



Connecticut Avenue Corridor Pedestrian and Bicycling Access and Safety Study

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July 2022

FINAL



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1. Introduction

Many in the transportation industry recognize that a historic auto-centric focus has created an unsafe, unwelcoming environment for other roadway users. *Vision Zero*, *context-sensitive* programs, and others seek to eliminate traffic fatalities and serious injuries while improving safety, health and accessibility. The recent pandemic experience, shifts in thinking about the use and configuration of public streets, as well as changes in travel and work location patterns present a unique opportunity to reimagine bold alternatives for Connecticut Avenue (MD 185) and adjacent streets in the Town of Kensington and the immediate surrounding area, in Montgomery County.

The purpose of this study is to produce up to three alternatives to improve walkability and bikeability, develop 10% designs, and document all findings and assumptions in this summary report for use during the next phase.

A. Study Area

Connecticut Avenue (MD 185) between Knowles Avenue and University Boulevard (MD 193) represented the primary study area, as shown in **Figure 1** below. Secondary study areas including Knowles Avenue (MD 547), Pylers Mill Road, Howard Avenue and University Boulevard (MD 193), were included for their significant connections between Connecticut Avenue (MD 185) and Town features and neighborhoods.

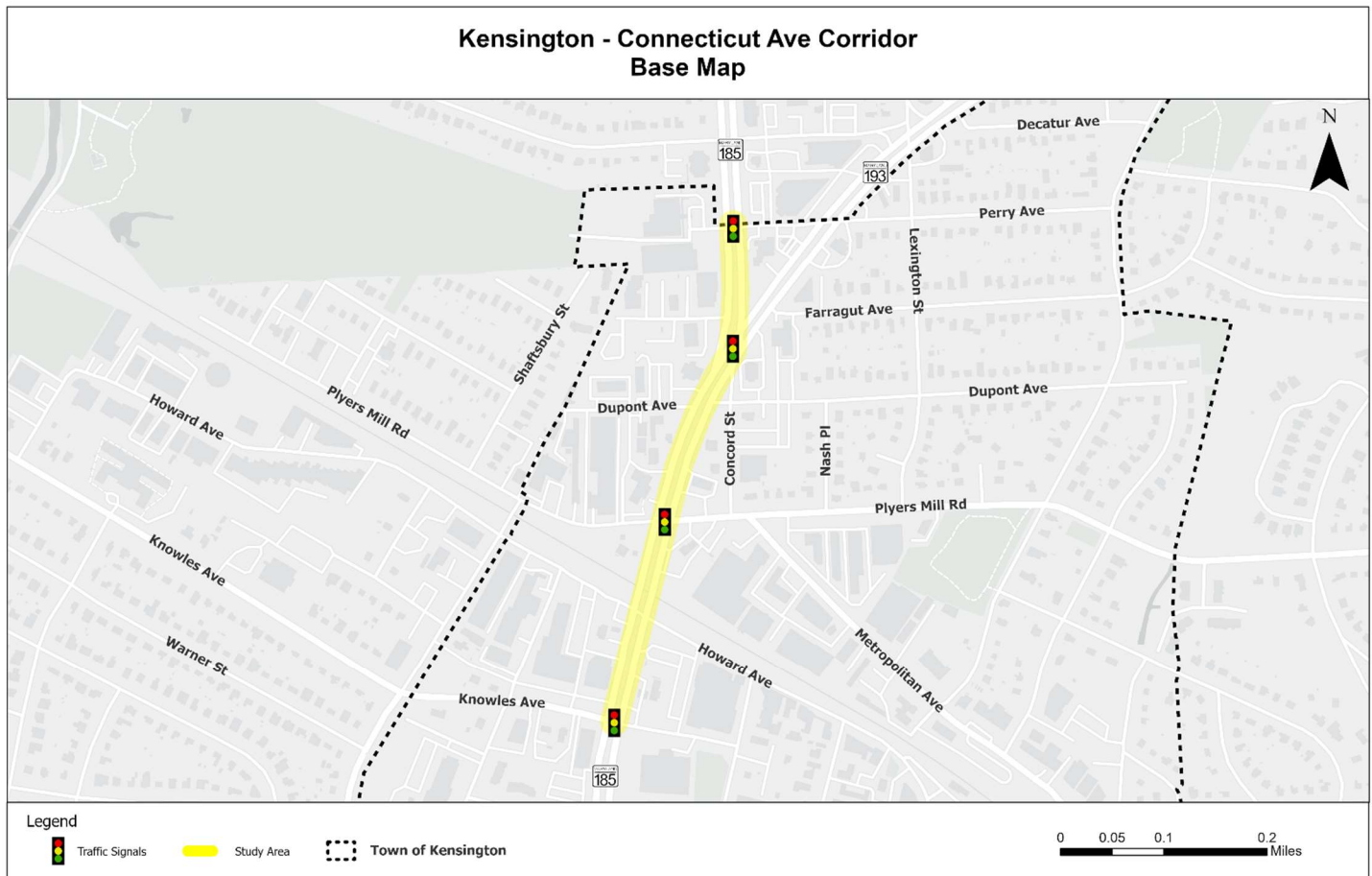


Figure 1: Study Area Map

B. Steering Committee

Numerous agencies and stakeholders contributed to the development of this project and its findings. The project team consulted with staff from Montgomery County Government, the Town of Kensington, Maryland Department of Transportation State Highway Administration (MDOT SHA), the Ken-Gar neighborhood, The Kensington House, Maryland Transit Administration's Maryland Area Rail Commuter (MARC), Montgomery County's Department of Transportation (MCDOT), and the Washington Metropolitan Area Transit Authority (WMATA).

C. Goals and Objectives

This project aims to address barriers for pedestrians, bicyclists, transit users, residents and businesses created by the arterial roadway, Connecticut Avenue (MD 185), bisecting the Town of Kensington. Both the Request for Proposals (RFP) and the steering committee emphasized:

- Reducing single-occupant vehicle trips by increasing pedestrian and bicycling access and safety.
- Encouraging walking and biking by reducing the time and effort required to reach destinations.
- Connecting separate segments of the community together, especially the Ken-Gar neighborhood, to the greater Kensington transportation network.

D. Equity Goals

The USDOT has recently declared equity to be a department-wide goal with the aim of reducing inequities across transportation networks and impacted communities.

The study area includes underserved communities that need equitable transportation access.

“From the construction of the transcontinental railroad to the Montgomery Bus Boycott, transportation has always been inseparable from America’s struggle for racial and economic justice. At its best, transportation can be a powerful engine of opportunity, connecting people to jobs, education, and resources—whether they live in a big city, a rural community, or anywhere in between. Ensuring equity and accessibility for every member of the traveling public is one of the Department of Transportation’s highest priorities”.

—Secretary Pete Buttigieg

This project will help address gaps and barriers to accessing regional transit and trail networks and create more economic opportunities. The current project seeks to weave all transportation modes together harmoniously while prioritizing previously under-represented modes such as transit riders, pedestrians and bicyclists to improve safety and access.

2. Background Plans & Documents

This project builds upon the existing work completed by Montgomery County and MDOT SHA.

A. Montgomery County’s [Bicycle Master Plan](#)

Montgomery County Planning Department’s (M-NCPPC) Bicycle Master Plan offers a comprehensive overview and recommendations to provide a network of bikeways throughout Montgomery County to ensure safety and comfort for all bicyclists. The plan was relied upon in the Connecticut Avenue Corridor Planning Study for ensuring recommended improvements align with the future network plans.

B. Montgomery County’s [Pedestrian Master Plan](#)

M-NCPPC is still developing the Pedestrian Master Plan, but the study includes an analysis of the “Pedestrian Level of Comfort,” which is useful in identifying gaps in the pedestrian network and reinforces the need for the Connecticut Avenue Corridor Planning Study efforts, as Connecticut Avenue (MD 185) is scored as ranging from “Uncomfortable” to “Undesirable.”

C. [Summit Avenue Extended](#)

Montgomery County Department of Transportation (MCDOT) project plans to extend Summit Avenue from its terminus at Plyers Mill Road northward to reconnect with Connecticut Ave (MD 185) opposite University Boulevard (MD 193). This project will have significant impacts on operations and pedestrian connections at Connecticut Avenue (MD 185) and University Boulevard (MD 193).

D. [Kensington Sector Plan](#)

Montgomery County Council approved the [Kensington Sector Plan](#) in 2012, creating a long-term planning framework for Kensington to promote a mixed-use Town Center with pedestrian-friendly connections. The Plan makes recommendations for land use, zoning, urban design, transportation, environment, and community facilities to broadly reinvigorate the Town Center while preserving Kensington's scale and historical character.

E. [MD 185 Needs Analysis](#)

Maryland Department of Transportation State Highway Administration (MDOT SHA) completed this planning study for Connecticut Avenue (MD 185) from the Washington D.C. line to University Boulevard (MD 193) in January 2022. As a transportation planning study, the [MD 185 Needs Analysis](#) considered corridor and intersection improvements related to all modes of travel. Many of the identified improvements to the Connecticut Avenue corridor are consistent with the goals of the Kensington: Connecticut Avenue Corridor Planning Study, such as travel lane widths, lower speed limits, and upgrades to key pedestrian crossings, while others are beyond the focus of the current study.

F. [Complete Streets Design Guide](#)

Complete Streets are roadways that are designed and operated to provide safe, accessible and healthy travel for all users of the 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. The approach to Complete Streets will vary in different parts of Montgomery County. This new document provides a one-stop guide for designing new streets and reconstructing or retrofitting existing streets following these principles:

Safety – maximize safety for all (pedestrians, bicyclists, and motor vehicles),

Sustainability – enhance ecological functions and economic appeal of a streetscape, and

Vitality – create streets that are great, dynamic places

G. [MDOT SHA's Context Driven Guidebook](#)

Through this guide, MDOT SHA acknowledges the broad multi-use of the transportation network and seeks to provide a range of access and mobility solutions for all users. The tools and processes contained in the guide seek to balance the access needs created by the surrounding land use and the mobility needs of both local and regional travelers.

3. Existing Conditions

A. Roadway Geometry

Lane Configuration & Functional Classification: Connecticut Avenue (MD 185), is classified as a principal arterial (major highway), with a six-lane cross-section and left-turn lanes at intersections, as shown in **Figure 2** below. The corridor serves as a major connection between the District of Columbia and communities in Maryland. All of the intersections along Connecticut Avenue (MD 185) within the Town of Kensington either restrict the vehicular turning movements through a median presence or operate with a full-color traffic signal.

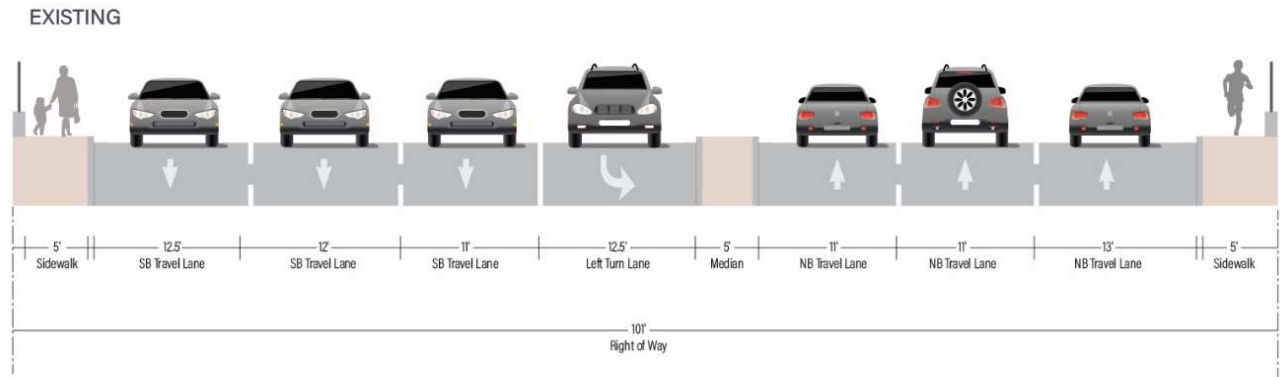


Figure 2: Connecticut Avenue (MD 185) Existing Cross-Section

Currently, the [pedestrian facilities](#) are limited to standard five-foot sidewalks adjacent to the vehicular travel lanes. **Figure 3** identifies the existing sidewalks in green and the WMATA and MCDOT Ride On bus stops as well as several other key destinations within the Town.

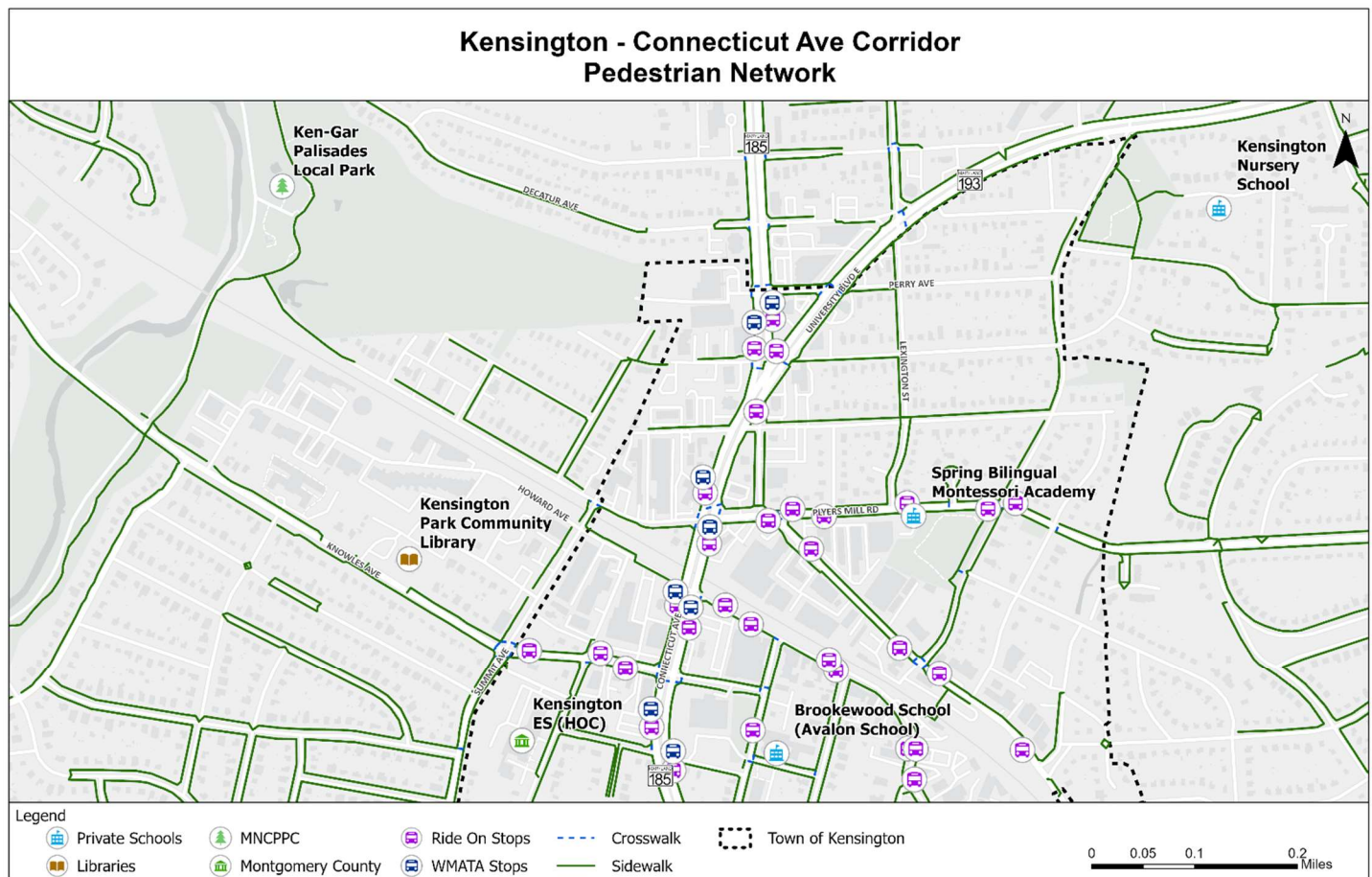


Figure 3: Existing Pedestrian Facilities

[Bicycles](#) are expected to share travel lanes with motorists on Connecticut Avenue (MD 185), though many use the sidewalk instead. The standard 5-foot sidewalk width was established to accommodate two pedestrians walking side by side; however, in locations with higher pedestrian usage or multi-modal use, including bicyclists, a potential safety issue can arise when trying to navigate the tight space. Montgomery County's [Bicycle Master Plan](#) includes an interactive map including both existing and proposed facilities.

Alignment: Connecticut Avenue (MD 185) runs north-south. South of Knowles Avenue, near Washington Street, there is a slight horizontal curve. Then, at the intersection with University Boulevard

(MD 193), Connecticut Avenue (MD 185) continues to the left with University Boulevard (MD 193) traffic traveling to the right and east. As it progresses north Connecticut Avenue (MD 185) in Kensington rises vertically beginning at approximately Baltimore Street and includes a bridge over the railroad tracks.

Land Use and Access: Connecticut Avenue (MD 185) through the Town of Kensington lies within a commercial residential town zone with residential zoning just beyond the commercial properties. **Figure 4** includes an excerpt of Montgomery County's zoning map, which depicts commercial land uses in purple and residential in tan/brown.

Due to the quantity, age and commercial nature of the properties, each property has at least one driveway onto Connecticut Avenue (MD 185) and often multiple access drives. The Access Management Manual defines access management as "coordinated planning, regulation and design of access between roadways and land development" with a goal of improving the safety and efficiency of moving people and goods while reducing conflicts between all travel modes. Along Connecticut Avenue (MD 185), a raised median effectively limits each access drive to right-in/right-out only. While this restriction minimizes vehicular conflict points, it creates a potential safety concern as motorists typically look in one direction for vehicular conflicts and overlook potential pedestrian conflicts from the opposite direction.

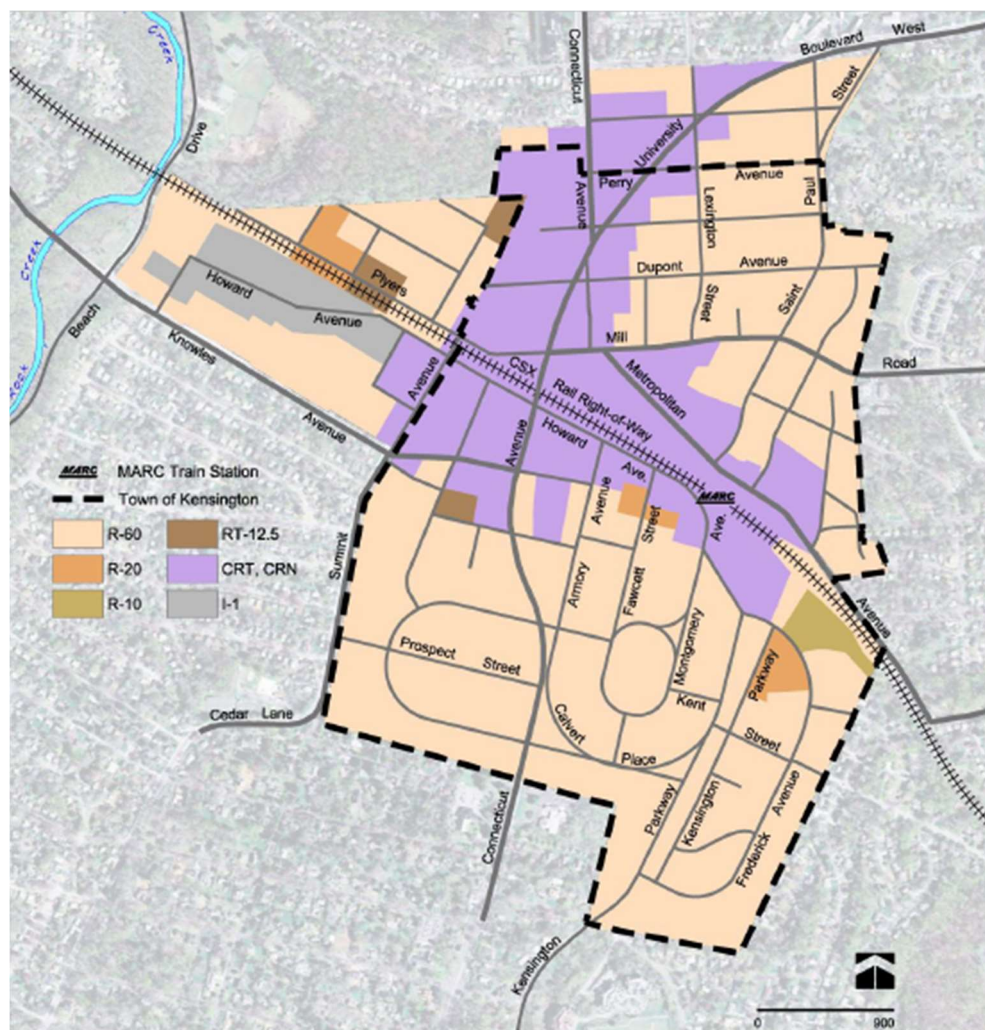


Figure 4: Zoning Map (Source: Kensington Sector Plan)

Street Lighting: Connecticut Avenue (MD 185) includes overhead leased lighting (i.e. attached to utility poles with service maintained by the utility company) on both sides of the roadway. An additional street light fixture is provided on the northwest corner of Connecticut Avenue (MD 185) and Plyers Mill Road.

Similarly, leased lighting is provided along one side of Knowles Avenue (MD 547), Howard Avenue and Plyers Mill Road. Additional pedestrian scale lighting is provided on the south side of Howard Avenue (east leg).

B. Pedestrian Activity

During the steering committee's field walk, crossing the Connecticut Ave. and Plyers Mill Road intersection legally from southeast corner to southwest corner (a three-legged crossing) took over 4 minutes.

Pedestrian crossing volumes were recently collected at signalized intersections and those near bus stops along Connecticut Avenue (MD 185). The number of pedestrians crossing each leg of the intersection is noted in the pull-out intersection boxes in **Figure 5**. Throughout the day, Connecticut Avenue (MD 185) at Knowles Avenue (MD 547) experienced the highest pedestrian activity, with the most pedestrian crossings occurring during the mid-day peak.

Due to the COVID-19 pandemic conditions, people's travel patterns, school/work and other schedules have changed permanently or temporarily. Transit ridership from 2019 was used to assess pre-pandemic activity levels in anticipation that current trends may still be suppressed due to pandemic patterns. Montgomery County Department of Transportation and WMATA 2019 data were used to identify the bus stop ridership in the purple and blue circles in **Figure 5**. Larger circles are indicative of higher ridership. Additionally, the Kensington MARC station located on Howard Avenue draws pedestrian and bicycle activity, especially for commuters to Washington D.C.

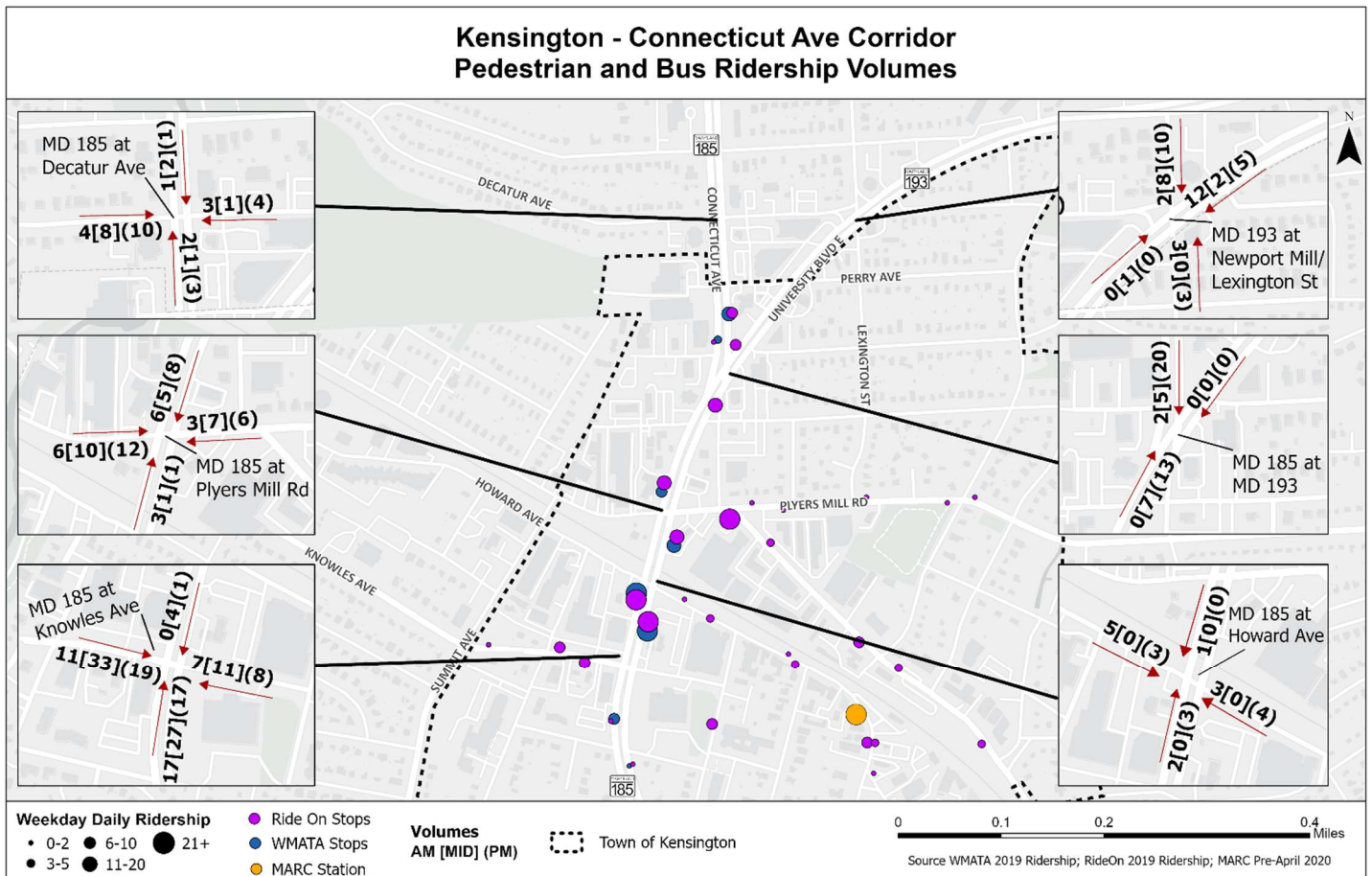


Figure 5: Summary of Pedestrian Activity

C. Pedestrian Level of Comfort

Montgomery County's Existing Conditions Report for the Pedestrian Master Plan defines a range of pedestrian levels of comfort (PLOC), identifying how "comfortable" it is to traverse a corridor or crossing. The report notes that 'comfort' is different than "safety". While "safety" is paramount, "comfort" creates an enjoyable environment, encouraging people to walk. The plan includes four main scores:

- 1 - Undesirable (depicted in red)
- 2 - Uncomfortable (depicted in orange)
- 3 - Somewhat Comfortable (depicted in light blue)
- 4 - Very Comfortable (depicted in medium blue)

The PLOC is influenced by a number of criteria, including pathway, or sidewalk, presence; land use; pathway width; posted speed limit on a parallel roadway; pathway buffer width; pathway condition; on-street buffer (DPL – designated parking lane, or SBL – separated bike lane). **Table 1** shows how the criteria work together to influence PLOC along a corridor, such as Connecticut Avenue. More details about PLOC can be found in the *Appendix A Pedestrian Level of Comfort Methodology* within the proposed Montgomery County's [Pedestrian Master Plan](#).

Table 1: Pedestrian Pathway Table (Source: Montgomery County Pedestrian Master Plan Appendix A)

	PATHWAY WIDTH	POSTED SPEED LIMIT	PATHWAY BUFFER WIDTH / ON-STREET SEPARATION											
			0 ft to <2 ft			2 to <5 ft			5 to <8 ft			≥8 ft		
			No DPL or SBL	DPL or 1SBL	2SBL or DPL & SBL	No DPL or SBL	DPL or 1SBL	2SBL or DPL & SBL	No DPL or SBL	DPL or 1SBL	2SBL or DPL & SBL	No DPL or SBL	DPL or 1SBL	2SBL or DPL & SBL
URBAN	No walkway		Use "No Pathway" Table											
	< 5ft	< 25 mph	4	3	1	4	3	1	3	2	1	2	1	1
		25 mph	4	3	1	4	3	1	3	2	1	2	1	1
		30 mph	4	3	1	4	3	1	3	2	1	2	1	1
		35 mph	4	3	2	4	3	2	3	2	1	2	1	1
		≥ 40 mph	4	4	3	4	3	2	3	2	2	2	1	1
	≥5 to 8 ft	< 25 mph	2	2	1	2	2	1	2	1	1	1	1	1
		25 mph	2/3*	2	1	2/3*	2	1	2	1	1	1	1	1
		30 mph	4	3	1	3	2	1	2	1	1	1	1	1
		35 mph	4	3	2	3	2	2	3	2	1	2	1	1
		≥ 40 mph	4	4	3	4	3	2	3	2	2	2	1	1
	≥8 to 10 ft	< 25 mph	2	2	1	2	1	1	1	1	1	1	1	1
		25 mph	2	2	1	2	1	1	1	1	1	1	1	1
		30 mph	4	3	1	3	2	1	2	1	1	1	1	1
		35 mph	4	3	2	3	2	2	3	2	1	2	1	1
		≥ 40 mph	4	4	3	4	3	2	3	2	2	2	1	1
	≥10 ft	< 25 mph	2	1	1	2	1	1	1	1	1	1	1	1
		25 mph	2	2	1	2	1	1	1	1	1	1	1	1
		30 mph	3	2	1	3	2	1	2	1	1	1	1	1
		35 mph	4	3	2	3	2	2	3	2	1	1/2^	1	1
		≥ 40 mph	4	4	3	4	3	2	3	2	2	1/2^	1	1

Figure 6 shows Connecticut Avenue (MD 185) through the Town of Kensington primarily at an undesirable PLOC largely due to the standard width sidewalks located adjacent to 30 MPH Connecticut Avenue (MD 185).

Kensington - Connecticut Ave Corridor Pedestrian Level of Comfort

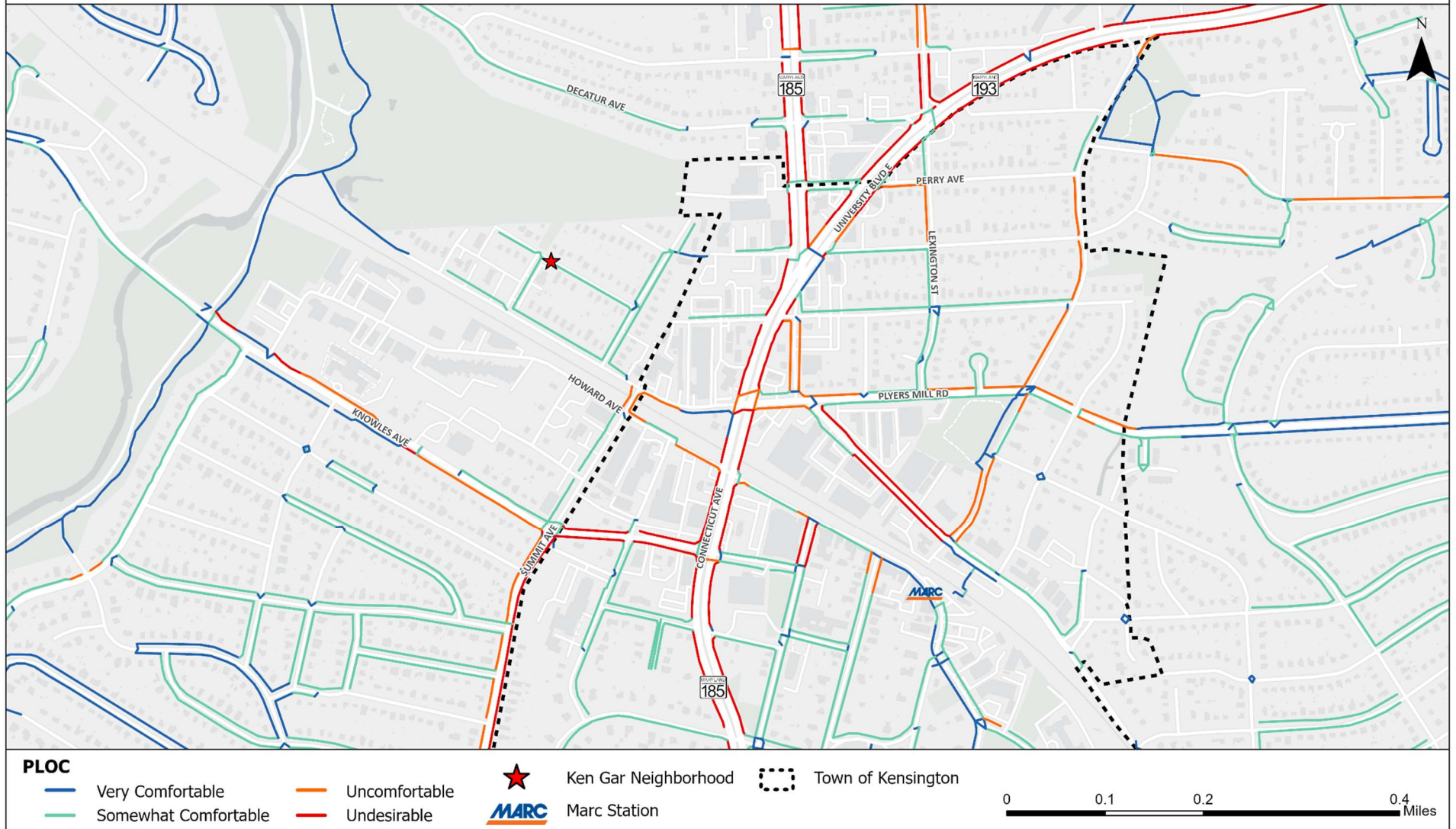
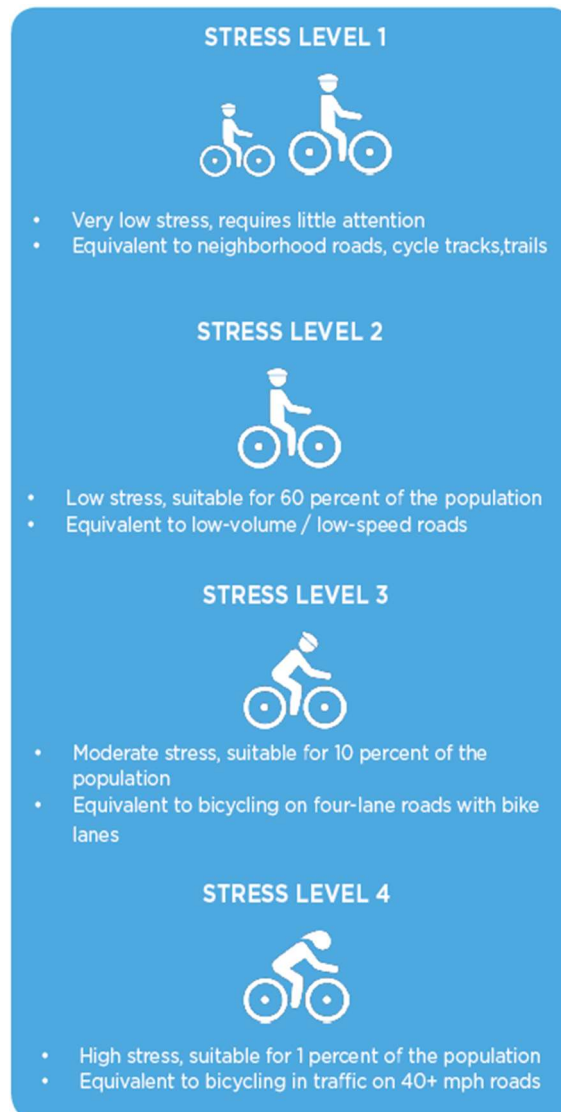


Figure 6: Pedestrian Level of Comfort (Source: Montgomery County's [Pedestrian Master Plan](#))

D. Bicycle Level of Traffic Stress

Level of traffic stress (LTS) aims to quantify the amount of discomfort bicyclists feel when traveling close to traffic. Montgomery County's [Bicycle Master Plan](#) Appendix D includes the methodology defining bicycle LTS. The four original primary levels of traffic stress are identified as shown in the graphic below.



LTS considers the posted speed limit, number of through lanes, on-street parking turnover and the presence of a bikeway facility in a roadway segment evaluation. **Table 2** shows how the LTS changes with the various conditions. Similar LTS methodology is available for intersection crossings but are evaluated based upon the presence of right-turn lanes, their length, and turn lane configurations, or at unsignalized crossings - width of cross street, speed limit of cross street and presence or absence of median refuge.

Table 2: Bicycle Level of Traffic Stress (Source: Montgomery County [Bicycle Master Plan](#) Appendix D)

Street Segments: Original Level of Traffic Stress
Bikeway: Mixed Traffic

Posted Speed Limit (mph)	# of Through Lanes	Mixed Traffic		Priority Shared Lane Markings			
		No Parking		Parking			
		Center Line	No Center Line	Center Line & High Parking Turnover	Center Line & Low Parking Turnover	No Center Line & Non-Residential	No Center Line & Residential
≤25	2-3	2	1	2	2	1	1
	4-5	3	n/a	3	3	n/a	n/a
	≥6	4	n/a	4	4	n/a	n/a
30	2-3	3	2	3	3	2	2
	4-5	4	n/a	4	4	n/a	n/a
	≥6	4	n/a	4	4	n/a	n/a
35	2-3	4	4	4	4	n/a	n/a
	4-5						
	≥6						
40	2-3	4	4	4	4	n/a	n/a
	4-5						
	≥6						
≥45	2-3	4	4	4	4	n/a	n/a
	4-5						
	≥6						

Figure 7 graphically depicts the LTS along Connecticut Avenue (MD 185) and the surrounding area based on the criteria in the table above. Connecticut Avenue (MD 185) is identified as high traffic stress due to its posted speed and number of travel lanes with no separate bike facilities provided. Similarly, Knowles Avenue (MD 547) and Plyers Mill Road are “moderate” traffic stress, while many local roads are low or very low stress.

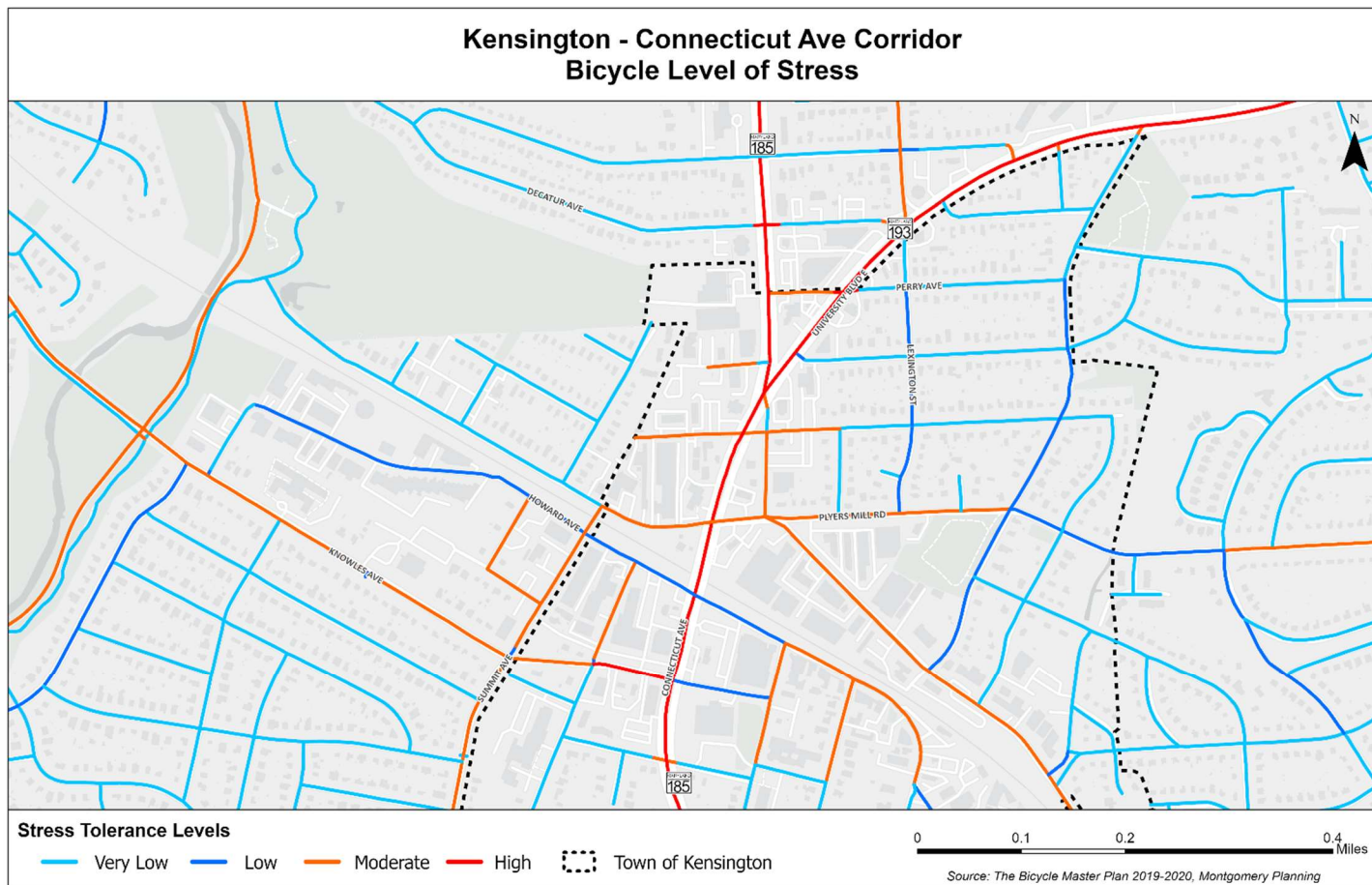


Figure 7: Summary of Bicycle Level of Stress (Source: Montgomery County's [Bicycle Master Plan](#))

E. Vehicular Traffic Volumes

Annual Average Daily Traffic (AADT) estimates the daily vehicle traffic load on a roadway section and represents how busy the road is. As a daily average, the actual peak morning and evening traffic volumes may be higher. **Figure 8** shows the AADT along the study corridor from MDOT SHA for 2019.

The heavy blue line between Plyers Mill Road and University Boulevard (MD 193) indicates that this section of Connecticut Avenue (MD 185) experiences the highest traffic volumes, which MDOT SHA indicates is at approximately 43,800. Volumes at this level justify the six-lane roadway section. However, beyond this roadway section where volumes decrease, there may be opportunity to reduce the number of travel lanes.

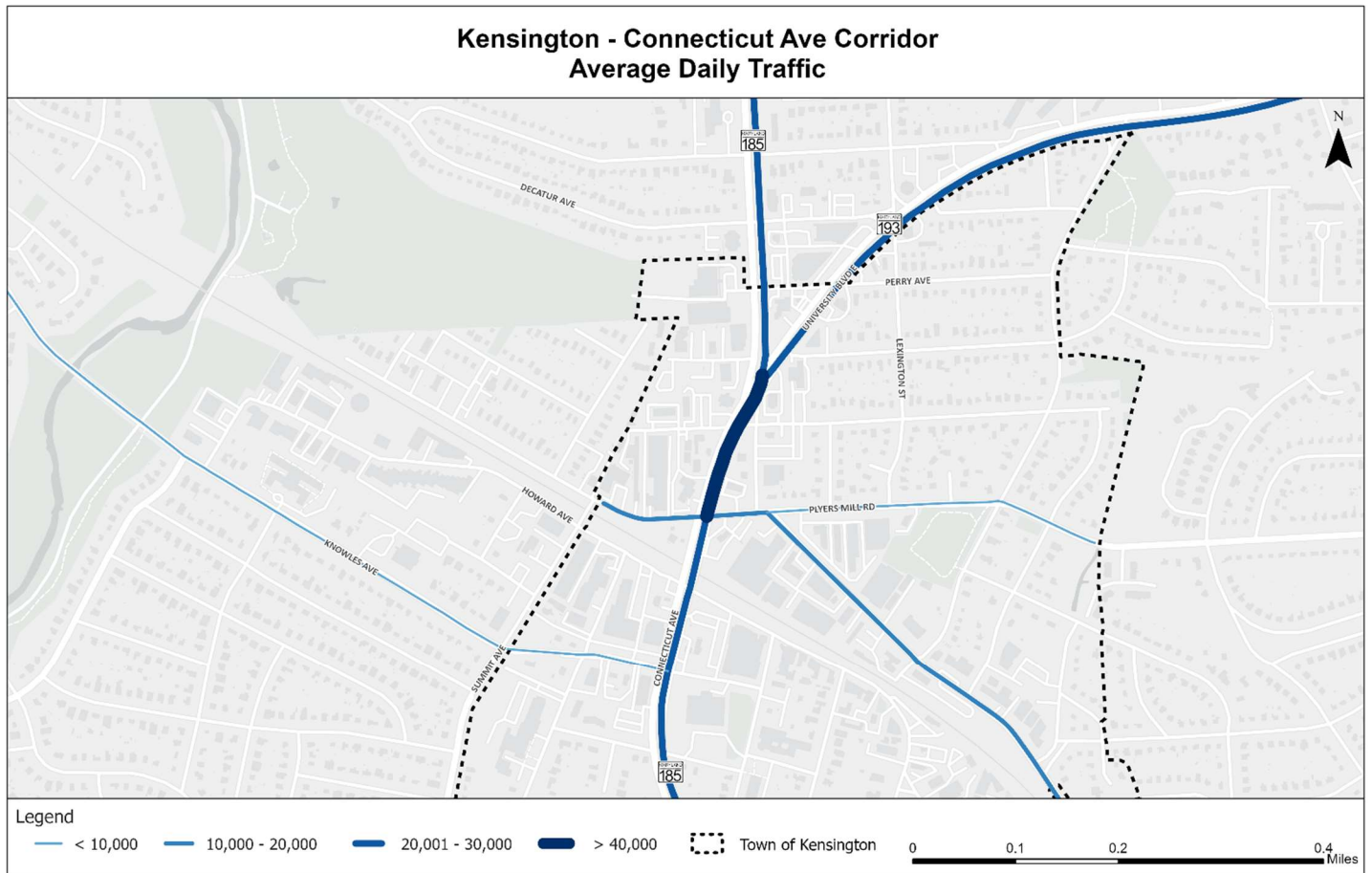


Figure 8: Vehicular Traffic Volumes (Source: MDOT SHA 2019)

F. Speed Data

Vehicular speeds impact both pedestrian and bicyclists' comfort traveling on and along roadways.

The posted speed limit on Connecticut Avenue (MD 185) through the Town of Kensington is 30 MPH.

Speed data was gathered from INRIX, a data and analytics tool that provides real-time traffic data, to determine peak hour and off-peak hour speeds. The collection period included October 2021. INRIX gathers speed data from vehicles that can be used to calculate the average speed for roadways. INRIX does not account for traffic stopped at traffic signals or for individual vehicles along the corridor. Therefore, the reported speeds may appear slightly lower than expected. **Figure 9, Figure 10 and Figure 11** show speeds on roadway section by time of day for morning peak, mid-day and evening peak, respectively.

During the peak periods when traffic volumes are heaviest, most vehicles travel at or below the posted speed limit. Vehicle speeds increase during the mid-day with lower traffic volumes, especially on the Connecticut Avenue (MD 185) section just north of University Boulevard (MD 193). Industry studies have shown a direct correlation between pedestrian injury severity and vehicle speeds. An excerpt from MDOT SHA's [Context Driven: Access & Mobility for All](#) states, "roadway speed...has been shown to be a critical factor in the severity of pedestrian crashes; while a pedestrian struck by a vehicle at 25 miles per hour (MPH) has

a 25 percent risk of sustaining a serious or fatal injury, the risk jumps to 50 percent at 33 MPH and 75 percent at 41 MPH.”

However, engineers and practitioners do not want to set artificially low speed limits that will be ignored by motorists and create a potential speed differential between vehicles, which may cause an incident as well.

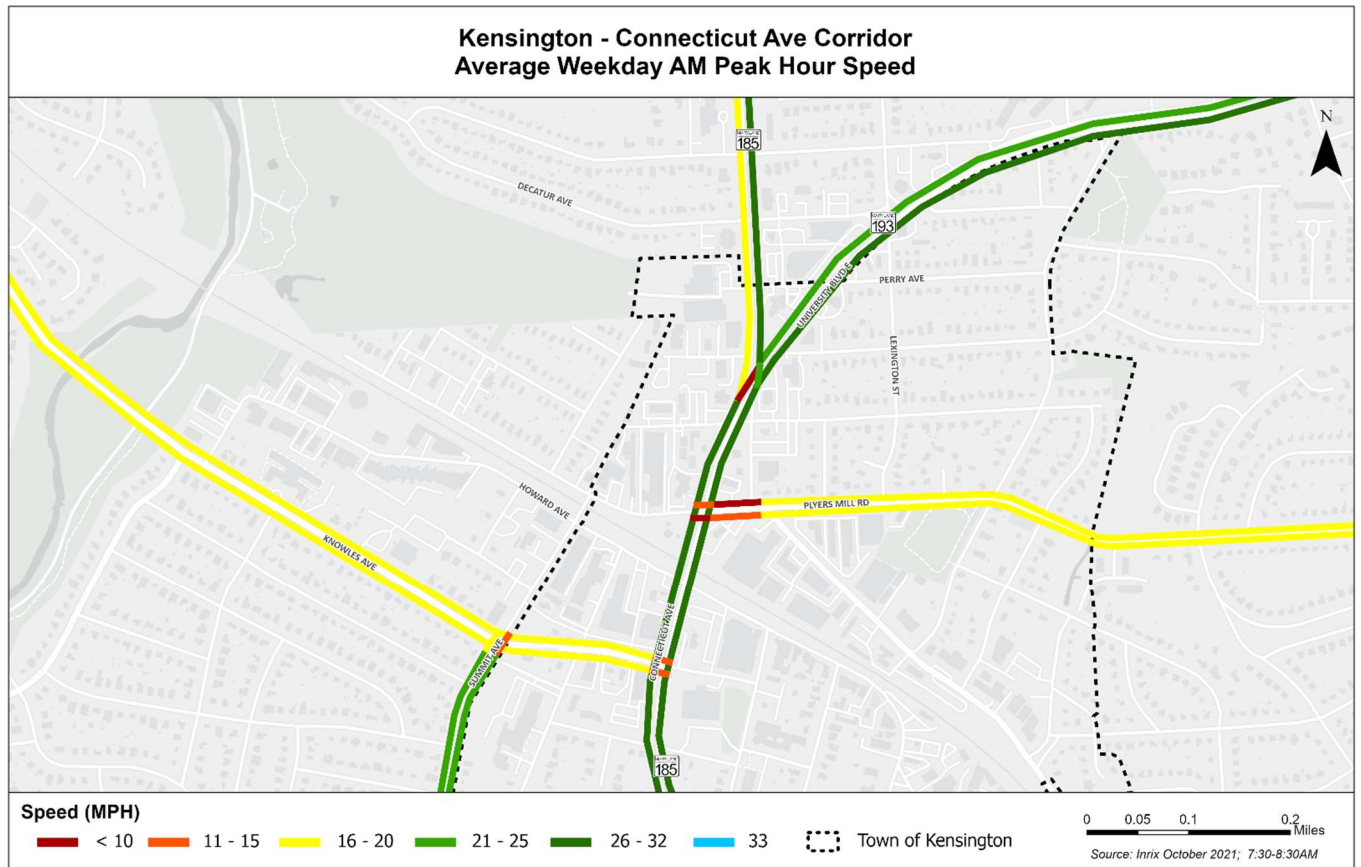


FIGURE 9: AM INRIX SPEED DATA

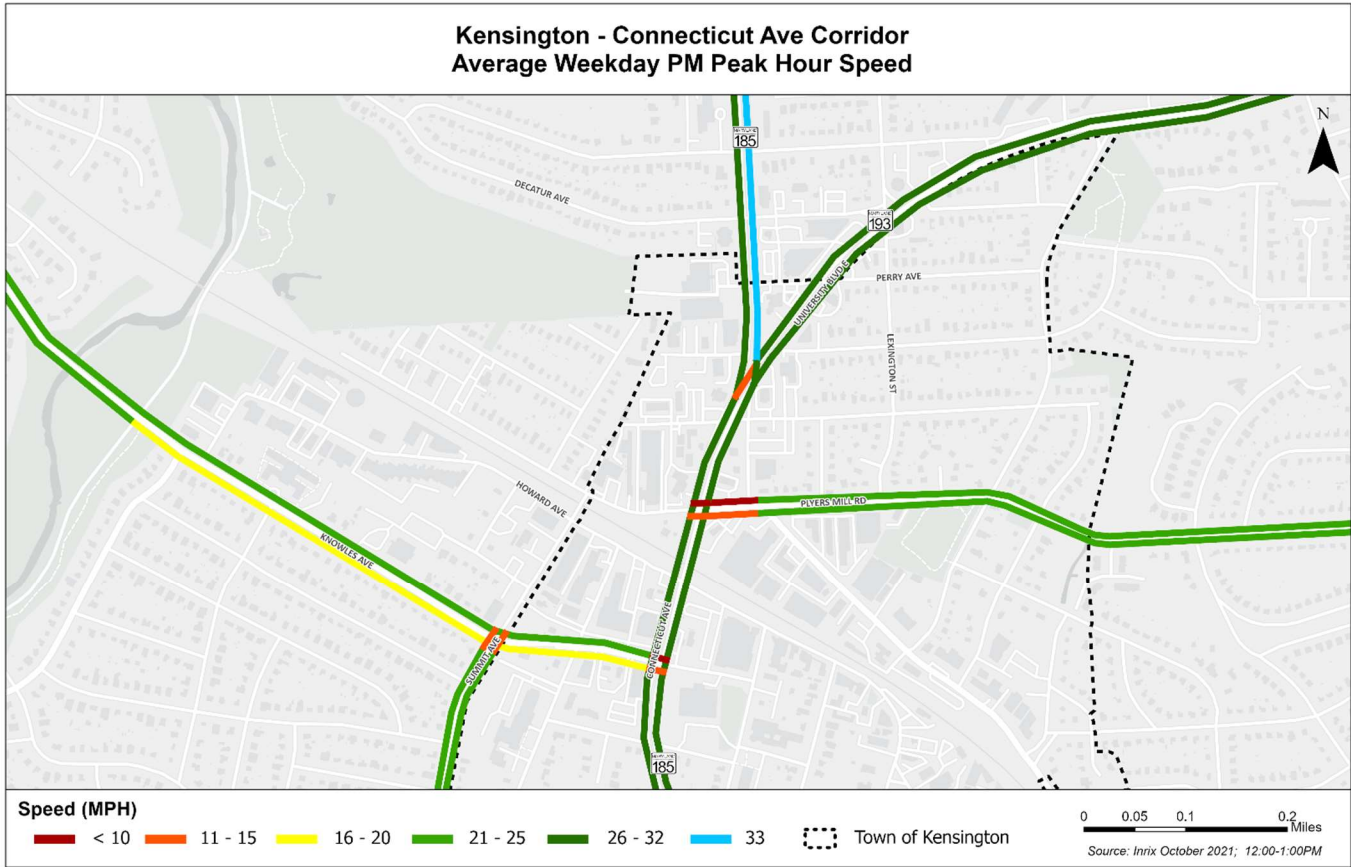


Figure 10: Mid-Day INRIX Speed Data

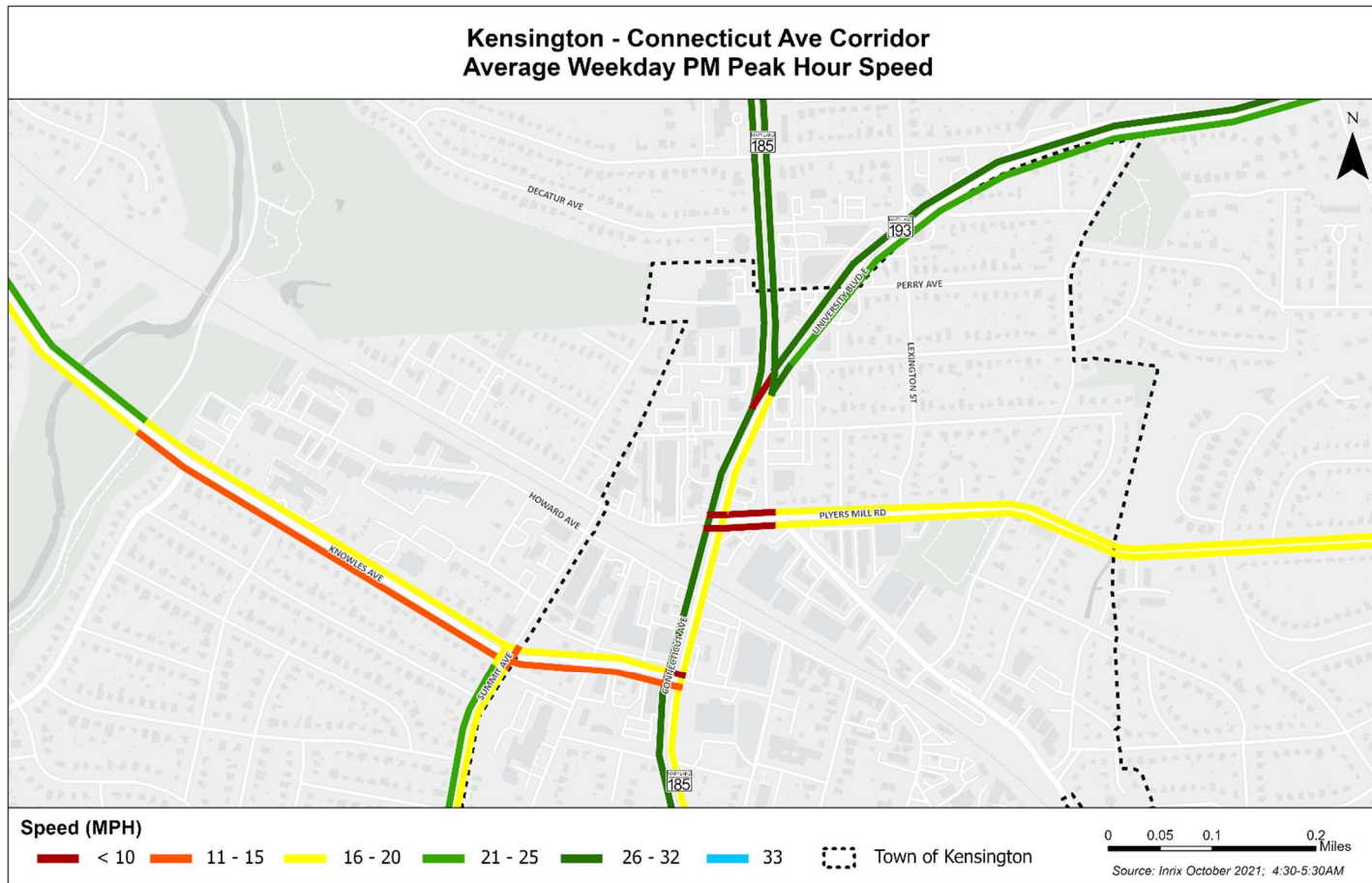


Figure 11: PM INRIX Speed Data

G. Safety Data

Historical crash data from 2016 – 2020 was obtained from Montgomery County’s open-source dataset collected via the Automated Crash Reporting System (ACRS) of the Maryland State Police and reported by the Montgomery County Police and local police departments.

Figure 12 graphically depicts the crashes along the corridor in yellow and red, indicating the locations with the highest crash density. Red and yellow diamonds depict locations of pedestrian and bicycle crashes, respectively. The highest overall crash rate occurred at Connecticut Avenue (MD 185) and Plyers Mill Road, Connecticut Avenue (MD 185) and Knowles Avenue (MD 547) and Connecticut Avenue (MD 185) and Perry Avenue, which represent three of the four signalized intersections in the study corridor. The majority of pedestrian crashes occurred at the Connecticut Avenue (MD 185) and Knowles Avenue (MD 547) intersection.

A total of 389 crashes were reported. Of these crashes, 139 involved an injury. Of the reported injuries, there were 0 severe/disabling, and 0 fatal crashes. There were 20 crashes involving a person walking or biking, of which 19 individuals walking or biking were injured or disabled.

In total 5% of crashes in the study area vicinity involved a person walking or biking, and 95% of those crashes resulted in an injury for the pedestrian or bicyclist.

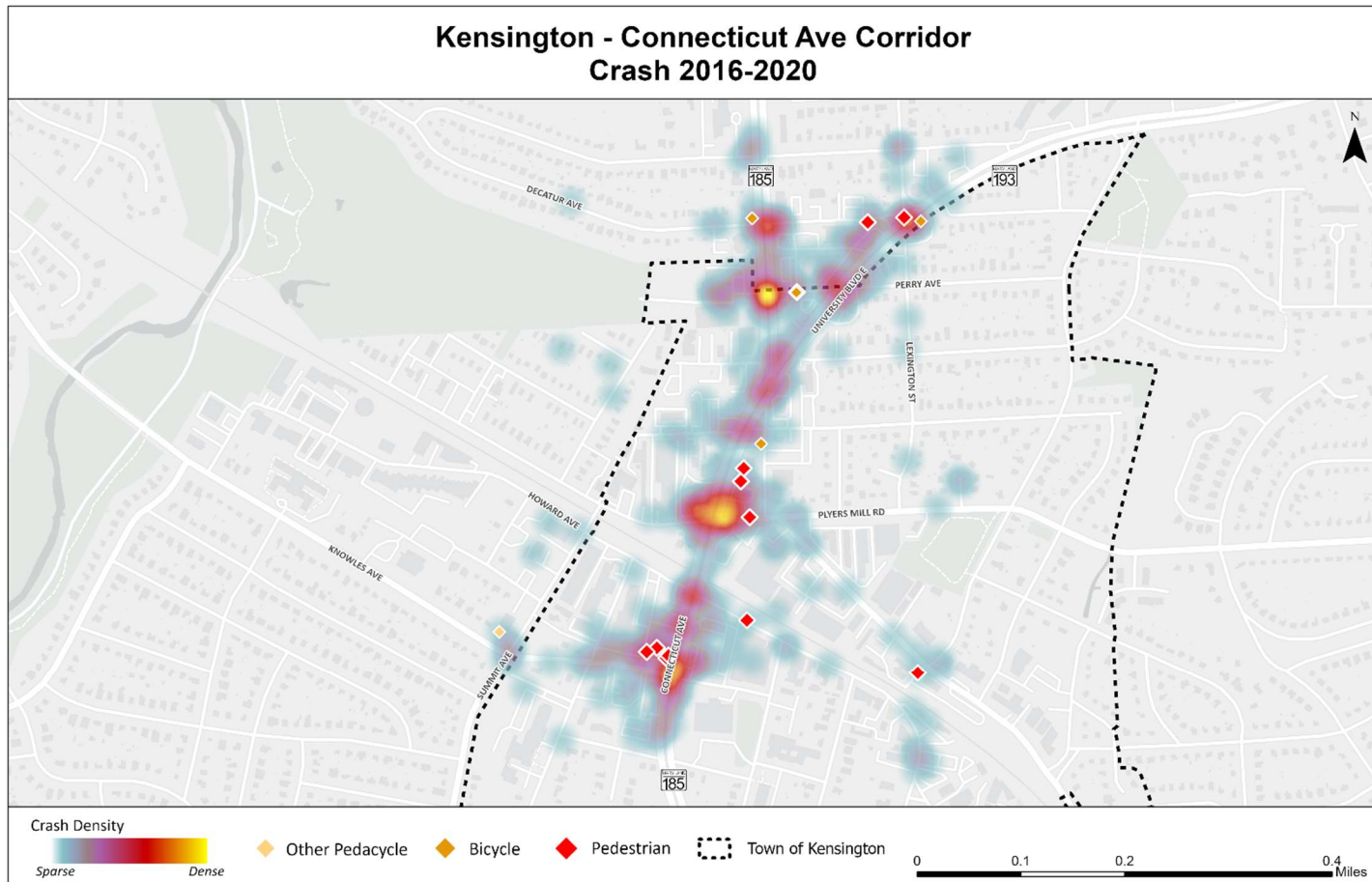


Figure 12: Summary of Crashes (Source: Montgomery County Crash Data)

H. Capacity Analyses

A capacity analysis of the Connecticut Avenue corridor was performed using Synchro 11, a macroscopic and deterministic traffic analysis software which implements the Highway Capacity Manual (HCM) methodology. Synchro was used to report the delay, Level of Service (LOS) and volume-to-capacity ratio at the five study intersections along Connecticut Avenue. Synchro is a deterministic and macroscopic signal analysis computer software program that models street networks and traffic signal systems. Geometric data such as number of lanes, lane configuration, storage lengths, tapers and distances between intersections were inputted into the Synchro network. Additionally, existing signal timings and phasing were obtained from the Montgomery County Department of Transportation and coded into the Synchro traffic model along with existing traffic volumes.

Intersection capacity analyses were performed using the industry standard HCM methodology. Synchro implements HCM methods of analysis, which were used for the intersection capacity analysis of all study intersections during weekday AM and PM peak hours. Performance measures of effectiveness from the Synchro model include level of service (LOS), volume-to-capacity (v/c) ratio and average vehicle delay. **Table 3** shows each Level of Service and their corresponding delay values for signalized and unsignalized intersections.

Key performance measures are defined as follows:

- **Level of Service (LOS)** is a qualitative measure describing operational conditions of an intersection or any other transportation facility. LOS measures the quality of traffic service, and may be

determined for intersections, roadway segments, or arterial corridors on the basis of delay, congested speed, volume to capacity (v/c) ratio, or vehicle density by functional class. At intersections, LOS is a letter designation that corresponds to a certain range of roadway operating conditions. The levels of service range from 'A' to 'F', with 'A' indicating the best operating conditions and 'F' indicating the worst, or a failing, operating condition.

- The **volume-to-capacity ratio (v/c ratio)** is the ratio of current flow rate to the capacity of the intersection. This ratio is often used to determine how sufficient capacity is on a given roadway. Generally, a ratio of 1.0 indicates that the roadway is operating at capacity. A ratio of greater than 1.0 indicates that the facility is operating above capacity as the number of vehicles exceeds the roadway capacity.
- **Delay** (control delay) is the portion of delay attributed to traffic signal operation for signalized intersections. Control delay (overall delay) can be categorized into deceleration delay, stopped delay and acceleration delay.

Table 3: Intersection Level of Service Thresholds

Level of Service	Delay Range (sec)	
	Signalized intersections	Unsignalized intersections
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Political jurisdictions establish the acceptable performance measures. **Table 4** summarizes these acceptable thresholds for both Montgomery County and the state, MDOT SHA.

Table 4: Summary of Acceptable Performance Measures

Jurisdiction	Delay / Vehicle (sec)	Level of Service	Volume / Capacity Ratio
Montgomery County ¹	80	E/F	1.0
MDOT SHA ²	NA	D	NA

¹Montgomery County's Local Area Transportation Review Guidelines – July 2021

²MDOT SHA Draft Guidelines for Traffic Impact Reports/Studies

Traffic counts were conducted in Fall 2021 for:

- Connecticut Avenue (MD 185) at Knowles Ave.
- Connecticut Avenue (MD 185) at Howard Ave.
- Connecticut Avenue (MD 185) at Plyers Mill Rd.
- Connecticut Avenue (MD 185) at University Blvd. (MD 193)

Pre-pandemic counts were used for Connecticut Avenue (MD 185) at Perry Avenue intersection volume distribution. Traffic volumes were then balanced along the corridor through the study intersections for a more calibrated Synchro model.

The analysis results are presented in **Table 5**.

Table 5: Summary of Existing Capacity Analyses

#	Intersection	Existing Conditions – AM (PM)					
		Delay/Veh (sec)		Level of Service		Volume/ Capacity Ratio	
1	MD 185 at Knowles Ave	20.1	(33.9)	C	(C)	0.83	(0.67)
2	MD 185 at Howard Ave ¹	1.0	(1.6)	A	(A)	-	-
3	MD 185 at Plyers Mill Road	34.6	(64.0)	C	(E)	0.82	(0.94)
4	MD 185 at University Blvd (MD 193)	23.7	(14.2)	C	(B)	0.86	(0.52)
5	MD 185 at Perry Ave	11.8	(10.9)	B	(B)	0.56	(0.45)

¹For stop controlled intersections, only the results of the stopped approaches are reported.

All of the intersections within the corridor currently operate at acceptable levels of service by Montgomery County's threshold criteria. Only Connecticut Avenue (MD 185) and Plyers Mill Road fall below MDOT SHA's acceptable LOS 'D' during the evening peak period. Due to the heavy side street volumes and the current lane configuration, eastbound and westbound Plyers Mill Road operate with "split phasing", meaning only one approach receives a green signal at a time, which adds overall delay to the intersection.

4. Alternatives Development

The purpose of the Town of Kensington Connecticut Avenue Corridor Planning Study is to assess walkability, bikability and to examine opportunities to reduce individual vehicular trips and identify alternatives to create new or enhance available connections to create a more livable and less auto-dependent community.

Alternative development was based on input from Kensington officials, the aforementioned steering committee and several community field walks with members of the steering committee as well as Kensington residents, who identified the challenges in accessing desired destinations on foot.

Recognizing differences in how pedestrians, bicyclists, transit users and drivers experience travel, their comfort, stress and vulnerability to conflicts guided the consideration of potential alternatives. Several alternatives were considered that ultimately were not pursued due to excessive challenges as discussed below:

- **Shared Use Path Along Railroad:** Adding a pathway adjacent to the existing railroad under Connecticut Avenue (MD 185) to better connect the east and west sides of the Town was considered. However, due to several railroad design constraints this alternative was deemed unfeasible and is no longer under consideration.
- **Pedestrian Flyover Bridge:** This alternative considered providing an elevated pathway linking the potential shared use path bridge on the east side of Connecticut Avenue (MD 185) to the west side. Experience has shown pedestrians prefer crossing at street level, especially when trying to access transit stops and businesses along the main roadway. Pedestrians are unlikely to travel out of their way to access pedestrian bridges. Therefore, the group agreed not to consider this alternative.

- **North Kensington Transportation Network:** The transportation network centered around the Connecticut Avenue (MD 185) and University Boulevard (MD 193) intersection was identified as a challenge for motorists, pedestrians and bicyclists. Multiple alternatives were discussed from roadway/intersection realignment to one-way couplets (see “Long Term Alternatives” section below for more details) to greenway paths connecting into historic Kensington. Due to the scale of these improvements relative to the current task, if these alternatives are to be explored it will need to be under a separate future task.

MDOT SHA’s [MD 185 Needs Analysis](#) was completed during the Kensington Connecticut Avenue Corridor Pedestrian and Bicycling Access and Safety Study and included several improvements within the current study area. Similar to the current study, the *MD 185 Needs Analysis* identified improvements as near-, mid- and long-term projects. The following is an excerpt of projects identified within the current study limits (noted as “Segment 6” within the *MD 185 Needs Analysis*):

- MD 185/Connecticut Avenue corridor (long-term):
 - Modify cross-section to narrow travel lane widths, add buffers and expand eastern sidewalk (long-term)
 - Tighten curb radii (long-term)
 - Install “No Turn on Red” signs at intersections with high sidepath volumes to emphasize pedestrian priority (long-term)
 - Request consideration of automated red-light enforcement (long-term) from Montgomery County Police Department
 - Minimize, narrow and consolidate driveways as fronting properties develop/redevelop (long-term)
- MD 185/Connecticut Avenue at Knowles Avenue includes multiple proposed improvements:
 - Install leading pedestrian interval (LPI) to reduce turning conflicts with pedestrians in crosswalk (Near Term)
 - Install “Turning Traffic Yield to [peds]” sign and high visibility crosswalk to emphasize pedestrian priority (Near Term)
 - Modify signal operations to protected left-turn phasing and/or flashing red arrow phasing (long-term)
- MD 185/Connecticut Avenue at Howard Avenue:
 - Install Rectangular Rapid-Flashing Beacon (RRFB) or High-Intensity Activated crossWalk (HAWK) to improve driver yielding to pedestrians (mid-term)
 - Install High Visibility Crosswalk to improve visibility of conflicting crosswalk (mid-term)
- MD 185/Connecticut Avenue at Plyers Mill Road:
 - Install leading pedestrian interval (LPI) to reduce turning conflicts with pedestrians in crosswalk (mid-term)
 - Modify signal operations to protected left-turn phasing and/or flashing red arrow phasing (long-term)
- MD 193/University Boulevard – reduce the number of lanes on MD 193 to minimize pedestrian exposure and crossing time (long-term)

The current study concurs with the *MD 185 Needs Analysis* improvements and complements the previous efforts by expanding and defining key improvements related to pedestrian and bicycle accessibility and safety specifically. The retained alternatives for the current study include:

- **Corridor-wide Changes:** Repurposing pavement section(s) to accommodate all modes of transportation, enhance sidewalk buffers, provide shared use paths or wider sidewalks. Modifying regulatory speed limits.
- **Streetscape Improvements:** Repurposing pavement or area adjacent to roadway to enhance streetscape design.
- **Shared Use Path Bridge:** Installing new facility to provide safe, separate structure.
- **Wayfinding:** Providing branded signing to direct residential and commercial traffic, especially foot and bicycle traffic, to safe and accessible routes to Town destinations.

- **Signal Operations:** Implementing signal timing or cycle changes to prioritize pedestrians and vulnerable users and to safely traverse intersections.
- **Intersection Improvements:** Installing marked crosswalks to accommodate “shortest path” crossings and eliminate barriers for pedestrians, cyclists and vulnerable users; Modifying geometry to reduce conflicts between pedestrians and turning motorists.

The alternatives presented offer the Town and transportation officials a menu of options ranging from short-term (1 – 2 years), mid-term (3 – 5 years) and long-term (greater than 5 years) from which to choose.

A. Short-Term Alternatives

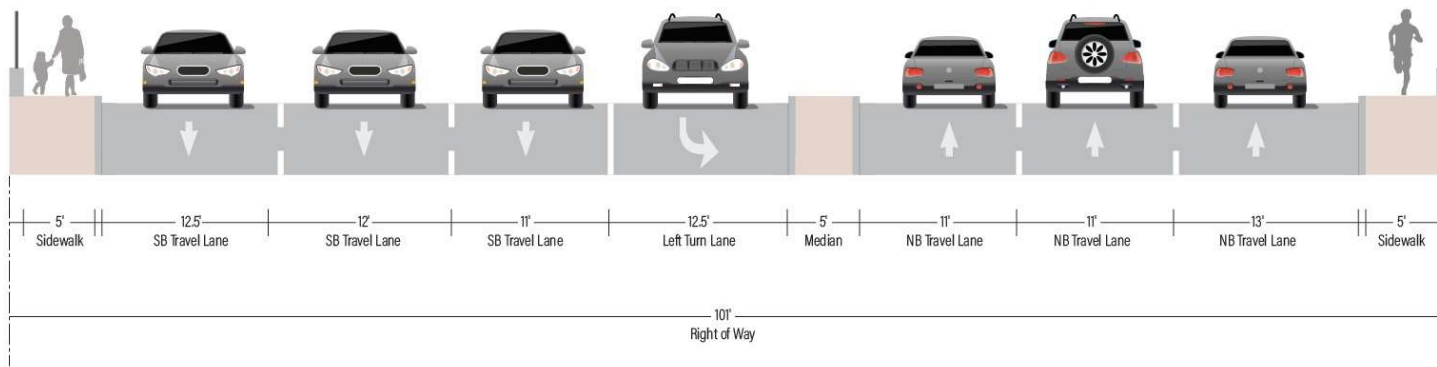
○ Restriping MD 185/Connecticut Avenue

This alternative reallocates the existing pavement section to reduce travel lane widths and provides a buffer area between the vehicular travel lanes and the existing sidewalks. Benefits of this alternative include potential vehicular speed reduction due to the tighter lanes, increased pedestrian comfort and providing separate space for bicycle travel along Connecticut Avenue. This alternative is consistent with MDOT SHA's *MD 185 Needs Analysis*.

Figure 13 includes the existing lane configuration for Connecticut Avenue (MD 185) with vehicle travel lanes ranging from 11-ft to 13-ft abutting the standard 5-ft sidewalks on the bridge over the railroad tracks. The bottom image shows a narrower vehicular travel footprint within the existing pavement section to accommodate a buffer area between the vehicular and sidewalk traffic.

Connecticut Ave (MD 185) Bridge Over CSX Tracks

EXISTING



PROPOSED—NEAR TERM

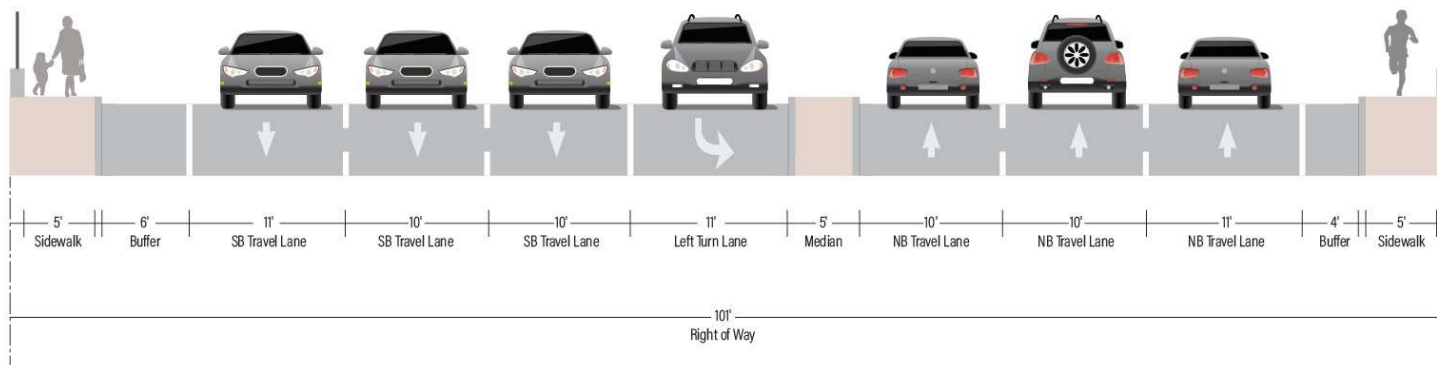


Figure 13: Connecticut Avenue Lane Configuration – Existing & Near-Term Restriping

- **Install Additional Crosswalks**

While many of the intersections within the Town of Kensington include crosswalks, the crosswalks are inconsistent, may not be marked and often require a pedestrian to traverse three legs of the intersection to access desired destination. Providing missing crosswalk connections reduces pedestrian exposure, increases pedestrian comfort and discourages mid-block or unsafe crossings.

Figure 14 shows the proposed locations for new crosswalks.

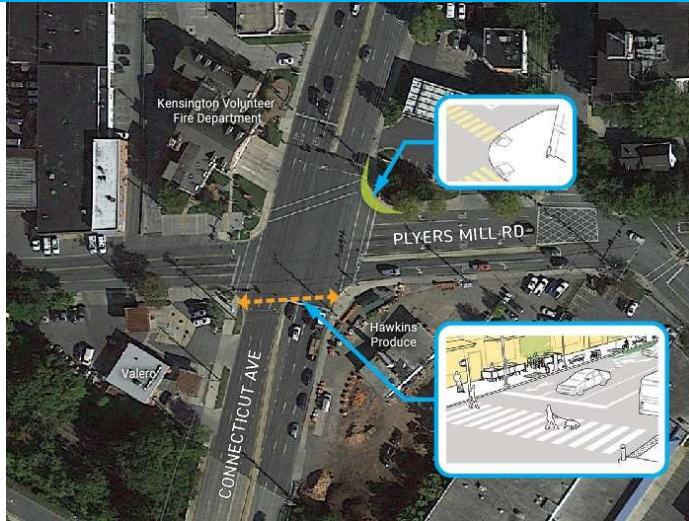
Connecticut Avenue (MD 185) at Plyers Mill Road: The alternative includes adding a MD 185/Connecticut Avenue south leg crosswalk and associated signal equipment to reduce pedestrian delay, increase pedestrian comfort and compliance in crossing the intersection. This alternative will increase vehicular delay at the intersection. However, an adequate level of service will be maintained.

Connecticut Avenue (MD 185) at Knowles Avenue: The alternative includes adding a MD 185/Connecticut Avenue north leg crosswalk and associated signal equipment to reduce pedestrian delay, increase pedestrian comfort and compliance in crossing the intersection. This alternative will increase vehicular delay at the intersection. However, an adequate level of service will be maintained.

Knowles Avenue (MD 547) at Detrick Avenue: Application of MDOT SHA's *Pedestrian Treatments: Best Practices Guide* to this intersection may be considered for a marked crosswalk, due to the surrounding land use, posted speed limit, and vehicular and pedestrian volumes.

Howard Avenue at Summit Avenue: While unmarked crosswalks and curb ramps exist at the intersection, during the walking tour residents said that marked crosswalks would improve the comfort crossing this intersection. During a nearby construction project, Town of Kensington officials were able to coordinate with Montgomery County Department of Transportation to have the crosswalks installed. This alternative has been completed.

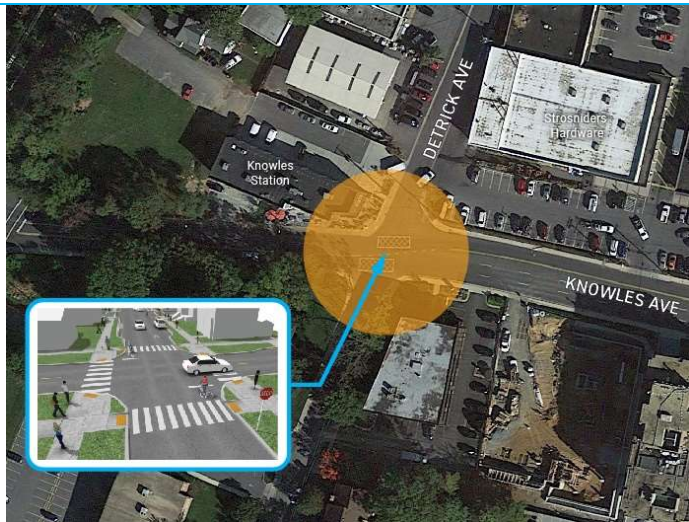
Short-Term: New Marked Crosswalk Locations



Connecticut Avenue at Plyers Mill Road – south leg¹



Connecticut Avenue at Knowles Avenue – north leg



Knowles Avenue at Detrick Avenue



Howard Avenue at Summit Avenue – north and west legs

Figure 14: Crosswalk Alternatives

¹ Image includes both short-term crosswalk as well as mid-term bumpout proposed at the intersection.

B. Mid-Term Alternatives

- **Create Greenways:** Per Montgomery County Planning Department's Bicycle Facility Design Toolkit:

Neighborhood greenways are streets with low motorized vehicle traffic volumes and speeds, designed and designated to give walking and bicycling priority. They use signs, pavement markings and speed and volume management measures to discourage through trips by motor vehicles and create safe, comfortable crossings of busy arterial streets.

Neighborhood greenways offer a range of potential treatments to better balance street usage among modes. Treatments to consider may include traffic calming and bike boulevard treatments such as mini-roundabouts, chicanes, traffic diverters and bike crossing islands.

As neighborhood greenways occur on low vehicle volume roadways, there may be an opportunity to repurpose the pavement to better balance transportation modes using an advisory bike lane (ABL). This provides for two-way vehicular and non-vehicular traffic using a center travel lane and striped edge lanes on either side, as shown in **Figure 15** below. The center lane is dedicated for vehicular use and shared by motorists traveling in both directions, whereas pedestrians, bicyclists and other non-vehicular modes have right-of-way in the edge lanes. The edge lanes may be used by motorists to pass another vehicle once they have yielded to any non-motorized user in the edge lane. As ABLs are currently an experimental treatment, they require an approved Request to Experiment from the Federal Highway Administration (FHWA) prior to use.



Figure 15: Sample ABL in San Diego, CA and accompanying sign

Neighborhood greenways were proposed for two roadway sections.

Lexington Street provides a north-south connection between MD 193/University Boulevard and Plyers Mill Road, running parallel to MD 185/Connecticut Avenue, as shown in **Figure 16**.

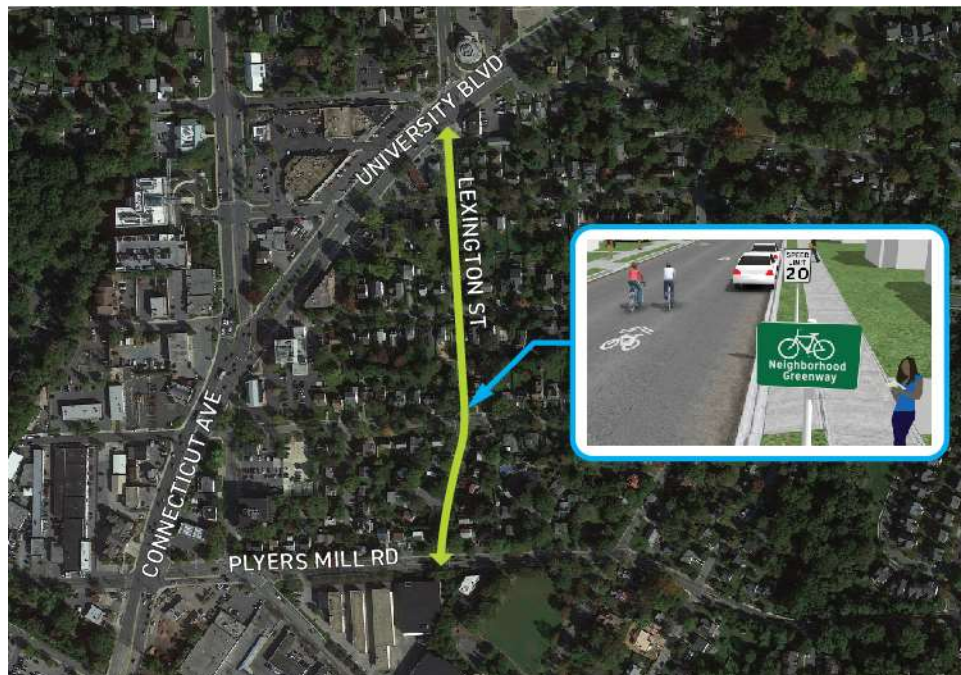


Figure 16: Lexington Street Neighborhood Greenway

Plyers Mill Road west of Shaftsbury Street, as shown in **Figure 17** provides a link to the Rock Creek Trail and ultimately to Connecticut Avenue and the MARC station on Howard Avenue.

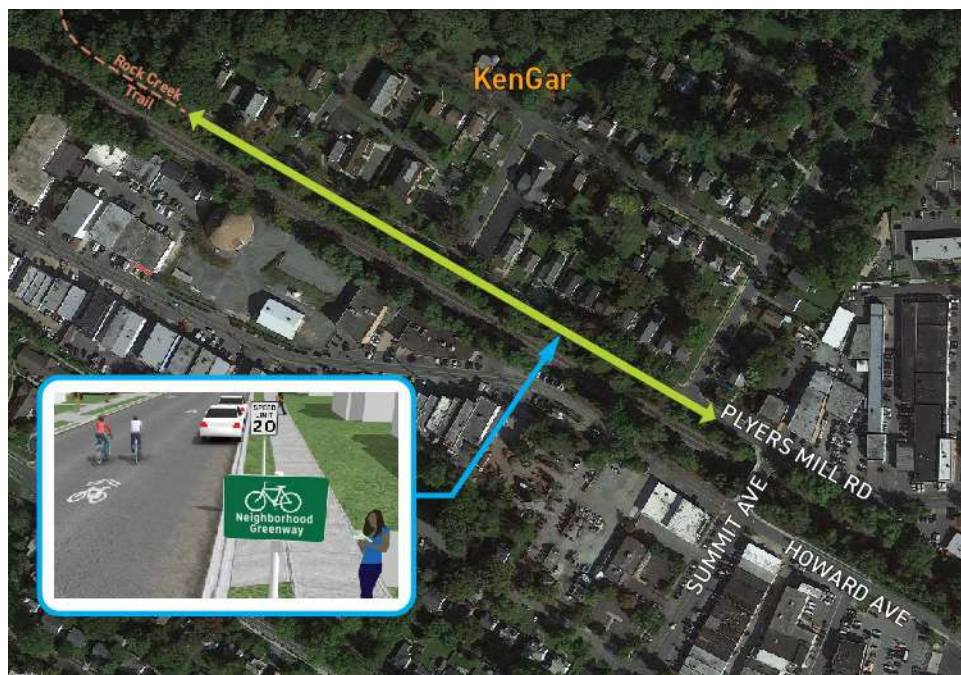


Figure 17: Plyers Mill Road (KenGar) Neighborhood Greenway

○ Install Upgraded Traffic Controls

This alternative considers several traffic control upgrades at Connecticut Avenue (MD 185) and Howard Avenue, including:

- HAWK (High-Intensity Activated CrossWalk) signal also known as a Pedestrian Hybrid Beacon. **Figure 18:** This device would stop Connecticut Avenue (MD 185) traffic to assist safely crossing people near Howard Avenue. Typically, HAWKs are used mid-block and not at an intersection with traffic approaching from multiple directions. The existing geometry (Connecticut Avenue turn lanes) and numerous access drives create a challenging environment in which to install a HAWK near Howard Avenue. However, this alternative is consistent with the MDOT SHA's *MD 185 Needs Analysis* recommendations.
- Non-traditional signalized, diagonal crosswalk: This device would maintain the existing vehicular traffic operations while adding a pedestrian crosswalk from the northeast corner to the southwest corner.
- Full color traffic signal at Connecticut Avenue (MD 185) and Howard Street. This alternative proposes to remove the "S" median to allow all vehicular movements to construct a traffic signal with standard pedestrian crosswalk facilities at Connecticut Avenue and Howard Avenue.

MDOT SHA and traffic engineering officials utilize established warrants to determine when and where to install traffic signals. Further coordination with MDOT SHA will be necessary to ultimately identify the most appropriate control at this intersection.

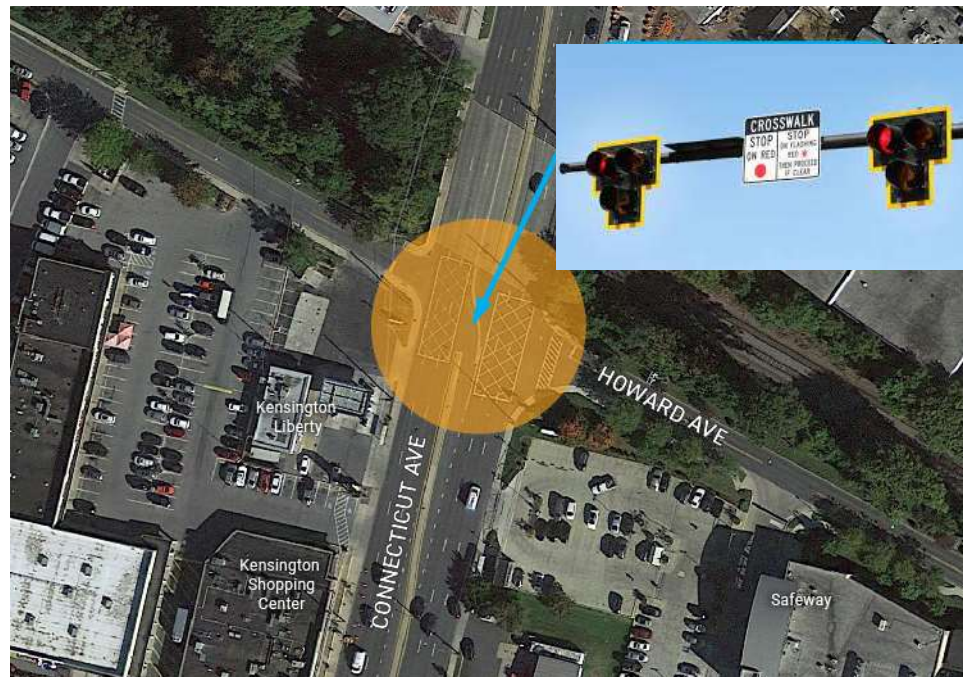


Figure 18: Connecticut Avenue (MD 185) and Howard Avenue

- **Install Minor Geometric Improvements**

This alternative involves constructing a “bump out” on the northeast corner of Connecticut Avenue (MD 185) and Plyers Mill Road. By relocating the existing curb and gutter into the intersection and decreasing the curb radius, this alternative increases pedestrian conspicuity to approaching motorists, shortens the pedestrian crossing distance on both the north and east legs and slows westbound Plyers Mill Road right-turning motorists; thereby, improving pedestrian comfort and safety.

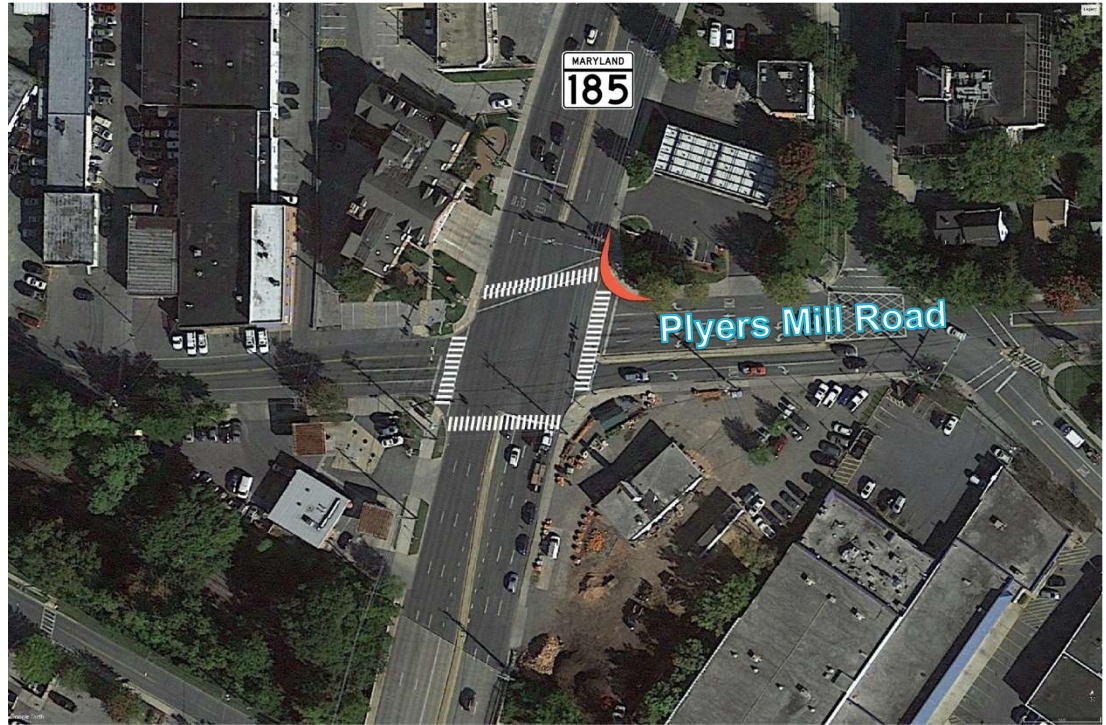


Figure 19: Connecticut Avenue (MD 185) and Plyers Mill Road Improvements

C. Long-Term Alternatives

- Narrow Connecticut Avenue (MD 185) and Widen Sidewalks /Streetscape**
 This alternative presents narrower vehicle travel lanes including wider sidewalks, plantings and street trees, where possible. The purpose of this alternative is to create an attractive streetscape for Connecticut Avenue (MD 185) that is inviting to pedestrians and bicyclists and reflects its function as Town roadway, not a thoroughfare. **Figure 20** includes the cross-section for the long-term narrowing of Connecticut Avenue through the Town of Kensington. **Figure 20** depicts the bridge cross-section. However, the corridor sections beyond the bridge may include landscaping and/or streetscaping within the repurposed pavement area. This alternative is comparable to the findings and recommendations in MDOT SHA's *MD 185 Needs Analysis*, shown in **Figure 21**.

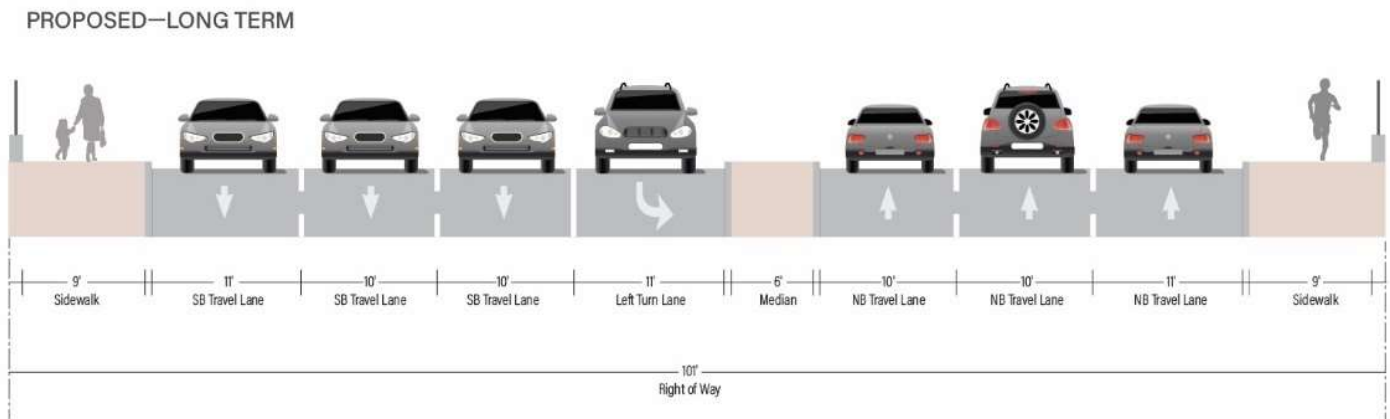


Figure 20: Long-term Connecticut Avenue (MD 185) Cross-section (Bridge Section)

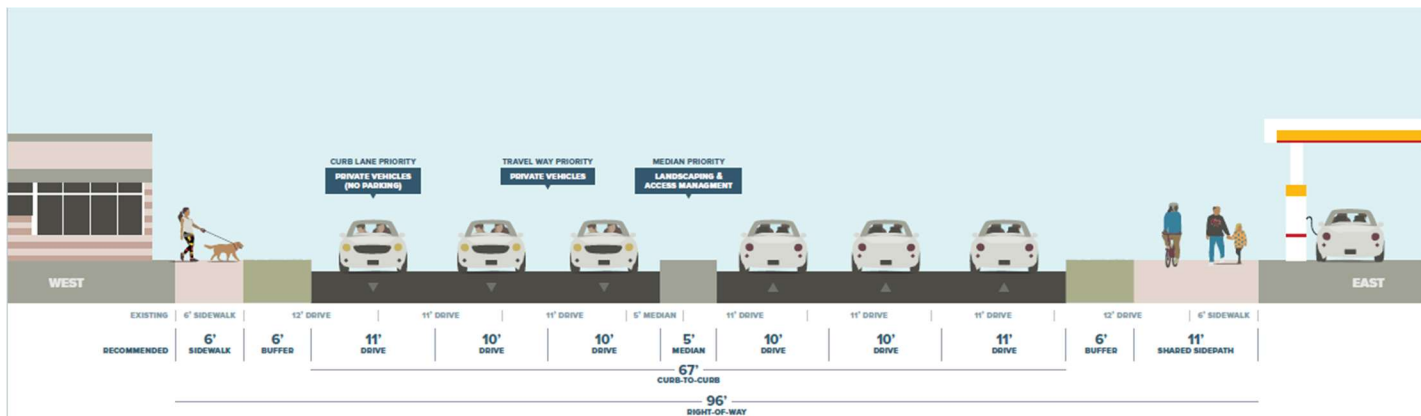


Figure 21: Long-term Connecticut Avenue (MD 185) Cross-section (Source: MD 185 Needs Analysis)

- Pedestrian Bridge**

During the field walk, many attendees noted discomfort when traveling along Connecticut Avenue (MD 185) over the railroad tracks due to the standard sidewalk directly placed against the vehicular travel lanes. This alternative proposes a separated shared-use path bridge adjacent to Connecticut Avenue (MD 185) to accommodate bicyclists, pedestrians and other non-vehicular modes. The alternative connects to Montgomery County's proposed shared use path along the frontage of the Kensington Crossing site (formerly Hawkins Produce) immediately north of the bridge terminus, on the southeast corner of Connecticut Avenue and Plyers Mill Road. **Figure 22** identifies the location and cross-section of the pedestrian bridge alternative.

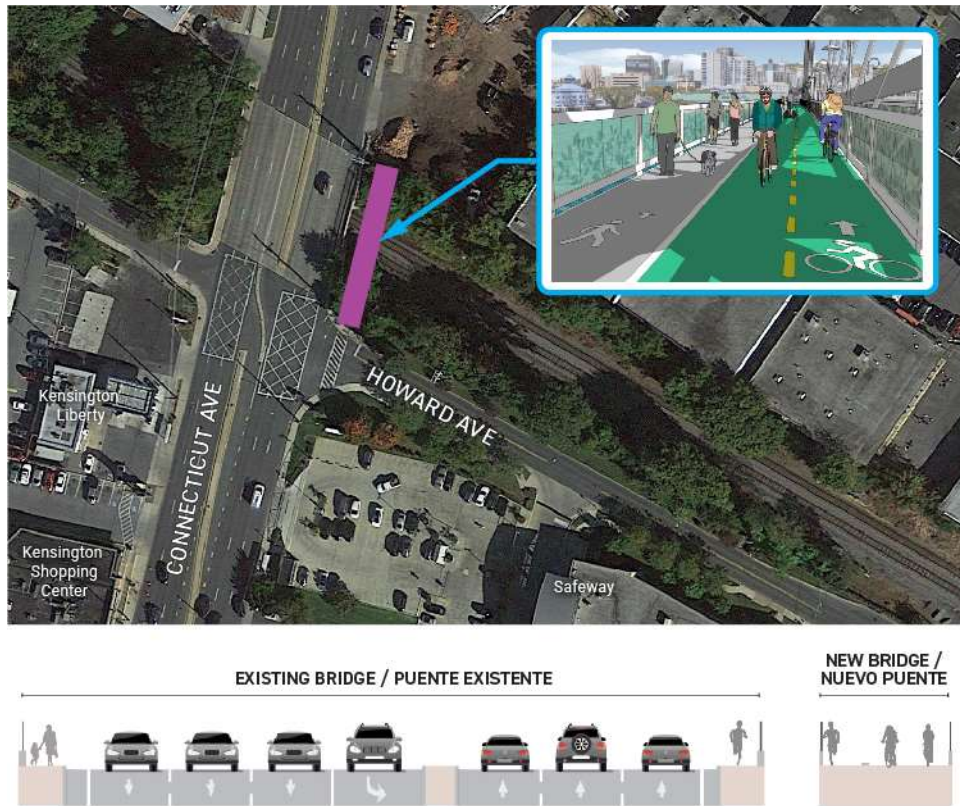
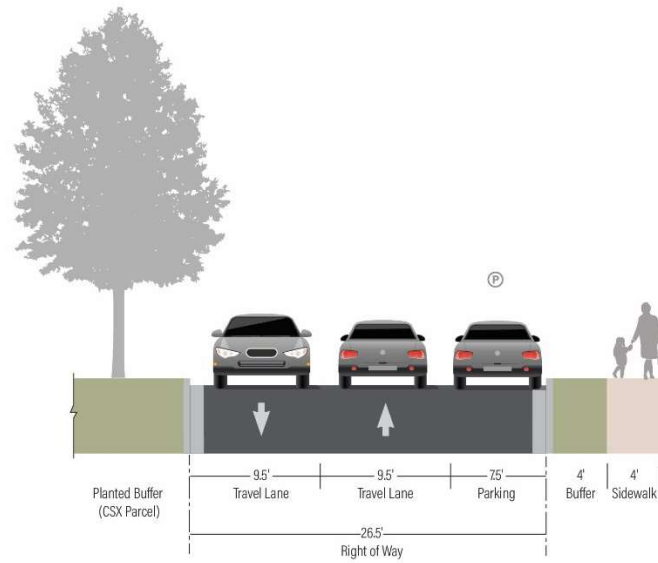


Figure 22: Connecticut Avenue (MD 185) Pedestrian Bridge alternative

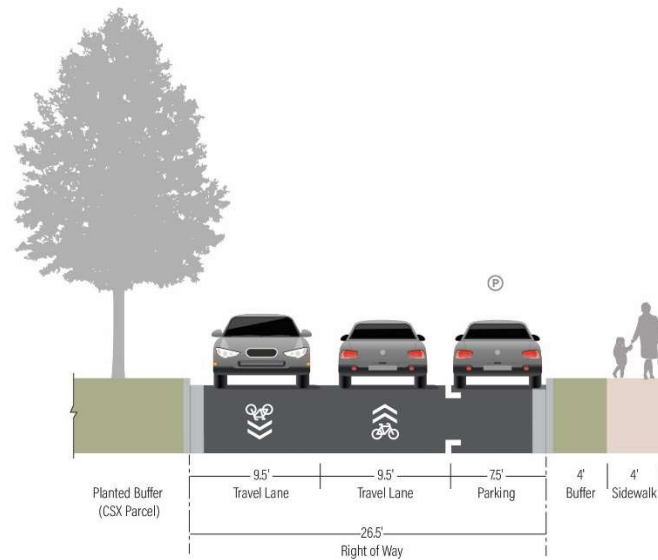
- Shared Use Path

The shared use path alternative serves multiple purposes from providing an off-road bicycle and pedestrian connection to Rock Creek Trail to narrowing the roadway pavement section creating a slower and safer neighborhood street feel. **Figure 23** includes the cross-sections for Plyers Mill Road, including the existing configuration, the greenway and shared-use path configurations. While the greenway cross-section can be accommodated within the existing right-of-way and pavement section, the shared use path alternative eliminates on-street parking and requires additional trail paving on the south side of Plyers Mill Road, which necessitates right-of-way from CSX.

EXISTING



PROPOSAL #1
Neighborhood Greenway



PROPOSAL #2
Shared Use Path

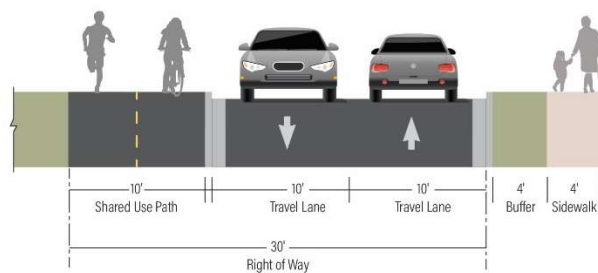


Figure 23: Plyers Mill Road west of Shaftsbury Street Cross-sections of Mid-term and Long-term Alternatives

- **Sidepath**

Consistent with Montgomery County's Bicycle Master Plan, the Plyers Mill Road sidepath alternative includes separated bikeways to decrease bicyclists' traffic stress and improve pedestrians' comfort level by increasing their separation from vehicular traffic on Plyers Mill Road. This alternative requires widening and right-of-way acquisition.

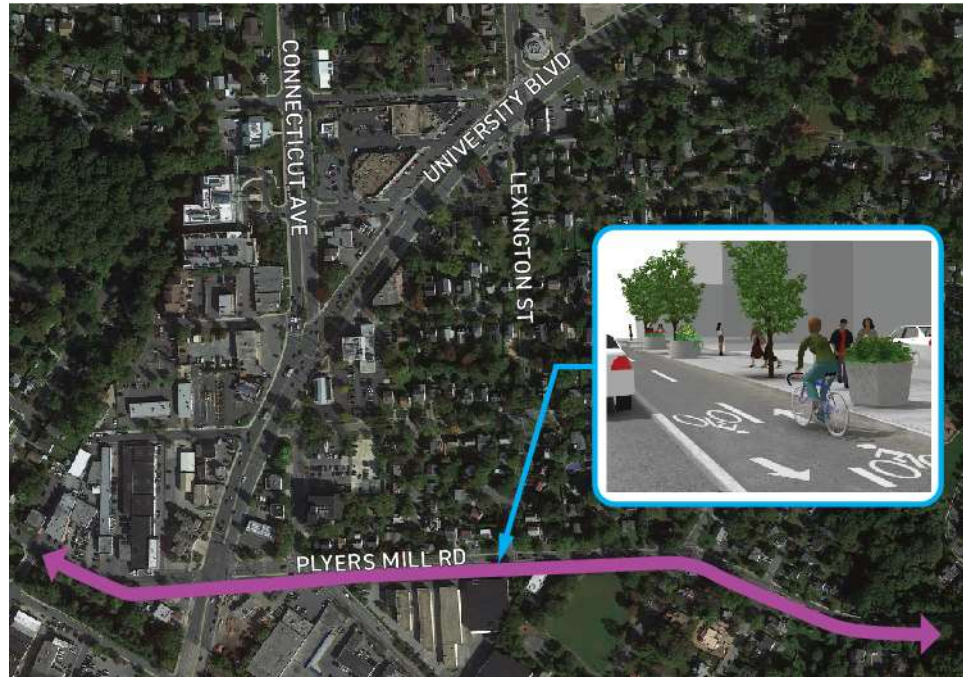


Figure 24: Plyers Mill Road Sidepath

- **Bike Lanes**

This alternative repurposes the outside travel lane to a bike lane/cycle track and allows for wider pedestrian facilities along University Boulevard (MD 193). The alternative is most beneficial when tying into other alternatives along Connecticut Avenue (MD 185), such as the one-way couplet and/or the Lexington Street greenway.

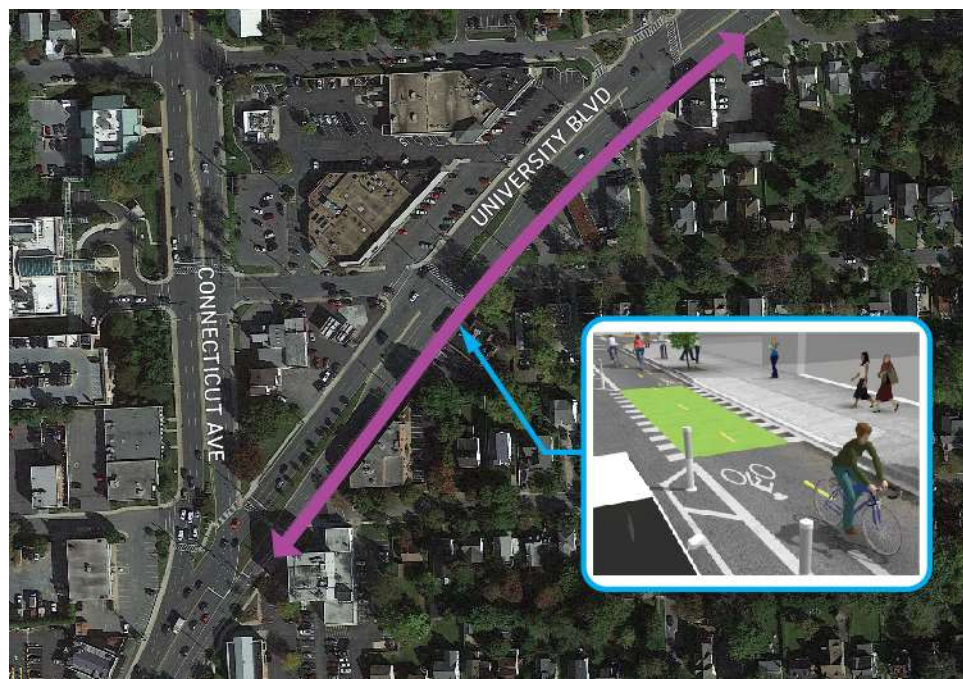


Figure 25: University Boulevard Bike Lanes

- **Wayfinding System**

During the field walk with Ken-Gar residents, there were multiple requests for improved signage to Kensington destinations, such as the library and Edith Throckmorton Neighborhood Park as well as Kensington districts. Other urban areas have successfully directed visitors to community destinations using wayfinding signs branded specifically for the city or town.

- **North Kensington: One-Way Couplet**

A number of pedestrian and bicycle challenges exist in North Kensington where major arterials -- Connecticut Avenue (MD 185) and University Boulevard (MD 193) -- merge. Due to the heavy vehicular traffic volumes and the skewed intersection of these roadways, pedestrians and bicyclists struggle to safely navigate the intersections of North Kensington. This alternative seeks to separate vehicular traffic volumes and reclaim the previous roadway grid network. In doing so, pedestrians and bicyclists can navigate narrower and simpler crossings with decreased delays and greater conspicuity. Additionally, a portion of University Boulevard (MD 193) can be repurposed for public use, possibly in the form of a pocket park, creating a destination in this section of Town. This alternative requires an update to the Montgomery County master plan, the addition of a traffic signal and widening to existing roadways. **Figure 26** shows the limits of the one-way couplet alternative as well as its potential to connect to several other proposed alternatives.



Figure 26: North Kensington: One-way Couplet Alternative

[Montgomery County's Summit Avenue Extended project](#) offers an alternative local route to Connecticut Avenue (MD 185) and intersects Connecticut Avenue (MD 185) opposite Farragut Avenue at the existing University Boulevard intersection. The one-way couplet alternative could simplify this future connection and roadway improvement by removing the University Boulevard (MD 193) leg. Additional studies are needed to fully assess the impacts and traffic control modifications necessary to accommodate the North Kensington alternative. Therefore, this alternative was not pursued further in the current planning effort.

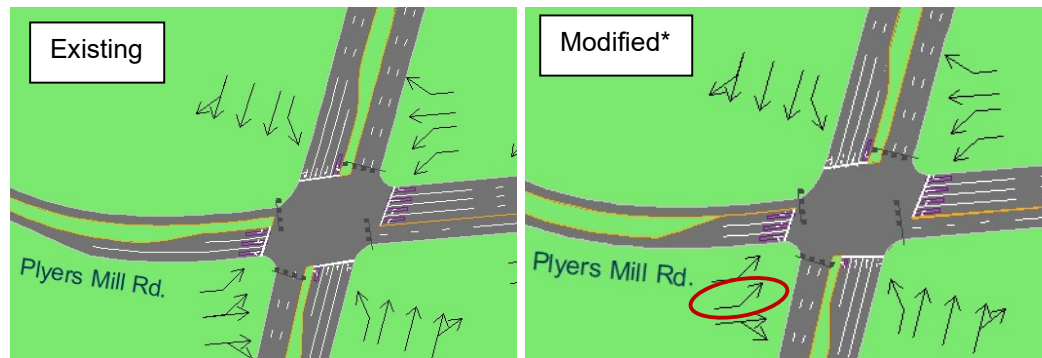
5. Alternatives Analyses

A. Capacity Analyses

Alternative capacity analyses were conducted to assess the initial feasibility of the retained alternatives, involving new signalization or signal modifications. As described previously, intersection level of service (LOS), delay, and volume-to-capacity ratio were analyzed using Synchro, based on Highway Capacity Manual (HCM) methodology. For intersections in urban areas such as the Town of Kensington, MDOT SHA considers LOS 'E' or better to be acceptable.

The following alternatives were analyzed:

- › Alternative 1A: Connecticut Avenue (MD 185) at Knowles Avenue north leg crosswalk and southbound right-turn on red restriction
- › Alternative 1B: Connecticut Avenue (MD 185) at Plyers Mill Road – add south leg crosswalk and northbound right-turn on red restriction
- › Alternative 1C: Plyers Mill Road at Connecticut Avenue (MD 185)– add south leg crosswalk and modified west leg sidestreet lane configuration



*The lane use on the Plyers Mill Road west leg is modified to meet MDOT SHA and MCDOT acceptable operations/thresholds.

Table 6 summarizes the capacity analyses for installing the additional crosswalks at Connecticut Avenue (MD 185), Knowles Avenue and Plyers Mill Road. The results indicate that both intersections currently operate at acceptable levels of service, though Connecticut Avenue (MD 185) and Plyers Mill Road experience a LOS 'E' and congestion in the evening peak period.

Adding the north leg crosswalk on Connecticut Avenue (MD 185) at Knowles Avenue minimally impacts intersection operations. Adding the south leg crosswalk on Connecticut Avenue (MD 185) at Plyers Mill Road results in a LOS 'F' and added delay during the evening peak period. However, modifying the Plyers Mill Road lane configuration from a separate left-turn lane, shared left/through lane and shared through/right-turn lane to double left-turn lanes and a single shared through/right-turn lane (see images above) to remove the Plyers Mill Road side street split phasing allows the intersection to continue operating acceptably.

Table 6: Capacity Analyses for Connecticut Avenue (MD 185) Missing crosswalks

Intersection	Existing			Alt 1A			Alt 1B			Alt 1C		
	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio
AM Peak												
Connecticut Avenue at Plyers Mill Rd	C	34.6	0.82	D	35.8	0.82	D	36.9	0.82	C	34.2	0.84
Connecticut Avenue at Knowles Ave	C	20.1	0.83	C	20.9	0.84	C	28.3	0.83	C	27.8	0.83
PM Peak												
Connecticut Avenue at Plyers Mill Rd	E	64.0	0.94	E	64.6	0.94	F	81.6	0.93	E	61.0	0.94
Connecticut Avenue at Knowles Ave	C	33.9	0.67	C	34.6	0.69	C	34.9	0.67	D	35.1	0.67

In addition to the crosswalk alternatives, several signal alternatives were considered for the MD 185/Connecticut Avenue and Howard Avenue intersection, including:

- › Alternate 2A: Connecticut Avenue (MD 185) at Howard Avenue full color signal
- › Alternate 2B: Connecticut Avenue (MD 185) at Howard Avenue HAWK
- › Alternate 2C: Connecticut Avenue (MD 185) at Howard Avenue Diagonal Crossing
- › Alternate 2D: Connecticut Avenue (MD 185) at Howard Avenue full color signal with leading pedestrian interval (LPI)

Table 7: Connecticut Avenue (MD 185) at Howard Avenue Capacity Analyses

Existing				Alt 2A			Alt 2B			Alt 2C			Alt 2D		
	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio	LOS	Delay (sec/veh)	v/c Ratio
AM Peak	A	1.0	NA ¹	A	3.5	0.71	B	10.1	0.80	B	13.9	0.64	A	10.0	0.72
PM Peak	A	1.6	NA ¹	A	15.7	0.65	D	39.8	1.89	C	28.3	0.59	C	25.2	1.68

¹Intersection currently operates under stop control

Table 7 summarizes the capacity analyses for modifying the intersection operations at Connecticut Avenue (MD 185) and Howard Avenue. The analyses shows that any of the signalized alternatives at Connecticut Avenue (MD 185) and Howard Avenue can operate within acceptable thresholds for both Montgomery County and MDOT SHA.

Due to limitations within the Synchro software, Alternate 2B (HAWK) was analyzed as a fourth phase during which pedestrians would be able to cross Connecticut Avenue (MD 185) while mainline traffic was stopped. Side street right-turns may also be able to turn once yielding to pedestrians in the crosswalk.

Alternative 2C includes a separate all-pedestrian phase with ample time for pedestrians to cross the intersection diagonally. During the pedestrian phase, no other vehicular movements would be permitted at the intersection.

B. Cost Estimate

Rough orders of magnitude construction costs were developed for each of the retained alternatives. Estimates are largely based upon MDOT SHA's Price Index as well as industry leaders for items not included in MDOT SHA's index. These cost estimates are for planning and high-level comparison purposes only as many unknown factors will contribute to final design and construction costs. **Table 8** includes the planning level cost estimates for the alternatives included in the **Alternatives Development** section.

Table 8: Alternative Cost Estimates

Alternative	Approximate Cost Estimate
Short Term	
Connecticut Avenue (MD 185) – restriping within existing pavement section	\$19,800
Connecticut Avenue (MD 185) at Plyers Mill Road – south leg crosswalk ²	\$18,000
Connecticut Avenue (MD 185) at Knowles Avenue – north leg crosswalk ²	\$18,000
Knowles Avenue at Detrick Avenue – pedestrian & bicycle striped crossings on all legs	\$11,500
Mid-Term	
Connecticut Avenue (MD 185) at Plyers Mill Road – NE bumpout	\$15,000
Plyers Mill Road Greenway	\$2,000
Lexington Street Greenway	\$2,000
Connecticut Avenue (MD 185) at Howard Avenue	
Full color traffic signal	\$250,000 - \$300,000
Signal with diagonal crossing	\$200,000
HAWK signal/beacon	\$150,000
Long-Term	
Connecticut Avenue (MD 185)– pavement narrowing and streetscape	\$5,610,000
Connecticut Avenue (MD 185)– shared use path bridge	\$2,000,000
Plyers Mill Road – Shared Use Path	\$750,000
Plyers Mill Road – Separated Bike Lanes (~1 mile)	\$750,000
Kensington Wayfinding System	\$16,000
University Boulevard (MD 193) – cycle track & wide sidewalk	\$325,000

In sum, the short-term alternatives are approximately \$67,000; mid-term alternatives are estimated at \$319,000 and long-term alternatives could top \$9,500,000 in total.

² Costs do not reflect potential Americans with Disabilities Act (ADA) infrastructure necessary to accommodate the additional crosswalk

C. Screening Matrix

The retained alternatives were evaluated based on specific measures of effectiveness (MOE) selected in consultation with the steering committee and the Town. The following MOEs were used in the evaluation:




- **Construction Cost** – Estimated project cost is a key element in the Town's and their transportation partners' planning efforts. This MOE provides a comparison among the alternatives for relative cost.
- **Public Favorability** – Public involvement and preferences guide the alternative selection. The level of favorability was determined from the public workshop and survey responses.
- **Right-of-Way/Utility Impact** – Right-of-way and utility impacts affect project scheduling and cost. Therefore, alternatives anticipated to experience either minimal or significant impacts were noted.
- **Traffic Operations** – While the project goals focus on pedestrian and bicycle accessibility and safety, impacts on vehicular traffic operations were considered as well to ensure that alternatives continued to operate at acceptable levels.
- **Bicycle Level of Traffic Stress** – A key project goal is to improve bicycle accessibility which can be measured by using Montgomery County's Bicycle Level of Traffic Stress (LTS).
- **Pedestrian Level of Comfort** – A key project goal is to improve pedestrian accessibility which can be measured by using Montgomery County's Pedestrian Level of Comfort (LOC).

The screening matrix shows benefits to each identified alternative, with no single alternative outranking the others. The lower-cost alternatives generally do not greatly improve the bicycle LTS or pedestrian LOC; whereas, alternatives yielding low-stress bicycle and high-comfort pedestrian results have a significantly higher cost. Depending upon the weight of the criteria, various alternatives may better meet the Town's goals.






The screening matrix was used in concert with the public survey, workshop results as well as Ken-Gar neighborhood canvas to identify the three alternatives for 10% design as part of this project. Generally, the screening matrix can be used by the Town of Kensington and its transportation partners for understanding opportunities and risks associated with alternatives moving forward.

Town of Kensington's Connecticut Avenue: Short-Term Retained Alternatives Screening
































Description	Construction Cost	Public Favorability	ROW/ Utility Impact	Traffic Operations	Bicycle Comfort	Pedestrian Access
Connecticut Ave: Narrowing						
Install missing crosswalks (MD 185/Knowles Ave, MD 185/Plyers Mill Road)						
Knowles Ave at Detrick Ave - crossing						




	High Cost	Lowest 33%	Significant ROW/ Utility Impacts	Degrades Level of Service to Failing	LTS = 4	LOC = 4
	Moderate Cost	Mid 33%	Minimal ROW/ Utility Impacts	No/Little Change	LTS = 2 - 3	LOC = 2 - 3
	Low Cost	Top 33%	No ROW/ Utility Impacts	Improves Level of Service	LTS = 1	LOC = 1

Town of Kensington's Connecticut Avenue: Mid-Term Retained Alternatives Screening

Description	Construction Cost	Public Favorability	ROW/ Utility Impact	Traffic Operations	Bicycle Comfort	Pedestrian Access
Plyers Mill Road - bumpout						
Plyers Mill Road Greenway						
Lexington Street Greenway						
Traffic Signal at Connecticut Ave & Howard Ave						
	High Cost	Lowest 33%	Significant ROW/ Utility Impacts	Degrades Level of Service to Failing	LTS = 4	LOC = 4
	Moderate Cost	Mid 33%	Minimal ROW/ Utility Impacts	No/Little Change	LTS = 2 - 3	LOC = 2 - 3
	Low Cost	Top 33%	No ROW/ Utility Impacts	Improves Level of Service	LTS = 1	LOC = 1

Town of Kensington's Connecticut Avenue: Long-Term Retained Alternatives Screening

Description	Construction Cost	Public Favorability	ROW/ Utility Impact	Traffic Operations	Bicycle Comfort	Pedestrian Access
Connecticut Ave: Narrowing						
Connecticut Ave Shared Use Path Bridge						
Plyers Mill Road Shared Use Path						
Plyers Mill Road - Separated Bike Lanes						
University Blvd Bike Lane + Wide Sidewalk			 			

	High Cost	Lowest 33%	Significant ROW/ Utility Impacts	Degrades Level of Service to Failing	LTS = 4	LOC = 4
	Moderate Cost	Mid 33%	Minimal ROW/ Utility Impacts	No/Little Change	LTS = 2 - 3	LOC = 2 - 3
	Low Cost	Top 33%	No ROW/ Utility Impacts	Improves Level of Service	LTS = 1	LOC = 1

Note: The MD 193/University Boulevard pavement repurposing/restriping for a bike lane has minimal to no right-of-way impacts; however, relocating the curb to widen the sidewalk may have moderate right-of-way and/or utility impacts.

6. Public Involvement

Montgomery County and the Town of Kensington emphasized the importance of public input at the outset of and throughout the project aiming to garner maximum input. A survey in English and Spanish was developed to solicit input on existing conditions and preferred alternatives. The survey was available online from March 14, 2022, through May 4, 2022. A project flyer including public workshop details, and a link to the survey was posted on the Town of Kensington's website, sent to local stakeholder groups and neighborhood listservs, as well as shared with local businesses and people crossing Connecticut Avenue – pedestrians, bicyclists and transit riders.

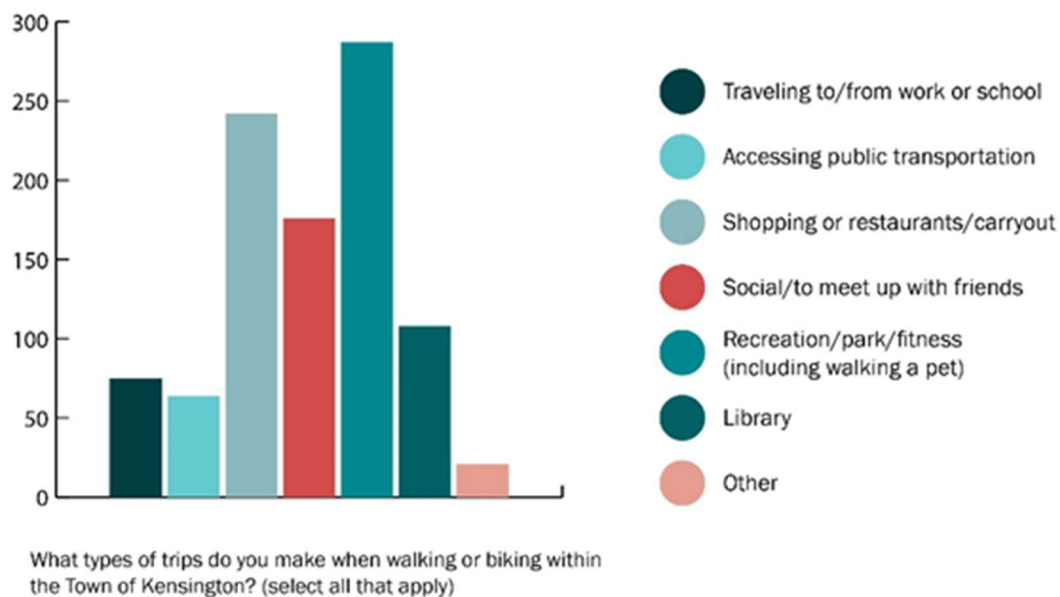
To solicit further community and stakeholder input, a public workshop was held on April 21, 2022, at the Kensington Town Hall from 7 PM to 9 PM. Meeting announcements were posted on the Town website and sent to stakeholder groups. The workshop included a presentation on the study purpose, existing data and conditions, plus alternatives under consideration, followed by an open house with roll plans and posters of the study area and transportation data. Approximately 30 people attended in person and another 12 attended virtually. The attendees were asked to provide feedback on the existing challenges to walking and biking and offer ideas on improving access around the Town and specifically along and crossing Connecticut Avenue.

A. Public Engagement / Survey Results

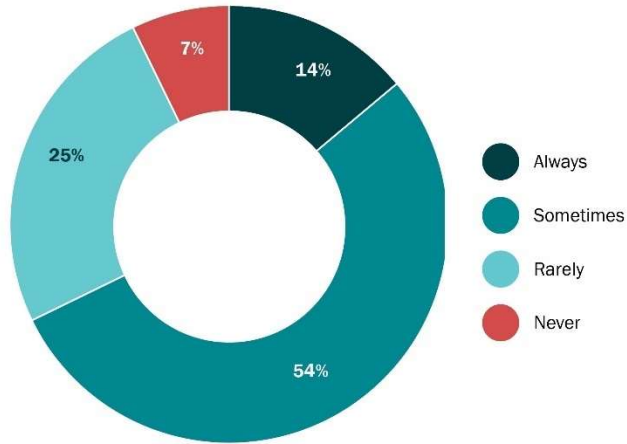
The public engagement process included a survey that inquired about respondents' experience walking/biking within the Town, types of trips, comfort level crossing Connecticut Avenue and gauged the interest in ten of the alternatives under consideration. The public survey received 586 responses.

The public survey found that most respondents (78%) lived in the vicinity of the Town of Kensington and walked or biked within Kensington daily or once a week. **Table 9** denotes the type of trips that respondents take within Kensington.

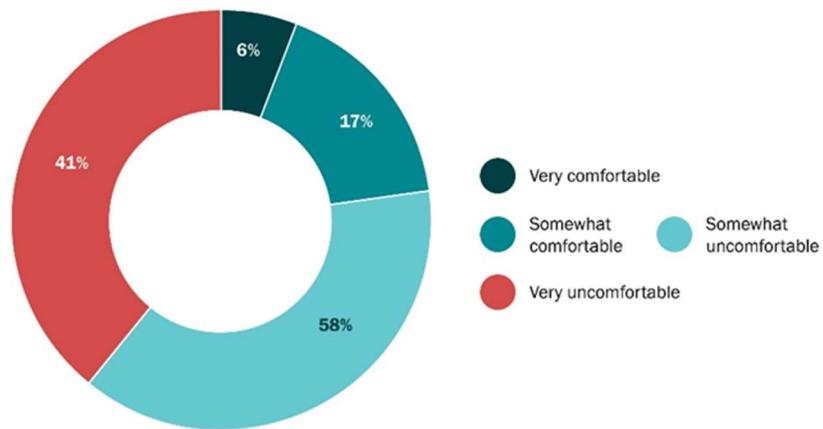
Table 9: Walking or Biking Trips



Respondents were asked how often they crossed Connecticut Avenue and their comfort level in doing so. The figures below show that most walking/biking trips involve traversing Connecticut Avenue and further that overwhelmingly respondents feel “somewhat” or “very” uncomfortable crossing. A significant majority of respondents (68%) noted that there are trips they would prefer to take by walking or biking that they don't make due to the difficulty and/or stress of crossing Connecticut Avenue.



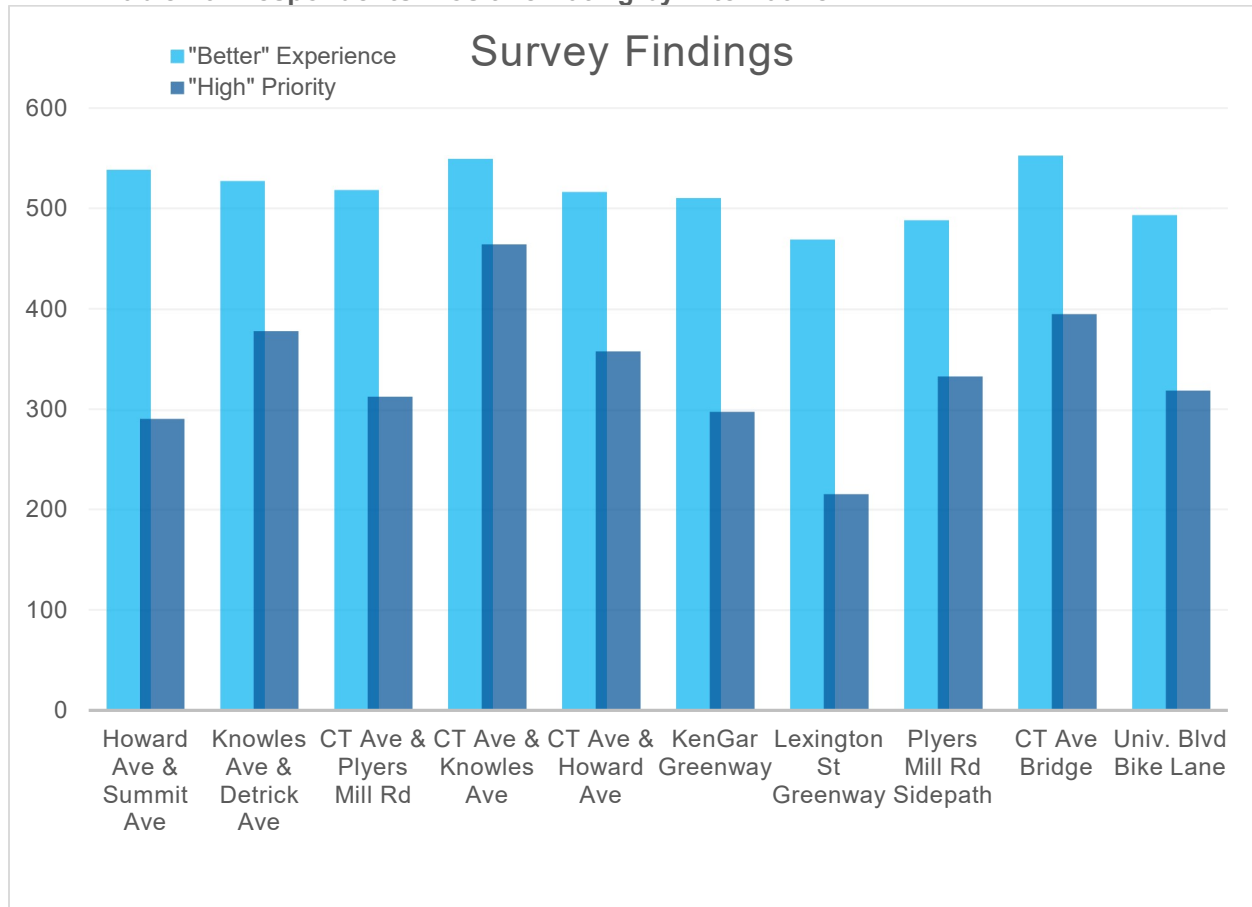
When walking or biking in Kensington, how often does your trip include crossing Connecticut Avenue?



How comfortable do you feel crossing Connecticut Avenue by non-motorized means?

For each of the ten alternatives included in the survey, respondents were to rate how the alternative would change their walking or biking experience as well as the priority of the alternative in their opinion. **Table 10** includes respondents' positive rating for each alternative, which defines their experience as "somewhat better" or "much better" as well as a priority of "very high" and "somewhat high".

Table 10: Respondents' Positive Rating by Alternative

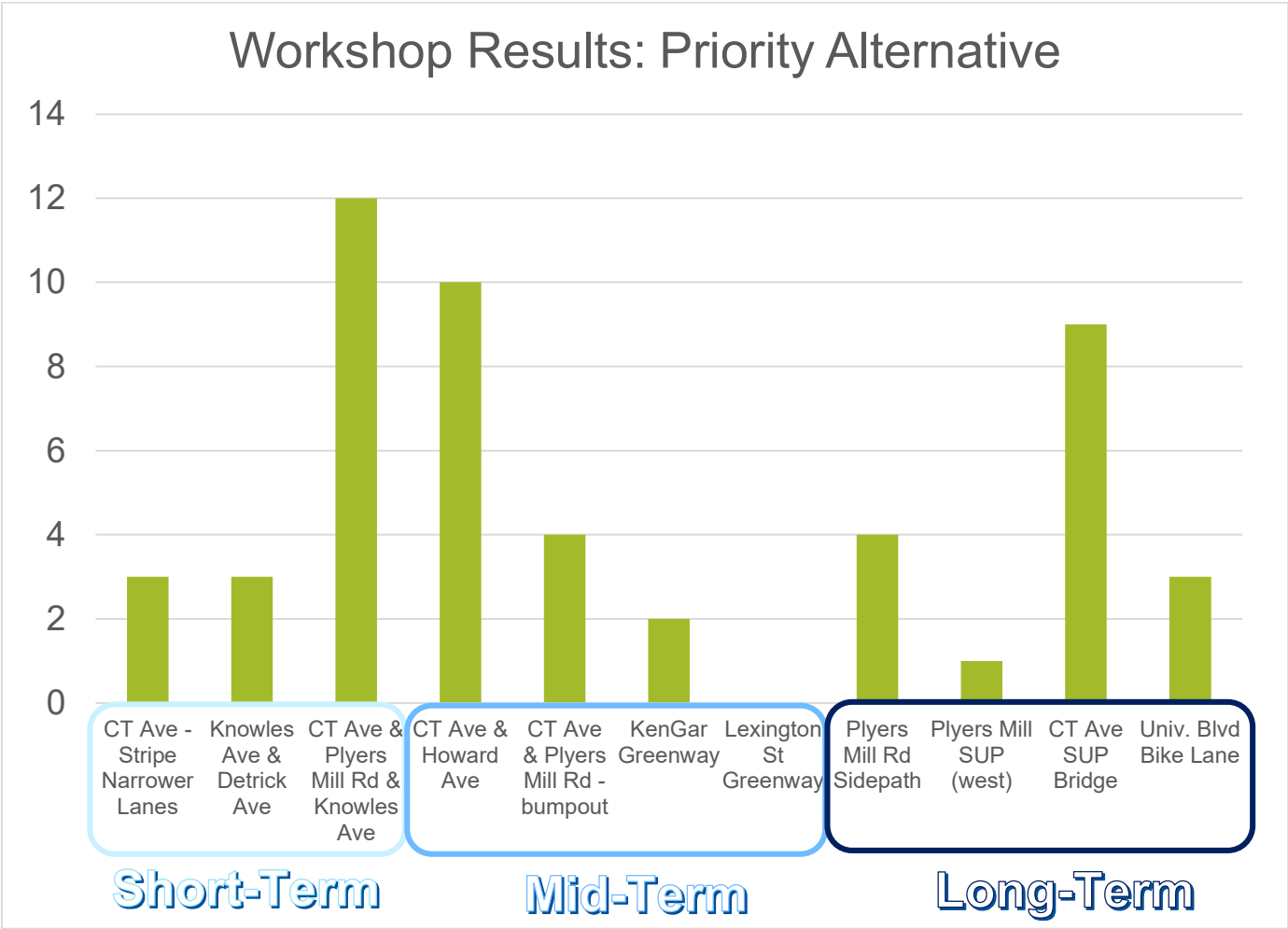


The above table identifies the following top three long-, mid- and short-term alternatives:

- Long-Term: Connecticut Avenue (MD 185) Shared Use Path Bridge
- Mid-Term: Connecticut Avenue (MD 185) and Howard Avenue traffic signal
- Short-Term: Connecticut Avenue (MD 185) and Knowles Avenue pedestrian crossing

These findings are consistent with the results of the post-workshop survey. Attendees were asked to select their priority short-, mid- and long-term alternative, shown in light-, medium and dark blue respectively, which yielded the results shown in **Table 11**.

Table 11: Summary of Workshop Attendee Priorities



B. Ken-Gar Canvas

To ensure equity of responses and review of the retained alternatives, an additional canvas of Ken-Gar residents at a neighborhood event was conducted following the public workshop. While the alternative selection was somewhat more detailed than the survey, the alternatives all included the same locations. The following list orders respondents’ top priorities:

- Connecticut Ave (MD 185) – Shared Use Path Bridge
- Connecticut Ave (MD 185) at Plyers Mill Road – missing crosswalk
- Connecticut Ave (MD 185) at Plyers Mill Road – bump out
- Connecticut Ave (MD 185) at Knowles Avenue – missing crosswalk
- Connecticut Ave (MD 185) at Howard Avenue – signal

The Ken-Gar community’s top priorities align with those found in the general online survey. The community did express concern with alternatives that would reduce available pavement or street trees within their neighborhood, preferring to explore neighborhood greenway tools before any changes to the existing footprint. Many residents highlighted crosswalk and intersection improvements at Connecticut Avenue (MD 185) and Plyers Mill Road and Howard Avenue and Knowles Avenue as critical to improving connectivity, accessibility and safety.

7. Potential Funding Opportunities

New bicycle and pedestrian enhancements and infrastructure costs may require stand-alone projects and necessitate federal Transportation Enhancement Program (TEP) or National Recreation Trails Program (NRT) funds and/or a combination of the state programs as detailed below or be smaller parts of other routine maintenance projects. Matching funds will need to be identified in advance for grant applications. In many cases, payment of expenses up front by the grant recipient is required, prior to reimbursement by the funding agency.

A. Surface Transportation Block Grant / Transportation Alternatives Program (TAP)

The program funds projects that create on- and off-road bicycle and pedestrian facilities. The TA Program spends approximately \$10 million annually. Implementing TA-eligible projects requires a local match of 20 - 50%.

B. National Recreation Trails Program (NRT)

The Recreational Trails Program (RTP) is a grant program of the U.S. Department of Transportation's Federal Highway Administration (FHWA) that provides funds to States to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. The NRT Program within the state receives approximately \$1 Million annually in federal funds to assist jurisdictions in developing smaller-scale trail head and restoration projects. The RTP is federally funded and administered on a reimbursement basis and may reimburse up to 80% of the project's total cost.

C. Bicycle Retrofit Program

Fund 88 – The MDOT SHA Bicycle Retrofit was created to integrate bicycling into mainstream transportation facilities, promote connectivity or address safety concerns. Projects include bicycle signage installation, removing bicycling obstructions, restriping wider shoulders, as well as constructing off-road facilities adjacent to roadways. For this program, a “bicycle retrofit” means an on-road or off-road improvement to bicycle access, and includes the following requirements:

- Considered where no other project is planned
- Projects for on-road improvements do not require any further funding participation from the local jurisdiction
- Projects for off-road improvements require local jurisdiction:
 - i. To fund or secure all right-of-way (ROW) outside SHA ROW
 - ii. To provide opportunities for public involvement prior to construction
 - iii. To maintain the facility upon construction completion

D. MDOT/Kim Lamphier Bikeways Network Program

supports projects that maximize bicycle access and fill missing links in the state's bicycle network, connecting shared use paths and roads, and enhancing last-mile connections to work, school, shopping, transit, etc. Funded by the State, the Bikeways Program requires a local match of 20% of the total project cost.

Bikeway Projects must meet one of the following criteria:

- Be within 3 miles of a rail transit station or major bus transit hub
- Provide or enhance bicycle access along any gap identified in the Statewide Trails Plan
- Identified as a transportation priority in the County's most recent annual priority letter submitted to MDOT
- Enhance bicycle circulation within or access to a Sustainable Community, Designated Maryland Main Street, census tract at or below 60% of area median income, major university, central business district, or important tourist or heritage attraction

E. Sidewalk Reconstruction for Pedestrian Access

Fund 33 – ADA Retrofit is a Capital Program Fund administered by MDOT SHA. The program addresses existing non-compliant elements of the sidewalk system along state roadways not addressed under other programs. The goal is to provide accommodations for persons with

disabilities through a commitment to remove barriers that impede free movement for all pedestrians along State roadways. Projects must provide access and connectivity to pedestrian generators (transit, government and public facilities) within one-half mile. There is no local funding requirement.

F. New Sidewalk Construction for Pedestrian Access

Fund 79 – MDOT SHA's New Sidewalk Construction fund aims to add "missing" sidewalks especially along "urban highways" and within Priority Funding Areas. Generally, projects within a Priority Funding Area, such as Kensington, are funded 75% by MDOT SHA and 25% by the local jurisdiction. However, as a system preservation project, there may be opportunities for the project to be fully funded by MDOT SHA.

G. Urban Street Reconstruction

Fund 84 – MDOT SHA's Urban Street Reconstruction is a system preservation fund that enables rehabilitation through urban areas where MDOT SHA needs to preserve or improve the transportation facility and the local community desires to enhance the quality of life and economic viability of its neighborhoods. Projects include geometric and safety improvements, storm drain improvements, traffic signing and/or signalization modifications and streetscape design. Criteria for selection include:

- Safety (pedestrian, cyclist, motorist)
- Roadway infrastructure (pavement, drainage, sidewalk, ADA compliance)
- Within a sustainable community
- Road transfer eligibility
- Identified as a County priority

In addition to the previously-established grant opportunities, the federal 2021 Infrastructure Investment and Jobs Act (IIJA) includes new, additional available grants. The IIJA provides \$5 billion in grants for states and local governments with \$1 billion to be given out in FY 2022.

H. Safe Streets and Roads for All supports local initiatives to prevent transportation-related death and serious injury on roads and streets (i.e. Vision Zero). Eligible projects include comprehensive safety action planning and planning, design & development activities for infrastructure projects identified in a comprehensive safety action plan. Key considerations include the likelihood of significantly reducing or eliminating fatalities and serious injuries involving various road users, including pedestrians, bicyclists, public transportation users, motorists, and commercial operators. Examples of eligible project types include, but are not limited to:

- Implementing improvements along an expanded multimodal network of reconfigured roads with separated bicycle lanes and improved safety features for pedestrian crossings.
- Applying low-cost safety treatments such as rumble strips, wider edge lines, flashing beacons, and better signage along high-crash rural corridors.
- Conducting speed management projects such as implementing traffic calming road design changes and setting appropriate speed limits for all road users.
- Installing safety enhancements such as safer pedestrian crossings, sidewalks, and additional lighting for people walking, rolling, or using mobility assistive devices.
- Addressing alcohol-impaired driving along key corridors through education, outreach, and publicized sobriety checkpoints on weekends and holidays.
- Making street design changes informed by culturally competent education and community outreach.
- Creating safe routes to school and public transit services through multiple activities that lead to people safely walking, biking, and rolling in underserved communities.

I. Reconnecting Communities Pilot Program aims to restore community connectivity by removing, retrofitting, or mitigating highways or other transportation facilities that create barriers to community connectivity, including mobility, access, or economic development. Grants are

available through this program for both planning and capital construction projects.
<https://www.transportation.gov/grants/reconnecting-communities>

8. Recommendations

Historically, Connecticut Avenue has prioritized automobile traffic and commuting to/from Washington D.C. However, recent local and national transportation planning trends acknowledge the need for “people to move car free throughout the Town, enjoying a healthier, more sustainable community,” as expressed in the Kensington Sector Plan. The retained alternatives seek to incorporate the vision from the background documents, such as Kensington Sector Plan connectivity initiatives, and to meet project goals as well as Montgomery County DOT and MDOT SHA accessibility and safety goals. Currently, congestion along Connecticut Avenue serves as an impediment to alternative travel modes, encouraging many to take single-rider auto trips that could otherwise be completed on foot or by bike. This project seeks to improve connections in Kensington to prioritize non-automotive trips for all residents, businesses and visitors.

Initial Project Design: In reviewing the public input, project goals and the screening matrix, several short-, mid- and long-term alternatives were recommended to be further explored for 10% design. Public input and acceptance of recommendations are critical to achieving the goals of promoting walking and biking as safe alternative modes of transportation. Each of the retained alternatives ranked high among all polled groups.

The following alternatives are recommended to be taken to 10% design under this project:

- **Short-Term:** Coordinate with MDOT SHA to install missing crosswalks and associated pedestrian signal equipment on Connecticut Avenue (MD 185) at Knowles Ave and at Plyers Mill Road.
- **Mid-Term:** Coordinate with MDOT SHA to install the most appropriate signal device to provide a new crossing at Connecticut Avenue (MD 185) and Howard Ave.
- **Long-Term:** Initiate planning and design efforts to construct a separate pedestrian bridge adjacent to Connecticut Avenue (MD 185) over the railroad tracks to tie in to anticipated shared use paths along both Connecticut Avenue as well as Plyers Mill Road. Further, the Town of Kensington may pursue the neighborhood bikeways, especially on Plyers Mill Road, to connect Connecticut Avenue pedestrian and bicycle improvements to the Ken-Gar neighborhood, Rock Creek Trail and the MARC Station, providing multi-modal connectivity.

To commence the recommended alternatives, an initial design schematic for each has been prepared. The drawings depict the proposed improvements and identify key components of each alternative. The 10% design plans can be found in the Appendix.

On-going Project Development: While the current project developed base-level design plans for three alternatives, many of the other retained alternatives are considered “low hanging fruit” that could be explored further with transportation agency partners such as MCDOT or MDOT SHA. Nearly all of the short- and mid-term alternatives could be pursued under the funding sources in Section 7 with the appropriate agency. Beyond the three design alternatives, the following alternatives can be pursued in relative short order:

- **Pedestrian recall phasing** should be considered for pedestrian signal alternatives, due to the Town of Kensington’s context as a suburban, transit-oriented environment.
- **Knowles Avenue at Detrick Avenue** was also ranked as a high priority in public response. Based on the current intersection geometrics, the crossing can simply be “marked” with minimal appurtenances.

- *Connecticut Avenue: Narrowing* can be accomplished during a corridor repaving and restriping project and therefore should be coordinated with MDOT SHA District Three.
- *Greenway facilities* primarily involve low-cost improvements to emphasize the pedestrian and bicycling populations. These improvements can be coordinated through MDOT SHA and MCDOT on their respective neighborhood streets, Plyers Mill Road and Lexington Street.

Wayfinding System: As a complimentary design tool, wayfinding systems can help extend the reach of the active transportation network by conveying the available walking and biking routes and their respective distances. Developing a town-wide walking and biking wayfinding plan may further encourage residents and visitors to complete their trip(s) without using an automobile.

North Kensington Study: The limits of this alternative exceed the current project scope. A future study to disperse vehicular traffic through this area may offer an opportunity to create a gateway into the Town of Kensington. This alternative could improve pedestrian and bicycle accessibility and safety through shorter crossings, as well as possibly creating a pocket park or other destination for residents and visitors alike to this section of Town. Additional studies are needed to thoroughly evaluate the transportation network's opportunities and challenges in this area.

Next Steps: This study serves as a launching pad for further prioritizing pedestrian and bicycle accessibility and safety within the Town of Kensington, Montgomery County and the State of Maryland. The Town has consistently expressed its vision for a walkable and bikeable community and continues to develop plans to create a reality for this vision. With the Kensington Sector Plan as a basis for the vision, Montgomery County's Vision Zero initiative prioritizing transportation safety for all network users, and the MDOT SHA *MD 185 Needs Analysis* reimagining the corridor to incorporate the surrounding context, this project offers a segue into the Town's continued transportation accessibility and safety goals.

In addition, the Town's recent Bicycle & Pedestrian Priority Area designation by both Montgomery County DOT and MDOT SHA positions the Town to collaborate with them for improvements. As identified within this report, these efforts will make the Town safer and more accommodating, especially for pedestrians and bicyclists.

Appendix: Additional References

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Appendix: Ken-Gar Canvas Survey

Do you live in Ken-Gar?	In a typical month, how often do you walk or bike in Kensington?	What types of trips do you make when walking or biking within the Town of Kensington?	What types of trips do you make when walking or biking within the Town of Kensington?	What types of trips do you make when walking or biking within the Town of Kensington?	When walking or biking in Kensington, how often does your trip include crossing Connecticut Avenue?
No	Once a week	Shopping or restaurants/carryout	Shopping or restaurants/carryout		Sometimes
Yes	Rarely	Recreation/park/fitness (walking pet)			Rarely
Yes	Rarely	Library	Social/meet up with friends		Sometimes
No	Once a week	Recreation/park/fitness (walking pet)			Never
No	A few times per month	Shopping or restaurants/carryout			Always
yes	A few times per month	Recreation/park/fitness (walking pet)			Never
yes	Once a week	Shopping or restaurants/carryout		Walking with Kids	Sometimes
yes	Daily	Shopping or restaurants/carryout			Sometimes
yes	Daily	Traveling to/from work or school		Walks to work	Always

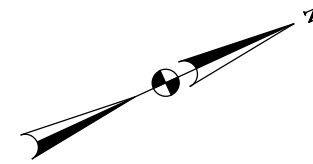
SHORT TERM: NEW CROSSWALKS				SHORT-TERM: NARROW LANES	
#1 Connecticut Ave at Plyers Mill	#2 Knowles Ave at Detrick	#4 Howard	#5 Connecticut Ave and Knowles Ave (add north crossing)	#3 Narrow lanes, landscape buffer	#4 Connecticut Ave Edgeline striping

1		2	3	don't want greenway - feel like	
1		3	2		
3		1	2		
3			2		1
1			2		
1		3	2		
2			1		3
2			1		

MID-TERM ALTERNATIVES					LONG-TERM ALTERNATIVES				
#1 Plyers Mill Rd Greenway	#2 Howard Ave Signal	#3 ADA Upgrades, Intersection & Signal Improvements	#4 Lexington Street Greenway	#5 Connecticut Ave & Plyers Mill tighten NE radius	#1 Plyers Mill Road - Shared Use Path	#2 Kensington Wayfinding System	#3 University Blvd Bike Lane	#4 Plyers Mill Road Sidepath	#5 MD 185/Conn - Shared Use Path Bridge

it's already taken	3	1		2	not a priority		2		1
1			2				1	2	
2			3	1				2	1
	1	3		2	3	2			1
2	1			3	1	2		3	
			2	1		1			2
			2	1		2			1

Appendix: Design Plans – 10%



LEGEND

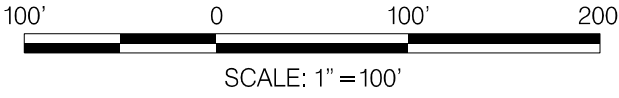
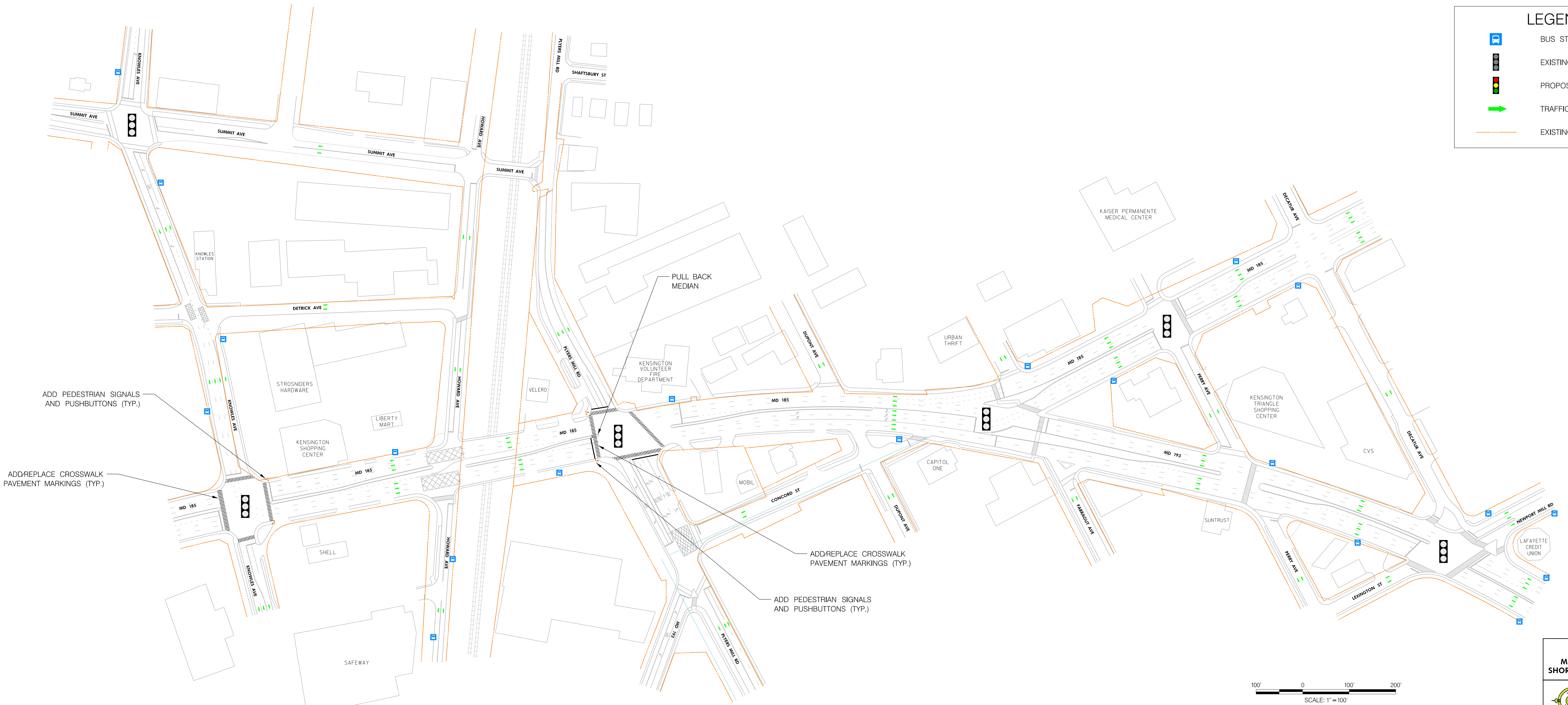
BUS STOP SHELTERS

EXISTING SIGNALIZED INTERSECTION

PROPOSED SIGNALIZED INTERSECTION

TRAFFIC FLOW DIRECTION

EXISTING RIGHT-OF-WAY



TOWN OF KENSINGTON

MD 185 (CONNECTICUT AVENUE) CORRIDOR

SHORT-TERM SAFETY IMPROVEMENT ALTERNATIVES

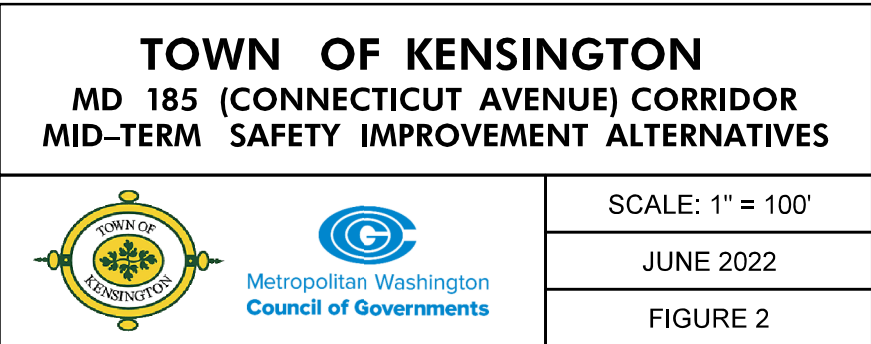
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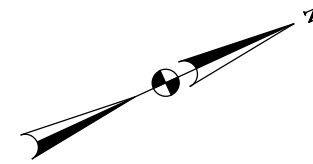
JUNE 2022

FIGURE 1



202202_Kensington MD 185 Corridor Short-Term Safety Improvement Alternatives - 05/2022
142 - 05/2022 - Kensington MD 185 Corridor Short-Term Safety Improvement Alternatives - 05/2022





LEGEND

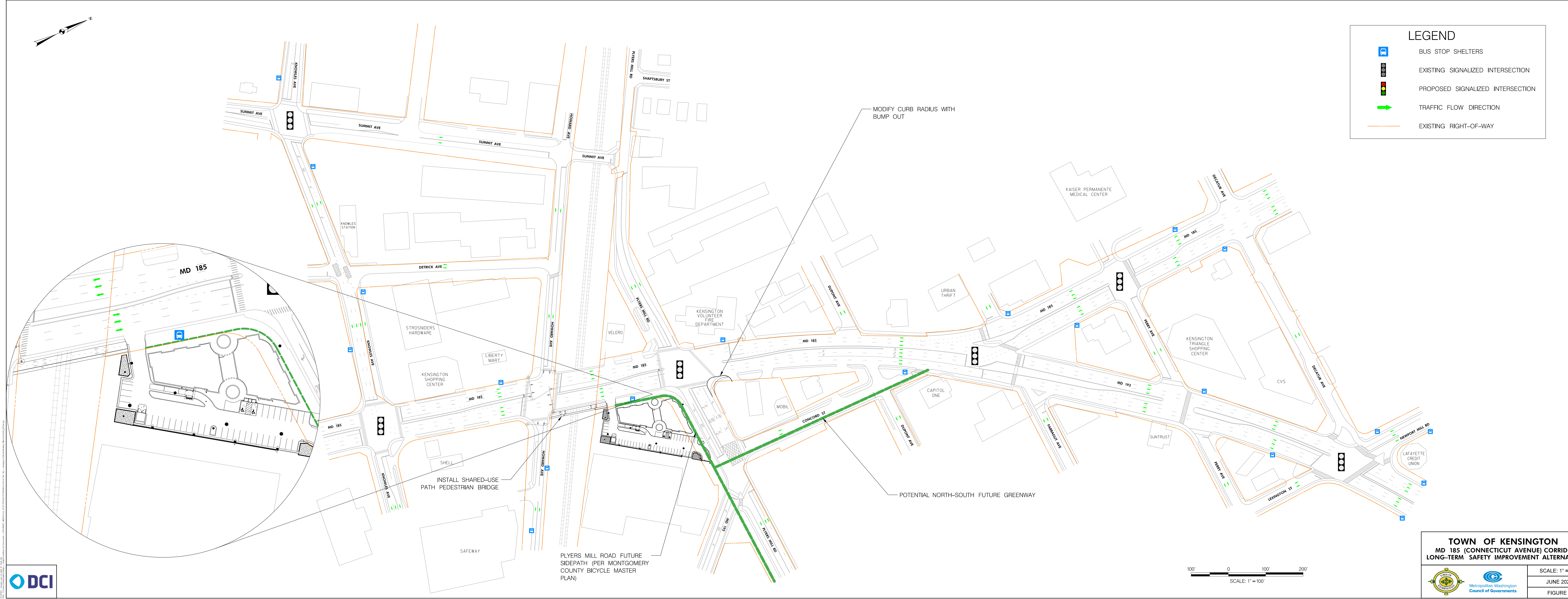
BUS STOP SHELTERS

EXISTING SIGNALIZED INTERSECTION

PROPOSED SIGNALIZED INTERSECTION

TRAFFIC FLOW DIRECTION

EXISTING RIGHT-OF-WAY



TOWN OF KENSINGTON

MD 185 (CONNECTICUT AVENUE) CORRIDOR

LONG-TERM SAFETY IMPROVEMENT ALTERNATIVES

SCALE: 1" = 100'

JUNE 2022

FIGURE 3