton in Prince George's County. It will provide a direct connection to the Metrorail Red, Green and Orange Lines; at Bethesda, Silver Spring, College Park, and New Carrollton. The Purple Line will also connect to MARC, Amtrak, and local bus services. Within the study area the Maryland Department of Transportation is planning for the Purple Line to travel along the north side of Bonifant Street west of Fenton Street and cut through the Silver Spring Library. Bonifant Street will become one-way from Georgia Avenue to Fenton Street. The Purple Line will enter the intersection of Fenton Street and Wayne Avenue on the southwest corner and continue along Wayne Avenue to the east. (Refer to Appendix A – Purple Line Plan). The intersection of Fenton Street and Wayne Avenue will operate at a Level of Service (LOS) of C in the AM peak hour and LOS of D in the PM

peak hour in the year of 2040 in the no-build Purple Line scenario. With the Purple Line the intersection will operate at a LOS of C in the AM peak hour and LOS of F in the PM peak hour in the year of 2040.

2.4 EXISTING TRAFFIC DATA (2017)

Peak hour turning movement counts (TMCs) were collected at the following intersections on a weekday (Tuesday - Thursday) (6:30 AM to 9:30 AM and 3:30 PM to 6:30 PM) and on Saturday (1:00 PM to 4:00 PM). (Refer to Table 2 – Traffic Count Locations).

Table 1 - Traffic Count Locations

Intersection	Weekday Counted	Saturday Counted
Fenton St at Cameron St	3/29/2017	3/25/2017
Fenton St at US 29 (Colesville Road)	3/29/2017	3/25/2017
Fenton St at Ellsworth Dr	3/29/2017	3/25/2017
Fenton St at Wayne Ave	3/30/2017	4/1/2017
Fenton St at Bonifant St	3/30/2017	4/1/2017
Fenton St at Thayer St	3/30/2017	4/1/2017
Fenton St at Silver Spring Ave	4/4/2017	4/1/2017
Fenton St at Sligo Ave	4/4/2017	4/8/2017

The AM, PM and Saturday peak hours were determined to be 8:15 to 9:15 AM, 5:30 to 6:30 PM and 1:00 PM to 2:00 PM on Saturday. Traffic counts for the intersections along Georgia Avenue were obtained from SHA's Internet Traffic Monitoring System (I-TMS). The turning movement volumes during these peak hours are summarized in Figure 4. (Refer to Appendix B – Traffic Volume Data).

2.4.1 Bicycle Volumes

Bicycle counts were collected at the intersections along Fenton Street and Grove Street. The bicycle volumes along Grove Street, a designated bikeway, were approximately three (3) bicycles per hour for each direction during the AM peak period and Saturday peak period. The PM peak period had approximately one (1) per hour. The bicycle volumes along Fenton Street were approximately four (4) to five (5) bicycles per hour for each direction for all three (3) peak periods.

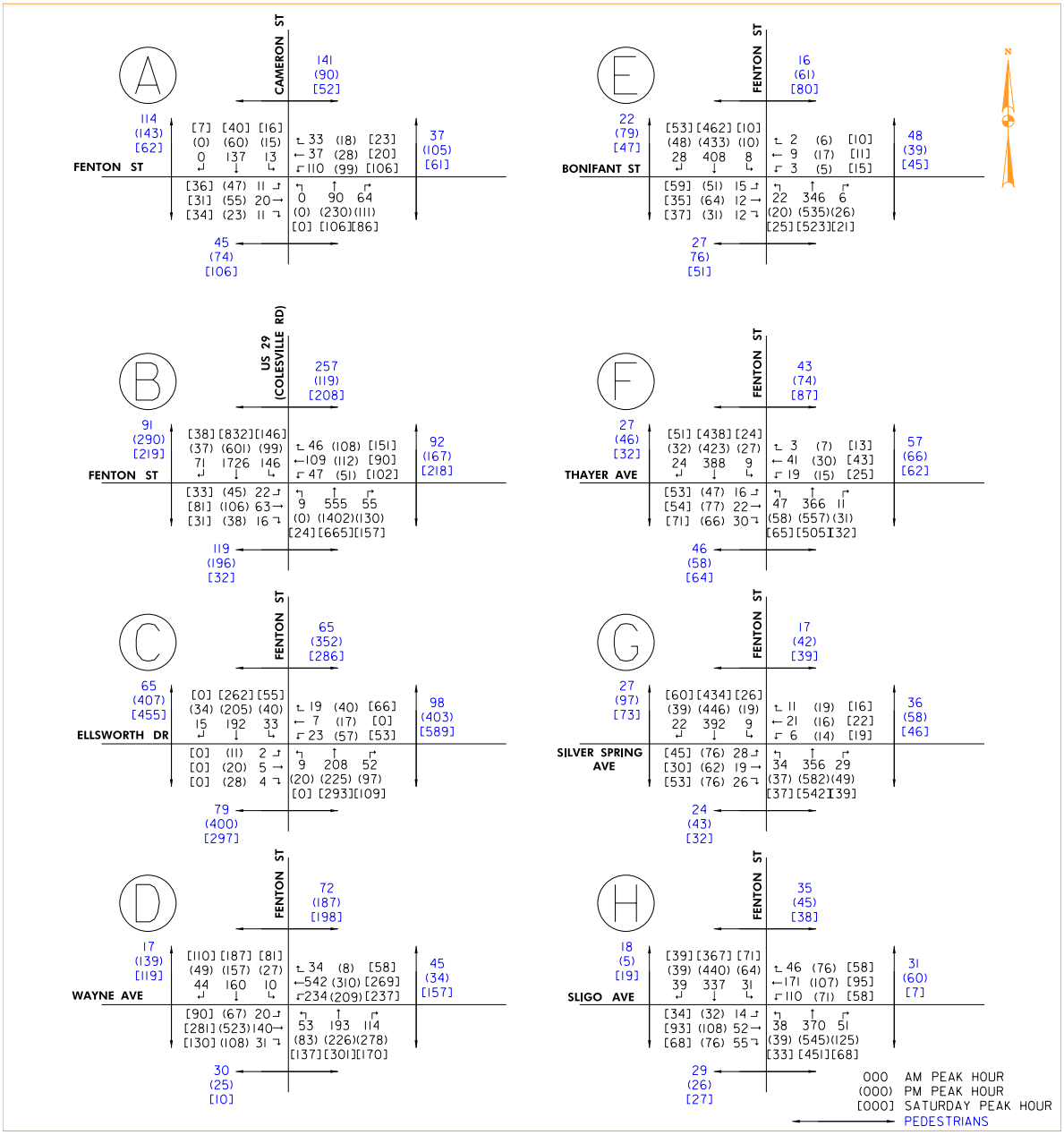

Figure 4 - Existing Traffic Volumes (2017)

2.4.2 Existing Capacity Analysis

A Synchro model was built including all intersections and roadway segments in the study area. Lane configurations and control type were verified in the field. Traffic signal timings were obtained from Montgomery County Department of Transportation. Capacity analysis was performed using SimTraffic's delay per intersection approach and 95th percentile queue and was recorded for

each intersection. (Refer to Table 3 - Existing Approach Delay (Seconds/Vehicle) and Table 4 - Fenton Street Existing Queues (Feet)). (Refer to Appendix C – Existing Synchro Capacity Analysis).

As shown in Table 3 - Existing Approach Delay (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach, the total for each intersection, and for each of the three (3) peak hours analyzed. All of the intersections along Fenton Street at a LOS of D or better. Only the westbound approach at the US Route 29 (Colesville Road) intersection operates at a LOS E for the existing conditions.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 2 - Existing Travel Time(Refer to Appendix C – Existing Synchro Capacity Analysis).

Table 2 - Existing Travel Time

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	7.6	10.2	7.8	Cameron St	30.5	10.2	29.0
Sligo Ave	13.9	16.7	13.9	Colesville Rd	45.1	16.7	43.3
Silver Spring Ave	19.4	29.0	22.5	Roeder Rd	11.4	29.0	10.1
Thayer Ave	17.0	21.8	22.0	Ellsworth Dr	12.5	21.8	13.6
Easley St	10.8	12.7	11.6	Wayne Ave	29.9	12.7	53.3
Bonifant St	8.0	7.8	9.6	Bonifant St	17.5	7.8	18.4
Wayne Ave	21.5	44.4	30.9	Easley St	4.9	44.4	5.0
Ellsworth Dr	23.1	27.6	22.8	Thayer Ave	15.1	27.6	15.5
Roeder Rd	8.0	9.2	7.9	Silver Spring Ave	20.2	9.2	20.6
Colesville Rd	51.7	70.6	54.0	Sligo Ave	24.3	70.6	18.9
Cameron St	33.6	39.4	34.2	Gist Ave	7.5	39.4	7.5
Total	214.6	289.4	237.2		218.9	289.4	235.2

Table 3 - Existing Approach Delay (Seconds/Vehicle)

Intersection	Peak Hour	Existing 2017 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	25.1	C	27.4	C	7.0	A	6.2	A	15.4	B
	PM	25.3	C	30.0	C	9.6	A	8.9	A	17.1	B
	SAT	25.8	C	28.0	C	8.1	A	6.8	A	17.9	B
Fenton St at US 29 (Colesville Road)	AM	43.0	D	44.8	D	19.7	B	16.5	B	20.3	C
	PM	47.9	D	56.7	E	9.7	A	17.4	B	18.8	B
	SAT	36.6	D	48.2	D	14.0	B	29.5	C	27.4	C
Fenton St at Ellsworth Dr	AM	23.6	C	24.7	C	7.6	A	6.7	A	9.0	A
	PM	14.4	B	17.0	B	12.9	B	10.9	B	12.9	B
	SAT			24.5	C	7.8	A	39.0	D	10.1	B
Fenton St at Wayne Ave	AM	27.2	C	37.2	D	11.7	B	15.1	B	27.4	C
	PM	15.4	B	25.7	C	35.3	D	36.0	D	26.4	C
	SAT	37.9	D	22.2	C	21.3	C	39.0	D	28.8	C
Fenton St at Bonifant St	AM	22.9	C	7.5	A	4.5	A	8.0	A	7.3	A
	PM	37.7	D	18.5	B	4.2	A	8.6	A	10.3	B
	SAT	35.6	D	31.8	C	5.6	A	7.7	A	10.4	B
Fenton St at Thayer St	AM	25.2	C	18.4	B	5.4	A	5.8	A	8.0	A
	PM	33.8	C	25.3	C	9.5	A	8.4	A	12.9	B
	SAT	37.6	D	38.9	D	9.9	A	7.3	A	14.2	B
Fenton St at Silver Spring Ave	AM	19.2	B	13.0	B	5.8	A	7.0	A	8.0	A
	PM	37.7	D	33.7	C	13.8	B	8.9	A	16.5	B
	SAT	31.2	C	31.9	C	8.8	A	7.7	A	11.1	B
Fenton St at Sligo Ave	AM	17.4	B	23.9	C	8.2	A	12.2	B	14.9	B
	PM	29.0	C	34.9	C	10.4	B	12.9	B	18.2	B
	SAT	34.3	C	28.4	C	7.8	A	9.3	A	14.8	B
		= Unstable flow at or near capacity									

Table 4 - Fenton Street Existing Queues (Feet)

Intersection	Peak Hour	Existing 2017 (Movements)							
		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM	28	55		187		93	21	76
	PM	62	83		173		151	36	55
	SAT	52	79		159		100	32	46
	*	206	206		418		422	100	372
Fenton St at US 29 (Colesville Road)	AM	83	96	223	97	257	276	429	382
	PM	131	142	236	161	161	167	225	225
	SAT	98	92	231	192	256	212	478	405
	*	418	418	264	264	263	263	541	541
Fenton St at Ellsworth Dr	AM		30		70	129	59	58	117
	PM		70		106	186	112	74	126
	SAT				123	151	89	84	112
	*		707		405	497	100	191	191
Fenton St at Wayne Ave	AM	55	136	246	264	77	152	26	157
	PM	79	211	199	130	127	290	59	267
	SAT	111	206	190	134	139	232	99	312
	*	666	666	275	868	100	321	497	497
Fenton St at Bonifant St	AM		64		33	35	89	18	196
	PM		165		47	37	101	25	197
	SAT		144		58	28	116	33	187
	*		677		560	100	412	50	321
Fenton St at Thayer St	AM		99		96	61	143	30	192
	PM		191		85	99	311	60	242
	SAT		188		114	107	267	56	211
	*		628		525	100	430	100	412
Fenton St at Silver Spring Ave	AM		99		56	57	153	39	193
	PM		231		79	99	364	63	215
	SAT		119		90	64	222		203
	*		620		563	100	479	100	430
Fenton St at Sligo Ave	AM		135	226	117	73	187	52	224
	PM		258	196	136	82	225	126	265
	SAT		198	123	113	45	200	75	182
	*		177	536	250	100	173	150	479
* Storage Length		= a queue length that exceeds the storage lengt							

3.0 SCENARIO ANALYSIS

To determine if it is feasible for a cycle track along Fenton Street, Stantec analyzed eight (8) scenario roadway configurations for the Fenton Street Cycle Track. The eight (8) scenarios were done for modeling purposes only and will not reflect a final proposal. All scenarios include a two-way cycle track along the south or west side of Fenton Street.

There are current improvements planned for the intersection of Fenton Street and Cameron Street. The improvements are to make this intersection a protected intersection. This improvement will change the eastbound approach of Fenton Street from a left-turn lane and a thru-right lane to a shared left-thru-right lane. The Purple Line will revise the lane configurations of Bonifant Street. The northbound approach will have a northbound left-turn and a thru-right lane. The southbound lane will have a left-right turn lane. These two improvements will be the same for all scenarios.

Scenario 1 favors cyclist and will limit vehicles by prohibiting southbound right turns and northbound left turns across the two-way cycle track. Scenario 2 maximizes parking and loading zones by limiting turn lanes. Scenario 3 favors vehicular traffic by having dedicated left-turn lanes with exclusive and permissive phasing. Scenario 4 also is like Scenario 3 with dedicated left turns but the phasing is exclusive only to provide additional safety to the cycle track. Scenario 5 adds an additional safety measure with dedicated southbound right turn lanes with exclusive phasing. The southbound approach will also have a shared thru-left lane. The northbound approach will have a dedicated left turn lane with exclusive phasing and a shared thru-right lane. Scenario 6 has a shared left-thru-right lane for southbound and northbound will have a dedicated left-turn lane with exclusive phasing and a shared thru-right lane. Scenario 7 is like Scenario 4 with dedicated left turns with exclusive left turn phasing for northbound Fenton Street. However, in this scenario the northbound left turn at Thayer Avenue is prohibited and left turns would use Silver Spring Avenue. Scenario 8 is the same as Scenario 7 except that left turns are prohibited at Silver Spring Avenue and are allowed at Thayer Avenue.

3.1 SCENARIO 1 - BICYCLES

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario will favor cyclist and will limit vehicles by prohibiting southbound right turns and northbound left turns across the two-way cycle track. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 5 – Scenario 1 Lane Configurations, Table 6 - Scenario 1 Approach Delay (Seconds/Vehicle), Table 7 – Scenario 1 Queues (Feet), and Appendix D – Scenario 1 Synchro Analysis).

As shown in Figure 5 – Scenario 1 Lane Configurations, there are no traffic turning across the cycle track except at the US 29 (Colesville Road) intersection. At this intersection there will be a dedicated right-turn lane for the eastbound Fenton Street and a dedicated left turn lane for westbound Fenton Street. Both of these movements will have exclusive phasing and will not conflict with the cycle track.

As shown in Table 6 - Scenario 1 Approach Delay (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach and the total delay for each intersection, for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better. The westbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay and queues due to the reduction of lanes on this approach and causes spillback to Ellsworth Drive intersection. The orange highlights in Table 6 - Scenario 1 Approach Delay (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection. However, by prohibiting turns across the cycle track these vehicles will divert to either Grove Street or Georgia Avenue to make the turning movement.

Table 7 – Scenario 1 Queues (Feet) have yellow highlights that indicate approaches that have queues that exceed the storage length. This table shows that the northbound/eastbound movements along Fenton Street exceed the storage length at three (3) intersections.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 5 - Scenario 1 Travel Time (Seconds)) (Refer to Appendix D – Scenario 1 Synchro Analysis).

Table 5 - Scenario 1 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	7.6	10.4	8.9	Cameron St	27.9	24.6	31.9
Sligo Ave	14.3	15.9	15.0	Colesville Rd	65.4	62.7	47.2
Silver Spring Ave	21.5	27.5	31.5	Roeder Rd	11.7	11.9	11.9
Thayer Ave	21.4	22.8	26.1	Ellsworth Dr	12.1	18.9	12.6
Easley St	11.7	16.6	18.2	Wayne Ave	24.3	22.6	34.3
Bonifant St	9.3	10.5	11.6	Bonifant St	19.0	23.4	20.0
Wayne Ave	22.1	24.4	31.3	Easley St	5.8	5.7	5.6
Ellsworth Dr	23.3	28.4	53.0	Thayer Ave	16.4	20.6	19.7
Roeder Rd	8.5	9.6	31.7	Silver Spring Ave	21.6	27.1	23.2
Colesville Rd	49.1	51.1	66.8	Sligo Ave	24.5	43.1	27.1
Cameron St	36.9	29.9	37.2	Gist Ave	8.5	9.3	8.1
Total	225.7	247.1	331.3		237.2	269.9	241.6

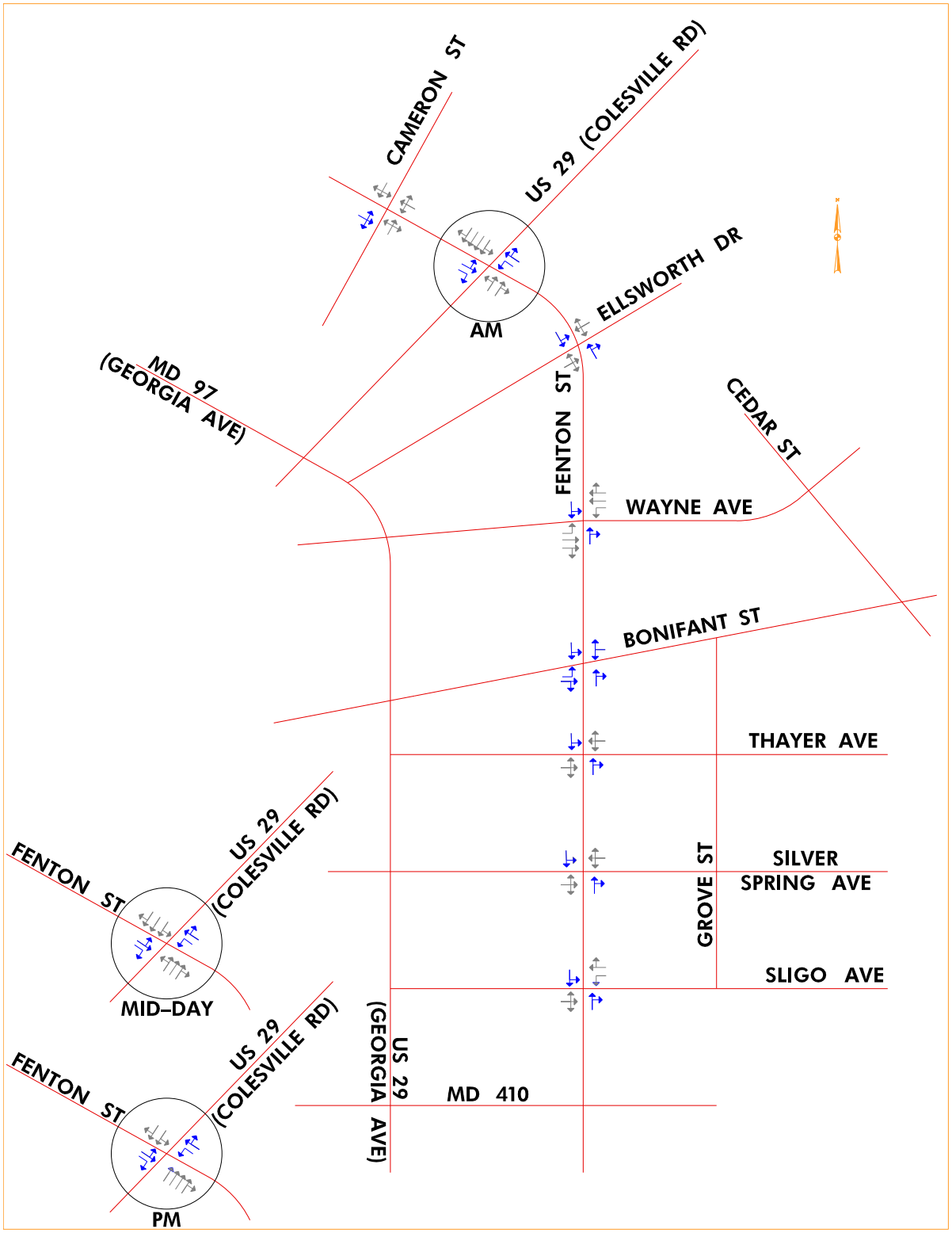

Figure 5 -Scenario 1 Lane Configurations

Table 6 - Scenario 1 Approach Delay (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 1 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	22.0	C	29.9	C	6.6	A	7.1	A	16.4	B
	PM	20.4	C	23.1	C	9.6	A	8.6	A	14.5	B
	SAT	27.1	C	29.5	C	7.3	A	7.6	A	17.8	B
Fenton St at US 29 (Colesville Road)	AM	54.0	D	55.9	E	4.6	A	28.3	C	25.6	C
	PM	57.9	E	51.4	D	8.9	A	36.7	D	23.7	C
	SAT	43.6	D	103.0	F	29.4	C	56.9	E	52.3	D
Fenton St at Ellsworth Dr	AM	21.0	C	21.2	C	7.6	A	5.5	A	8.3	A
	PM	13.2	B	13.5	B	12.8	B	12.9	B	13.0	B
	SAT			40.6	D	34.2	C	5.6	A	25.9	C
Fenton St at Wayne Ave	AM	25.1	C	32.9	C	13.4	B	10.8	B	24.9	C
	PM	41.1	D	75.0	E	16.6	B	10.8	B	38.5	D
	SAT	38.6	D	22.2	C	23.1	C	22.1	C	26.5	C
Fenton St at Bonifant St	AM	10.4	B	3.0	A	5.2	A	8.7	A	7.1	A
	PM	17.9	B	9.8	A	6.7	A	10.9	B	9.7	A
	SAT	19.9	B	17.9	B	7.6	A	8.8	A	9.6	A
Fenton St at Thayer St	AM	11.0	B	11.4	B	8.3	A	7.7	A	8.5	A
	PM	19.6	B	15.4	B	10.0	A	12.0	B	12.3	B
	SAT	22.1	C	18.9	B	13.6	B	11.2	B	14.0	B
Fenton St at Silver Spring Ave	AM	9.7	A	6.1	A	7.2	A	8.8	A	8.0	A
	PM	21.8	C	20.4	C	12.3	B	14.1	B	14.6	B
	SAT	20.7	C	19.0	B	15.7	B	11.0	B	14.4	B
Fenton St at Sligo Ave	AM	8.1	A	12.0	B	8.1	A	11.2	B	10.1	B
	PM	20.8	C	24.3	C	9.5	A	29.9	C	19.8	B
	SAT	21.8	C	18.7	B	8.9	A	14.7	B	13.9	B

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 7 – Scenario 1 Queues (Feet)

Intersection	Peak Hour	Scenario 1 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		58		185		71	22	87
	PM		101		156		148	28	56
	SAT		101		139		98	32	44
	*		209		419		428	100	376
Fenton St at US 29 (Colesville Road)	AM	148	47	143	237	116	89	592	558
	PM	204	122	158	255	114	205	346	348
	SAT	128	82	184	323	314	271	574	489
	*	419	125	125	263	260	260	570	547
Fenton St at Ellsworth Dr	AM		32		65		139		111
	PM		72		98		202		158
	SAT				160		438		136
	*		724		416		498		199
Fenton St at Wayne Ave	AM	54	133	248	281		229		128
	PM	95	296	348	498		349		146
	SAT	219	236	179	180		343		234
	*	667	667	275	876		323		498
Fenton St at Bonifant St	AM	23	49		27		113		209
	PM	49	90		45		102		225
	SAT	54	74		49		106		198
	*	693	693		541		152		323
Fenton St at Thayer St	AM		75		78		190		214
	PM		145		75		290		282
	SAT		141		83		311		254
	*		633		526		430		336
Fenton St at Silver Spring Ave	AM		84		46		182		215
	PM		168		64		296		286
	SAT		117		69		330		239
	*		625		538		474		430
Fenton St at Sligo Ave	AM		100	93	121		178		235
	PM		229	84	174		217		454
	SAT		145	66	130		207		262
	*		182	538	538		169		474

* Storage Length = a queue length that exceeds the storage length

3.2 SCENARIO 2 – PARKING AND LOADING ZONES

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario will maximize parking and loading zones with no dedicated turn lanes along Fenton Street. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 6 – Scenario 2 Lane Configurations, Table 9 - Scenario 2 Approach Delays (Seconds/Vehicle), Table 10 - Scenario 2 Queues (Feet) and Refer to Appendix E – Scenario 2 Synchro Analysis).

As shown in Figure 6 – Scenario 2 Lane Configurations, Fenton Street is narrowed to one lane in each direction and all turns are made from the same lane. As shown in Table 9 - Scenario 2 Approach Delays (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach and the total delay for each intersection, for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better except the intersections of Ellsworth Drive, Thayer Avenue and Silver Spring Avenue. The westbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay and queues due to the reduction of lanes on this approach. The queues extend back along Fenton Street to Ellsworth Drive. The orange highlights in Table 9 - Scenario 2 Approach Delays (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 10 - Scenario 2 Queues (Feet) have yellow highlights indicate approaches that have queues that exceed the storage length. These tables show that the northbound movements along Fenton Street exceed the storage length at all but two (2) intersections.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 8 - Scenario 2 Travel Time (Seconds)) (Refer to Appendix E – Scenario 2 Synchro Analysis).

Table 8 - Scenario 2 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	8.1	37.2	9.1	Cameron St	26.5	25.0	28.0
Sligo Ave	16.2	52.9	17.2	Colesville Rd	55.5	107.1	46.5
Silver Spring Ave	23.9	114.9	28.1	Roeder Rd	11.8	11.7	12.0
Thayer Ave	24.3	96.1	32.7	Ellsworth Dr	11.9	18.5	12.9
Easley St	12.3	78.1	19.9	Wayne Ave	29.9	29.6	42.1
Bonifant St	10.4	25.6	13.0	Bonifant St	20.7	18.3	18.7
Wayne Ave	29.5	99.5	42.2	Easley St	5.9	5.1	5.3
Ellsworth Dr	23.7	424.4	36.0	Thayer Ave	17.6	17.4	20.0
Roeder Rd	14.7	123.9	27.7	Silver Spring Ave	21.2	25.9	25.8
Colesville Rd	101.1	190.5	70.7	Sligo Ave	26.5	38.7	31.3
Cameron St	34.4	30.3	34.2	Gist Ave	8.3	8.8	8.3
Total	298.6	1273.4	330.8		235.8	306.1	250.9

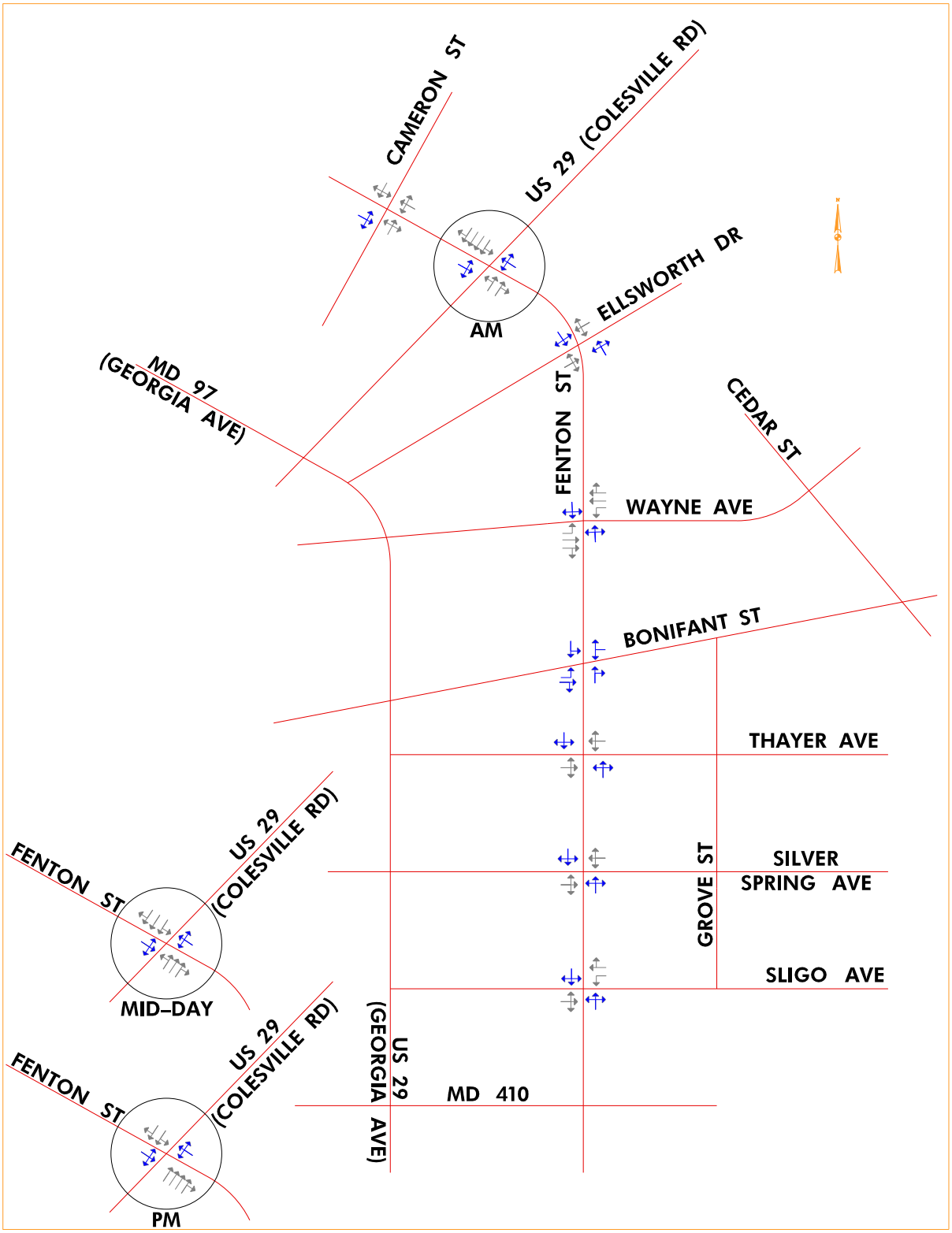

Figure 6 - Scenario 2 Lane Configurations

Table 9 - Scenario 2 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 2 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	21.7	C	29.3	C	6.7	A	6.9	A	15.5	B
	PM	21.9	C	22.7	C	9.7	A	8.3	A	14.4	B
	SAT	25.3	C	28.1	C	7.3	A	7.7	A	17.2	B
Fenton St at US 29 (Colesville Road)	AM	54.1	D	87.8	F	8.2	A	16.7	B	21.0	C
	PM	96.3	F	172.0	F	7.7	A	17.8	B	29.8	C
	SAT	34.6	C	61.9	E	29.7	C	42.9	D	40.6	D
Fenton St at Ellsworth Dr	AM	26.3	C	21.6	C	7.9	A	5.5	A	8.5	A
	PM	45.9	D	97.1	F	225.9	F	12.0	B	104.2	F
	SAT			35.6	D	19.7	B	5.8	A	17.3	B
Fenton St at Wayne Ave	AM	22.9	C	31.5	C	19.0	B	14.8	B	25.3	C
	PM	44.8	D	39.6	D	80.9	F	17.4	B	47.4	D
	SAT	43.0	D	31.6	C	30.9	C	28.7	C	33.6	C
Fenton St at Bonifant St	AM	10.5	B	3.3	A	6.3	A	9.4	A	7.8	A
	PM	106.4	F	59.2	E	21.3	C	8.3	A	28.0	C
	SAT	28.8	C	25.4	C	8.8	A	9.1	A	11.5	B
Fenton St at Thayer St	AM	14.5	B	13.0	B	12.1	B	9.0	A	11.0	B
	PM	120.0	F	35.5	D	86.2	F	8.8	A	57.1	E
	SAT	27.9	C	27.4	C	19.2	B	11.2	B	17.8	B
Fenton St at Silver Spring Ave	AM	10.6	B	7.4	A	9.1	A	8.4	A	8.8	A
	PM	144.2	F	55.5	E	87.8	F	13.7	B	65.2	E
	SAT	24.4	C	20.3	C	13.9	B	12.7	B	14.7	B
Fenton St at Sligo Ave	AM	9.5	A	14.4	B	10.2	B	12.8	B	11.9	B
	PM	90.7	F	105.4	F	33.0	C	25.7	C	52.8	D
	SAT	23.4	C	21.6	C	11.1	B	18.0	B	16.6	B

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 10 - Scenario 2 Queues (Feet)

Intersection	Peak Hour	Scenario 2 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		57		184		85	27	83
	PM		125		124		155	35	53
	SAT		107		154		86	35	49
	*		209		419		428	100	376
Fenton St at US 29 (Colesville Road)	AM		173		307	153	126	385	361
	PM		362		260	105	200	243	263
	SAT		161		315	318	272	497	414
	*		419		263	276	276	552	552
Fenton St at Ellsworth Dr	AM		31		67		147		112
	PM		94		267		679		157
	SAT				138		338		128
	*		718		416		498		193
Fenton St at Wayne Ave	AM	51	120	247	258		296		162
	PM	177	300	232	179		416		199
	SAT	121	221	231	161		393		312
	*	667	667	275	876		323		498
Fenton St at Bonifant St	AM	29	45		30		116		219
	PM	229	133		83		103		193
	SAT		138		55		105		219
	*	693	693		541		152		323
Fenton St at Thayer St	AM		83		92		227		235
	PM		400		90		569		223
	SAT		173		93		372		261
	*		633		526		430		172
Fenton St at Silver Spring Ave	AM		79		48		213		227
	PM		575		101		620		302
	SAT		116		70		319		279
	*		625		538		474		430
Fenton St at Sligo Ave	AM		101	99	138		199		240
	PM		320	102	540		213		422
	SAT		161	72	122		211		323
	*		182	538	538		169		474

* Storage Length = a queue length that exceeds the storage length

3.3 SCENARIO 3 – VEHICULAR TRAFFIC

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario will favor vehicular traffic and have northbound and southbound dedicated left-turn lanes with exclusive and permissive left-turn phasing. There will be a shared thru-right lane for northbound and southbound traffic along Fenton Street. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Refer to Figure 7 – Scenario 3 Lane Configurations, Table 12 - Scenario 3 Approach Delays (Seconds/Vehicle), Table 13 - Scenario 3 Queues (Feet) and (Refer to Appendix F – Scenario 3 Synchro Analysis).

As shown in Table 12 - Scenario 3 Approach Delays (Seconds/Vehicle), the delay per vehicle and Level of Service (LOS) is shown for each approach and the total delay for each intersection, for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better except Ellsworth Drive during the Saturday peak hour. The westbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay and queues during the Saturday peak hour. The orange highlights in Table 12 - Scenario 3 Approach Delays (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 13 - Scenario 3 Queues (Feet) have yellow highlights indicate approaches that have queues that exceed the storage length. These tables show that the northbound left and northbound thru movements along Fenton Street exceed the storage length at all intersections except two (2) intersections.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 11 - Scenario 3 Travel Time (Seconds)) (Refer to Appendix F – Scenario 3 Synchro Analysis).

Table 11 - Scenario 3 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	8.1	11.9	9.5	Cameron St	28.2	28.5	35.3
Sligo Ave	17.1	19.0	18.5	Colesville Rd	53.3	55.6	48.2
Silver Spring Ave	23.6	29.2	36.7	Roeder Rd	11.4	11.8	13.5
Thayer Ave	20.9	27.1	42.2	Ellsworth Dr	12.3	18.7	14.4
Easley St	12.4	16.1	33.3	Wayne Ave	29.2	29.2	46.3
Bonifant St	10.1	10.7	17.3	Bonifant St	20.8	19.9	20.0
Wayne Ave	24.5	30.9	58.4	Easley St	5.7	5.3	5.4
Ellsworth Dr	23.8	30.6	98.5	Thayer Ave	18.4	21.2	21.2
Roeder Rd	8.4	9.2	55.1	Silver Spring Ave	23.4	26.2	24.3
Colesville Rd	53.1	56.3	125.0	Sligo Ave	27.7	32.2	25.7
Cameron St	32.1	26.9	26.0	Gist Ave	8.4	9.0	8.2
Total	234.1	267.9	520.5		238.8	257.6	262.5

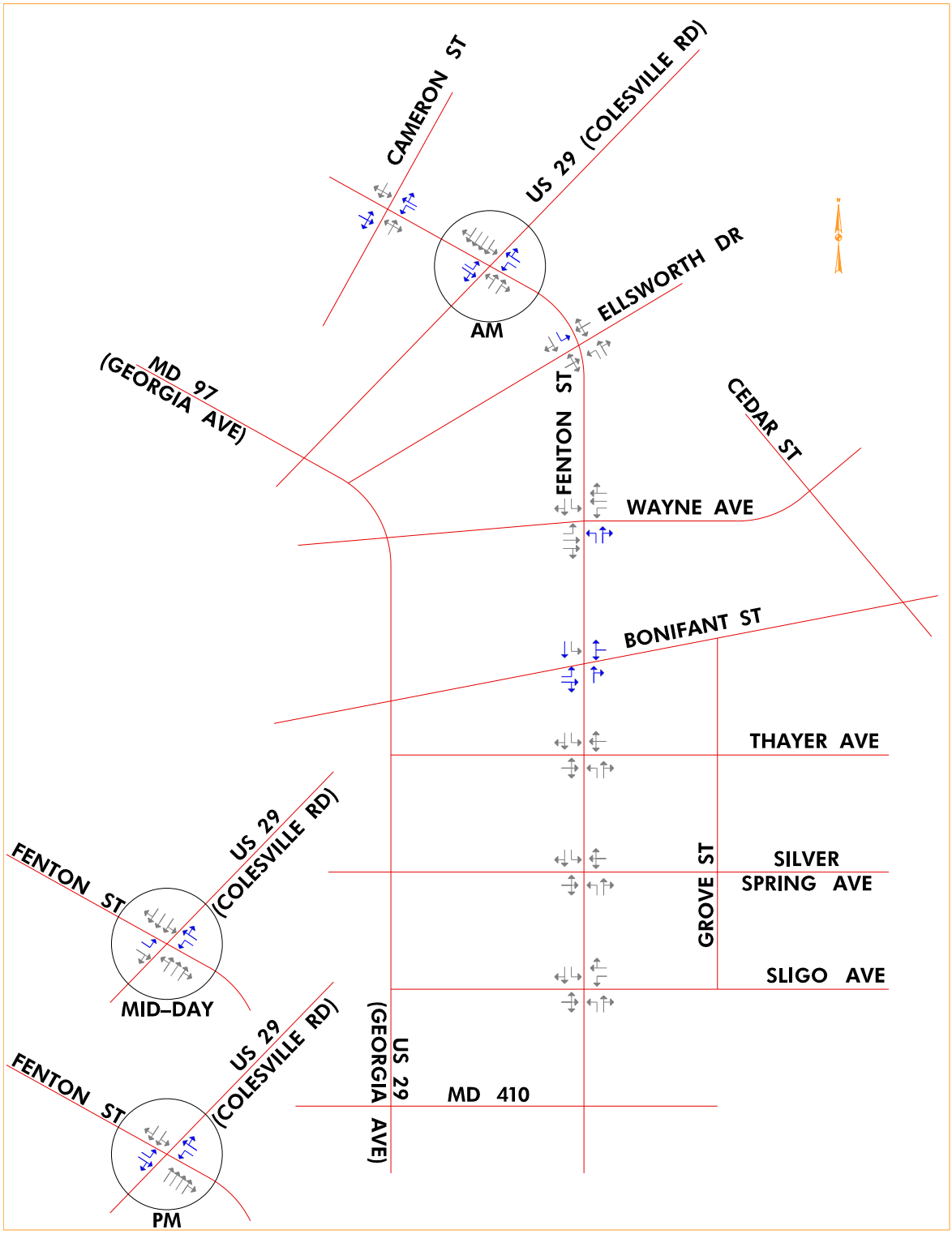

Figure 7 - Scenario 3 Lane Configurations

Table 12 - Scenario 3 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 3 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	26.6	C	22.5	C	9.4	A	9.5	A	15.3	B
	PM	23.8	C	17.5	B	12.3	B	12.1	B	15.5	B
	SAT	30.8	C	21.0	C	11.1	B	9.6	A	17.8	B
Fenton St at US 29 (Colesville Road)	AM	46.8	D	49.6	D	3.8	A	13.7	B	14.9	B
	PM	49.0	D	50.7	D	3.7	A	25.4	C	17.3	B
	SAT	43.2	D	110.0	F	18.4	B	24.2	C	34.7	C
Fenton St at Ellsworth Dr	AM	25.3	C	25.5	C	8.1	A	5.8	A	9.1	A
	PM	19.1	B	19.7	B	15.3	B	12.2	B	15.2	B
	SAT			72.3	E	83.9	F	7.5	A	57.0	E
Fenton St at Wayne Ave	AM	25.7	C	32.0	C	14.0	B	15.1	B	25.2	C
	PM	40.5	D	85.7	F	21.1	C	16.4	B	43.1	D
	SAT	62.9	E	33.2	C	44.1	D	31.1	C	42.9	D
Fenton St at Bonifant St	AM	11.4	B	4.1	A	6.0	A	9.4	A	7.8	A
	PM	17.5	B	9.4	A	6.9	A	9.4	A	9.2	A
	SAT	31.7	C	27.1	C	12.8	B	8.5	A	13.6	B
Fenton St at Thayer St	AM	14.0	B	11.6	B	8.3	A	9.4	A	9.4	A
	PM	19.3	B	16.2	B	14.1	B	12.6	B	14.4	B
	SAT	49.3	D	28.8	C	28.4	C	12.2	B	25.1	C
Fenton St at Silver Spring Ave	AM	10.4	B	7.7	A	8.6	A	10.2	B	9.4	A
	PM	22.0	C	17.7	B	14.4	B	13.1	B	15.3	B
	SAT	51.9	D	28.5	C	20.5	C	11.4	B	20.4	C
Fenton St at Sligo Ave	AM	9.7	A	12.9	B	11.1	B	13.6	B	12.1	B
	PM	18.5	B	20.7	C	13.0	B	18.1	B	16.6	B
	SAT	20.1	C	17.5	B	12.5	B	12.1	B	14.2	B

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 13 - Scenario 3 Queues (Feet)

Intersection	Peak Hour	Scenario 3 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		65	102	97		94	37	92
	PM		106	103	68		157	37	59
	SAT		109	112	54		115	36	46
	*		209	125	419		423	100	372
Fenton St at US 29 (Colesville Road)	AM	52	134	124	219	112	98	381	330
	PM	118	207	145	255	98	145	312	311
	SAT	75	147	201	308	282	235	362	310
	*	100	419	125	263	270	270	547	547
Fenton St at Ellsworth Dr	AM		35		68	23	153		110
	PM		82		114	35	197	73	146
	SAT				241		614		141
	*		709		406	495	495	100	192
Fenton St at Wayne Ave	AM	50	130	233	259	90	230	40	165
	PM	105	309	344	645	130	359	65	188
	SAT	329	210	204	211	142	405	139	305
	*	667	667	275	864	92	322	100	495
Fenton St at Bonifant St	AM	27	49		30		113	24	200
	PM	47	87		41		103	33	199
	SAT	98	79		64		98	30	201
	*	688	688		535		152	75	322
Fenton St at Thayer St	AM		91		77	64	176	31	229
	PM		149		74	73	350	64	267
	SAT		287		119	81	433	52	276
	*		628		522	50	430	50	336
Fenton St at Silver Spring Ave	AM		84		50	59	186	35	250
	PM		166		56	61	334	60	282
	SAT		255		77	63	404	57	249
	*		620		533	40	474	50	430
Fenton St at Sligo Ave	AM		103	95	130	73	197	57	262
	PM		198	79	138	69	218	81	345
	SAT		164	66	116	81	217	78	240
	*		177	534	534	60	167	50	474

* Storage Length = a queue length that exceeds the storage length

3.4 SCENARIO 4 – NB/SB EXCLUSIVE LEFT-TURNS

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario will favor vehicular traffic and have northbound and southbound dedicated left-turn lanes with exclusive left-turn phasing. There will be a shared thru-right lane for northbound and southbound traffic along Fenton Street. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 8 – Scenario 4 Lane Configurations, Table 15 - Scenario 4 Approach Delays (Seconds/Vehicle), Table 16 - Scenario 4 Queues (Feet), and to Appendix G – Scenario 4 Synchro Capacity Analysis).

As shown in Table 15 - Scenario 4 Approach Delays (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach and the total delay for each intersection, for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better. The westbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay and queues due to the reduction of lanes on this approach. There are five (5) intersections that have an approach LOS E or LOS F for the Scenario 4 conditions. The orange highlights in Table 15 - Scenario 4 Approach Delays (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 16 - Scenario 4 Queues (Feet) have yellow highlights indicate approaches that have queues that exceed the storage length. This table shows that the northbound left and northbound thru movements along Fenton Street exceed the storage length at all intersections except two (2) intersections.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 14 - Scenario 4 Travel Time (Seconds)) (Refer to Appendix G – Scenario 4 Synchro Analysis).

Table 14 - Scenario 4 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	8.0	12.6	14.3	Cameron St	34.2	25.3	32.5
Sligo Ave	16.2	19.2	21.3	Colesville Rd	51.0	54.0	45.3
Silver Spring Ave	23.8	30.5	61.6	Roeder Rd	12.0	12.4	11.8
Thayer Ave	22.4	28.5	48.5	Ellsworth Dr	13.3	18.7	13.8
Easley St	11.2	18.9	35.3	Wayne Ave	33.2	33.7	56.3
Bonifant St	10.3	11.9	16.5	Bonifant St	19.3	21.5	19.0
Wayne Ave	25.1	34.0	53.1	Easley St	5.6	5.4	5.3
Ellsworth Dr	23.3	30.9	74.3	Thayer Ave	20.7	22.9	24.5
Roeder Rd	8.3	11.4	44.7	Silver Spring Ave	24.6	29.1	25.5
Colesville Rd	52.5	59.6	90.7	Sligo Ave	29.8	34.6	29.0
Cameron St	27.7	26.5	34.6	Gist Ave	8.6	8.7	8.3
Total	228.8	284.0	494.9		252.3	266.3	271.3

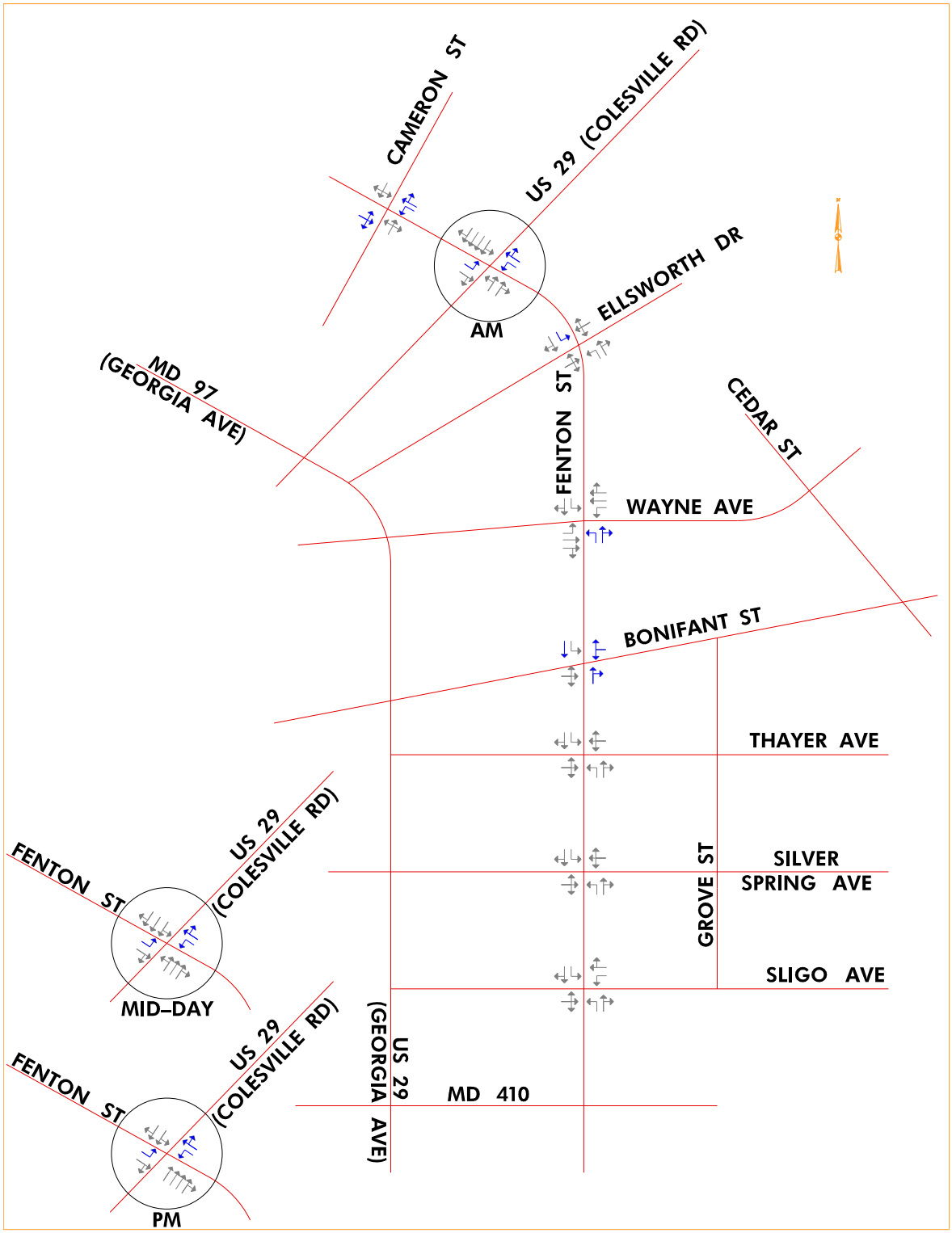

Figure 8 - Scenario 4 Lane Configurations

Table 15 - Scenario 4 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 4 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	30.3	C	27.0	C	9.4	A	9.6	A	17.2	B
	PM	18.5	B	23.3	C	15.4	B	13.0	B	17.5	B
	SAT	26.3	C	30.6	C	11.4	B	13.4	B	20.1	C
Fenton St at US 29 (Colesville Road)	AM	50.2	D	56.5	E	60.6	E	29.9	C	39.8	D
	PM	57.1	E	58.8	E	8.8	A	23.7	C	21.4	C
	SAT	40.0	D	118.6	F	27.1	C	37.4	D	44.7	D
Fenton St at Ellsworth Dr	AM	24.4	C	24.9	C	8.2	A	6.7	A	9.4	A
	PM	16.7	B	19.3	B	16.7	B	12.1	B	15.5	B
	SAT			66.0	E	60.9	E	6.9	A	43.4	D
Fenton St at Wayne Ave	AM	25.5	C	33.0	C	21.2	C	18.9	B	27.5	C
	PM	40.7	D	72.1	E	30.3	C	20.9	C	42.8	D
	SAT	53.7	D	27.8	C	52.4	D	41.4	D	43.9	D
Fenton St at Bonifant St	AM	9.2	A	4.2	A	6.0	A	8.5	A	7.3	A
	PM	19.6	B	10.7	B	7.9	A	10.7	B	10.3	B
	SAT	28.4	C	25.0	C	12.1	B	8.0	A	12.3	B
Fenton St at Thayer St	AM	15.8	B	13.3	B	11.8	B	11.7	B	12.2	B
	PM	21.7	C	18.2	B	17.6	B	13.8	B	16.9	B
	SAT	68.1	E	36.2	D	38.3	D	15.5	B	33.0	C
Fenton St at Silver Spring Ave	AM	12.4	B	9.4	A	10.3	B	11.4	B	10.9	B
	PM	26.1	C	20.6	C	17.6	B	16.1	B	18.5	B
	SAT	138.6	F	112.7	F	30.9	C	12.9	B	36.4	D
Fenton St at Sligo Ave	AM	9.2	A	13.0	B	12.3	B	15.4	B	12.9	B
	PM	17.5	B	21.3	C	14.4	B	20.7	C	17.8	B
	SAT	51.7	D	32.5	C	17.0	B	15.6	B	23.3	C

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 16 - Scenario 4 Queues (Feet)

Intersection	Peak Hour	Scenario 4 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		63	118	91		93	31	85
	PM	55	84	110	83		185	39	61
	SAT	52	79	112	64		107	38	49
	*	206	209	125	419		423	100	372
Fenton St at US 29 (Colesville Road)	AM	67	132	137	216	333	352	580	542
	PM	123	233	170	275	100	208	259	274
	SAT	79	144	185	322	316	259	472	403
	*	100	419	125	263	270	270	547	547
Fenton St at Ellsworth Dr	AM		27		78	24	141		124
	PM		73		107	45	209	70	154
	SAT				220		556		143
	*		707		406	495	495		192
Fenton St at Wayne Ave	AM	54	131	252	267	100	234	43	173
	PM	100	316	334	500	138	377	70	213
	SAT	285	262	200	165	145	406	144	354
	*	667	667	275	864	92	327	37	495
Fenton St at Bonifant St	AM		56		27		124	19	185
	PM		108		50		100	37	192
	SAT	71	82		59		103	18	208
	*	354	688		536		152	75	327
Fenton St at Thayer St	AM		96		84	79	204	37	247
	PM		151		75	82	383	49	265
	SAT		362		124	84	466	51	291
	*		628		522	50	430	50	336
Fenton St at Silver Spring Ave	AM		103		55	65	200	34	252
	PM		182		60	67	373	50	307
	SAT		452		212	71	471	60	293
	*		620		533	40	474	50	430
Fenton St at Sligo Ave	AM		102	92	136	82	199	56	255
	PM		189	82	153	77	220	80	366
	SAT		357	75	245	79	220	78	305
	*		177	534	534	60	167	50	474

* Storage Length

= a queue length that exceeds the storage length

3.5 SCENARIO 5 –SB EXCLUSIVE RIGHT-TURNS, NB EXCLUSIVE LEFT-TURN

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario will favor vehicular traffic and have northbound dedicated left-turn lanes with exclusive left-turn phasing. There will be a shared thru-right lane for northbound traffic along Fenton Street. Southbound Fenton Street will have a dedicated right-turn lane and a thru-left lane. The southbound right turn will have exclusive phasing. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 9 – Scenario 5 Lane Configurations, Table 18 - Scenario 5 Approach Delays (Seconds/Vehicle), Table 19 - Scenario 5 Queues (Feet), and to Appendix H – Scenario 5 Synchro Capacity Analysis).

As shown in Table 18 - Scenario 5 Approach Delays (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach, the total delay for each intersection, and for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better except the intersection of Wayne Avenue that operates at LOS E during the Saturday Peak hour. The US 29 (Colesville Road) intersection has the biggest increase in delay and queues due to the reduction of lanes on this approach. The orange highlights in Table 18 - Scenario 5 Approach Delays (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 19 - Scenario 5 Queues (Feet) have yellow highlights indicate approaches that have queues that exceed the storage length. These tables show that the northbound left and northbound thru movements along Fenton Street exceed the storage length at all intersections.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 17 Scenario 5 Travel Time (Seconds)) (Refer to Appendix H – Scenario 5 Synchro Analysis).

Table 17 Scenario 5 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	8.8	17.8	18.8	Cameron St	28.7	32.8	37.5
Sligo Ave	19.2	23.8	25.5	Colesville Rd	67.6	63.9	49.0
Silver Spring Ave	25.7	43.6	64.1	Roeder Rd	12.3	11.9	11.5
Thayer Ave	25.1	41.2	48.6	Ellsworth Dr	13.2	20.7	15.2
Easley St	12.8	32.4	40.9	Wayne Ave	43.2	52.9	88.8
Bonifant St	10.1	14.9	17.9	Bonifant St	21.0	25.2	22.9
Wayne Ave	25.9	51.1	61.6	Easley St	5.8	6.5	5.9
Ellsworth Dr	31.1	32.3	80.0	Thayer Ave	20.4	34.2	26.2
Roeder Rd	9.0	9.6	51.6	Silver Spring Ave	24.4	45.7	33.9
Colesville Rd	51.4	49.2	89.5	Sligo Ave	31.9	62.3	35.2
Cameron St	29.6	35.7	27.2	Gist Ave	8.6	9.4	8.4
Total	248.7	351.6	525.7		277.1	365.5	334.5

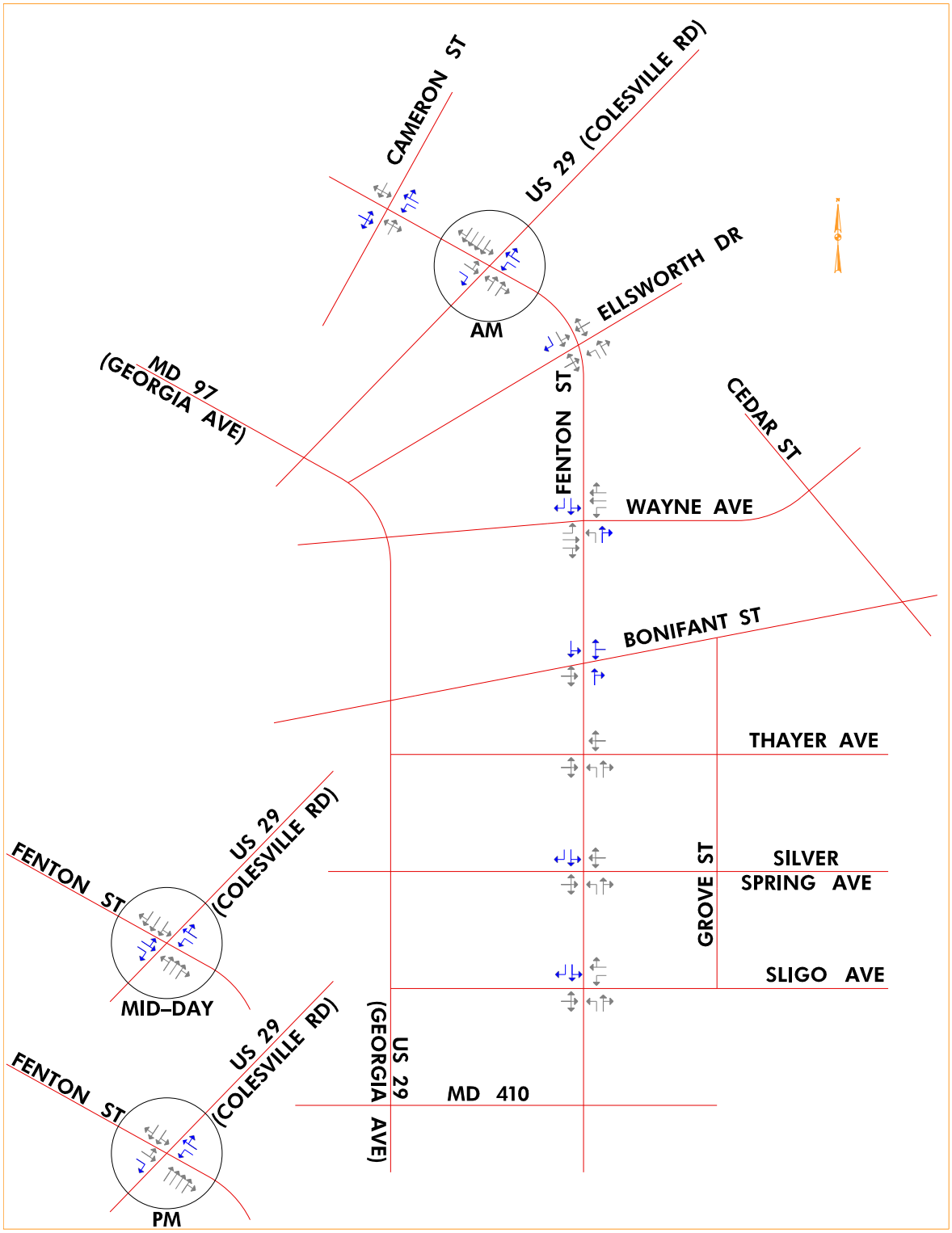

Figure 9 - Scenario 5 Lane Configurations

Table 18 - Scenario 5 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 5 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	26.0	C	27.6	C	11.5	B	10.0	A	17.9	B
	PM	25.2	C	29.7	C	13.7	B	11.9	B	19.2	B
	SAT	30.3	C	31.0	C	11.4	B	10.7	B	20.5	C
Fenton St at US 29 (Colesville Road)	AM	59.4	E	58.4	E	7.9	A	65.8	E	49.8	D
	PM	67.1	E	48.4	D	5.0	A	103.6	F	39.8	D
	SAT	52.5	D	126.4	F	28.4	C	53.9	D	53.9	D
Fenton St at Ellsworth Dr	AM	24.6	C	23.7	C	15.4	B	8.9	A	13.8	B
	PM	18.6	B	20.7	C	17.7	B	16.9	B	17.9	B
	SAT			74.0	E	74.6	E	8.4	A	51.7	D
Fenton St at Wayne Ave	AM	27.2	C	34.3	C	23.3	C	35.5	D	30.8	C
	PM	18.7	B	28.4	C	47.3	D	33.2	C	31.4	C
	SAT	50.7	D	65.5	E	57.6	E	72.2	E	60.9	E
Fenton St at Bonifant St	AM	12.6	B	3.9	A	6.0	A	9.8	A	8.1	A
	PM	35.5	D	19.1	B	11.1	B	11.5	B	14.5	B
	SAT	75.8	E	76.5	E	12.9	B	10.9	B	20.9	C
Fenton St at Thayer St	AM	17.5	B	15.2	B	15.1	B	13.2	B	14.5	B
	PM	70.1	E	44.7	D	31.4	C	26.3	C	35.5	D
	SAT	73.1	E	43.4	D	40.5	D	17.0	B	35.7	D
Fenton St at Silver Spring Ave	AM	12.1	B	9.0	A	12.4	B	12.4	B	12.2	B
	PM	38.4	D	33.7	C	30.6	C	35.6	D	33.7	C
	SAT	53.2	D	32.4	C	40.3	D	24.6	C	34.9	C
Fenton St at Sligo Ave	AM	10.7	B	15.9	B	15.5	B	20.3	C	16.3	B
	PM	36.5	D	35.7	D	19.8	B	52.0	D	34.3	C
	SAT	66.0	E	37.0	D	21.7	C	23.5	C	30.7	C

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 19 - Scenario 5 Queues (Feet)

Intersection	Peak Hour	Scenario 5 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		64	121	96		106		89
	PM		126	122	79		204		66
	SAT		114	121	68		128		66
	*		209	125	419		423		372
Fenton St at US 29 (Colesville Road)	AM	193	67	147	238	134	107	681	693
	PM	256	91	155	268		150	676	659
	SAT	172	85	184	325	303	260	535	463
	*	419	50	125	264	263	263	547	547
Fenton St at Ellsworth Dr	AM		26		77	24	187	119	53
	PM		73		100	35	218	162	77
	SAT				245		572		149
	*		700		411	477	477	189	50
Fenton St at Wayne Ave	AM	47	135	250	280	112	286	239	83
	PM	71	206	201	142	137	391	275	94
	SAT	243	227	317	391	146	405	481	88
	*	656	656	236	864	92	327	477	50
Fenton St at Bonifant St	AM	25	46		26		121		228
	PM	77	112		58		96		225
	SAT	214	81		105		98		262
	*	357	691		536		152	75	327
Fenton St at Thayer St	AM		83		87	74	259	255	65
	PM		382		117	81	490	321	80
	SAT		356		117	83	475	306	77
	*		616		522	50	430	336	50
Fenton St at Silver Spring Ave	AM		69		52	65	243	258	66
	PM		213		73	71	502	437	86
	SAT		232		79	71	484	369	88
	*		608		533	40	472	430	50
Fenton St at Sligo Ave	AM		117	101	154	83	209	278	83
	PM		269	97	197	79	210	543	85
	SAT		389	77	217	78	223	367	79
	*	100	166	534	534	60	167	472	50

* Storage Length = a queue length that exceeds the storage length

3.6 SCENARIO 6 –NB EXCLUSIVE LEFT-TURN

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario will favor vehicular traffic and have northbound and southbound dedicated left-turn lanes with exclusive left-turn phasing. There will be a shared thru-right lane for northbound and southbound traffic along Fenton Street. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 10 – Scenario 6 Lane Configurations, Table 21 - Scenario 6 Approach Delays (Seconds/Vehicle), Table 22 - Scenario 6 Queues (Feet), and to Appendix I – Scenario 6 Synchro Capacity Analysis).

As shown in Table 21 - Scenario 6 Approach Delays (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach, the total delay for each intersection, and for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better. The eastbound Fenton Street approach at US 29 (Colesville Road) has the biggest increase in delay and queues. The orange highlights in Table 21 - Scenario 6 Approach Delays (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 22 - Scenario 6 Queues (Feet) have yellow highlights indicate approaches that have queues that exceed the storage length. These tables show that the northbound/westbound left movements along Fenton Street exceed the storage length at all intersections except two (2) intersections.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 20 - Scenario 6 Travel Time (Seconds)) (Refer to Appendix I – Scenario 6 Synchro Analysis).

Table 20 - Scenario 6 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	7.9	10.5	8.5	Cameron St	28.8	29.0	34.1
Sligo Ave	15.4	16.2	15.4	Colesville Rd	64.8	155.5	48.5
Silver Spring Ave	22.9	28.4	30.2	Roeder Rd	11.5	11.9	11.7
Thayer Ave	21.8	24.5	31.4	Ellsworth Dr	12.9	20.2	12.7
Easley St	12.3	16.5	19.7	Wayne Ave	34.6	33.5	70.6
Bonifant St	10.3	11.1	12.6	Bonifant St	20.6	22.0	19.8
Wayne Ave	26.5	31.6	36.8	Easley St	5.7	5.4	5.5
Ellsworth Dr	24.2	27.0	23.3	Thayer Ave	20.3	25.6	25.6
Roeder Rd	8.3	9.0	9.7	Silver Spring Ave	24.9	32.7	27.1
Colesville Rd	47.6	53.8	47.7	Sligo Ave	30.6	49.3	32.2
Cameron St	28.3	27.3	32.9	Gist Ave	8.5	8.9	8.2
Total	225.5	255.9	268.2		263.2	394.0	296.0

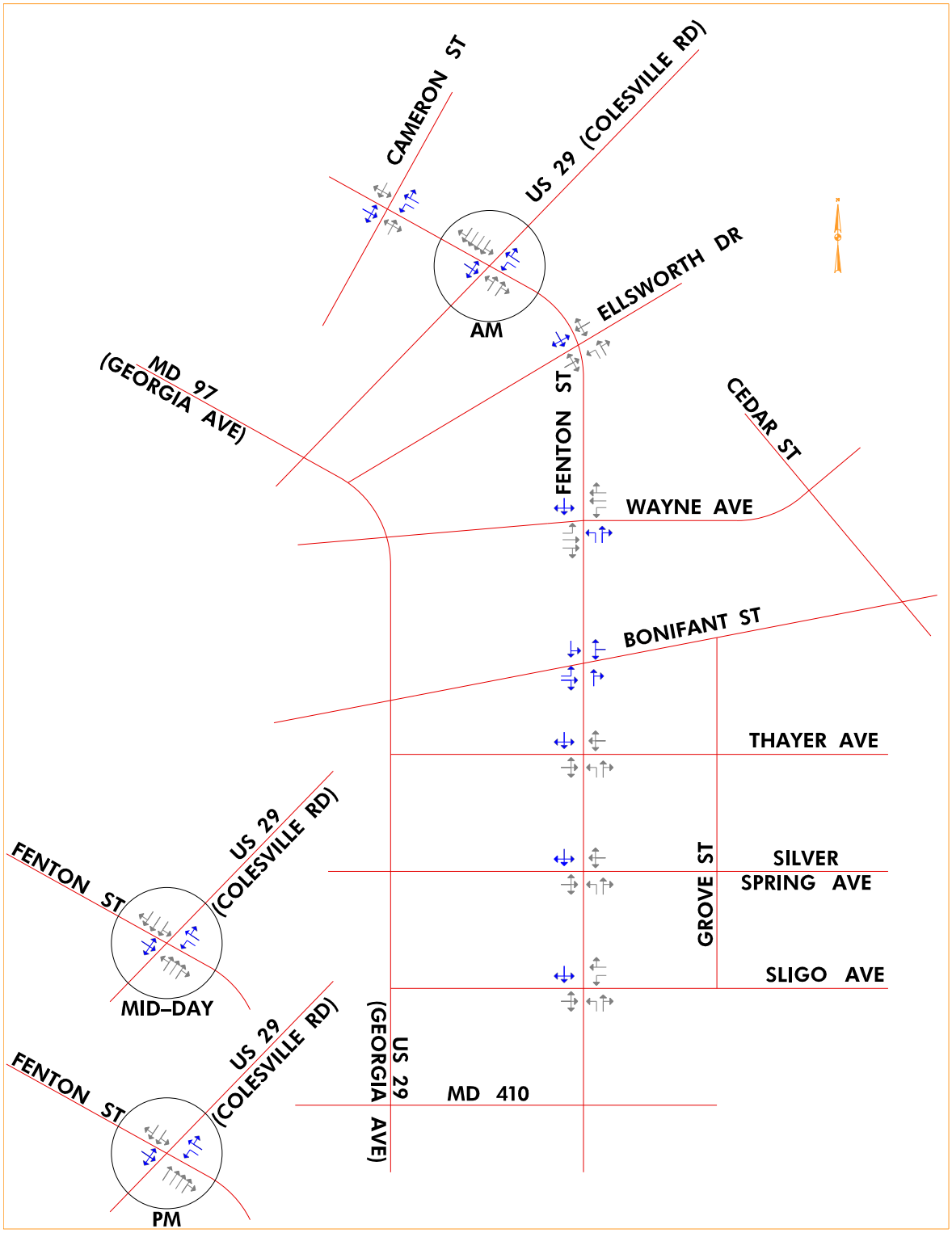

Figure 10 - Scenario 6 Lane Configurations

Table 21 - Scenario 6 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 6 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	24.9	C	25.0	C	11.1	B	10.0	A	16.8	B
	PM	22.4	C	23.5	C	15.8	B	13.8	B	18.5	B
	SAT	28.7	C	31.4	C	12.0	B	9.7	A	20.6	C
Fenton St at US 29 (Colesville Road)	AM	54.9	D	49.8	D	9.5	A	38.9	D	33.2	C
	PM	138.6	F	52.9	D	9.4	A	23.3	C	26.4	C
	SAT	46.8	D	49.5	D	19.9	B	40.7	D	35.1	D
Fenton St at Ellsworth Dr	AM	24.4	C	24.5	C	9.4	A	6.4	A	9.9	A
	PM	16.7	B	18.0	B	13.4	B	14.1	B	14.6	B
	SAT			22.3	C	8.5	A	5.7	A	9.5	A
Fenton St at Wayne Ave	AM	25.8	C	33.4	C	23.1	C	19.6	B	28.2	C
	PM	39.4	D	55.1	E	29.2	C	21.5	C	38.0	D
	SAT	44.8	D	29.4	C	37.2	D	55.1	E	40.1	D
Fenton St at Bonifant St	AM	9.9	A	3.0	A	6.2	A	9.9	A	8.0	A
	PM	21.8	C	10.1	B	7.2	A	10.3	B	10.1	B
	SAT	25.0	C	22.9	C	8.7	A	9.9	A	11.2	B
Fenton St at Thayer St	AM	19.6	B	13.6	B	11.7	B	11.4	B	12.3	B
	PM	21.8	C	16.8	B	13.9	B	16.6	B	16.0	B
	SAT	31.0	C	23.3	C	20.8	C	16.7	B	20.7	C
Fenton St at Silver Spring Ave	AM	12.0	B	9.1	A	9.3	A	11.8	B	10.6	B
	PM	23.5	C	20.7	C	15.0	B	20.1	C	18.3	B
	SAT	26.7	C	22.7	C	16.7	B	14.2	B	16.9	B
Fenton St at Sligo Ave	AM	10.2	B	14.4	B	11.1	B	16.4	B	13.3	B
	PM	25.7	C	28.3	C	12.8	B	35.5	D	23.9	C
	SAT	26.4	C	23.2	C	11.2	B	19.1	B	17.6	B

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 22 - Scenario 6 Queues (Feet)

Intersection	Peak Hour	Scenario 6 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		62	118	96		89	29	91
	PM		110	113	66		240	45	55
	SAT		99	111	58		112	35	50
	*		209	125	419		423	100	372
Fenton St at US 29 (Colesville Road)	AM		169	138	223	171	160	668	640
	PM		441	154	253	123	211	245	254
	SAT		178	176	274	284	246	491	422
	*		419	125	263	271	271	547	547
Fenton St at Ellsworth Dr	AM		32		78	30	160		111
	PM		74		96	47	184		161
	SAT				111		198		129
	*		713		411	496	496		192
Fenton St at Wayne Ave	AM	57	150	237	266	118	263		185
	PM	106	305	304	295	134	376		197
	SAT	112	225	222	168	138	393		422
	*	667	667	275	868	92	322		496
Fenton St at Bonifant St	AM	26	41		28		116		221
	PM		126		46		104		183
	SAT	62	83		56		101		222
	*	690	690		535		152		322
Fenton St at Thayer St	AM		97		87	74	220		249
	PM		149		78	80	309		266
	SAT		205		93	81	388		293
	*		628		525	50	430		412
Fenton St at Silver Spring Ave	AM		86		53	63	202		275
	PM		167		73	67	310		329
	SAT		122		78	69	343		290
	*		620		563	40	474		430
Fenton St at Sligo Ave	AM		113	102	147	73	190		273
	PM		250	92	187	81	226		447
	SAT		176	74	138	74	209		335
	*		177	534	534	60	167		474

* Storage Length = a queue length that exceeds the storage length

3.7 SCENARIO 7 –NB EXCLUSIVE LEFT-TURN (NO LEFTS AT THAYER AVENUE)

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario is a combination of the previous scenarios to maximize benefits for all users. Scenario 7 will have northbound dedicated left-turn lanes with exclusive left-turn phasing. Traffic will be prohibited from turning from Fenton Street to westbound Ellsworth Drive. Also, northbound left turns will be prohibited at Thayer Street. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 11 – Scenario 7 Lane Configurations, Table 24 - Sceanrio 7 Approach Delay (Seconds/Vehicle), Table 25 - Scenario 7 Queues (Feet), and to Appendix J – Scenario 7 Synchro Capacity Analysis).

As shown in Table 24 - Sceanrio 7 Approach Delay (Seconds/Vehicle) the delay per vehicle and Level of Service (LOS) is shown for each approach, the total delay for each intersection, and for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better. Since northbound left turns were prohibited at the intersection of Fenton Street and Thayer Street the Thayer Street intersection operation improves. However, the vehicles that were turning left at Thayer are now turning left at Silver Spring Avenue and the Fenton Street and Silver Spring Avenue intersection delay increases but still operates at a LOS C or better. The orange highlights in Table 24 - Sceanrio 7 Approach Delay (Seconds/Vehicle), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 25 - Scenario 7 Queues (Feet) have yellow highlights indicate approaches that have queues that exceed the storage length. These tables show that the northbound/westbound left movements along Fenton Street exceed the storage length at all intersections but the Ellsworth Drive intersection.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 23 - Scenario 7 Travel Time (Seconds)) (Refer to Appendix J – Scenario 7 Synchro Analysis).

Table 23 - Scenario 7 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	8.0	12.5	9.2	Cameron St	27.9	30.6	31.3
Sligo Ave	17.0	19.6	18.6	Colesville Rd	64.7	57.0	52.3
Silver Spring Ave	24.0	30.3	28.9	Roeder Rd	11.6	12.1	12.2
Thayer Ave	22.0	24.3	34.2	Ellsworth Dr	12.8	16.0	13.4
Easley St	11.8	18.7	27.9	Wayne Ave	34.4	31.0	54.1
Bonifant St	11.6	11.7	15.6	Bonifant St	19.6	21.3	19.6
Wayne Ave	25.0	32.5	50.0	Easley St	5.4	5.4	5.3
Ellsworth Dr	24.8	30.9	46.6	Thayer Ave	17.7	21.5	18.2
Roeder Rd	9.3	10.2	33.2	Silver Spring Ave	26.1	34.9	30.8
Colesville Rd	66.2	61.7	75.4	Sligo Ave	27.8	33.4	27.1
Cameron St	33.1	34.3	38.7	Gist Ave	8.6	9.0	8.1
Total	252.8	286.7	378.3		256.6	272.2	272.4

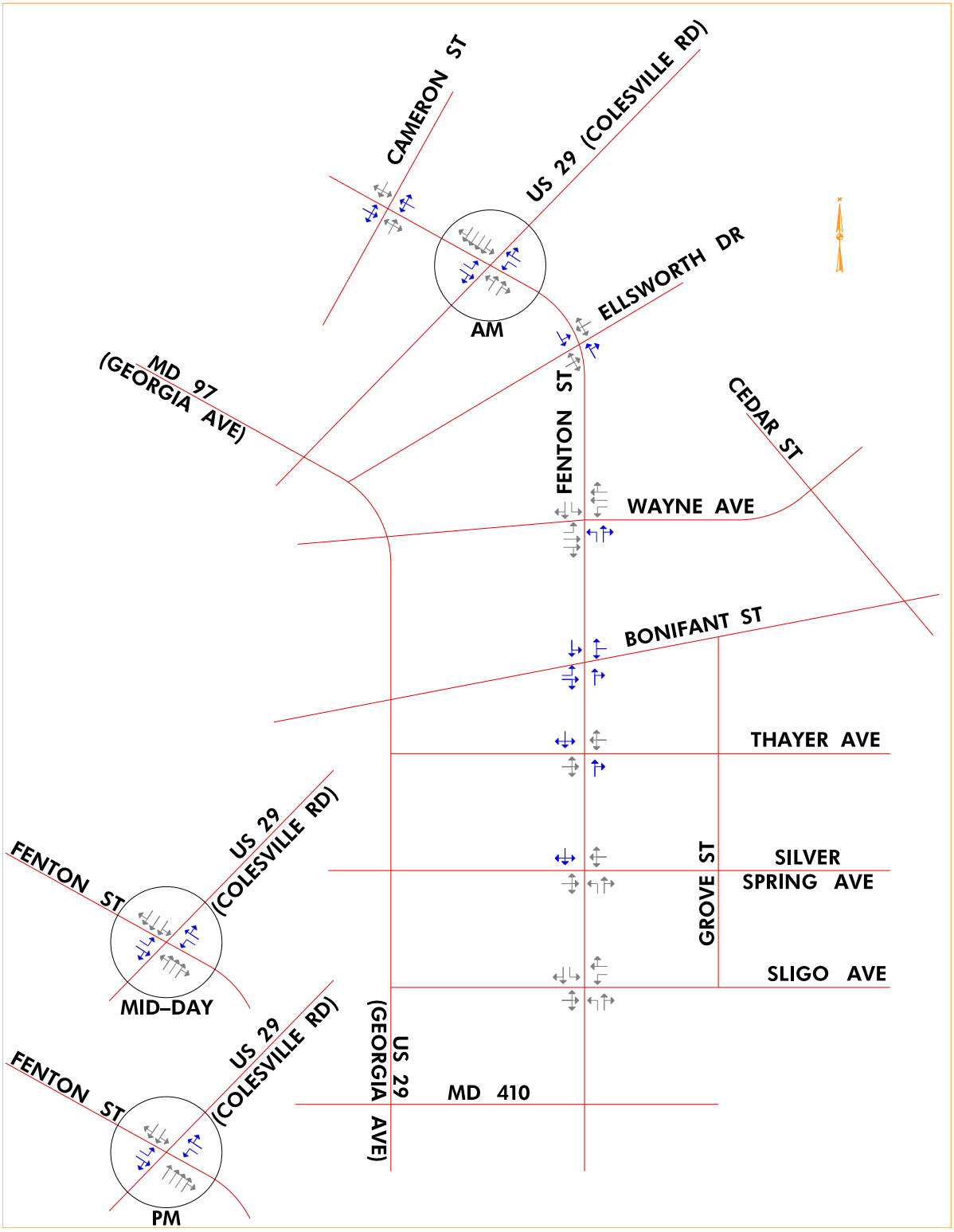

Figure 11 - Scenario 7 Lane Configurations

Table 24 - Scenario 7 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 7 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	22.7	C	25.5	C	6.8	A	7.1	A	14.5	B
	PM	27.2	C	24.9	C	8.9	A	9.0	A	15.3	B
	SAT	25.9	C	28.8	C	7.6	A	7.1	A	17.3	B
Fenton St at US 29 (Colesville Road)	AM	56.9	E	67.6	E	59.8	E	29.2	C	40.3	D
	PM	52.2	D	54.5	D	8.7	A	26.0	C	21.1	C
	SAT	43.2	D	139.8	F	27.5	C	37.0	D	48.0	D
Fenton St at Ellsworth Dr	AM	19.8	B	25.7	C	8.4	A	6.2	A	9.4	A
	PM	21.7	C	17.7	B	14.8	B	9.7	A	14.2	B
	SAT			57.3	E	33.4	C	6.5	A	28.2	C
Fenton St at Wayne Ave	AM	24.1	C	32.2	C	22.6	C	19.6	B	27.1	C
	PM	40.9	D	72.5	E	27.8	C	17.8	B	42.2	D
	SAT	42.8	D	26.2	C	49.1	D	38.5	D	39.1	D
Fenton St at Bonifant St	AM	10.2	B	3.9	A	7.3	A	9.2	A	8.2	A
	PM	18.9	B	10.7	B	7.4	A	9.2	A	9.6	A
	SAT	32.1	C	31.8	C	11.6	B	7.8	A	12.7	B
Fenton St at Thayer St	AM	11.7	B	11.1	B	8.7	A	8.8	A	9.1	A
	PM	16.1	B	16.7	B	9.1	A	14.3	B	12.4	B
	SAT	25.6	C	22.6	C	20.6	C	9.5	A	17.0	B
Fenton St at Silver Spring Ave	AM	12.8	B	10.7	B	12.4	B	13.2	B	12.7	B
	PM	25.7	C	20.9	C	22.2	C	21.4	C	22.5	C
	SAT	25.8	C	22.1	C	19.4	B	18.0	B	19.5	B
Fenton St at Sligo Ave	AM	9.7	A	13.7	B	12.6	B	13.8	B	12.9	B
	PM	13.0	B	23.8	C	13.8	B	20.3	C	17.0	B
	SAT	20.3	C	17.0	B	13.5	B	13.9	B	15.1	B

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 25 - Scenario 7 Queues (Feet)

Intersection	Peak Hour	Scenario 7 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		61		180		84		85
	PM		119		150		163		61
	SAT		106		138		96		58
	*		209	125	419		423	100	372
Fenton St at US 29 (Colesville Road)	AM	58	163	140	236	347	364	575	529
	PM	111	203	106	259	112	205	264	262
	SAT	80	151	309	283	316	264	422	366
	*	100	419	125	263	271	271	547	547
Fenton St at Ellsworth Dr	AM		36		78		153		129
	PM		73		97		188	62	124
	SAT				213		431		145
	*		713		411	496	496	100	192
Fenton St at Wayne Ave	AM	57	125	240	258	112	235	58	190
	PM	98	309	338	605	136	396	47	188
	SAT	135	224	220	162	143	394	145	347
	*	667	667	275	868	92	322	100	496
Fenton St at Bonifant St	AM		50		28		129	22	203
	PM		118		43		105	28	188
	SAT	92	93		60		101	29	194
	*	690	690		535		152	75	322
Fenton St at Thayer St	AM		72		77		186		222
	PM		158		74		294		263
	SAT		181		93		366	46	239
	*		628		525	50	430	50	412
Fenton St at Silver Spring Ave	AM		92		57	73	209		279
	PM		174		66	73	380		338
	SAT		119		74	74	354		295
	*		620		563	40	474		430
Fenton St at Sligo Ave	AM		111	88	135	75	201	62	250
	PM		209	86	151	75	216	80	335
	SAT		154	72	111	70	212	80	287
	*		177	534	534	60	167	50	474

* Storage Length = a queue length that exceeds the storage length

3.8 SCENARIO 8 –NB EXCLUSIVE LEFT-TURN (NO LEFTS AT SILVER SPRING AVENUE)

Stantec evaluated the traffic operations for a two-way cycle track along the south side of Fenton street. This scenario is a combination of the previous scenarios to maximize benefits for all users. Scenario 8 will have northbound dedicated left-turn lanes with exclusive left-turn phasing. Traffic will be prohibited from turning from Fenton Street to westbound Ellsworth Drive. Also, northbound left turns will be prohibited at Silver Spring Avenue. The traffic signal timing was optimized with the new phasing and the delay and queues were calculated. (Refer to Figure 12 – Scenario 8 Lane Configurations, Table 27 - Scenario 8 Approach Delays (Seconds/Delay), Table 28 - Scenario 8 Queues (Feet), and to Appendix K – Scenario 8 Synchro Capacity Analysis).

As shown in Table 27 - Scenario 8 Approach Delays (Seconds/Delay) the delay per vehicle and Level of Service (LOS) is shown for each approach, the total delay for each intersection, and for each of the three (3) peak hours analyzed. All the intersections along Fenton Street operate at a LOS of D or better. Since northbound left turns were prohibited at the intersection of Fenton Street and Silver Spring Avenue, the Silver Spring Avenue intersection operation improves. However, the vehicles that were turning left at Silver Spring Avenue are now turning left at Thayer Street and the Fenton Street and Thayer Street intersection delay increases but still operates at a LOS C or better. The orange highlights in Table 27 - Scenario 8 Approach Delays (Seconds/Delay), indicate an increase in approach delay of 10 seconds or more over the same approach for existing conditions. The yellow highlights indicate a LOS E or LOS F on that approach or for the total intersection.

Table 28 - Scenario 8 Queues (Feet)have yellow highlights indicate approaches that have queues that exceed the storage length. These tables show that the northbound/westbound left movements along Fenton Street exceed the storage length at all intersections but the Ellsworth Drive intersection.

The travel time was calculated for northbound and southbound Fenton Street. The total travel time is the time that it takes to travel from Gist Avenue to Cameron Street or from Cameron Street to Gist Avenue. The delay at each intersection for the through movement was calculated along with the travel time between intersections. The travel time equals the intersection delay plus the distance between intersections divided by the speed between intersections. (Refer to Table 26 - Scenario 8 Travel Time (Seconds)) (Refer to Appendix K – Scenario 8 Synchro Analysis).

Table 26 - Scenario 8 Travel Time (Seconds)

Northbound	AM	PM	Sat	Southbound	AM	PM	Sat
Gist Ave	8.0	13.2	13.2	Cameron St	21.5	31.1	30.4
Sligo Ave	15.7	19.5	19.9	Colesville Rd	43.2	57.8	49.9
Silver Spring Ave	24.7	28.8	45.0	Roeder Rd	1.9	11.8	12.9
Thayer Ave	27.4	27.2	45.7	Ellsworth Dr	5.6	15.6	14.2
Easley St	12.3	18.2	31.5	Wayne Ave	18.7	31.6	52.5
Bonifant St	10.9	11.7	16.4	Bonifant St	8.1	20.4	20.2
Wayne Ave	26.7	34.3	53.1	Easley St	1.3	5.3	5.5
Ellsworth Dr	23.9	30.0	58.5	Thayer Ave	13.0	24.6	26.2
Roeder Rd	8.5	10.4	41.7	Silver Spring Ave	8.9	28.5	25.6
Colesville Rd	51.5	61.0	96.6	Sligo Ave	14.6	32.6	26.8
Cameron St	33.7	37.9	38.5	Gist Ave	1.6	8.8	8.1
Total	243.3	292.2	460.1		138.4	268.1	272.3

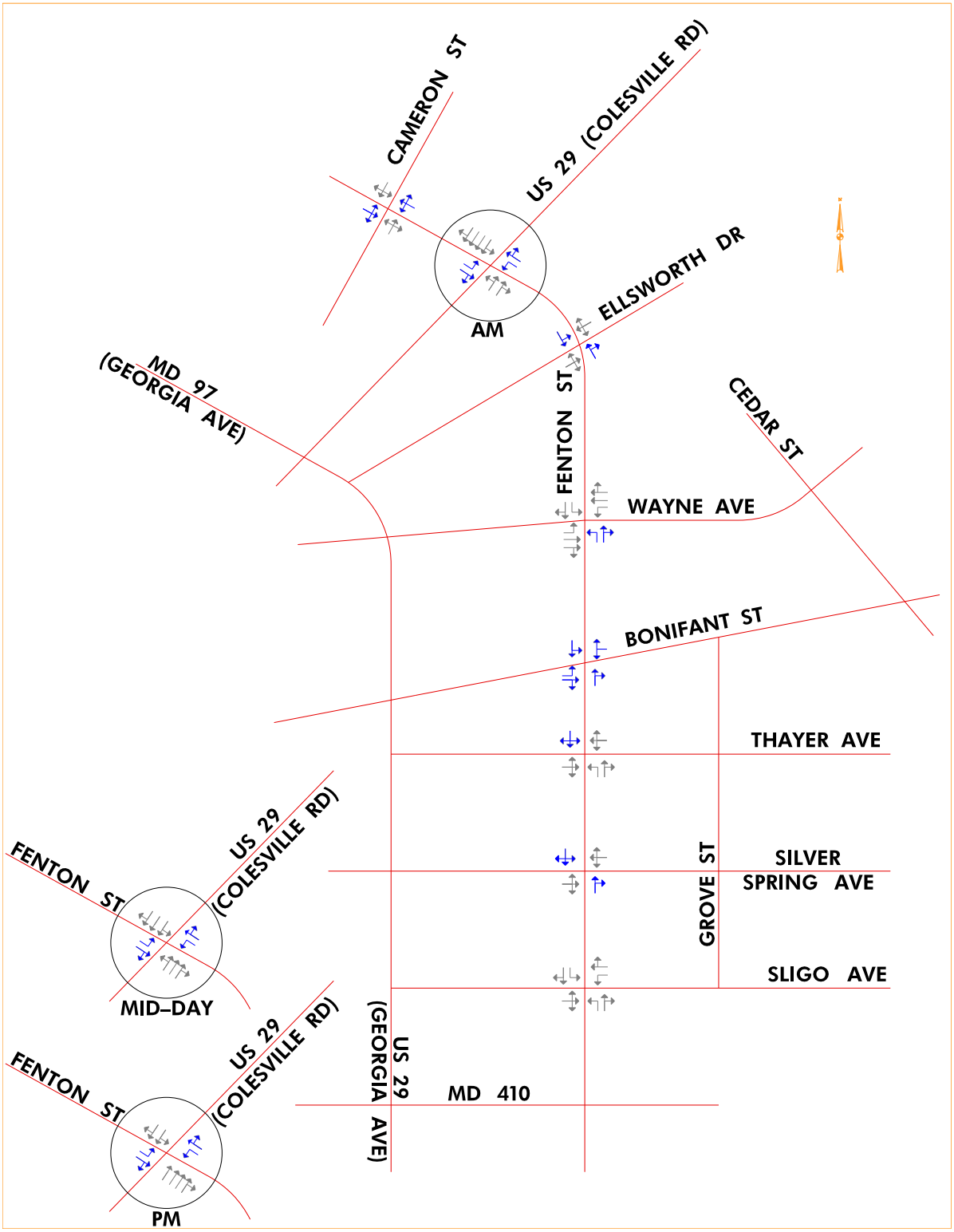

Figure 12 - Scenario 8 Lane Configurations

Table 27 - Scenario 8 Approach Delays (Seconds/Vehicle)

Intersection	Peak Hour	Scenario 8 (Approach)									
		EB		WB		NB		SB		Total	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	22.4	C	27.8	C	6.3	A	6.6	A	15.0	B
	PM	25.5	C	27.2	C	8.5	A	7.5	A	15.7	B
	SAT	23.5	C	28.0	C	7.7	A	8.2	A	16.9	B
Fenton St at US 29 (Colesville Road)	AM	46.7	D	51.4	D	58.7	E	27.1	C	37.1	D
	PM	56.8	E	58.4	E	9.0	A	25.1	C	21.5	C
	SAT	45.5	D	142.6	F	28.1	C	39.9	D	49.9	D
Fenton St at Ellsworth Dr	AM	16.6	B	24.9	C	7.9	A	5.6	A	8.7	A
	PM	14.8	B	17.3	B	14.4	B	9.1	A	13.3	B
	SAT			74.0	E	45.5	D	7.3	A	37.3	D
Fenton St at Wayne Ave	AM	26.5	C	32.4	C	24.0	C	18.8	B	27.9	C
	PM	40.1	D	69.9	E	31.4	C	20.0	B	42.6	D
	SAT	47.0	D	27.6	C	51.5	D	37.4	D	40.9	D
Fenton St at Bonifant St	AM	9.7	A	4.9	A	6.7	A	9.4	A	8.1	A
	PM	21.3	C	9.1	A	7.6	A	9.5	A	10.0	A
	SAT	34.0	C	35.5	D	12.4	B	8.4	A	13.5	B
Fenton St at Thayer St	AM	21.7	C	19.1	B	19.5	B	12.9	B	16.8	B
	PM	21.2	C	15.1	B	17.6	B	15.6	B	17.3	B
	SAT	44.9	D	27.7	C	36.5	D	17.3	B	30.0	C
Fenton St at Silver Spring Ave	AM	10.9	B	7.2	A	9.3	A	8.9	A	9.1	A
	PM	23.7	C	21.1	C	13.6	B	15.5	B	16.1	B
	SAT	52.4	D	27.0	C	23.8	C	13.0	B	22.4	C
Fenton St at Sligo Ave	AM	9.3	A	13.2	B	11.6	B	14.7	B	12.6	B
	PM	19.0	B	21.5	C	14.5	B	19.1	B	17.7	B
	SAT	38.1	D	22.1	C	15.3	B	14.1	B	18.8	B

= Unstable flow at or near capacity

= a 10 second increase in delay over existing delay

Table 28 - Scenario 8 Queues (Feet)

Intersection	Peak Hour	Scenario 8 (Movements) EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Fenton St at Cameron St	AM		57		177		83		84
	PM		116		160		140		65
	SAT		101		133		97		53
	*		209		419		423		372
Fenton St at US 29 (Colesville Road)	AM	73	130	109	213	340	362	557	521
	PM	116	211	87	261	110	213	275	281
	SAT	76	157	335	319	310	259	456	380
	*	100	419	125	263	271	271	547	547
Fenton St at Ellsworth Dr	AM		28		81		148		115
	PM		71		100		193	65	122
	SAT				254		497		151
	*		713		411		496	100	192
Fenton St at Wayne Ave	AM	50	143	240	247	115	277	49	175
	PM	101	313	345	480	137	391	75	199
	SAT	200	227	220	154	146	404	142	347
	*	667	667	275	868	92	322	100	496
Fenton St at Bonifant St	AM		55		32		131	24	207
	PM		128		40		101	30	178
	SAT	88	85		69		92	33	210
	*	690	690		535		152	75	322
Fenton St at Thayer St	AM		95		98	84	326	38	264
	PM		144		74	84	390	55	269
	SAT		254		101	91	478	57	301
	*		628		525	50	430	50	412
Fenton St at Silver Spring Ave	AM		87		46		196		247
	PM		173		65		337		306
	SAT		240		83		432		288
	*		620		563	40	474		430
Fenton St at Sligo Ave	AM		97	83	136	71	189	64	269
	PM		219	72	148	75	218	73	353
	SAT		280	71	146	68	218	84	262
	*		177	534	534	60	167	50	474

* Storage Length = a queue length that exceeds the storage length

4.0 CONCLUSION

The traffic impacts from constructing a two-way cycle track along the west side of Fenton street were analyzed. The following eight (8) different traffic scenarios were analyzed for the impacts to vehicular traffic:

- Scenario 1 Minimize Traffic Impacts to Bicyclists
- Scenario 2 Minimize Traffic Impacts to Parking and Loading Zones
- Scenario 3 Minimize Traffic Impacts to Vehicular Traffic
- Scenario 4 Northbound & Southbound Exclusive Left-Turn Phasing
- Scenario 5 Southbound Exclusive Right-Turn & Northbound Exclusive Left-Turn Phasing
- Scenario 6 Northbound Exclusive Left-Turn Phasing
- Scenario 7 Northbound Exclusive Left-Turn Phasing & No Northbound Left-Turns at Thayer Avenue
- Scenario 8 Northbound Exclusive Left-Turn Phasing & No Northbound Left-Turns at Silver Spring Avenue

Based on total intersection delay (Refer to Table 29 - Intersection Delay (Seconds/Vehicle)), Scenarios 1 and 6 provide the least traffic impact.

Table 29 - Intersection Delay (Seconds/Vehicle)

Intersection	Peak Hour	Existing		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5		Scenario 6		Scenario 7		Scenario 8	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Fenton St at Cameron St	AM	15.4	B	16.4	B	15.5	B	15.3	B	17.2	B	17.9	B	16.8	B	14.5	B	15.0	B
	PM	17.1	B	14.5	B	14.4	B	15.5	B	17.5	B	19.2	B	18.5	B	15.3	B	15.7	B
	SAT	17.9	B	17.8	B	17.2	B	17.8	B	20.1	C	20.5	C	20.6	C	17.3	B	16.9	B
Fenton St at US 29 (Colesville Road)	AM	20.3	C	25.6	C	21.0	C	14.9	B	39.8	D	49.8	D	33.2	C	40.3	D	37.1	D
	PM	18.8	B	23.7	C	29.8	C	17.3	B	21.4	C	39.8	D	26.4	C	21.1	C	21.5	C
	SAT	27.4	C	52.3	D	40.6	D	34.7	C	44.7	D	53.9	D	35.1	D	48.0	D	49.9	D
Fenton St at Ellsworth Dr	AM	9.0	A	8.3	A	8.5	A	9.1	A	9.4	A	13.8	B	9.9	A	9.4	A	8.7	A
	PM	12.9	B	13.0	B	104.2	F	15.2	B	15.5	B	17.9	B	14.6	B	14.2	B	13.3	B
	SAT	10.1	B	25.9	C	17.3	B	57.0	E	43.4	D	51.7	D	9.5	A	28.2	C	37.3	D
Fenton St at Wayne Ave	AM	27.4	C	24.9	C	25.3	C	25.2	C	27.5	C	30.8	C	28.2	C	27.1	C	27.9	C
	PM	26.4	C	38.5	D	47.4	D	43.1	D	42.8	D	31.4	C	38.0	D	42.2	D	42.6	D
	SAT	28.8	C	26.5	C	33.6	C	42.9	D	43.9	D	60.9	E	40.1	D	39.1	D	40.9	D
Fenton St at Bonifant St	AM	7.3	A	7.1	A	7.8	A	7.8	A	7.3	A	8.1	A	8.0	A	8.2	A	8.1	A
	PM	10.3	B	9.7	A	28.0	C	9.2	A	10.3	B	14.5	B	10.1	B	9.6	A	10.0	A
	SAT	10.4	B	9.6	A	11.5	B	13.6	B	12.3	B	20.9	C	11.2	B	12.7	B	13.5	B
Fenton St at Thayer St	AM	8.0	A	8.5	A	11.0	B	9.4	A	12.2	B	14.5	B	12.3	B	9.1	A	16.8	B
	PM	12.9	B	12.3	B	57.1	E	14.4	B	16.9	B	35.5	D	16.0	B	12.4	B	17.3	B
	SAT	14.2	B	14.0	B	17.8	B	25.1	C	33.0	C	35.7	D	20.7	C	17.0	B	30.0	C
Fenton St at Silver Spring Ave	AM	8.0	A	8.0	A	8.8	A	9.4	A	10.9	B	12.2	B	10.6	B	12.7	B	9.1	A
	PM	16.5	B	14.6	B	65.2	E	15.3	B	18.5	B	33.7	C	18.3	B	22.5	C	16.1	B
	SAT	11.1	B	14.4	B	14.7	B	20.4	C	36.4	D	34.9	C	16.9	B	19.5	B	22.4	C
Fenton St at Sligo Ave	AM	14.9	B	10.1	B	11.9	B	12.1	B	12.9	B	16.3	B	13.3	B	12.9	B	12.6	B
	PM	18.2	B	19.8	B	52.8	D	16.6	B	17.8	B	34.3	C	23.9	C	17.0	B	17.7	B
	SAT	14.8	B	13.9	B	16.6	B	14.2	B	23.3	C	30.7	C	17.6	B	15.1	B	18.8	B
		= Unstable flow at or near capacity																	
		= a 10 second increase in delay over existing delay																	

Conclusion

Based on the travel time along Fenton Street (Refer to Table 30 - Fenton Street Travel Time (Minutes)), Scenario 1 has the shortest travel time over the three (3) peak hours. However, Scenario 1 must divert traffic that wants to turn across the two-way cycle track which will impact traffic on Georgia Avenue and on Grove Street. Therefore, the Scenario 8 would have the best travel time.

Table 30 - Fenton Street Travel Time (Minutes)

	NB AM	SB AM	NB PM	SB PM	NB Sat	SB Sat	Total
Existing	3.6	3.6	4.8	4.8	4.0	3.9	24.7
Scenario 1	3.8	4.0	4.1	4.5	5.5	4.0	25.9
Scenario 2	5.0	3.9	21.2	5.1	5.5	4.2	44.9
Scenario 3	3.9	4.0	4.5	4.3	8.7	4.4	29.7
Scenario 4	3.8	4.2	4.7	4.4	8.2	4.5	30.0
Scenario 5	4.1	4.6	5.9	6.1	8.8	5.6	35.1
Scenario 6	3.8	4.4	4.3	6.6	4.5	4.9	28.4
Scenario 7	4.2	4.3	4.8	4.5	6.3	4.5	28.7
Scenario 8	4.1	2.3	4.9	4.5	7.7	4.5	27.9

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21 Appendix - Parking Data

Fenton Street Bikeway Study - On-Street Parking

Block	Existing Capacity	Parking Type / Restrictions	No. of vehicles parked (Day 1 - Thurs, 9/10)					No. of vehicles parked (Day 2 - Friday, 9/11)					No. of vehicles parked (Day 3 - Sat, 9/12)					Utilization			Notes
Fenton Street from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Gist - Sligo	3	Meter, 1-hr Parking, 7 am – 6 pm ex. Sunday	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0%	2%	33%	
Sligo - Silver Spring	10		3	5	6	7	10	4	5	9	7	10	1	6	10	5	9	10%	65%	100%	Construction lane closing, 8 am - 6 pm, Th, F, Sa; 8 blocked parking spaces were counted as utilized
Silver Spring - Thayer	23		21	22	17	22	23	17	17	19	21	21	11	23	22	22	21	48%	87%	100%	
Thayer - Bonifant	16		9	9	13	14	12	5	7	5	12	14	13	16	16	15	16	31%	73%	100%	
Bonifant - Wayne	5		3	0	0	3	3	2	4	3	4	5	4	3	4	5	5	0%	64%	100%	
Wayne - Ellsworth	12	Meter, 1-hr Parking 9 am – 6 pm ex. Sunday	7	7	8	12	10	5	12	12	11	11	12	10	12	10	11	42%	83%	100%	
Ellsworth - Colesville	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	Cars standing on regular basis, but not counted
Colesville - Cameron	22		21	22	21	18	17	21	22	21	22	21	18	20	22	22	12	55%	91%	100%	
Subtotal	91		64	65	65	76	75	54	67	69	77	82	59	79	86	79	74	59%	78%	95%	
Gist Avenue from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Philadelphia to Fenton	4	Meter, 1-hr Parking, 9 am – 6 pm ex. Sunday	4	1	3	3	2	4	2	4	4	4	4	4	4	4	4	25%	85%	100%	
Fenton to Woodbury	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	
Subtotal	4		4	1	3	3	2	4	2	4	4	4	4	4	4	4	4	25%	85%	100%	
Sligo Avenue from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Georgia to Fenton	16	Meter, 2-hr Parking, 9 am – 6 pm ex. Sunday	7		14	8	5	10	7	10	8	5	10	9	12	10	9	0%	55%	88%	
Fenton to Grove	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	
Subtotal	16		7	0	14	8	5	10	7	10	8	5	10	9	12	10	9	0%	52%	88%	
Silver Spring Avenue from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Georgia to Fenton	34	Meter, 1- to 2-hr Parking, 9 am – 6 pm ex. Sunday	16	25	34	34	34	12	28	29	34	34	25	34	34	34	34	35%	86%	100%	
Fenton to Grove	3		0	0	1	3	3	0	2	3	3	3	1	3	2	3	1	0%	62%	100%	
Subtotal	37		16	25	35	37	37	12	30	32	37	37	26	37	36	37	35	32%	85%	100%	
Thayer Avenue from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Georgia to Fenton	42	Meter, 1- to 2-hr Parking, 9 am – 6 pm ex. Sunday	20	33	33	42	41	20	36	36	41	37	16	41	42	40	41	38%	82%	100%	
Fenton to Grove	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	100%	100%	100%	
Subtotal	45		23	36	36	45	44	23	39	39	44	40	19	44	45	43	44	42%	84%	100%	
Ellsworth Drive from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Georgia to Fenton	0	Meter, 30-min, 1-hr, and 2-hr Parking, 9 am – 6 pm ex. Sunday	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	
Fenton to Veterans	17		12	15	11	17	16	6	17	16	16	16	16	16	17	17	16	35%	88%	100%	
Subtotal	17		12	15	11	17	16	6	17	16	16	16	16	16	17	17	16	35%	88%	100%	
Roeder Road from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Fenton to Spring	33	Meter, 1- to 2-hr Parking, 9 am – 6 pm ex. Sunday	24		29	22	13	28	33	33	28	30	28	33	32	30	22	0%	83%	100%	
Subtotal	33		24	0	29	22	13	28	33	33	28	30	28	33	32	30	22	0%	78%	100%	
Colesville Rd (US29) from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Georgia to Fenton	15	Meter, 1-hr Parking, 9:30 am – 3:30 pm M-F, 9 am - 6 pm Sat; No Stopping 6:30 - 9:30 am, 3:30 pm - 7 pm M-F		4	1		2		10	5		4	0	11	15	12	13	0%	47%	100%	Peak restricted times not included in utilization
Fenton to Spring	11	Meter, 2-hr Parking, 9:30 am – 3:30 pm M-F, 9 am - 6 pm Sat; No Stopping 6:30 - 9:30 am, 3:30 - 7 pm M-F		3	3		4		3	2		8	5	10	11	10	8	0%	55%	100%	Peak restricted times not included in utilization
Subtotal	26			7	4		6		13	7		12	5	21	26	22	21	0%	50%	100%	
Cameron Street from:			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Georgia to Fenton	5	Meter, 2-hr Parking, 9 am – 6 pm ex. Sunday	5	5	5	5	2	4	5	5	4	2	5	5	4	5	0	0%	81%	100%	
Fenton to Spring	24		20	9	12	23	24	23	19	19	24	15	22	22	21	21	24	38%	83%	100%	
Subtotal	29		25	14	17	28	26	27	24	24	28	17	27	27	25	26	24	48%	83%	97%	

Fenton Street Bikeway Study - On-Street Parking

Block	Existing Capacity	Parking Type / Restrictions	No. of vehicles parked (Day 1 - Thurs, 9/10)					No. of vehicles parked (Day 2 - Friday, 9/11)					No. of vehicles parked (Day 3 - Sat, 9/12)					Utilization			Notes
Study Area			8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	8:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	Min. Utilization	Avg. Utilization	Max. Utilization	
Fenton Village District (Gist to Wayne) Subtotal	159		86	98	124	139	136	77	111	121	137	136	88	143	149	141	143	48%	77%	94%	
Fenton Street only	57		36	36	36	46	48	28	33	36	44	50	29	49	52	47	51	49%	73%	91%	
Side Streets only	102		50	62	88	93	88	49	78	85	93	86	59	94	97	94	92	48%	79%	95%	
Ellsworth District (Wayne to Colesville) Subtotal	88		43	29	52	51	45	39	75	68	55	69	61	80	87	79	70	33%	68%	99%	
Fenton Street only	12		7	7	8	12	10	5	12	12	11	11	12	10	12	10	11	42%	83%	100%	
Side Streets only	76		36	22	44	39	35	34	63	56	44	58	49	70	75	69	59	29%	66%	99%	
North Silver Spring District (Colesville to Cameron) Subtotal	51		46	36	38	46	43	48	46	45	50	38	45	47	47	48	36	71%	86%	98%	
Fenton Street only	22		21	22	21	18	17	21	22	21	22	21	18	20	22	22	12	55%	91%	100%	
Side Streets only	29		25	14	17	28	26	27	24	24	28	17	27	27	25	26	24	48%	83%	97%	
Study Area Total	**298**		**175**	**163**	**214**	**236**	**224**	**164**	**232**	**234**	**242**	**243**	**194**	**270**	**283**	**268**	**249**	**55%**	**76%**	**95%**	

No data

Peak restricted

Notes:

Not intended to be a comprehensive, statistically-based study.

Utilization excludes vehicles parked in permit zones, handicap parking spaces, carsharing parking spaces, illegally parked vehicles, and vehicles standing in travel lanes or no parking zones.

Eight meters that were bagged due to construction along Fenton Street SB from Ripley to south of Silver Spring were counted as utilized.

There is no parking on Easley Street, Bonifant Street, or Wayne Avenue within one-block of Fenton Street.

Silver Spring Vacancy County
(FY12)

		Short-Term					Long-Term					Totals					
	Date	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	FY Average
Garage 2	Jul-19	118	0	14	104	88%	1193	0	398	795	67%	1311	8	412	891	68%	65%
	Aug-19	118	0	24	94	80%	1193	8	430	755	63%	1311	8	454	849	65%	
	Sep-19	118	0	26	92	78%	1193	6	390	797	67%	1311	6	416	889	68%	
	Oct-19	118	0	28	90	76%	1193	6	433	754	63%	1311	6	461	844	64%	
	Nov-19	118	0	19	99	84%	1193	6	428	759	64%	1311	6	447	858	65%	
	Dec-19	118	0	30	88	75%	1193	6	465	722	61%	1311	6	495	810	62%	
	Jan-20	118	0	20	98	83%	1193	6	449	738	62%	1311	6	469	836	64%	
	Feb-20	118	0	18	100	85%	1193	6	476	711	60%	1311	0	494	817	62%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Garage 4	Jul-19	104	0	62	42	40%	191	0	77	114	60%	295	0	139	156	53%	61%
	Aug-19	104	0	57	47	45%	191	5	57	134	70%	295	5	114	181	61%	
	Sep-19	104	0	45	59	57%	191	4	59	132	69%	295	4	104	191	65%	
	Oct-19	104	0	47	57	55%	191	0	66	125	65%	295	0	113	182	62%	
	Nov-19	104	0	57	47	45%	191	0	63	128	67%	295	0	120	175	59%	
	Dec-19	104	0	61	43	41%	191	0	66	125	65%	295	0	127	168	57%	
	Jan-20	104	0	48	56	54%	191	0	59	132	69%	295	0	107	188	64%	
	Feb-20	104	0	38	66	63%	191	0	69	122	64%	295	0	107	188	64%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Garage 5/55	Jul-19	214	0	133	81	38%	1433	21	792	641	45%	1647	21	925	722	44%	51%
	Aug-19	214	0	146	68	32%	1433	0	692	741	52%	1647	0	838	809	49%	
	Sep-19	214	0	174	40	19%	1433	0	817	616	43%	1647	0	991	656	40%	
	Oct-19	214	0	185	29	14%	1433	179	669	764	53%	1647	179	854	793	48%	
	Nov-19	214	83	59	72	34%	1433	64	635	798	56%	1647	147	694	953	58%	
	Dec-19	214	0	141	73	34%	1433	3	626	807	56%	1647	3	767	880	53%	
	Jan-20	214	0	134	80	37%	1433	317	385	731	51%	1647	317	519	1128	68%	
	Feb-20	214	0	134	80	37%	1433	317	472	644	45%	1647	317	606	724	44%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Garage 7	Jul-19	118	0	62	56	47%	1210	24	213	973	80%	1328	24	275	1029	77%	85%
	Aug-19	118	0	57	61	52%	1210	20	181	1009	83%	1328	20	238	1070	81%	
	Sep-19	118	0	49	69	58%	1210	20	134	1056	87%	1328	20	183	1125	85%	
	Oct-19	118	0	58	60	51%	1210	0	124	1086	90%	1328	0	182	1146	86%	
	Nov-19	118	0	52	66	56%	1210	0	170	1040	86%	1328	0	222	1106	83%	
	Dec-19	118	0	28	90	76%	1210	0	110	1100	91%	1328	0	138	1190	90%	
	Jan-20	118	0	52	66	56%	1210	0	81	1129	93%	1328	0	133	1195	90%	
	Feb-20	118	0	64	54	46%	1210	0	135	1075	89%	1328	0	199	1129	85%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	

Silver Spring Vacancy County
(FY12)

		Short-Term					Long-Term					Totals					
	Date	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	FY Average
Garage/Lot 9	Jul-19	4	0	3	1	25%	576	0	342	234	41%	580	0	345	235	41%	38%
	Aug-19	4	0	2	2	50%	576	0	397	179	31%	580	0	399	181	31%	
	Sep-19	4	0	3	1	25%	576	0	318	258	45%	580	0	321	259	45%	
	Oct-19	4	0	4	0	0%	576	0	334	242	42%	580	0	338	242	42%	
	Nov-19	4	0	2	2	50%	576	0	364	212	37%	580	0	366	214	37%	
	Dec-19	4	0	2	2	50%	576	0	380	196	34%	580	0	382	198	34%	
	Jan-20	4	0	3	1	25%	576	0	355	221	38%	580	0	358	222	38%	
	Feb-20	4	0	3	1	25%	576	66	276	234	41%	580	66	279	235	41%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Garage 16	Jul-19	0	0	0	0	0%	144	0	78	66	46%	144	0	78	66	46%	42%
	Aug-19	0	0	0	0	0%	144	0	73	71	49%	144	0	73	71	49%	
	Sep-19	0	0	0	0	0%	144	0	77	67	47%	144	0	77	67	47%	
	Oct-19	0	0	0	0	0%	144	0	75	69	48%	144	0	75	69	48%	
	Nov-19	0	0	0	0	0%	144	0	75	69	48%	144	0	75	69	48%	
	Dec-19	0	0	0	0	0%	114	0	74	40	35%	114	0	74	40	35%	
	Jan-20	0	0	0	0	0%	114	0	83	31	27%	114	0	83	31	27%	
	Feb-20	0	0	0	0	0%	114	0	85	29	25%	114	0	85	29	25%	
	Mar-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
	May-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
Garage 21	Jul-19	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	#DIV/0!
	Aug-19	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Sep-19	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Oct-19	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Nov-19	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Dec-19	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Jan-20	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Feb-20	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Mar-20	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Apr-20	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	May-20	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Jun-20	0	0	0	0	0%	0	0	0	0	0%	0	0	0	0	0%	
Garage 58	Jul-19	48	0	0	48	100%	1068	0	81	987	92%	1116	0	81	1035	93%	97%
	Aug-19	48	0	0	48	100%	1068	1	56	1011	95%	1116	1	56	1059	95%	
	Sep-19	48	0	0	48	100%	1068	0	7	1061	99%	1116	0	7	1109	99%	
	Oct-19	48	0	6	42	88%	1068	0	44	1024	96%	1116	0	50	1066	96%	
	Nov-19	48	0	0	48	100%	1068	0	20	1048	98%	1116	0	20	1096	98%	
	Dec-19	48	0	0	48	100%	1068	0	17	1051	98%	1116	0	17	1099	98%	
	Jan-20	48	0	0	48	100%	1068	0	0	1068	100%	1116	0	0	1116	100%	
	Feb-20	48	0	0	48	100%	1068	0	22	1046	98%	1116	0	22	1094	98%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Garage 60	Jul-19	0	0	0	0	0%	1663	0	508	1155	69%	1663	0	508	1155	69%	60%
	Aug-19	0	0	0	0	0%	1663	0	487	1176	71%	1663	0	487	1176	71%	
	Sep-19	0	0	0	0	0%	1663	0	564	1099	66%	1663	0	564	1099	66%	
	Oct-19	0	0	0	0	0%	1663	0	587	1076	65%	1663	0	587	1076	65%	
	Nov-19	0	0	0	0	0%	1663	0	605	1058	64%	1663	0	605	1058	64%	
	Dec-19	0	0	0	0	0%	1663	4	835	824	50%	1663	4	835	824	50%	
	Jan-20	0	0	0	0	0%	1663	0	862	801	48%	1663	0	862	801	48%	

Silver Spring Vacancy County
(FY12)

	Short-Term					Long-Term					Totals					
Date	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	FY Average
Feb-20	0	0	0	0	0%	1663	0	863	800	48%	1663	0	863	800	48%	
Mar-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
Apr-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
May-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
Jun-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	

Silver Spring Vacancy County
(FY12)

		Short-Term					Long-Term					Totals					
	Date	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	FY Average
Garage 61	Jul-19	0	0	0	0	0%	1241	0	535	706	57%	1241	0	535	706	57%	59%
	Aug-19	0	0	0	0	0%	1241	0	422	819	66%	1241	0	422	819	66%	
	Sep-19	0	0	0	0	0%	1241	0	558	683	55%	1241	0	558	683	55%	
	Oct-19	0	0	0	0	0%	1241	0	522	719	58%	1241	0	522	719	58%	
	Nov-19	0	0	0	0	0%	1241	0	475	766	62%	1241	0	475	766	62%	
	Dec-19	0	0	0	0	0%	1241	0	492	749	60%	1241	0	492	749	60%	
	Jan-20	0	0	0	0	0%	1241	0	506	735	59%	1241	0	506	735	59%	
	Feb-20	0	0	0	0	0%	1241	0	512	729	59%	1241	0	512	729	59%	
	Mar-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
	May-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20	0	0	0	0	0%		0		0	0%	0	0	0	0	0%	

Silver Spring Vacancy County
(FY12)

		Short-Term					Long-Term					Totals					
	Date	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	FY Average
Lot 2	Jul-19	19	0	1	18	95%	MNCP & PC					19	0	1	18	95%	88%
	Aug-19	19	0	2	17	89%	MNCP & PC					19	0	2	17	89%	
	Sep-19	19	0	3	16	84%	MNCP & PC					19	0	3	16	84%	
	Oct-19	19	0	3	16	84%	MNCP & PC					19	0	3	16	84%	
	Nov-19	19	0	3	16	84%	MNCP & PC					19	0	3	16	84%	
	Dec-19	19	0	2	17	89%	MNCP & PC					19	0	2	17	89%	
	Jan-20	19	0	2	17	89%	MNCP & PC					19	0	2	17	89%	
	Feb-20	19	0	3	16	84%	MNCP & PC					19	0	3	16	84%	
	Mar-20		0		0	0%	MNCP & PC					0	0	0	0	0%	
	Apr-20		0		0	0%	MNCP & PC					0	0	0	0	0%	
	May-20		0		0	0%	MNCP & PC					0	0	0	0	0%	
	Jun-20		0		0	0%	MNCP & PC					0	0	0	0	0%	
Garage 3	Jul-19	40	0	37	3	8%	115	0	91	24	21%	155	0	128	27	17%	33%
	Aug-19	40	0	37	3	8%	**115**	0	86	29	25%	155	0	123	32	21%	
	Sep-19	40	0	37	3	8%	**115**	0	85	30	26%	155	0	122	33	21%	
	Oct-19	40	0	31	9	23%	**115**	0	68	47	41%	155	0	99	56	36%	
	Nov-19	40	0	34	6	15%	**115**	0	72	43	37%	155	0	106	49	32%	
	Dec-19	40	0	27	13	33%	**115**	0	65	50	43%	155	0	92	63	41%	
	Jan-20	40	0	24	16	40%	**115**	0	54	61	53%	155	0	78	77	50%	
	Feb-20	40	0	23	17	43%	**115**	0	66	49	43%	155	0	89	66	43%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Lot 18	Jul-19	7	0	3	4	57%	6	0	5	1	17%	13	0	8	5	38%	94%
	Aug-19	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Sep-19	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Oct-19	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Nov-19	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Dec-19	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Jan-20	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Feb-20	7	0	0	7	100%	6	0	0	6	100%	13	0	0	13	100%	
	Mar-20		0		0	0%	6	0		6	100%	6	0	0	6	100%	
	Apr-20		0		0	0%	6	0		6	100%	6	0	0	6	100%	
	May-20		0		0	0%	6	0		6	100%	6	0	0	6	100%	
	Jun-20		0		0	0%	6	0		6	100%	6	0	0	6	100%	

Silver Spring Vacancy County
(FY12)

		Short-Term					Long-Term					Totals					
	Date	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	Capacity	Chained Off	Number Vacant	Number Occupied	Percent Occupied	FY Average
Lot 20	Jul-19	8	0	0	8	100%	31	0	0	31	100%	39	0	0	39	100%	97%
	Aug-19	8	0	0	8	100%	31	0	1	30	97%	39	0	1	38	97%	
	Sep-19	8	0	0	8	100%	31	0	0	31	100%	39	0	0	39	100%	
	Oct-19	8	0	0	8	100%	31	0	4	27	87%	39	0	4	35	90%	
	Nov-19		0		0	0%		0		0	0%	0	0	0	0	0%	Lot Closed Pe
	Dec-19		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jan-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Feb-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Lot 29	Jul-19	40	0	13	27	68%	26	0	0	26	100%	66	0	13	53	80%	86%
	Aug-19	40	0	7	33	83%	26	0	0	26	100%	66	0	7	59	89%	
	Sep-19	40	0	1	39	98%	26	0	0	26	100%	66	0	1	65	98%	
	Oct-19	40	0	2	38	95%	26	0	0	26	100%	66	0	2	64	97%	
	Nov-19	40	0	4	36	90%	26	0	0	26	100%	66	0	4	62	94%	
	Dec-19	40	0	13	27	68%	26	0	0	26	100%	66	0	13	53	80%	
	Jan-20	40	0	13	27	68%	26	0	0	26	100%	66	0	13	53	80%	
	Feb-20	40	0	19	21	53%	26	0	0	26	100%	66	0	19	47	71%	
	Mar-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	May-20		0		0	0%		0		0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%		0		0	0%	0	0	0	0	0%	
Lot 38	Jul-19	21	0	0	21	100%	0	0	0	0	0%	21	0	0	21	100%	98%
	Aug-19	21	0	0	21	100%	0	0	0	0	0%	21	0	0	21	100%	
	Sep-19	21	0	0	21	100%	0	0	0	0	0%	21	0	0	21	100%	
	Oct-19	21	0	0	21	100%	0	0	0	0	0%	21	0	0	21	100%	
	Nov-19	21	0	0	21	100%	0	0	0	0	0%	21	0	0	21	100%	
	Dec-19	21	0	0	21	100%	0	0	0	0	0%	21	0	0	21	100%	
	Jan-20	21	0	1	20	95%	0	0	0	0	0%	21	0	1	20	95%	
	Feb-20	21	0	2	19	90%	0	0	0	0	0%	21	0	2	19	90%	
	Mar-20		0		0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Apr-20		0		0	0%	0	0	0	0	0%	0	0	0	0	0%	
	May-20		0		0	0%	0	0	0	0	0%	0	0	0	0	0%	
	Jun-20		0		0	0%	0	0	0	0	0%	0	0	0	0	0%	
			Short-	Term				Long-	Term			Totals					
Totals			Chained	Number	Number	Percent		Chained	Number	Number	Percent		Chained	Number	Number	Percent	
	Date	Capacity	Off	Vacant	Occupied	Occupied	Capacity	Off	Vacant	Occupied	Occupied	Capacity	Off	Vacant	Occupied	Occupied	
Total	Jul-19	741	0	328	413	56%	8897	45	3120	5753	65%	9638	53	3448	6158	64%	65%
	Aug-19	741	0	332	409	55%	8897	34	2882	5986	67%	9638	34	3214	6395	66%	
	Sep-19	741	0	338	403	54%	8897	30	3009	5862	66%	9638	30	3347	6265	65%	
	Oct-19	741	0	364	377	51%	8897	185	2926	5965	67%	9638	185	3290	6342	66%	
	Nov-19	733	83	230	420	57%	8866	70	2907	5953	67%	9599	153	3137	6456	67%	
	Dec-19	733	0	304	429	59%	8836	13	3130	5696	64%	9569	13	3434	6125	64%	
	Jan-20	733	0	297	436	59%	8836	323	2834	5679	64%	9569	323	3131	6432	67%	
	Feb-20	733	0	304	429	59%	8836	389	2976	5471	62%	9569	383	3280	5906	62%	
	Mar-20	0	0	0	0	0%	6	0	0	6	100%	6	0	0	6	100%	
	Apr-20	0	0	0	0	0%	6	0	0	6	100%	6	0	0	6	100%	
	May-20	0	0	0	0	0%	6	0	0	6	100%	6	0	0	6	100%	
	Jun-20	0	0	0	0	0%	6	0	0	6	100%	6	0	0	6	100%	