MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

MD 187 NEEDS ANALYSIS

JANUARY 2022

Contents

Acknowledgements

This report is the result of a needs evaluation performed by the Maryland Department of Transportation State Highway Administration (MDOT SHA) Office of Planning and Preliminary Engineering and the MDOT SHA District Three Office.

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1 INTRODUCTION

Introduction

Project Background and Process

The Maryland Department of Transportation State Highway Administration (MDOT SHA) Office of Planning and Preliminary Engineering (OPPE), in consultation with MDOT SHA District 3 completed a comprehensive Needs Analysis for MD 187 (Old Georgetown Road) between McKinley Street in Bethesda, and Tilden Lane/Nicholson Lane in White Flint. This document outlines a long-term vision for the corridor by identifying strategies to address pedestrian and bicycle network deficiencies, enhance multi-modal safety and improve travel conditions along the corridor.

This plan provides a road-map to deliver recommendations from MDOT SHA's Context Driven - Access & Mobility for All Users 1.0, a planning and design resource offering practitioners guidelines centered on establishing safe and effective multi-modal transportation systems. Weighing the needs of pedestrians, bicyclists and drivers in the context to the surrounding environment allows targeted strategies that overcome deficiencies and improve safety and mobility to be provided in the network.

Purpose

The MD 187 and MD 355 corridors link the Bethesda Central Business District with White Flint, a rising transit oriented development centered around the Red Line Metro station of the same name. MD 187 begins and ends at MD 355, making it a corridor that both provides parallel north-south access slightly west of the MD 355 corridor, and a route that serves the adjacent communities. The MD 187 corridor includes a mix of well established residential neighborhoods, institutional uses like Suburban Hospital and the National Institutes of Health (NIH) Medical Center campus, intermixed with converted business properties, neighborhood community assets and the Wildwood Shopping Center. A recently implemented road diet just south of the I-495 interchange was completed by MDOT SHA to enhance multi-modal accommodation in the corridor. No significant new development would be expected in the corridor, though development is planned in the central portion of the corridor, just south of the I-270 interchange, and just north of the study area in White Flint, significant development is expected. Pedestrian and bicycle activity varies throughout the corridor, with a combination of the Bethesda Trolley Trail, schools, activity centers and residential neighborhoods generating demand for travel along the MD 187 corridor.

Approach

This Needs Analysis was completed to identify context sensitive transportation improvements that will improve travel, safety and experience for users of the MD 187 corridor. Acknowledging differences in how pedestrians, bicyclists, transit users, and drivers experience travel, their sensitivity to barriers, stress and vulnerability to conflicts are central to this holistic approach. The resulting recommendations are based on two key variables, CONTEXT, which is identified by

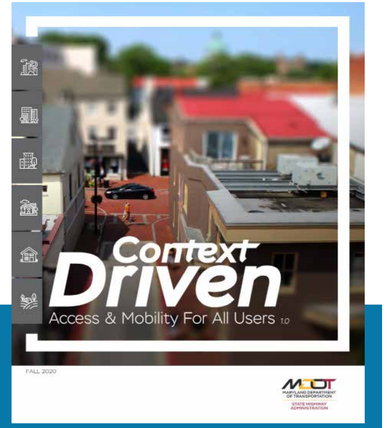
roadside use and intensity, and TOOLS that are appropriate to address user demand along the corridor.

Context varies within any corridor. This is in part due to the existing conditions along the roadside, which influences the level of activity and DEMAND to travel along or to cross a road. Context is identified by review of the existing conditions in the field, to experience character and travel conditions along a corridor, and a scan of long-range plans to reveal future conditions. Additional historical data, like traffic volumes and crash locations are layered, to provide a complete picture of how the road functions, supporting observations that are made in the field. Demand is a function of the density and intensity of development within the corridor, which informs how road users travel today. Travel demand may also increase, as growth occurs, or as new transportation facilities are provided. Future plans to introduce bus rapid transit (BRT) service, which Montgomery County has planned between Rock Spring Drive and White Flint, will ultimately lead to greater pedestrian and bicycle demand in the northern portions of the MD 187 corridor.

By undertaking a thorough review of existing and future conditions along MD 187, the corridor was segmented into Context Zone segments. Within these segments, needs can be paired with tools to address the challenges that users encounter while traveling through or across the corridor, and improve the user experience and safety along MD 187.

COVID-19 Pandemic

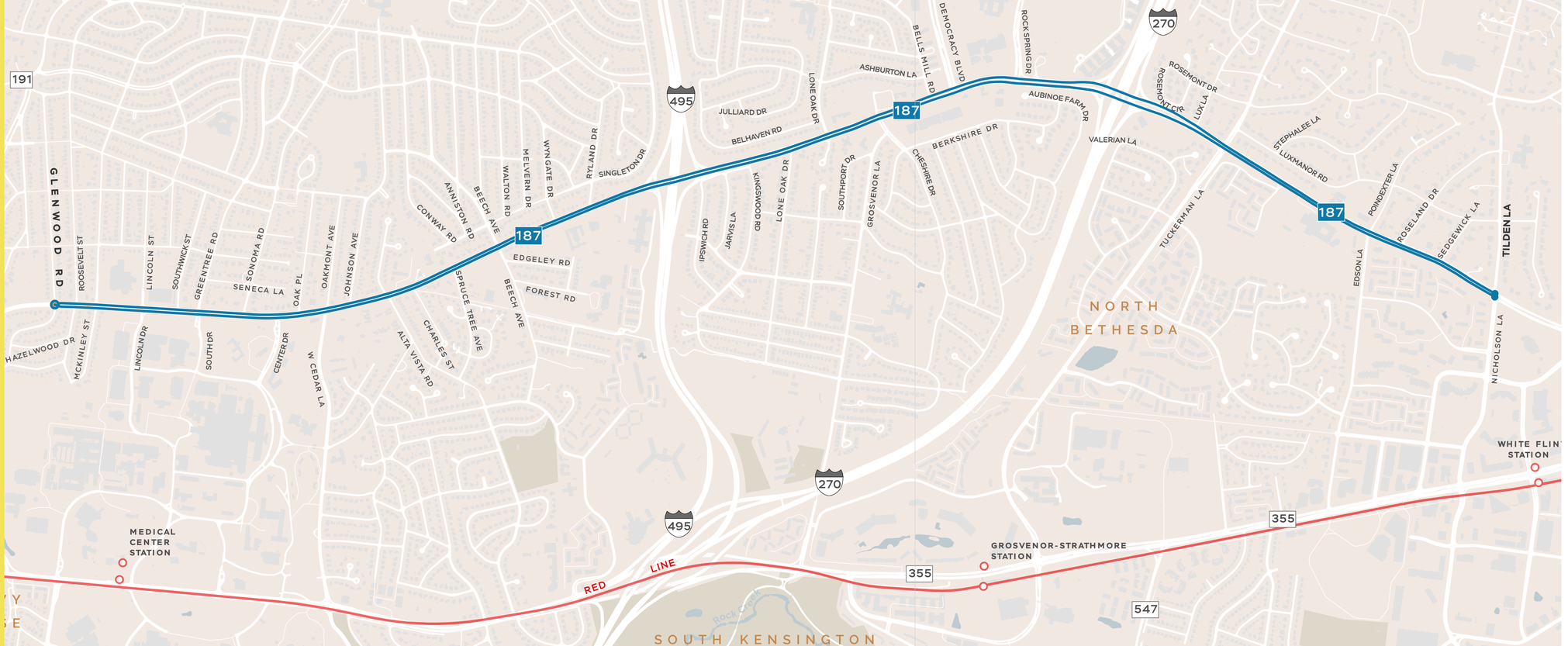
This study was conducted between the summer of 2020 and spring of 2021. During a significant portion of this time, emergency orders were in place that required businesses to operate at limited capacities, requiring school and non-essential work to be conducted remotely from residents homes. As a result, vehicular travel patterns were significantly influenced by reduced demand, during the periods when field observations were made over the course of this study. In addition, demand for outdoor recreation increased, highlighting the need for highways to serve the broad multi-modal needs of all roadway users.



MDOT SHA Administrator Tim Smith, PE in his November 13, 2020 introduction of Context Driven 1.0 stated, "The Context Driven Guide has and is changing the way we deliver projects by identifying proactive treatments that support safe access and mobility for pedestrians, bicyclists, and motorists. This approach places the focus on people, ensuring that the system is accessible to everyone, regardless of mode, a philosophy that is central to the Needs Analysis approach."

MD 187 provides a critical link between the Bethesda and White Flint communities in Montgomery County, Maryland. Situated along a western parallel alignment to MD 355, it provides a local link between the I-495 Capital Beltway and I-270. Demand for vehicular travel will tend to increase along MD 187 as additional development occurs along the corridor.

Public transportation provides alternative travel options via the existing WMATA Metro Red Line, which generally travels along the MD 355 corridor. A segment of the Bethesda Trolley Trail also passes through the southern portion of the study area, entering the corridor from the NIH Medical Center, and traveling along the east side of MD 187 before departing the study area at Charles Street.



MD 187 Corridor Overview

MD 187 (Old Georgetown Road) is an urban principal arterial connecting from MD 410 in Bethesda to MD 355 in White Flint, both non-incorporated areas of Montgomery County, MD. The study limits include McKinley Street to the south and Tilden Lane to the north. This corridor consists of a four to six-lane divided roadway with signalized and unsignalized intersections, turn lanes, and ramps to/from I-495 and I-270. In 2020, a road diet was implemented from West Cedar Lane/Oakmont Avenue to Ryland Drive. In both directions, the right-most lane was converted into a separated bike lane with a pavement marking buffer.

MD 187 consists of several marked pedestrian and school crossings, signalized and unsignalized. The posted speed limit changes from 35 mph to 40 mph at I-495 traveling northbound.

The land uses adjacent to the corridor are primarily residential, with institutional land uses from McKinley Street to W Cedar Lane/Oakmont Avenue (Suburban Hospital and the National Institute of Health campus) and commercial/shopping center land uses from Cheshire Drive to Rock Spring Drive/Yorkshire Terrace.

Road diet on MD 187 between West Ceder Ln/Oakmont Ave to Ryland Dr

2 EXISTING CONDITIONS & SAFETY

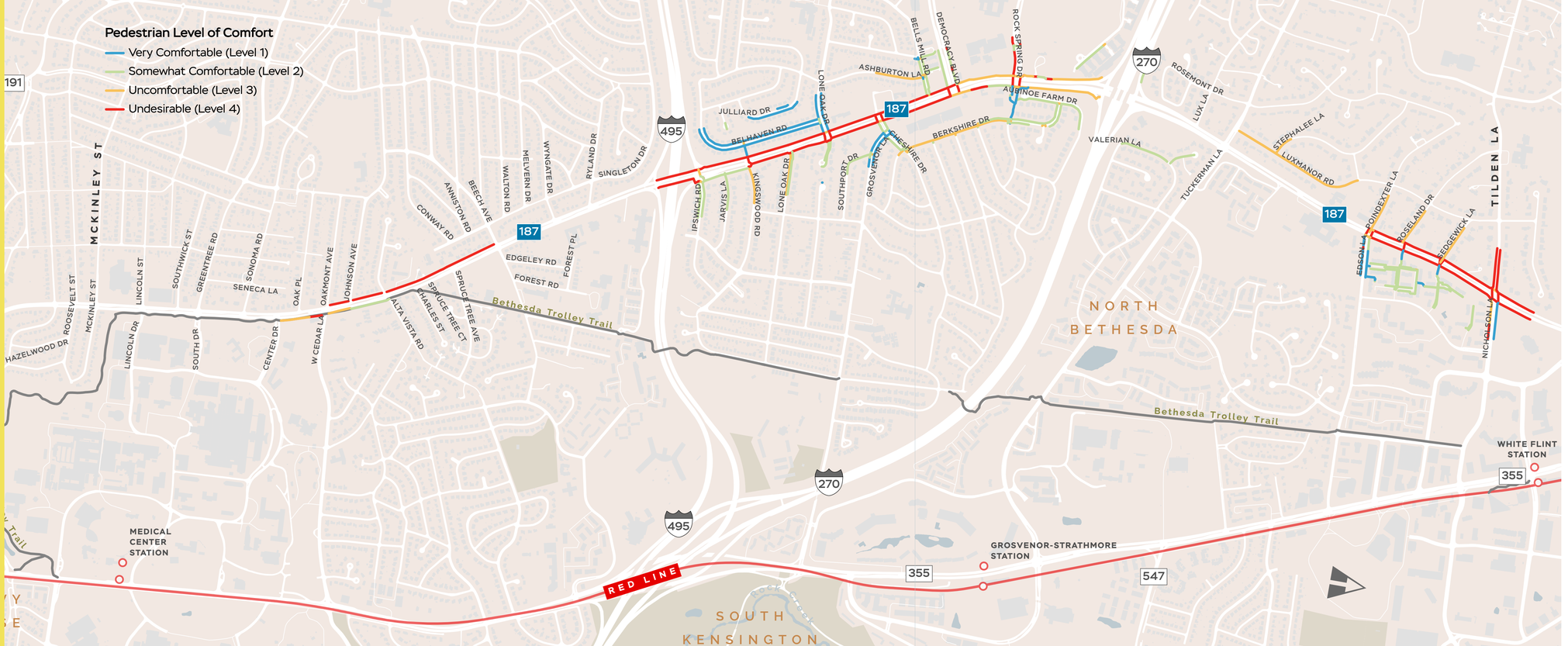
Overview

Travel along the MD 187 corridor is generally consistent, due to simiarity in roadway design and adjacent land use, which is generally residential or institutional. The recent road diet implemented in the southern portion of the corridor does improve bicyclist comfort and accessibility, with the added benefit of enhancing comfort for users in the adjacent sidewalk. Other factors will influence road users experiences, including method of travel, time of day, purpose for their trip, and locations where they enter and exit the corridor. Identifying variations in context at a corridor level, in order to establish zones of similar conditions, begins with a scan of existing traffic conditions, which are explained through metrics that describe traffic or the user experience.

To establish a baseline for this needs analysis, a variety of public data sources from Montgomery County and MDOT SHA were assembled and visualized to review existing travel conditions along the corridor. These measures are presented in order of vulnerability to traffic stress and safety, an acknowledgment that pedestrians represent the most vulnerable and sensitive user group, followed by bicyclists and transit users.

These data sources shed initial light on the challenges that road users may encounter at specific areas along the corridor, including higher volume segments of the street, and areas of concentrated activity where greater transit service is provided.

Safety is represented by crash evidence recorded in the corridor. When road conditions remain generally consistent over time, crashes offer valuable insights into challenges that users are experiencing, and potential needs to reduce the potential for similar collisions to occur in the future.



Pedestrian Level of Comfort

Pedestrian Level of Comfort (PLOC) was created by the Montgomery County Planning Department to identify locations in the existing walking network that are uncomfortable due to inadequate or incomplete sidewalks and crossings, and to quantify how different investments will increase connectivity. As part of the Montgomery County Bicycle Master Plan, this approach was inspired by the Bicycle Level of Traffic Stress (BLTS).[1]

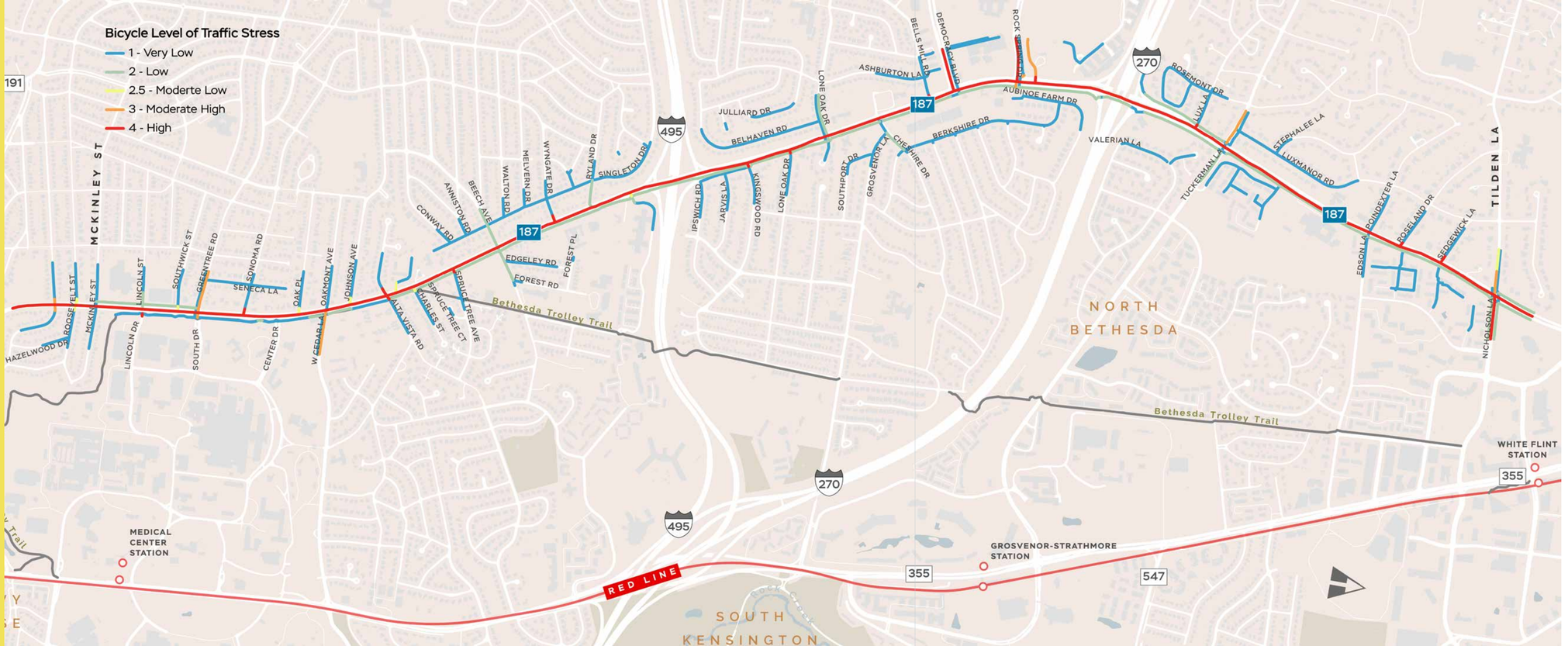
Factors such as pathway width, buffer from traffic, number of lanes to cross, traffic speed, presence of crosswalk markings, and availability of median islands affect comfort levels. The four main scores are undesirable (level 4), uncomfortable (level 3), somewhat comfortable (level 2) and very comfortable (level 1). Several factors are considered when scoring the thresholds, such as land use, roadway functional classification, pathway condition, and right-turn on red. Based on lack of available data, there are some factors that are not considered, such as pedestrian and street lighting, or the presence of a Leading Pedestrian Interval (LPI) at crossings. These factors are to be scored separately.

It is important to note that "comfort" differs from "safety." Safety is the basis for the transportation system, while comfort relates to a path that is enjoyable and comfortable for people of all ages. When a street receives a relatively poor score, it is a sign that change is needed to make people more comfortable and potentially attract more pedestrians.

The PLOC mapping along MD 187 is currently incomplete, because Montgomery County is currently developing the Pedestrian Master Plan for the County. The portions that have been recorded tend to identify the corridor is graded primarily at level 3 and level 4, uncomfortable to undesirable.

The cross streets that have been graded offer varying degrees of pedestrian comfort, spaning across along all levels.

1 Montgomery Planning



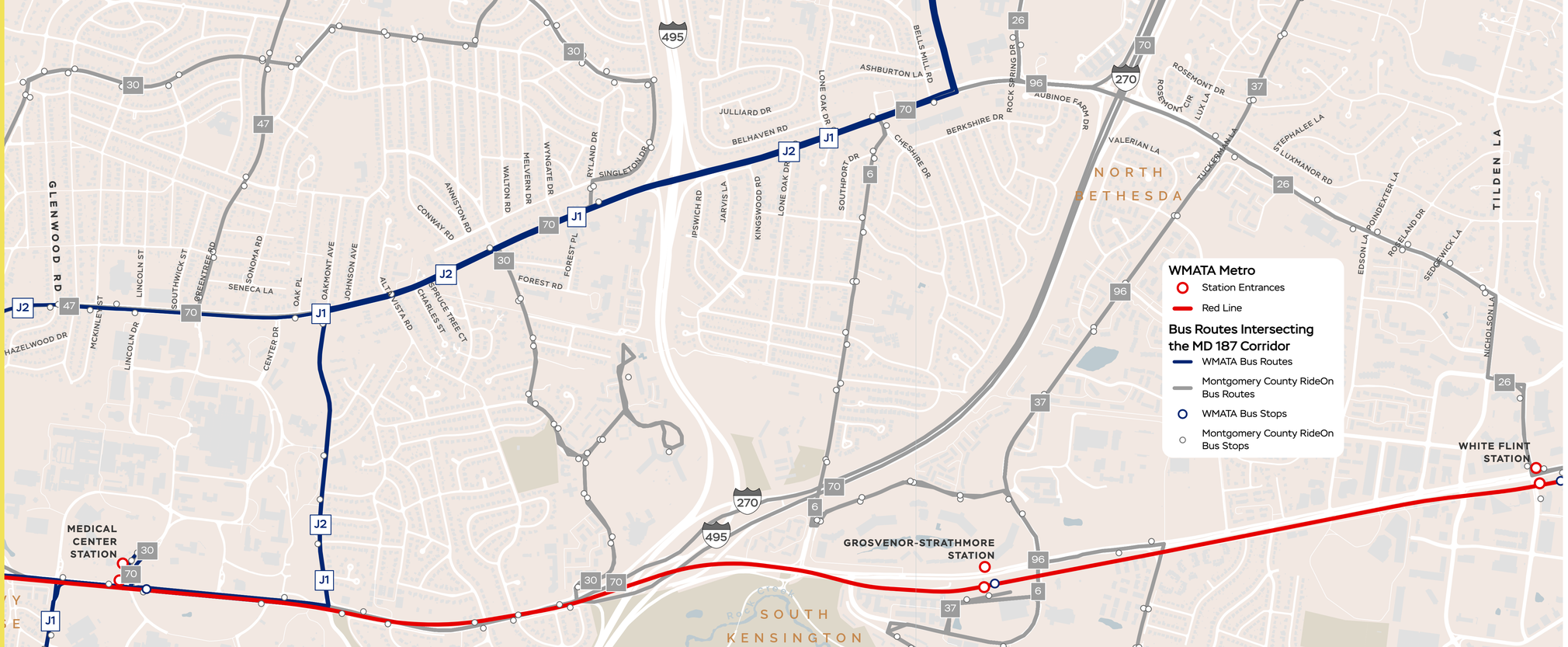
Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress (BLTS) is a methodology that was developed by the Mineta Transportation Institute as a tool to quantify the amount of discomfort that people feel when they travel closely to vehicular and pedestrian traffic. The Montgomery County Planning Department revised this methodology to fully capture the stress levels on some of the roads in the county. The goal of this methodology was to address which roads needed improvements as part of the County's 2018 Bicycle Master Plan to recommend ways of creating a connected bikeway system that will appeal to a wider range of riders. The revised level of stress is categorized by the following categories:

LTS	Stress Level	Rider Type
0	None	Most
1	Very Low Stress	Most
2	Low Stress	Strong
2.5	Moderately Low Stress	Strong
3	Moderately High Stress	Confident
4	High Stress	Confident
5	Very High Stress	Confident

In the MD 187 corridor, the BLTS is ranked a Stress Level 4 for on-road bicyclists, with posted speeds of 35 mph to 40 mph. Off road BLTS ranges from Stress Level 1-2, with bicyclists accommodated on sidewalk or sidepath facilities, including the Bethesda Trolley Trail, which runs along the east side of MD 187 from Lincoln Drive to Charles Street.

A recently implemented road diet implemented by MDOT SHA, repurposing the outside lane of MD 187 between Cedar Lane and Ryland Drive is not reflected on the BLTS mapping because it was completed after the BLTS analysis, which offers a significantly lower stress on-road experience within this portion of the corridor.



Transit Access

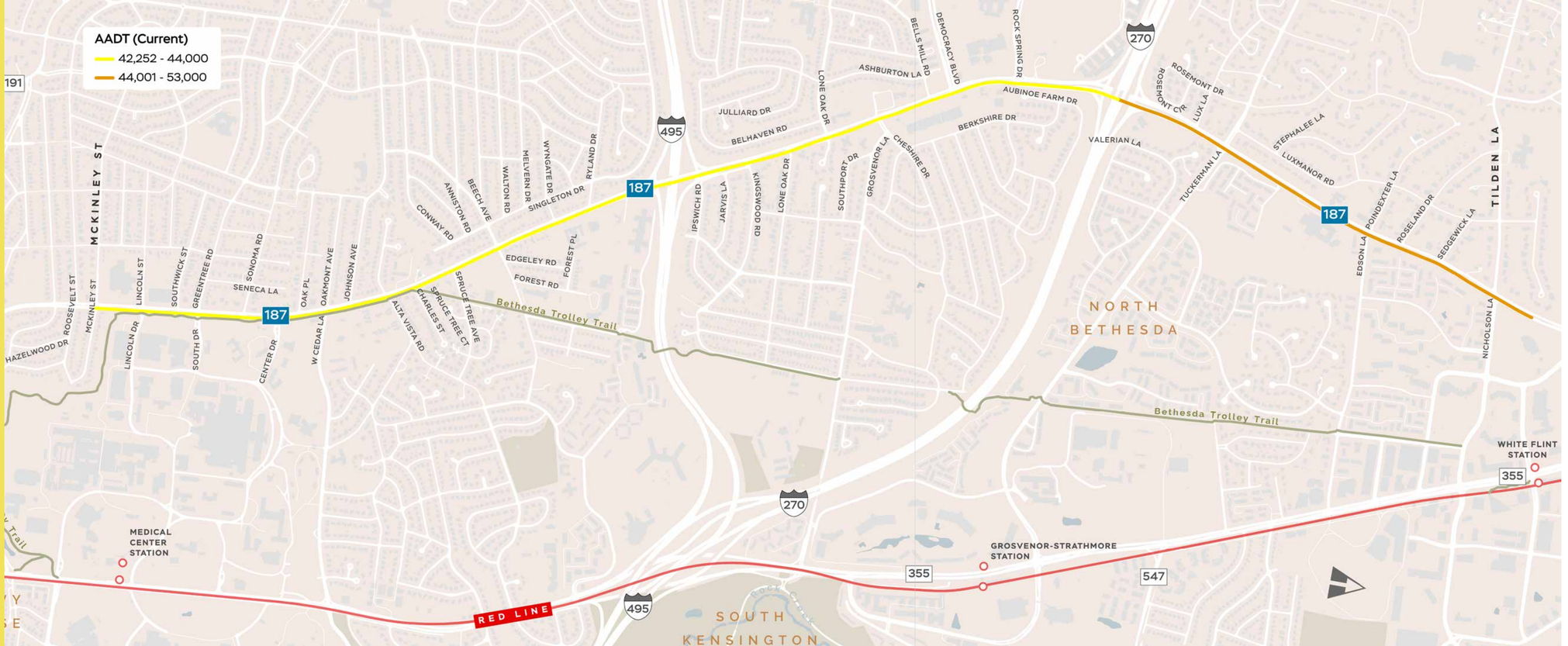
The MD 187 corridor is served by several transit agencies including WMATA, and Montgomery County Transit Ride On.

The WMATA J1 bus runs along MD 187 from the Montgomery Mall to the Silver Spring Station, making about 15 stops along the corridor. The bus runs along the segment from south of McKinley Street to Democracy Boulevard. The J1 bus provides weekday peak period service in the peak direction only (westbound in the AM and eastbound in the PM) with headways of approximately 20 minutes.

The WMATA J2 bus runs along MD 187 from the Montgomery Mall to the Silver Spring Station, making about 15 stops along the corridor. The bus runs along the segment from south of McKinley Street to Democracy Boulevard. The J2 bus provides every day service with headways of approximately 10 to 20 minutes on the weekdays, and approximately 25 to 30 minutes on weekends.

The Montgomery County RideOn bus system consists of seven (7) separate bus routes that run along or across MD 187 between McKinley Street and Tilden Lane/Nicholson Lane, including Bus 6, 26, 30, 37, 47, 70, and 96.

These descriptions are based on the latest available info in January 2021, which includes service reductions in response to the COVID-19 pandemic.



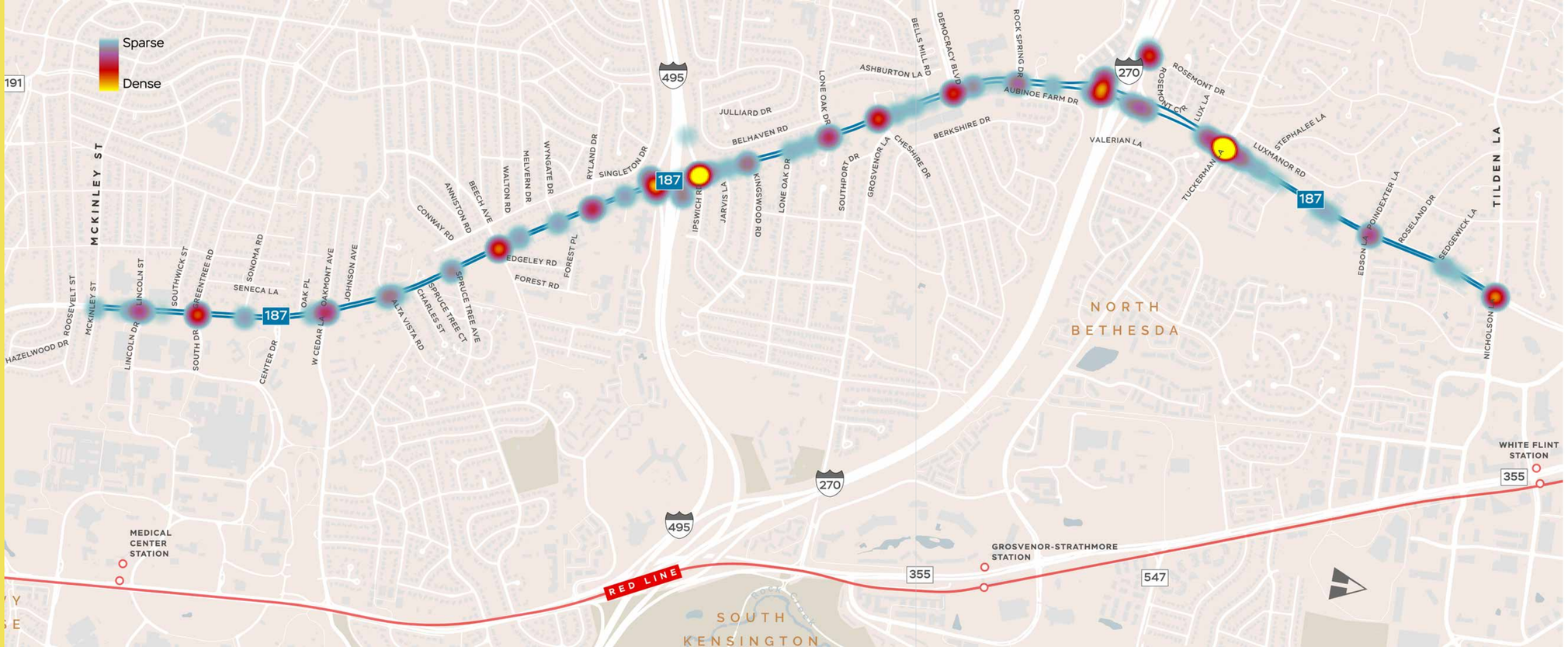
Vehicular Travel Conditions

Annual Average Daily Traffic (AADT) is an estimate of the mean traffic volume across all days for a year for a given location along a roadway. Estimated AADT was obtained from MDOT SHA for the year 2018. Updated traffic volumes will be used for final project development

Along the segment of MD 187 from McKinley Street to Tilden Lane/ Nicholson Lane, the AADT ranges from 40,000-55,000. At the southern end of the corridor, the AADT from McKinley Street to I-495 was recorded to be approximately 42,000 vehicles. The segment of MD 187 from I-495 to I-270 was recorded to be nearly 44,000 vehicles. The northern end of the corridor is the most heavily traveled, between I-270 and Tilden Lane/Nicholson Lane, with an average of nearly 51,000 vehicles.

Throughout the study corridor, MD 187 is a six-lane roadway with three through lanes in each direction, with exception of the portion of the corridor between Cedar Lane and Ryland Drive where MDOT SHA recently implemented road diet, repurposing the outside lane of MD 187 as a buffered bike lane.

From a general planning perspective according to the Highway Capacity Manual (HCM), a four-lane roadway with exclusive left-turn lanes may operate at Level of Service "E" or better with daily service volumes of 27,000 to 36,000. While a full operational analysis is required to validate these general recommendations, the recent road diet of MD 187 in a portion of road with slightly higher AADTs suggests that further study of lane repurposing concepts would be appropriate to provide continuity in the corridor.



Crash History

Crash data was reviewed for a five year period (2014 - 2018). Crash rates and trends were reviewed and assessed by the following subcategories: all crashes, injury crashes, bicycle and pedestrian crashes, and injury bicycle and pedestrian crashes.

A total of 338 crashes were reported during this period. Of these crashes, 65 were severe, disabling, or fatal; 18 of these crashes involved a person walking or biking, of which 14 individuals walking or biking were injured or disabled.

In total 5% of crashes along the study area involved a person walking or biking (18 crashes), and 77% of those crashes resulted in an injury for the pedestrian or bicyclist. Within the study area the most significant bicycle and pedestrian crash rates occurred in the southern portion of the corridor, with the highest concentration located between Ipswich Road and Grosvenor Lane.

The highest rate of crashes and resulting injuries were recorded in close proximity to the I-495 and I-270 interchanges. Injury crashes in these portions of the corridor were primarily rear end and head on left turn crashes.

The Tuckerman Lane intersection represented 12% of all crashes with the study corridor, of which 29% of these crashes were head-on left turn type.

Although the analysis was specific to 2014-2018 crash data, two bicycle crashes that occurred in 2019 were noted due to the severe outcome of the collisions. A severe crash at the I-495 interchange involved a teen riding their bicycle across the eastbound ramp, when they were struck by a driver who was reentering I-495 from the exit ramp. A fatal crash occurred near the Beach Ave. intersection where a bicyclist was struck by a vehicle, resulting in a bicyclist fatality.

3 SEGMENTATION & TOOLKIT DEVELOPMENT

Overview

Identifying needs in the MD 187 corridor first requires an assessment of context, which informs which tools will be appropriate to balance the safety, accessibility, and mobility needs of all road users. Context is revealed by layering existing conditions data, planned or expected changes that may influence travel behavior along the corridor, and field observation. Roadside land use is often a primary indicator of context, with varying density and mixes of use that tend to generate activity, or demand for local access. To a lesser degree, design of the road may be an indicator of context, though existing facilities may be misaligned toward auto mobility rather than local access. Operational character may also influence context, including prevailing vehicle speeds, frequency of controlled intersections or prevalence of certain crash types that may indicate an imbalance in how the road functions.

By considering and weighing these factors, the MD 187 corridor can be segmented into distinct contexts. This process builds on guidance from MDOT SHA's Context Driven, which outlines a variety of contexts, and associated priorities of local access or mobility. In reviewing context at the corridor level, finer detail of variation in travel needs are revealed than those observed at a regional level, responding to more discrete variations in land use, density, significant regional transportation facilities, or other factors. Change tends to occur gradually, so recognizing areas of transition helps to identify the context, and then define the limits of each segment.

The final step before establishing specific corridor recommendations is to establish the toolkit of improvements that are appropriate in each context identified within a corridor. This process leverages local and industry best practices to prioritize access in contexts with higher pedestrian, transit and bicycle activity, and to balance mobility with safety in areas of lower activity. The toolkit primarily includes design and operational tools that may be introduced at MDOT SHA's discretion, and policy recommendations like automated enforcement that may require coordination with the agencies with oversight of those programs.

Field Review

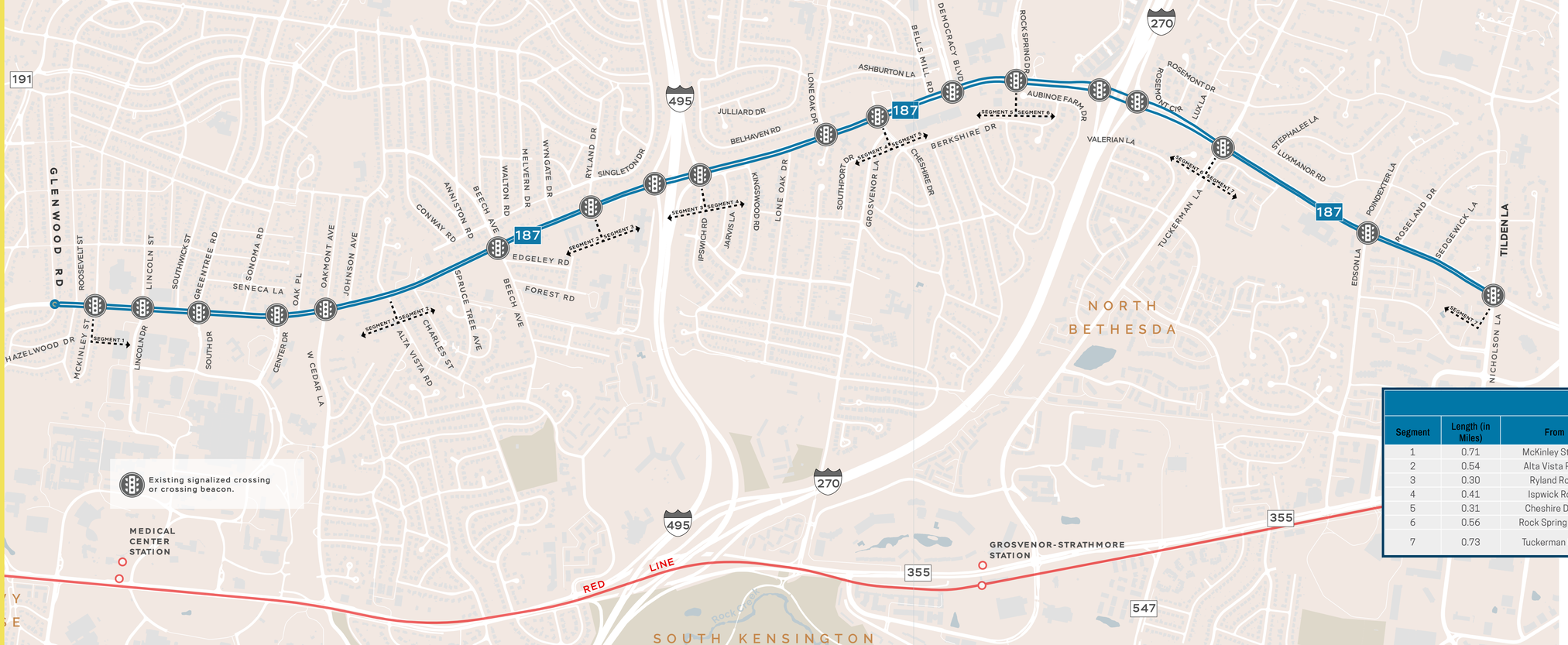
Field reviews were conducted in the late summer and early fall of 2020 to review existing conditions in the MD 187 corridor. Observations were collected using GIS equipped tablets, allowing opportunities, challenges and photographs of existing conditions to be recorded spatially along the corridor for review and mapping. Initial assessments of possible context segments were developed from observed

conditions as investigators traveled along the corridor. Key themes that were observed included:

- Sidewalks directly connected to high speed or heavily trafficked segments of MD 187.
- Unmarked crossings of minor side-streets, some with skewed intersection geometry.
- Increased bicycle and pedestrian comfort in the road dieted portion of the corridor (Cedar Lane to Ryland Drive).
- Occasional vehicular travel or stopping in the buffered bike lane.
- Permissive left-turn signal phasing, allowing left turns across the concurrent crosswalk movement.
- Permissive left-turn signal phasing at intersections with high volumes of approaching traffic.
- Lack of designated or controlled crosswalk locations at potential points of demand, including transit stops, and where the Bethesda Trolley Trail intersects the corridor.
- High speed freeway ramps with poor crosswalk visibility.
- Inconsistent provision of pedestrian detection and countdown signals.
- Incomplete bicycle facilities, resulting in sharing the sidewalk or riding in high speed and volume traffic.
- Lack of physical separation in the buffered bike lane, resulting in stopping or driving in the bike lane.
- Perceived speeding behavior.

Context Evaluation and Segmentation

To refine and validate initial context zone segmentation identified in the field, additional data sources were reviewed to layer context. This initially included a scan of the field observations to assess local conditions, highlight unique findings, and attribute data around the themes identified previously. Corridor plans and information were scanned and recorded for each of the segments, including Montgomery County's highway and transitways plan, bicycle master plan, M-NCPPC sector plans, Vision Zero plan, zoning, and MDOT SHA's Context Zones. Roadway data such as Annual Average Daily Traffic (AADT), Level of Traffic Stress (LTS), and functional classifications were also reviewed and recorded. Crashes that occurred along the corridor were also evaluated and summarized, as discussed below. A matrix was developed to summarize the data and characteristics for each of the context segments.



Context Segment Map

This map presents the context segments identified for the MD 187 Needs Analysis study corridor. The locations of existing signal controlled intersections are included to contextualize frequency of opportunities to cross the corridor.

Street sections for each of the context zones and toolkit recommendations are presented in the following section. These sections represent a vision for the corridor that will address the needs of broader users upon implementation. In recognition that change will occur incrementally, near- and mid-term improvements that may advance this vision are presented in Chapter 4.

MD 187 Context Segments

Segment	Length (in Miles)	From	To	Context
1	0.71	McKinley Street	Alta Vista Road	Suburban Activity Center
2	0.54	Alta Vista Road	Ryland Road	Suburban Activity Center
3	0.30	Ryland Road	Ispwick Road	Suburban Activity Center
4	0.41	Ispwick Road	Cheshire Drive	Suburban Activity Center
5	0.31	Cheshire Drive	Rock Spring Drive	Suburban Activity Center
6	0.56	Rock Spring Drive	Tuckerman Lane	Suburban
7	0.73	Tuckerman Lane	Nicholson Lane / Tilden Lane	Suburban Activity Center

Crash Evaluation

A detailed review of crash trends in the context segments was completed for comparison of overall crash trends within each of the context segments, and to identify where bicycle and pedestrian safety trends are observed in the collision data. The highest rates of injury crashes occurred in Segments 3 and 6, which includes the I-495 and I-270 interchange ramps respectively, and Segment 4, which is a residential area between the I-495 interchange and the Wildwood Shopping Center. Crash types in these segments were primarily rear end and head on left turn crash types.

The highest bicycle and pedestrian crash rates occurred in the southern Segments 1 - 4 of the corridor, where the regional Bethesda Trolley Trail is located adjacent to MD 187. In total only 5% of crashes along the study area involved a person walking or biking, but 77% of those crashes resulted in an injury or worse for the pedestrian or bicyclist, indicating a disproportionately negative impact on pedestrians or bicyclists who do experience a crash within the MD 187 corridor.

INJURY CRASHES (2014 - 2018)				
Segment	Length	Injury Crashes (per Mile)	AADT	Per Mile Per 1 Million Vehicles
1	0.71	13	43,100	300
2	0.54	13	51,600	250
3*	0.30	40	44,800	890
4	0.41	24	46,500	520
5	0.31	6	46,500	130
6*	0.56	32	49,100	650
7	0.73	10	51,600	190

*This segment spans two AADT readings, so the AADT for this segment is the average of those two readings.

BICYCLE & PEDESTRIAN CRASHES (2014 - 2018)				
Segment	Length	Injury Crashes (per Mile)	AADT	Per Mile Per 1 Million Vehicles
1	0.71	6	43,100	140
2	0.54	9	51,600	170
3*	0.30	7	44,800	160
4	0.41	10	46,500	220
5	0.31	0	46,500	0
6*	0.56	4	49,100	80
7	0.73	1	51,600	20

*This segment spans two AADT readings, so the AADT for this segment is the average of those two readings.

Toolkit Development

Best practice resources provide guidance on enhancing safety, particularly for non-motorized road users, and enhancing multi-modal accessibility. To establish a toolkit appropriate to address needs in the MD 187 corridor, the following best practices from national and local guidebooks were consulted:

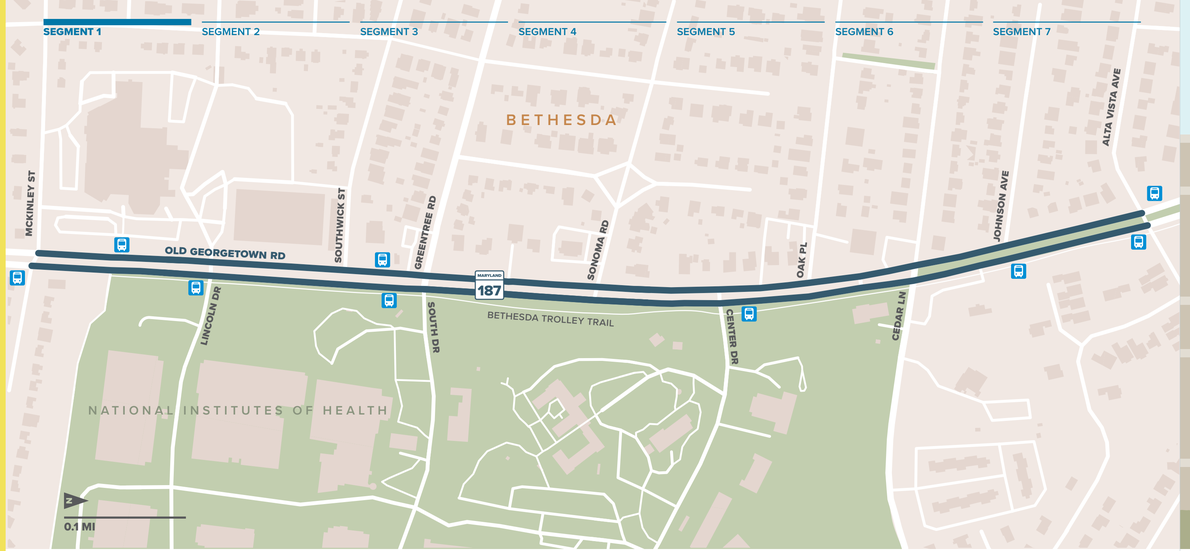
- Montgomery County Complete Streets Guide
- Montgomery County Bicycle Facility Design Toolkit
- MDOT SHA Context Driven: Access & Mobility for All Users
- Global Street Design Guide from the Global Designing Cities Initiative
- ITE's Implementing Context Sensitive Design on Multi-modal Thoroughfares
- Fehr & Peer's LA Bike/Bus Interaction Study
- Oregon Metro's Designing Livable Streets and Trails Guide
- FHWA Intersection Safety Case Study
- Signalized Intersections: An Informational Guide (link)
- NCHRP 812: Signal Timing Manual

Context-sensitive recommendations were drafted and revised for each context, with consideration of the unique demands in each segment along the corridor and each attribute within that segment. This included a comprehensive inventory of the various roadway elements, including travel lanes and widths, turn lanes and treatments, medians, sidewalk

Context Segment Recommendations

In each of the context segments, the preferred master plan or "complete street" elements identified in the matrix was complied to develop an unconstrained roadway section to document the preferred corridor design under ideal conditions. In all cases, implementing such a design would be infeasible due to impacts to the surrounding community, so a context-sensitive approach was used to identify a constrained street section that prioritizes pedestrian and bicyclist safety, access and a balanced approach to address all needs in the MD 187 corridor. This constrained roadway section and key recommendations for each context zone are summarized in the following pages.

The full buildout of these street sections would be achieved by implementing all of the Long-Term Improvements shown in Chapter 4.



MULTIMODAL NEEDS ON THE CORRIDOR

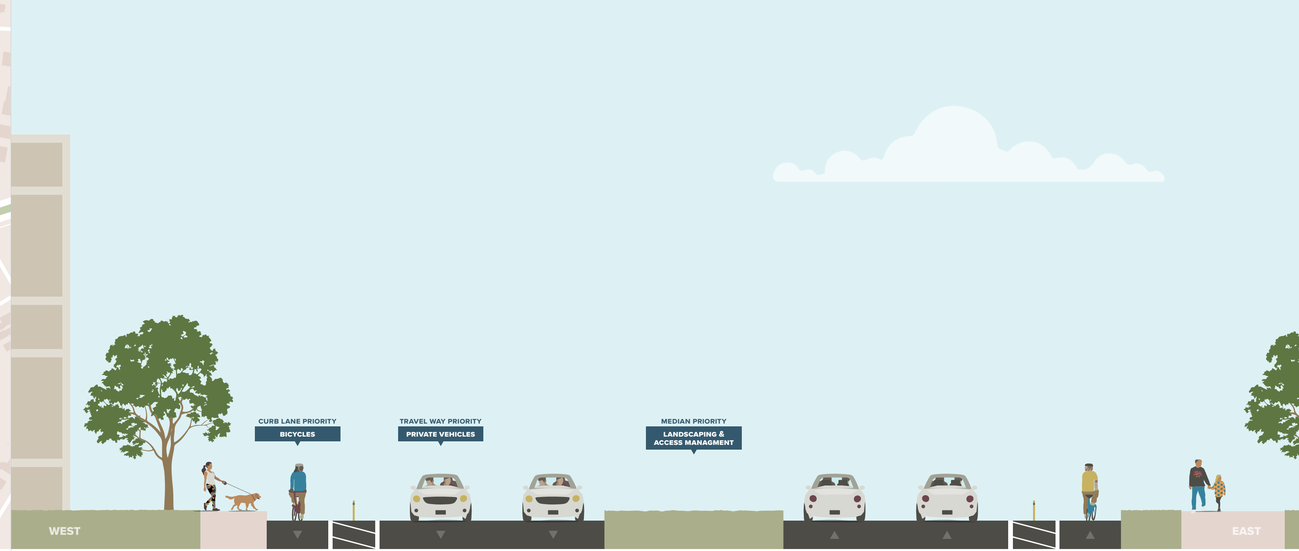
Segment 1 connects the National Institutes of Health campus to neighborhoods north and south. The County's Pedestrian Level of Comfort rating system only covers the portion of this segment north of Center Drive, but the remaining portion has similar characteristics which is "uncomfortable" for walking. The County's Bicycle Level of Stress rating labels this segment as "high stress" for people on bicycles due to three travels per direction and a wide outer vehicle lane. The Bethesda Trolly Trail runs along the eastside of this segment and provides space for people walking and biking.

Frequent bus stops lead to increased pedestrian crossing needs which are partially served by traditional traffic signals at McKinley Street, Lincoln Drive, Greentree Road, Center Drive, and Cedar Lane. Segment 1 has the second lowest rate of injury crashes, and the fourth highest bicycle and pedestrian crash rate along the study corridor.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

MDOT SHA could consider performing an operational evaluation to determine if a road reconfiguration is suitable for Segment 1. Repurposing one travel lane per direction would allow for continuity to the existing buffered bike lanes in Segment 2 and allows for the maintenance of wider outside lanes for transit and the landscaped median with turn pockets. Providing space for people biking and an additional buffer for people walking can create a lower stress walking and biking environment.

The buffered bike lanes could include safety features such as removable flex posts, qwick kurbs, rubber bumps, and green paint. Crossing at Alta Vista Ave could be considered to enable access to the Bethesda Trolley Trail. Safe pedestrian crossing every block, or relatively 600'-900', could include elements such as continental striping, Pedestrian Hybrid Beacons (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where possible. Where non-landscape buffered sidewalks exist, convert to landscape buffered sidewalk as development opportunities arise. The Center Drive curb radii could be tightened and the channelized right turn at Lincoln Drive could be squared if it does not impede oper-



TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS
- [x] Protected/ permitted left-turns
- [ ] Right-turn on red allowed except areas with high sidepath voumes

CURB RADII
- [ ] 15' Maximum curb radius
- [x] Tighten curb radii
- [ ] Remove slip lanes

SPEED
POSTED SPEED 35 | TARGET SPEED 35

ENFORCEMENT
- [ ] Encourage automated red light enforcement
- [ ] Encourage automated speed enforcement

PEDESTRIAN & BIKE
- [x] High-visibility crosswalks at all approaches
- [x] Push-buttons
- [ ] LPI at signalized intersections in core area

West: 6.5' Sidewalk; 6' Bike lane
East: 6' Bike lane

600' 900' Protected crossing spacing

OTHER
- [ ] Minimize, narrow, and consolidate driveways
- [ ] Pedestrian-scale lighting in town center areas
- [x] Medium tree canopy coverage

MULTIMODAL NEEDS ON THE CORRIDOR

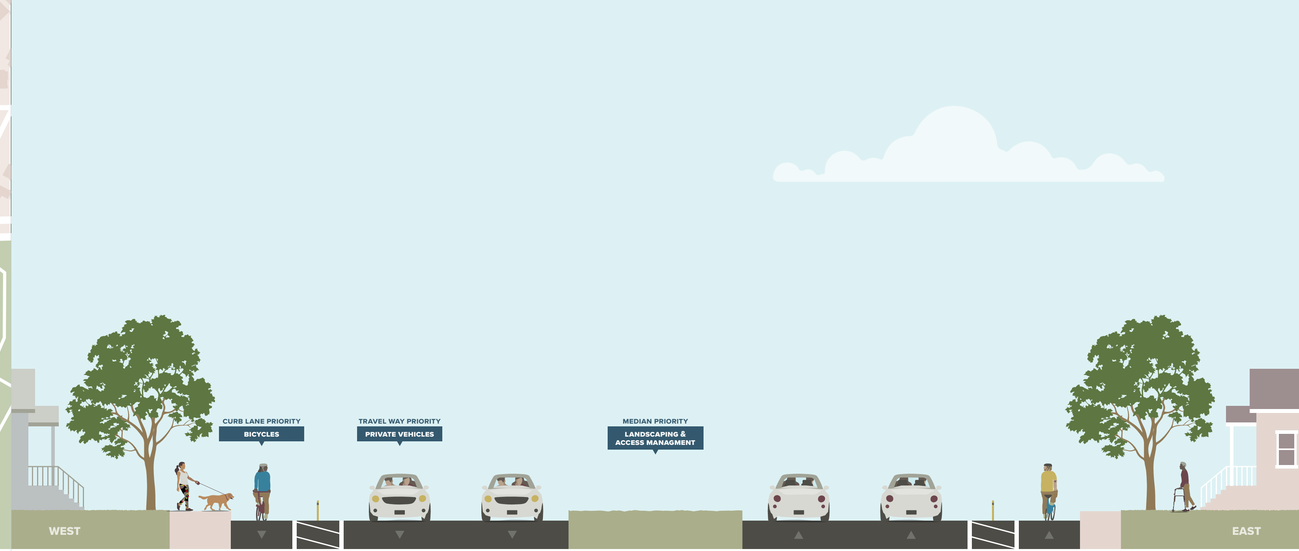
Segment 2 connects the Alta Vista neighborhood to I-495. The County's Pedestrian Level of Comfort rating system only covers the portion of this segment from Alta Vista to Beech Avenue, but the remaining portion has similar characteristics which is "uncomfortable" for walking. The bicycle level of stress rating has not been revaluated since the road diet, but buffered bike lanes were installed in 2019 and the new facility increases comfort and leads toward low stress biking.

Despite three pairs of bus stops, pedestrians have limited crossing opportunities within the area, with a traditional traffic signal at Beech Avenue and Ryland Drive. Segment 2 is tied for second lowest injury crash rate, but the second highest segment for bicycle and pedestrian crashes along the study corridor.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

Segment 2 currently has a recently implemented road diet with buffered bike lanes. These elements were added after a fatal bicycle collision in 2019. Additional recommended improvements in this segment focus on enhancing the existing bicycle facility and pedestrian crossings. The buffered bike lanes could be enhanced to include safety features such as removable flex posts, qwick kurbs, rubber bumps, and green paint.

Safe pedestrian crossing every other block, or relatively 800'-1600', could include elements such as continental striping, Pedestrian Hybrid Beacon (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where possible. Crossing opportunities could be evaluated at Wyngate Drive and Alta Vista Road. The community has desired a traditional signal at Alta Vista, but other pedestrian crossing features could be considered. Automated speed cameras could be encouraged near Charles Street and Beech Ave.



TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS

- Protected/ permitted left-turns
- Right-turn on red allowed except areas with high sidepath voumes

CURB RADII

- 15' Maximum curb radius
- Tighten curb radii
- Remove slip lanes

SPEED

POSTED SPEED **35**

TARGET SPEED **35**

ENFORCEMENT

- ☐ Encourage automated red light enforcement
- ☑ Encourage automated speed enforcement

PEDESTRIAN & BIKE

- ☑ High-visibility crosswalks at all approaches
- ☑ Push-buttons
- ☐ LPI at signalized intersections in core area

West
- 6' Sidewalk
- 6' Bike lane

East
- 6' Sidewalk
- 6' Bike lane

800' 1,600' Protected crossing spacing

OTHER

- ☐ Minimize, narrow, and consolidate driveways
- ☐ Pedestrian-scale lighting in town center areas
- ☑ Medium tree canopy coverage

MULTIMODAL NEEDS ON THE CORRIDOR

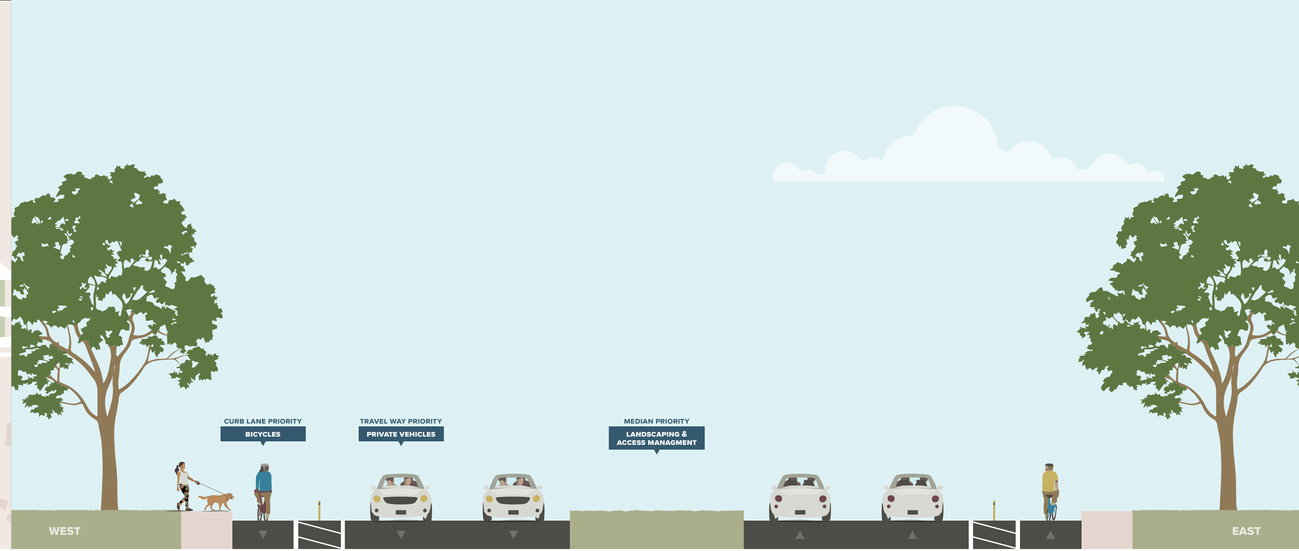
Segment 3 connects areas north and south to I-495. The current layout is difficult for people walking and biking to safely navigate interstate entrance and exit ramps. This segment of MD 187 is "undesirable" for pedestrians, "high stress" for people on bicycles, and partially on Montgomery County's Vision Zero High Injury Network. Non-landscape buffered sidewalks, no dedicated bicycle facilities, and three travel lanes per direction add to the stressful environment.

Pedestrian crossing is limited to traditional signals at Ryland Drive, the southern I-495 interchange area, and the northern I-495 interchange area. Additionally, interstate ramp crossings can be uncomfortable due to fast slip lanes and limited visibility. Segment 3 has the highest rate of injury crashes, and the third highest segment for bicycle and pedestrian crashes along the study corridor.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

MDOT SHA could consider performing an operational evaluation to determine if a road reconfiguration is suitable for Segment 3. Converting one travel lane per direction provides space for continuing the existing buffered bike lanes in Segment 2 and maintain the landscaped median with turn pockets.

The buffered bike lanes could include safety features such as removable flex posts, qwick kurbs, rubber bumps, and green paint. Safe pedestrian crossing every block, or relatively 600'-900', could include elements such as continental striping, Pedestrian Hybrid Beacons (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where possible. Hazard Identification Beacons (HIBs) or bike signals could be added at ramp crossings to increase driver awareness of individuals walking and biking across the ramps. Where non-landscape buffered sidewalks exist, convert to landscape buffered sidewalk as development opportunities arise. All curb radii could be tightened to a maximum of 25'. Right turn slip lanes at the westbound and eastbound ramps could be removed, and junction intersections could be realigned to right angles to slow vehicles to safe turning speeds. The northbound MD 187 ramp exiting off westbound I-495 could be directed to the signalized intersection, and the free-flow move-



TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS
- ☐ Protected/ permitted left-turns
- ☐ Right-turn on red allowed except areas with high sidepath voumes

CURB RADII
- 25' Maximum curb radius
- ☑ Tighten curb radii
- ☑ Remove slip lanes

SPEED
POSTED SPEED 35 | TARGET SPEED 35

ENFORCEMENT
- ☑ Encourage automated red light enforcement
- ☐ Encourage automated speed enforcement

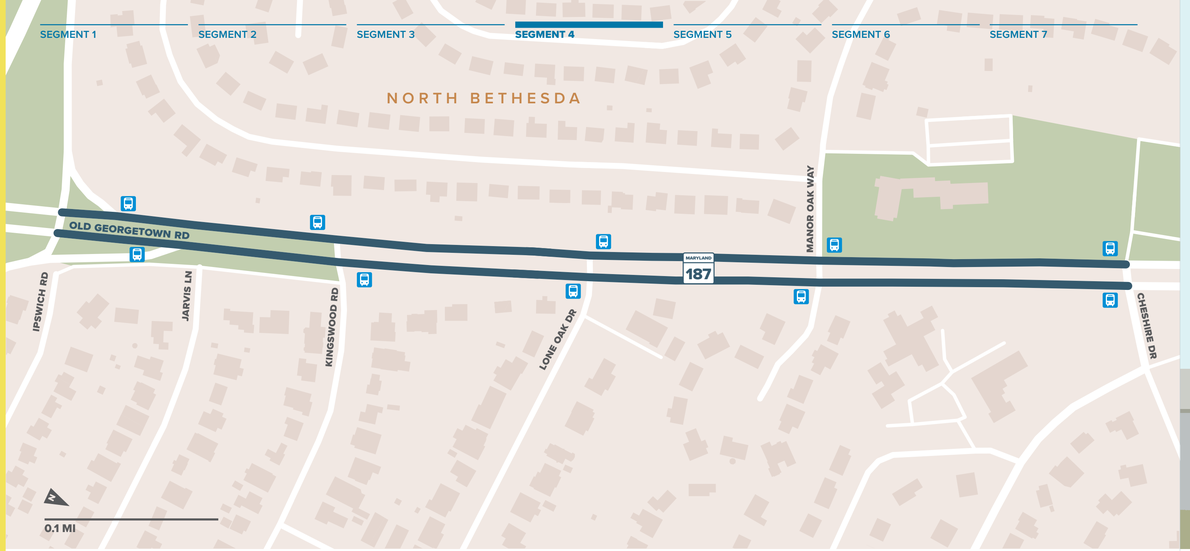
PEDESTRIAN & BIKE
- ☑ High-visibility crosswalks at all approaches
- ☑ Push-buttons
- ☐ LPI at signalized intersections in core area

West
- 5' Sidewalk
- 6' Bike lane

East
- 5' Sidewalk
- 6' Bike lane

600' – 900' Protected crossing spacing

OTHER
- ☐ Minimize, narrow, and consolidate driveways
- ☐ Pedestrian-scale lighting in town center areas
- ☑ Medium tree canopy coverage



MULTIMODAL NEEDS ON THE CORRIDOR

Segment 4 connects the Wildwood Manor neighborhood to I-495 to the south and the Wildwood Shopping Center to the north. This segment of MD 187 is "undesirable" for pedestrians, "high stress" for people on bicycles, and is on Montgomery County's Vision Zero High Injury Network. Sidewalks abutting the curb, wide vehicular lanes, no dedicated bicycle facilities, and three travel lanes per direction add to the stressful environment.

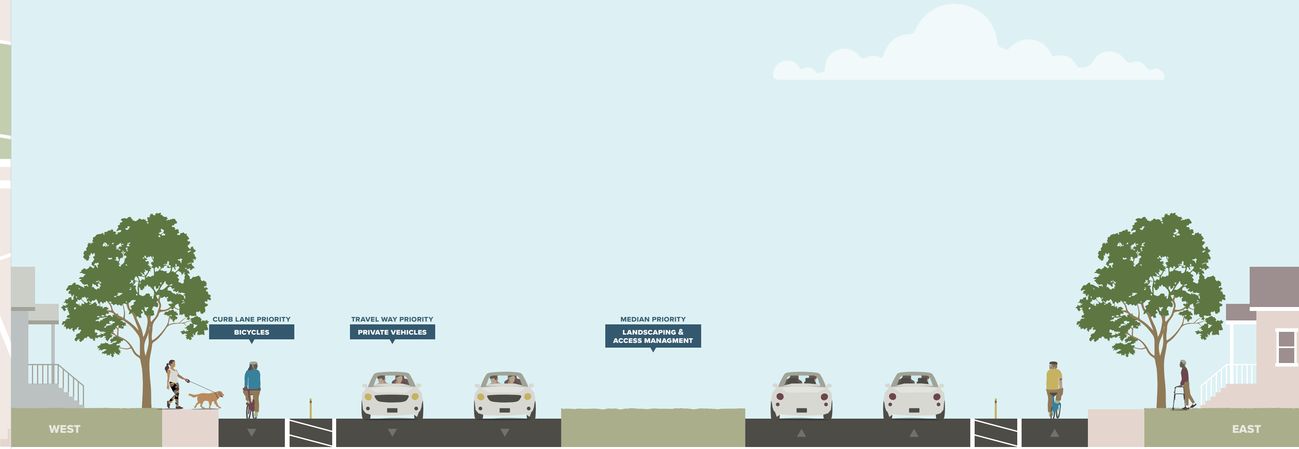
Despite frequent bus stops, pedestrians have limited crossing opportunities within the area, with a traditional traffic signal at the northern I-495 interchange area and Manor Oak Way. Segment 4 has the third highest rate of injury crashes, and the highest segment for bicycle and pedestrian crashes along the study corridor, including a pedestrian fatality in 2018 at Kingswood Road.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

MDOT SHA could consider performing an operational evaluation to determine if a road reconfiguration is suitable for Segment 4. Converting one travel lane per direction provides space for buffered bike lanes and maintains a landscaped median with turn pockets.

The buffered bike lanes could include safety features such as removable flex posts, qwick kurbs, rubber bumps, and green paint. Safe pedestrian crossing every block, or relatively 500', could include continental striping, Pedestrian Hybrid Beacons (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extension elements where possible. A pedestrian crossing could be evaluated at Kingswood Road due to the transit stops, cut-through sidewalk access to the adjacent neighborhood, and as the location of a 2018 pedestrian fatality. A southern crosswalk leg and lighting could be evaluated at Manor Oak Drive.

Where non-landscape buffered sidewalks exist, convert to landscape buffered sidewalk as development opportunities arise. Consider tightening curb radii at Manor Oak Road and Kingswood Road intersections. The westbound I-495 exit ramp to northbound MD 187 could be stubbed and re-aligned with the signalized intersection. Sidewalk could be added between the I-495 underpass and Kingswood Road. Automated speed cameras could be encouraged near the exit ramps.



TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS
- Protected/ permitted left-turns
- Right-turn on red allowed except areas with high sidepath voumes

CURB RADII
- 25' Maximum curb radius
- [x] Tighten curb radii
- [ ] Remove slip lanes

SPEED
- POSTED SPEED 40
- TARGET SPEED 35

ENFORCEMENT
- [x] Encourage automated red light enforcement
- [ ] Encourage automated speed enforcement

PEDESTRIAN & BIKE
- [x] High-visibility crosswalks at all approaches
- [x] Push-buttons
- [ ] LPI at signalized intersections in core area
- West 5.5' Sidewalk, 6.5' Bike lane
- East 5.5' Sidewalk, 6.5' Bike lane
- 500' Protected crossing spacing

OTHER
- [ ] Minimize, narrow, and consolidate driveways
- [ ] Pedestrian-scale lighting in town center areas
- [ ] High tree canopy coverage

MULTIMODAL NEEDS ON THE CORRIDOR

Segment 5 connects the Wildwood Manor neighborhood to the Wildwood Shopping Center and Georgetown Square. As a retail area, this segment is slightly less stressful for pedestrians but is still rated as "uncomfortable," while bicycling is rated "high stress." The segment is on Montgomery County's Vision Zero High Injury Network. Much of this segment has non-landscape buffered sidewalks, which, combined with wide vehicular lanes, no dedicated bicycle facilities, driveway conflicts, and three travel lanes per direction add to the stressful environment.

With retail centers on either side of MD 187, pedestrian crossing opportunities occur at traditional traffic signals at Cheshire Drive, Democracy Boulevard, and Rock Spring Drive. Segment 5 has the lowest rate of injury crashes, and the lowest rate of bicycle and pedestrian crashes along the study corridor.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

MDOT SHA could consider performing an operational evaluation to determine if a road reconfiguration is suitable for Segment 5. Converting one travel lane per direction provides space for buffered bike lanes and maintains the raised median with turn pockets. Providing space for people biking and an additional buffer for people walking can create a lower stress walking and biking environment.

The buffered bike lanes could include safety features such as removable flex posts, qwick kurbs, rubber bumps, and green paint. Safe pedestrian crossing every block, or relatively 800'-1000', could include elements such as continental striping, Pedestrian Hybrid Beacons (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where possible. Where non-landscape buffered sidewalks exist, convert to landscape buffered sidewalk as development opportunities arise. Access points at Exxon and Sandy Spring Bank between Democracy Boulevard and Rock Spring Drive could be consolidated.

TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS
- Protected/ permitted left-turns
- Right-turn on red allowed except areas with high sidepath voumes

CURB RADII
- 25' Maximum curb radius
- Tighten curb radii
- Remove slip lanes

SPEED
POSTED SPEED **40**
TARGET SPEED **35**

ENFORCEMENT
- [x] Encourage automated red light enforcement
- [ ] Encourage automated speed enforcement

PEDESTRIAN & BIKE
- [x] High-visibility crosswalks at all approaches
- [x] Push-buttons
- [ ] LPI at signalized intersections in core area

West
5.5' Sidewalk
6.5' Bike lane

East
5.5' Sidewalk
6.5' Bike lane

800'
1,000'
Protected crossing spacing

OTHER
- [x] Minimize, narrow, and consolidate driveways
- [ ] Pedestrian-scale lighting in town center areas
- [x] Medium tree canopy coverage

MULTIMODAL NEEDS ON THE CORRIDOR

Segment 6 crosses over I-270 and it is difficult for people walking and biking to safely navigate interstate entrance and exit ramps. The County's Pedestrian Level of Comfort rating system only covers the portion of this segment from Rock Spring Drive to the southern I-270 ramps, but the remaining portion has similar characteristics which is "uncomfortable" for walking. Segment 6 is "high stress" for people on bicycles and is on Montgomery County's Vision Zero High Injury Network. Non-landscape buffered sidewalks, no dedicated bicycle facilities, and three travel lanes per direction add to the stressful environment. Bus Rapid Transit is proposed along and north of Rock Spring Drive.

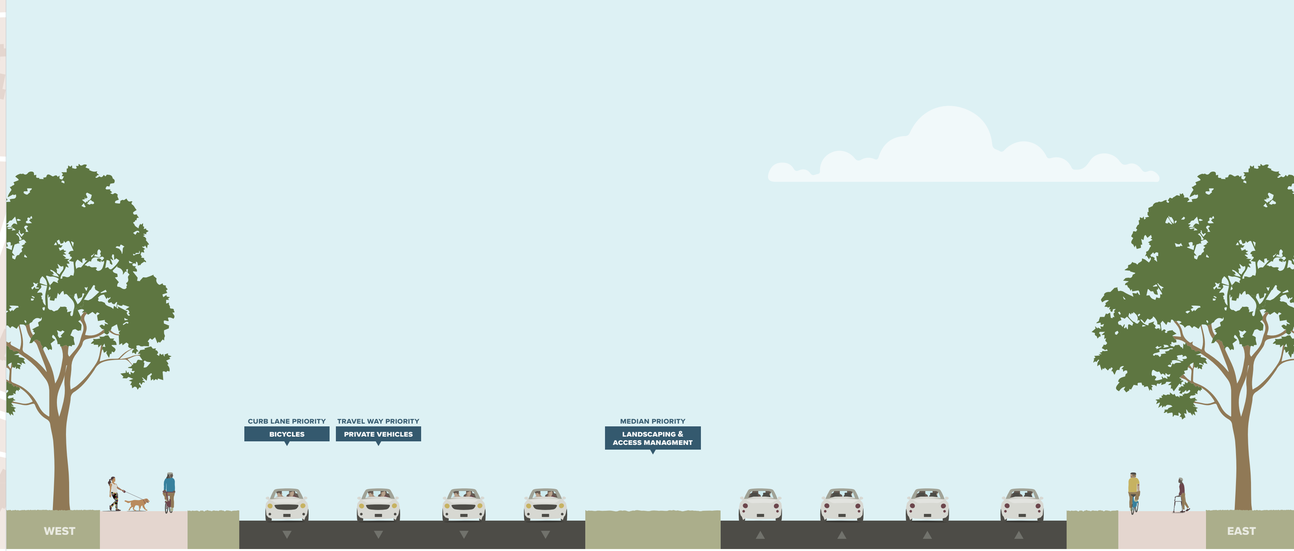
Pedestrian crossing is limited to signals at Rock Spring Drive, the southern I-270 interchange area, the northern I-270 interchange area, and Tuckerman Lane. The northern and southern interchange areas have no crosswalks over MD 187. Additionally, interstate ramp crossings are hostile due to fast slip lanes and limited visibility. Segment 6 has the second highest rate of injury crashes, and the third lowest segment for bicycle and pedestrian crashes along the study corridor. Tuckerman Lane has a high percentage of crashes in comparison to the study corridor and these are primarily head-on where the opposing vehicle is making a left turn and rear end in the same direction where a vehicle has slowed to make a left turn.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

An 11' side path along the east and west side of MD 187 is recommended to support people walking and biking and future planned Bus Rapid Transit. Providing raised and separated directional space for people walking and biking over I-270 creates a lower stress walking and biking environment.

Safe pedestrian crossing every block, or relatively 800'-1000', could include elements such as continental striping, Pedestrian Hybrid Beacons (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where possible. A fourth crosswalk leg could be added at Rock Spring Drive and Tuckerman Lane. Hazard Identification Beacons (HIBs) could be added at ramp crossings to increase driver awareness of individuals walking and biking across the ramps. Red light and speed cameras could be encouraged at Rock Spring Drive, Walker Johnson High School, and Tuckerman Lane.

Where non-landscape buffered sidewalks exist, convert to landscape buffered sidewalk as development opportunities arise.. The northwest corner of Rock Spring Drive, and all corners of Tuckerman Lane could be tightened to a maximum of 25'. Ramp junction intersections could be realigned to right angles. Protected left turns are recommended at ramp interchanges, and the protected/permitted left turn at Tuckerman Lane could be eliminated.



TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS
- Protected left-turns
- Right-turn on red allowed except areas with high sidepath voumes

CURB RADII
- 25' Maximum curb radius
- [x] Tighten curb radii
- [ ] Remove slip lanes

SPEED
- POSTED SPEED 40
- TARGET SPEED 35

ENFORCEMENT
- [x] Encourage automated red light enforcement
- [x] Encourage automated speed enforcement

PEDESTRIAN & BIKE
- [x] High-visibility crosswalks at all approaches
- [x] Push-buttons
- [ ] LPI at signalized intersections in core area
- West 11' Sidepath
- East 11' Sidepath
- 800' / 1,000 Protected crossing spacing

OTHER
- [ ] Minimize, narrow, and consolidate driveways
- [ ] Pedestrian-scale lighting in town center areas
- [ ] Medium tree canopy coverage

MULTIMODAL NEEDS ON THE CORRIDOR

Segment 7 connects I-270 to North Bethesda. The County's Pedestrian Level of Comfort rating system only covers the portion of this segment from north Pointdexter Lane/Edson Lane, but the remaining portion has similar characteristics which is "undesirable" for walking. This segment of MD 187 is rated "high stress" for bicycling and is on Montgomery County's Vision Zero High Injury Network. Non-landscape buffered sidewalks, wide vehicular lanes, no dedicated bicycle facilities, and three travel lanes per direction add to the stressful environment.

Despite five pairs of bus stops, pedestrian crossing is limited to traditional traffic signals at Tuckerman Lane, Pointdexter Lane/Edson Lane, and Tilden Lane/Nicholson Lane. A school traffic signal is located at Tilden Milden Middle School. Bus Rapid Transit is planned for this portion of MD 187. Segment 7 has the second lowest rate of injury crashes, and the second lowest segment for bicycle and pedestrian crashes along the study corridor.

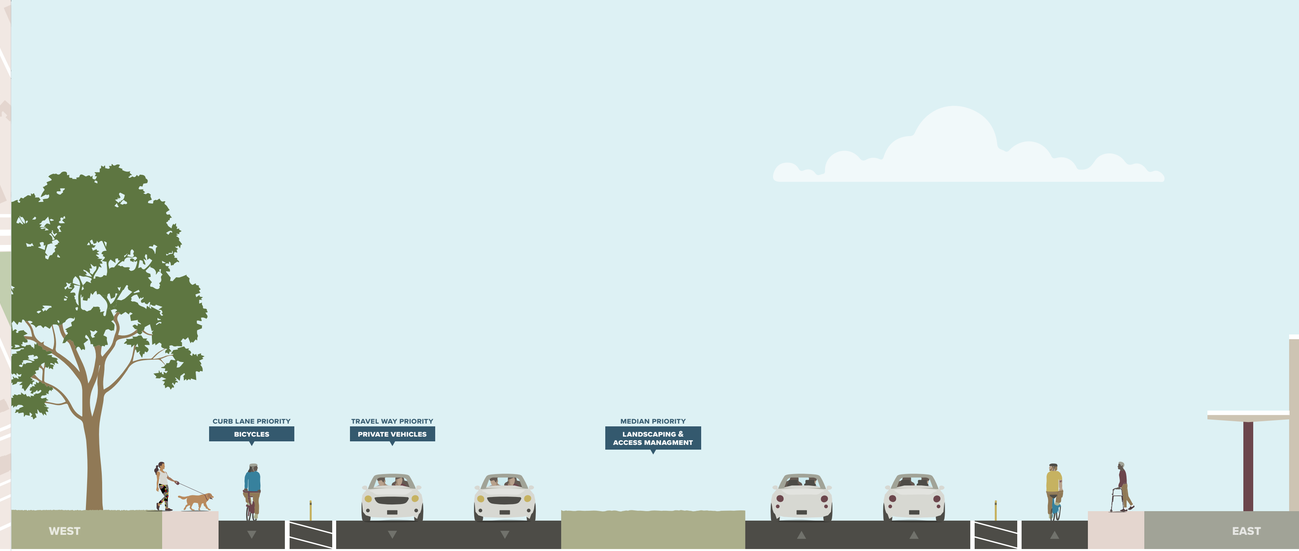
WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

MDOT SHA should consider performing an operational evaluation to determine if a road reconfiguration is suitable for Segment 7. Converting one travel lane per direction provides space for buffered bike lanes and maintains the raised median with turn pockets. Providing space for people biking and additional buffer for people walking can create a lower stress walking and biking environment.

The buffered bike lanes could include safety features such as removable flex posts, qwick kurbs, rubber bumps, and green paint. Longterm, a 17' bus and bike shared lane per direction could be considered with the proposed Bus Rapid Transit.

The space would be converted from one travel lane per direction and part of the median. Safe pedestrian crossing every block, or relatively 800'-1000' could include elements such as continental striping, Pedestrian Hybrid Beacons (PHB), pedestrian refuge island, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where possible.

Red light and speed cameras and no turn on red restrictions could be encouraged at Tilden Middle School and Poindexter/Edson Lane. Consider redesigning Tilden Lane/Nicholson Lane intersection to eliminate free right turn and tighten curb radii to a maximum of 25'. Where non-landscape buffered sidewalks exist, convert to landscape buffered sidewalk as development opportunities arise.



EXISTING	5.5' SIDEWALK	12' DRIVE		10.5' DRIVE	11' DRIVE	18' MEDIAN	11' DRIVE	10.5' DRIVE	12' DRIVE		5.5' SIDEWALK	
RECOMMENDED	5.5' SIDEWALK	6.5' BIKE LANE	5' BUFFER	11' DRIVE	11' DRIVE	18' MEDIAN	11' DRIVE	11' DRIVE	5' BUFFER	6.5' BIKE LANE	5.5' SIDEWALK	

85' CURB-TO-CURB

96' RIGHT-OF-WAY

TOOLKIT ELEMENTS IN THE CROSS-SECTION

TURNS
- Protected/ permitted left-turns
- Consider no-right -turn-on-red

CURB RADII
- 25' Maximum curb radius
- ☑ Tighten curb radii
- ☐ Remove slip lanes

SPEED
POSTED SPEED 40

TARGET SPEED 35

ENFORCEMENT
- ☑ Encourage automated red light enforcement
- ☑ Encourage automated speed enforcement

PEDESTRIAN & BIKE
- ☑ High-visibility crosswalks at all approaches
- ☑ Push-buttons
- ☐ LPI at signalized intersections in core area

West
- 5.5' Sidewalk
- 6.5' Bike lane

East
- 5.5' Sidewalk
- 6.5' Bike lane

800' / 1,000 Protected crossing spacing

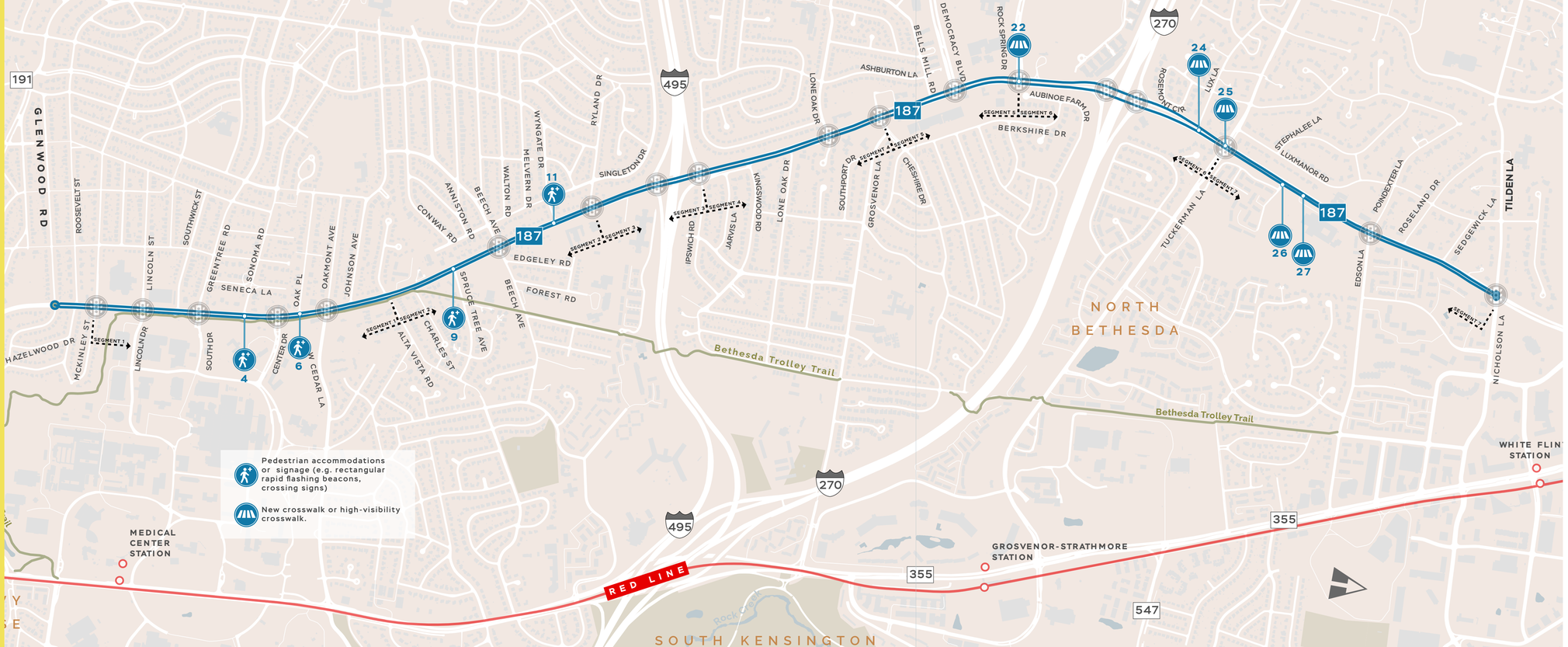
OTHER
- ☐ Minimize, narrow, and consolidate driveways
- ☐ Pedestrian-scale lighting in town center areas
- ☑ Medium tree canopy coverage

4 PRIORITIZATION & IMPLEMENTATION

Overview

Meeting the broad needs of MD 187 users will require thoughtful and intentional investments over time. Change in established highway corridors rarely occurs rapidly, often taking place incrementally to leverage opportunities for quick improvements in safety or mobility. Strategic approaches are required to outline manageable projects, identify funding and achieve meaningful change.

MDOT SHA has a variety of near- and mid-term opportunities to address needs in the MD 187 corridor, which plans are developed for a broader reorientation of the corridor to achieve the grander vision outlined in this study. Drawing from the observations of this process, the following section outlines locations where short term improvements can be achieved, some of which may be championed by partners and the local community.

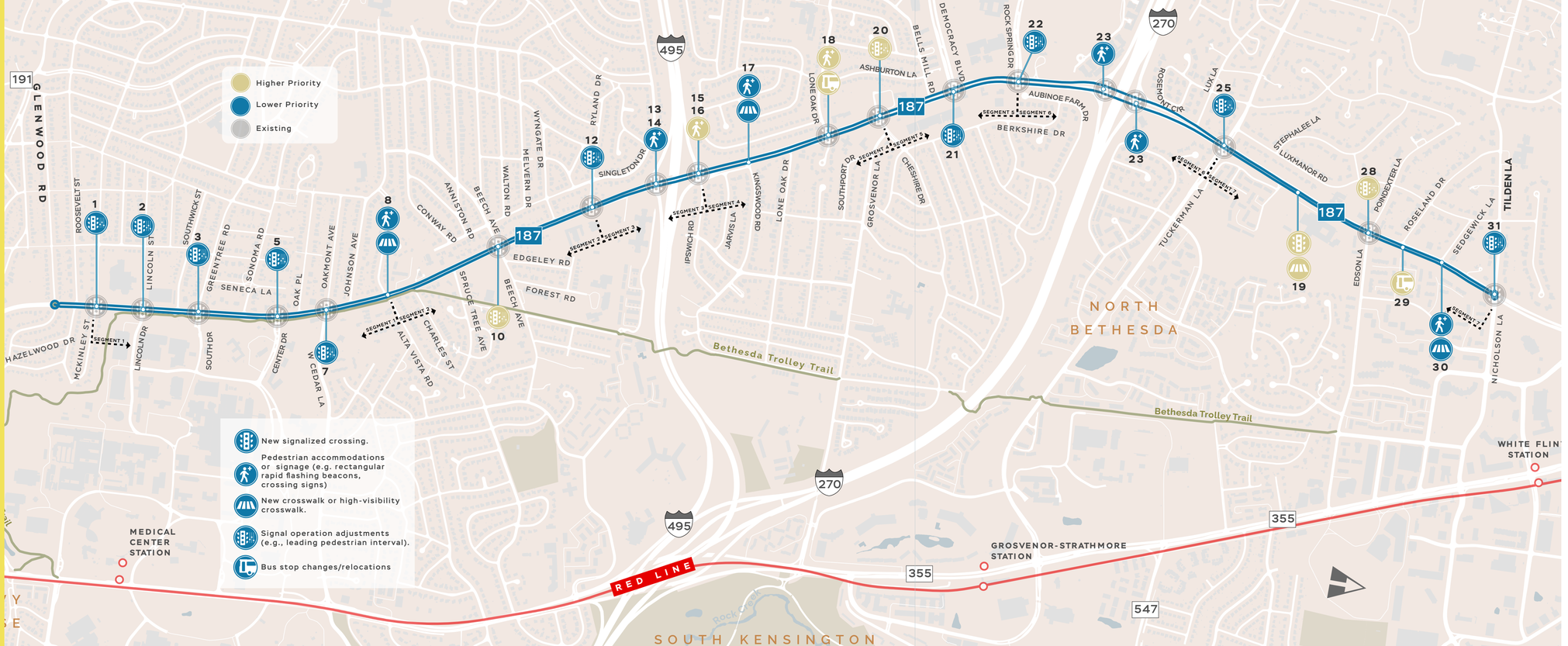


Near-Term Strategies

The MD 187 corridor includes multiple opportunities for near-term improvements that will improve safety, access, and mobility for travelers in the corridor. Near-term improvements will be implemented quickly to improve safety in targeted areas, and then followed with mid- and long-term improvements that may take several years to select, design, and implement.

Proposed near-term improvements are shown on this map and detailed in the table on page 48. The proposed improvements primarily consist of the addition of high visibility crosswalks, painted median extensions, and "Turning Traffic Yield to Peds" (R10-15) signage. Such measures have been proven effective in increasing driver awareness and reducing conflicts. In addition, ADA compliance should be ensured during the installation of any of these near-term improvements.

Near-Term Improvements						
ID	Segment	Intersection	Improvement Type	Description	Potential Treatment	Cost Range
4	1	Sonoma Road	Pedestrian Accomodations or Signing	Improve driver awareness of pedestrians when turning	Painted Median Extension, Turning Traffic Yield to Peds signing, High Visibility Crosswalk	$
6	1	Oak Place	Pedestrian Accomodations or Signing	Improve driver awareness of pedestrians when turning	Painted Median Extension, Turning Traffic Yield to Peds signing, High Visibility Crosswalk	$
9	2	Spruce Tree Avenue	Pedestrian Accomodations or Signing	Improve driver awareness of pedestrians when turning	Painted Median Extension, Turning Traffic Yield to Peds signing, High Visibility Crosswalk	$
11	2	Wyngate Drive	Pedestrian Accomodations or Signing	Improve driver awareness of pedestrians when turning	Painted Median Extension, Turning Traffic Yield to Peds signing, High Visibility Crosswalk	$
22	5&6	Rock Spring Drive	New or High Visibility Crosswalk	Improve visibility of conflicting crosswalk	High Visibility Crosswalk	$$
24	6	Lux Lane	New or High Visibility Crosswalk	Improve visibility of conflicting sidepath crossing of side-street	High Visibility Crosswalk	$
25	6&7	Tuckerman Lane	New or High Visibility Crosswalk	Improve visibility of conflicting crosswalk	High Visibility Crosswalk	$
26	7	Cedarwood Drive	New or High Visibility Crosswalk	Improve visibility of school crossing of side-street	High Visibility Crosswalk	$
27	7	Charles W. Woodward High School	New or High Visibility Crosswalk	Improve visibility of school crossing of side-street	High Vi sibility Crosswalk	$
All	All	N/A	Access Management	Modify driveways as fronting properties develop/redevelop	Minimize, narrow, and consolidate driveways	Varies



Mid-Term Strategies

Projects that would take several years to design and implement are ideal opportunities for implementation in the mid-term. These tools include installation of countermeasures such as new traffic signals or pedestrian hybrid beacons to increase the frequency of safe crossing opportunities within the corridor.

Minor intersection retrofits at locations where visibility of yield-controlled approaches to crosswalks is not ideal are also opportunities that can be reviewed and implemented in this time-frame. These improvements may require utility relocations to accommodate vehicular traffic with the required geometric modifications. Potential impacts to traffic signals would also require additional time and funding, ensuring that the improvements address ADA criteria upon completion.

In addition, efforts such as improving access management by consolidating driveways along the corridor can improve safety by reducing conflict points. This type of effort would be ongoing and opportunistic as properties develop and redevelop.

Public involvement will be key to determining which mid-term projects and strategies to move forward with. To aid in this determination, the intersections with proposed mid-term projects have been scored on a scale of 0 to 3 to gauge which areas are most in need of improvements (3 representing a higher need, and 0 a lower need).

As described below the tables on pages 52 and 53, the scoring considered proximity to schools, proximity to bus stops, and whether or not the intersection was within a high crash area as determined from the Crash History map in Chapter 2.

Mid-Term Improvements							
ID	Segment	Intersection	Improvement Type	Description	Potential Treatment	Cost Range	Priority Score
1	1	McKinley Street	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	1
2	1	Lincoln Street	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	1
3	1	Greentree Road	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	1
5	1	Center Drive	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	1
7	1	W Cedar Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	0
8	1&2	Alta Vista Road	New or High Visibility Crosswalk	Improve visibility of conflicting crosswalk	High Visibility Crosswalk (south leg)	$	1
			Pedestrian Accomodations or Signing	Provide enhanced crossing	Install RRFB, HAWK, or Traffic Signal	$$ / $$$	1
10	2	Beach Avenue	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	2
12	2&3	Ryland Road	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$	1
13	3	I-495 EB Exit Ramp	Pedestrian Accomodations or Signing	Emphasize pedestrian priority	Install RRFB	$$	1
14	3	I-495 EB Entry Ramp	Pedestrian Accomodations or Signing	Emphasize pedestrian priority	Install RRFB	$$	1
15	3&4	I-495 WB Exit Ramp	Pedestrian Accomodations or Signing	Emphasize pedestrian priority	Install RRFB	$$	2
16	3&4	I-495 WB Entry Ramp	Pedestrian Accomodations or Signing	Emphasize pedestrian priority	Install RRFB	$$	2
17	4	Kingswood Road	New or High Visibility Crosswalk	Improve visibility of conflicting crosswalk	High Visibility Crosswalk (south and east legs)	$	1
			Pedestrian Accomodations or Signing	Emphasize pedestrian priority	Install RRFB or HAWK	$$ / $$$	1

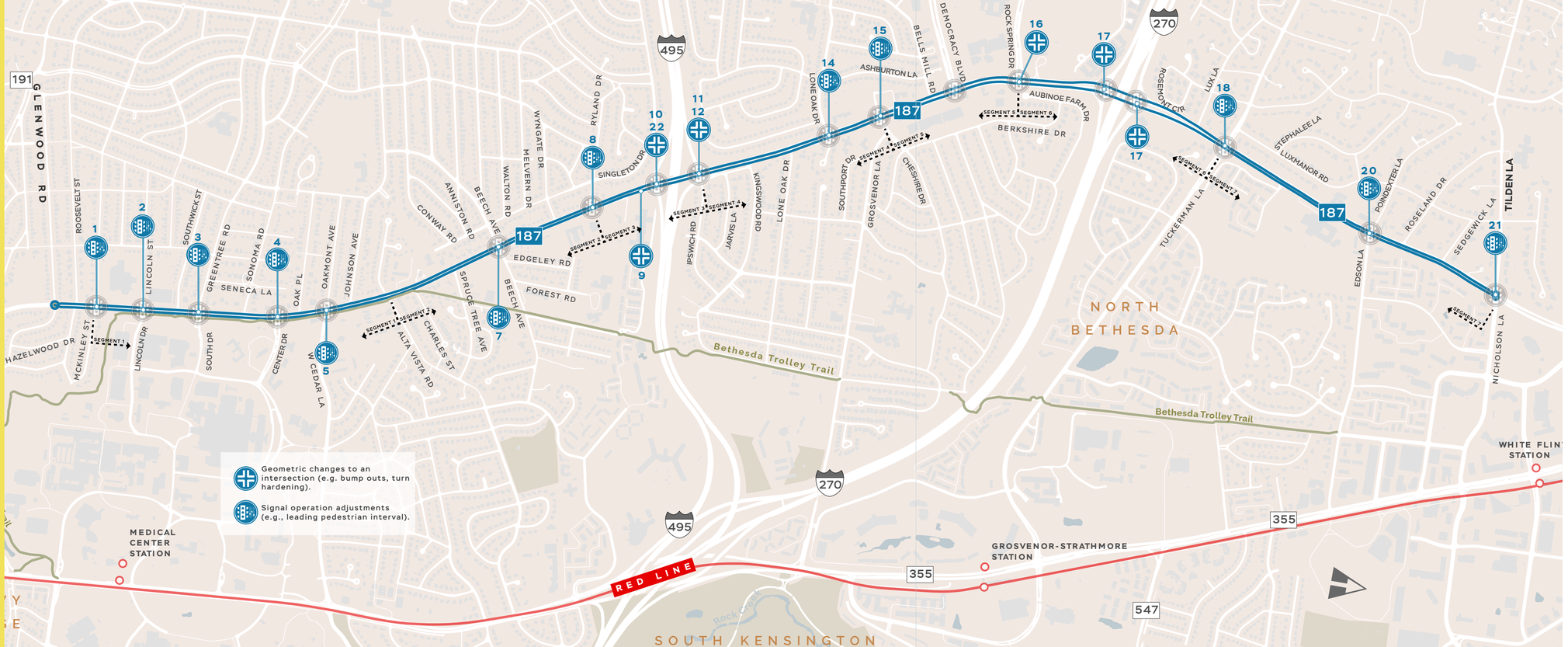
= Higher Priority (2 points)
= Lower Priority (<2 points)

Priority was determined by adding up points as follows:
- Within 1,000 feet of a school (1 point).
- Within 100 feet of a bus stop (1 point).
- Within a high crash area, using the Crash History map from Chapter 2 (1 point).

Mid-Term Improvements							
ID	Segment	Intersection	Improvement Type	Description	Potential Treatment	Cost Range	Priority Score
18	4	Lone Oak Drive	Bus Stop Changes	Consider consolidating Bus Stop	Sign Removal	$	2
18	4	Manor Oak Way	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$$	2
19	7	Charles W. Woodward High School	New or High Visibility Crosswalk	Improve visibility of conflicting crosswalk	High Visibility Crosswalk	$	2
			New Signalized Crossing	Provide safe crossing of south leg with refuge to serve school crossing	Install RRFB or HAWK	$$ / $$$	2
20	4&5	Cheshire Drive	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$$	2
21	5	Democracy Blvd	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$$	0
22	5&6	Rock Spring Drive	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$$	1
23	6	I-270 Ramps (3)	Pedestrian Accomodations or Signing	Emphasize pedestrian priority at uncontrolled ramp crossing	Install RRFB	$$	1
25	6&7	Tuckerman Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI, Upgrade Pedestrian Signals	$$	1
28	7	Edson Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$$	2
29	7	Roseland Drive	Bus Stop Changes	Consider consolidating Bus Stop	Sign Removal	$	2
30	7	Sedgewick Lane	New or High Visibility Crosswalk	Improve visibility of conflicting crosswalk	High Visibility Crosswalk	$	1
			Pedestrian Accomodations or Signing	Improve driver yielding to pedestrians in crosswalk at Bus Stop	Install RRFB or HAWK	$$$	1
31	7	Nicholson Lane/ Tilden Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	LPI	$$	0

= Higher Priority (2 points)
= Lower Priority (<2 points)

Priority was determined by adding up points as follows:
- Within 1,000 feet of a school (1 point).
- Within 100 feet of a bus stop (1 point).
- Within a high crash area, using the Crash History map from Chapter 2 (1 point).



Long-Term Strategies

Long-term projects are typically high-cost projects that can take many years to plan, coordinate, and successfully implement. Such projects include major changes to traffic signals, changes to curb space, adding bike lanes or pedestrian pathways, or road diets/lane reductions.

While improvements of this scale involve the most expensive and time-consuming projects recommended in this report, they also have the potential to yield the greatest safety benefits. The full build-out of these long-term improvements would result in the cross-sections shown in Chapter 3 of this report.

As with the list of proposed mid-term improvements, input from the community and stakeholders will be important in determining the long-term improvements that should be implemented along the MD 187 corridor.

Long-Term Improvements (Individual Projects)						
ID	Segment	Intersection	Improvement Type	Description	Potential Treatment	Cost Range
1	1	McKinley Street	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
2	1	Lincoln Street	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
3	1	Greentree Road	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
4	1	Center Drive	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
5	1	W Cedar Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
7	2	Beach Avenue	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
8	2&3	Ryland Road	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing and/or Flashing Red Arrow Phasing	$$
9	3	Maplewood Park Drive	Geometric Improvement	Reduce turning speeds across crosswalk	Remove channelized free-right turn slip lane	$$$
10	3	I-495 EB Entry Ramp	Geometric Improvement	Reduce turning speeds across crosswalk	Remove channelized free-right turn slip lane	$$$
11	3&4	I-495 WB Exit Ramp	Geometric Improvement	Reduce turning speeds across crosswalk	Remove channelized free-right turn slip lane	$$$
12	3&4	I-495 WB Entry Ramp	Geometric Improvement	Reduce turning speeds across crosswalk	Remove channelized free-right turn slip lane	$$$
14	4	Manor Oak Way	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing	$$
15	5&6	Cheshire Drive	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing	$$
16	5&6	Rock Spring Drive	Geometric Improvement	Reduce turning speeds across crosswalk	Remove channelized free-right turn slip lane	$$$
17	6	I-270 Ramps (3)	Geometric Improvement	Reduce turning speeds across crosswalk	Compact ramp geometry to encourage low speeds with truck aprons	$$
18	6&7	Tuckerman Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing	$$
20	6	Edson Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing	$$
21	6	Nicholson Lane/ Tilden Lane	Signal Operations Improvement	Reduce turning conflicts with pedestrians in crosswalk	Protected Left Turn Phasing	$$
22	3	I-495 EB Exit Ramp	Geometric Improvement	Reduce turning speeds across crosswalk	Remove channelized free-right turn slip lane	$$$

Long-Term Improvements (Cross-Section Improvements by Segment)				
Segment	Improvement Type	Description	Potential Treatment	Cost Range
1	Modify Cross-Section	Reconstruct street with new cross-section	Convert outer drive lane to 6' bike lane with 5' buffer per side	$$$
1	Modify Cross-Section	Reconstruct street with new cross-section	Increase western sidewalk by 1'	$$$
1	Modify Cross-Section	Reconstruct street with new cross-section	Resize drive lanes as appropriate with outer lanes widest	$$$
1	Modify Corners	Modify corners concurrent with street reconstruction	Tighten curb radii along segment	$$$
3	Modify Cross-Section	Reconstruct street with new cross-section	Convert outer drive lane to 6' bike lane with 5' buffer per side	$$$
3	Modify Corners	Modify corners concurrent with street reconstruction	Tighten curb radii along segment (Maximum curb radius of 25')	$$$
4	Modify Cross-Section	Reconstruct street with new cross-section	Convert outer drive lane to 6.5' bike lane with 5' buffer per side	$$$
4	Modify Cross-Section	Reconstruct street with new cross-section	Resize drive lanes as appropriate with outer lanes widest	$$$
4	Modify Corners	Modify corners concurrent with street reconstruction	Tighten curb radii along segment	$$$
5	Modify Cross-Section	Reconstruct street with new cross-section	Convert outer drive lane to 6.5' bike lane with 5' buffer per side	$$$
5	Modify Cross-Section	Reconstruct street with new cross-section	Resize drive lanes as appropriate with outer lanes widest	$$$
7	Modify Cross-Section	Reconstruct street with new cross-section	Convert outer drive lane to 6.5' bike lane with 5' buffer per side	$$$
7	Modify Cross-Section	Reconstruct street with new cross-section	Resize drive lanes as appropriate with outer lanes widest	$$$
7	Modify Corners	Modify corners concurrent with street reconstruction	Tighten curb radii along segment (Maximum curb radius of 25')	$$$
6	Modify Cross-Section	Reconstruct street with new cross-section	Expand western sidewalk to 11' sidepath	$$$
6	Modify Cross-Section	Reconstruct street with new cross-section	Increase eastern sidewalk 5.5'	$$$
6	Modify Cross-Section	Reconstruct street with new cross-section	Reduce buffer to 6.5 per side	$$$
6	Modify Cross-Section	Reconstruct street with new cross-section	Reduce median to 17'	$$$
6	Modify Cross-Section	Reconstruct street with new cross-section	Resize drive lanes as appropriate with outer lanes widest	$$$
6	Modify Corners	Modify corners concurrent with street reconstruction	Tighten curb radii along segment (Maximum curb radius of 25')	$$$

Long-Term Improvements (Cross-Section Improvements by Segment)				
Segment	**Improvement Type**	**Description**	**Potential Treatment**	**Cost Range**
2	Speed Management	Seek opportunities to install speed cameras	Encourage automated speed enforcement	$
3	Speed Management	Seek opportunities to install red light cameras	Encourage automated red light enforcement	$
4	Speed Management	Seek opportunities to install red light cameras	Encourage automated red light enforcement	$
5	Speed Management	Reduce posted speed limit	Aim for target speed of 35 mph	$
5	Speed Management	Seek opportunities to install red light cameras	Encourage automated red light enforcement	$
6	Speed Management	Reduce posted speed limit	Aim for target speed of 35 mph	$
6	Speed Management	Seek opportunities to install red light and speed cameras	Encourage automated red light and speed enforcement	$
7	Speed Management	Reduce posted speed limit	Aim for target speed of 35 mph	$
7	Speed Management	Seek opportunities to install red light and speed cameras	Encourage automated red light and speed enforcement	$

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MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

MD 187 CORRIDOR STUDY

JANUARY 2022