## 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.

### Fehr & Peers DC
- Tory Gibler
- Matthew Ridgway, AICP
- Marya Vyas

### RK&K
- Tony Chan, PE, PTOE
- Michael Geffel, PE
- Nathan George, AICP
- Collin Hodges, AICP

### Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>Existing Conditions</td>
<td>10</td>
</tr>
<tr>
<td>Segmentation &amp; Toolkit Development</td>
<td>22</td>
</tr>
<tr>
<td>Implementation</td>
<td>44</td>
</tr>
</tbody>
</table>
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 roadmap 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 modality 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 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 facilities like Suburban Hospital and the National Institutes of Health Medical Center campus, intermixed with converted business properties, neighborhood community centers and the White Flint Shopping Center. 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 near 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

Introduction

Project Background and Process

"The 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..."
study area 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 influence the level of activity and DEMAND to travel along or across 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 corridor functions, supporting observations that are made in the field. Demand is a function of the density and intensity of development along 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 30th St NW, 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 lesser capacities, requiring social and non-social interactions to be conducted remotely from residential homes. In small, rural corridors pedestrian and bicycle demand was significantly lower than in urban demand. During the periods when field observations were made along the corridor, COVID-19 restrictions were in place, providing an opportunity to observe how changes in user demand along the corridor influenced correlations between travel demand and road-use patterns.

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 lesser capacities, requiring social and non-social interactions to be conducted remotely from residential homes. In small, rural corridors pedestrian and bicycle demand was significantly lower than in urban demand. During the periods when field observations were made along the corridor, COVID-19 restrictions were in place, providing an opportunity to observe how changes in user demand along the corridor influenced correlations between travel demand and road-use patterns.

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 lesser capacities, requiring social and non-social interactions to be conducted remotely from residential homes. In small, rural corridors pedestrian and bicycle demand was significantly lower than in urban demand. During the periods when field observations were made along the corridor, COVID-19 restrictions were in place, providing an opportunity to observe how changes in user demand along the corridor influenced correlations between travel demand and road-use patterns.
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 access 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 rightmost 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 commercial 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.
INTRODUCTION

EXISTING CONDITIONS & SAFETY

Overview

Traveling along the MD 187 corridor is generally consistent, due to similarity 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 aims to improve bicyclist comfort and accessibility, with the added benefit of enhancing safety for users in the adjacent sidewalk. Other factors will influence multimodal experiences, including weather, time of day, and purpose of travel. These factors can affect travel experiences at the corridor level, or in order to establish zones of similar conditions, begin with a scan of existing traffic conditions, which are reviewed 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, statistical analysis of crashes can identify 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). 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 4, uncomfortable to undesirable.

The cross streets that have been graded offer varying degrees of pedestrian comfort, spanning across all levels.
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 establish which roads needed improvements as part of the County’s 2018 Bicycle Master Plan to recommend ways of creating a connected bikeway system that would appeal to a wider range of riders. The revised level of stress is categorized by the following categories:

<table>
<thead>
<tr>
<th>LTS Stress Level</th>
<th>Rider Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 None</td>
<td>Most</td>
</tr>
<tr>
<td>1 Very Low Stress</td>
<td>Most</td>
</tr>
<tr>
<td>2 Low Stress</td>
<td>Strong</td>
</tr>
<tr>
<td>2.5 Moderately Low Stress</td>
<td>Strong</td>
</tr>
<tr>
<td>3 Moderately High Stress</td>
<td>Confident</td>
</tr>
<tr>
<td>4 High Stress</td>
<td>Confident</td>
</tr>
<tr>
<td>5 Very High Stress</td>
<td>Confident</td>
</tr>
</tbody>
</table>

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 Route 355 to Deanwood Drive. 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.
The MD 187 corridor is served by several transit agencies including WMATA, and Montgomery County RideOn. 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 westbound direction only (from the mall and continues in the PNR 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 J2 bus provides daily service with headways of approximately 10 to 20 minutes on 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 motor 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 northern end of this 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 the exception of the portion of the corridor between Cedar Lane and Ryland Drive where MDOT SHA recently implemented a 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 confirm these general recommendations, the recent road diet of MD 187 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 examined independently for 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. Of these crashes involved a person walking or biking, of which 54 individuals walking or biking were injured or disabled.

In total 4% of crashes along the study area involved a pedestrian walking or biking (12 crashes), and 77% of these crashes resulted in an injury for the pedestrian or bicyclist. Of the bicycle and pedestrian crashes, 77% occurred in the southern portion of the corridor, with the highest concentration located between Specra Road and Grosvenor Lane.

The highest rate of crashes involving bicycles occurred close to the intersection with 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 intersection of Tuckerman Lane represented 12% of all crashes with the study corridor, of which 29% of these crashes were head-on left turn crashes.

Although the analysis was specific to 2014-2018 crash data, two bicycle crashes that occurred in 2019 were noted due to the severe outcomes of the collisions. A severe crash at the I-495 interchange involved a teen riding a bicycle near the shoulders of the highway, who was struck by a driver who was speeding (100 mph) 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.
INTRODUCTION

1 SEGMENTATION & TOOLKIT DEVELOPMENT

Overview

Identifying needs in the MD 187 corridor requires an assessment of context, which defines 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, land use, travel behavior, and field observations. Roadside land use is often a primary indicator of context, with varying density and access that tend to generate activity or demand for local access. To a lesser degree, design of the road way may be an indicator of context. Through existing facilities may be optimized to cater to automobile rather than local access. Operational character may also influence context, including permitting certain speeds, frequency of stops, pedestrian and bicycle access, and pattern of use. Each of these context types may indicate an indication 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 some cases, context of 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 on recognizing areas of transition help to identify the context, and then define the limits of each segment.

The final step before establishing specific corridor recommendations is to identify the list of improvements that are appropriate to meet context defined within a corridor. This process leverages local and industry best practices to prioritize access in contexts with higher generation, and local bicycle activity, with a 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 that require additional enhancements 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. Field assessments of possible corridor segments were developed from observed
conditions as investigators traveled along the corridor. Key themes and issues 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.
- Insufficient 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 analysis included a scan of the field observations to assess local conditions, highlight unique findings, and correlate data around the themes identified previously. Relevant data and information were scanned and recorded for each context segment, including Montgomery County’s highway and transitway plans, bike master plans, and M-NCPPC sector plans. Vision Zero, crash data such as Annual Average Daily Traffic (AADT), Level of Traffic Stress (LTS), and functional classifications were also reviewed and evaluated. Crashes that occurred along the corridor were also mapped 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 corridor segments identified for the MD 187 Needs Analysis study. The locations of existing signal controlled intersections are included to contextualize frequency of opportunities to cross the corridor. Street sections for each of the corridor zones and toolkit interventions are presented in the following table. These sections represent an initial 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

<table>
<thead>
<tr>
<th>Segment</th>
<th>Length (in Miles)</th>
<th>From</th>
<th>To</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.71</td>
<td>McKinley Street</td>
<td>Alta Vista Road</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>2</td>
<td>0.54</td>
<td>Alta Vista Road</td>
<td>Ryland Road</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>3</td>
<td>0.30</td>
<td>Ryland Road</td>
<td>Ispwick Road</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>4</td>
<td>0.41</td>
<td>Ispwick Road</td>
<td>Cheshire Drive</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>5</td>
<td>0.31</td>
<td>Cheshire Drive</td>
<td>Rock Spring Drive</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>6</td>
<td>0.56</td>
<td>Rock Spring Drive</td>
<td>Tuckerman Lane</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>7</td>
<td>0.73</td>
<td>Tuckerman Lane</td>
<td>Nicholson Lane</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>8</td>
<td>0.56</td>
<td>Nicholson Lane</td>
<td>Tilden Lane</td>
<td>Suburban Activity Center</td>
</tr>
<tr>
<td>9</td>
<td>0.73</td>
<td>Tilden Lane</td>
<td>Southport Dr</td>
<td>Suburban Activity Center</td>
</tr>
</tbody>
</table>
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)

<table>
<thead>
<tr>
<th>Segment</th>
<th>Length</th>
<th>Injury Crashes (per Mile)</th>
<th>AADT</th>
<th>Per Mile Per 1 Million Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.71</td>
<td>13</td>
<td>43,100</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>0.54</td>
<td>13</td>
<td>51,600</td>
<td>250</td>
</tr>
<tr>
<td>3*</td>
<td>0.30</td>
<td>40</td>
<td>44,800</td>
<td>890</td>
</tr>
<tr>
<td>4</td>
<td>0.41</td>
<td>24</td>
<td>46,500</td>
<td>520</td>
</tr>
<tr>
<td>5</td>
<td>0.31</td>
<td>6</td>
<td>46,500</td>
<td>130</td>
</tr>
<tr>
<td>6*</td>
<td>0.56</td>
<td>32</td>
<td>49,100</td>
<td>650</td>
</tr>
<tr>
<td>7</td>
<td>0.73</td>
<td>10</td>
<td>51,600</td>
<td>190</td>
</tr>
</tbody>
</table>

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

### BICYCLE & PEDESTRIAN CRASHES (2014 - 2018)

<table>
<thead>
<tr>
<th>Segment</th>
<th>Length</th>
<th>Injury Crashes (per Mile)</th>
<th>AADT</th>
<th>Per Mile Per 1 Million Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.71</td>
<td>6</td>
<td>43,100</td>
<td>140</td>
</tr>
<tr>
<td>2</td>
<td>0.54</td>
<td>9</td>
<td>51,600</td>
<td>170</td>
</tr>
<tr>
<td>3*</td>
<td>0.30</td>
<td>7</td>
<td>44,800</td>
<td>160</td>
</tr>
<tr>
<td>4</td>
<td>0.41</td>
<td>10</td>
<td>46,500</td>
<td>220</td>
</tr>
<tr>
<td>5</td>
<td>0.31</td>
<td>0</td>
<td>46,500</td>
<td>0</td>
</tr>
<tr>
<td>6*</td>
<td>0.56</td>
<td>4</td>
<td>49,100</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>0.73</td>
<td>1</td>
<td>51,600</td>
<td>20</td>
</tr>
</tbody>
</table>

*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 compiled 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.
What tools are applicable to address the needs?

- **Multimodal Needs on the Corridor:**
  - Bike and pedestrian volumes are high (7,000+ pedestrians, 3,000+ bikes).
  - Bike and pedestrian accidents are frequent.
  - Bike and pedestrian fatalities are rare.

- **Segment 1:**
  - The Americans with Disabilities Act (ADA) sidewalk is too narrow.
  - Curb radii need to be tightened.

- **Segment 2:**
  - Three travel lanes per direction.
  - Curved roadway.

- **Segment 3:**
  - Tightened curb would reduce speed.
  - Channelized turn lanes.

- **Segment 4:**
  - Protect bicycle riders from left-turning vehicles.
  - Improve visibility for cyclists.

- **Segment 5:**
  - Protect bicycle riders from left-turning vehicles.
  - Improve visibility for cyclists.

- **Segment 6:**
  - Protect bicycle riders from left-turning vehicles.
  - Improve visibility for cyclists.

- **MD 187:**
  - Bicycle riders are vulnerable to right-turning vehicles.

- **Hybrid Beacons (PHB), Pedestrian Refuge Island, and Rapid Rectangular Flashing Beacon (RRFB):**
  - Additional tools could include.

- **Other Options:**
  - Safe pedestrian crossings.
  - Curb radius changes.

- **Elements in the Cross-Section:**
  - Bike lane
  - Sidewalk
  - Median
  - Curb
  - Sign

- **Enforcement:**
  - Automated speed enforcement
  - Automated red light enforcement

- **Other Data:**
  - Bike and pedestrian volumes
  - Bicycle and pedestrian fatalities
  - Bicycle and pedestrian accidents

- **30-50% of the segment is constrained for walking and biking:**
  - Pedestrian Level of Comfort (PLC) provides space for people walking and biking.
  - Bike Level of Stress (BLS) provides space for people walking.

- **Stress:**
  - “High stress” for people on bicycles due to three travel lanes.
  - “Low stress” for people walking.

- **Rating System:**
  - 1 (least stressful) to 5 (most stressful).
**Alta Vista Road – Ryland Drive**

**CONSTRAINED RIGHT-OF-WAY RECOMMENDATION**

leads toward low stress biking.

in 2019 and the new facility increases comfort and road diet, but buffered bike lanes were installed of stress rating has not been revaluated since the remaining portion has similar characteristics which is “uncomfortable” for walking. The bicycle level of stress rating system only covers the portion of this segment from Alta Vista to Beech Avenue, but the facility and pedestrian crossings. The buffered bike segment focus on enhancing the existing bicycle Additional recommended improvements in this injury crash rate, but the second highest segment from Alta Vista to Beech Avenue could be considered. Automated speed enforcement could be considered. Accelerated speed camera would be encouraged near Glencar Road and Shady Grove.

**WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?**

- **Removable Flex Posts:** Remove a portion of the lane for bike riders, leaving a smaller lane for cars.
- **Quick Curbs:** Build a curb that is easily removable or adjustable.
- **Rubber Bumpers:** Add a soft, absorbent material to the curbs.

**MULTIMODAL NEEDS ON THE CORRIDOR**

The corridor has a primary focus on pedestrian and bicycle needs. The Community Planning Board for MD 63, the County’s Pedestrian and Bicycle Plan, and the Comprehensive Plan have outlined strategies for improving pedestrian and bicycle facilities. However, the study area has a significant amount of missing or broken infrastructure. Two primary problems are identified:

1. **Lack of dedicated bicycle facilities:** Bicycle facilities are required to accommodate the needs of both cyclists and pedestrians. The corridor has a mix of dedicated bicycle facilities and shared facilities.
2. **Pedestrian safety:** Pedestrian safety is a concern along the corridor, with a high number of pedestrian crashes reported. The corridor has a mix of signalized and unsignalized intersections, with some intersections having pedestrian signals.

**SEGMENT 2**

- **Focus:** Connect the Alta Vista neighborhood to the I-495.
- **Key Features:**
  - **Buffered Bike Lanes:** These were added after a fatal bicycle collision in 2019.
  - **Pedestrian Crossings:** Crossings were added at Wyngate Drive and Alta Vista Road.
- **Recommended Improvements:**
  - **Automated Speed Enforcement:** Install automated speed enforcement at MD 187.
  - **High Visibility Crosswalks:** Mark crosswalks with high-visibility colors.
  - **Pedestrian Refuge Island:** Add a refuge island at each signalized intersection.
  - **Rapid Rectangular Flashing Beacons (RRFB):** Install RRFB at each signalized intersection.

**SEGMENT 3**

- **Focus:** Connect the Beech Avenue neighborhood to the I-495.
- **Key Features:**
  - **Limited Crossing Opportunities:** There are limited crossing opportunities within the area.
  - **Automated Speed Enforcement:** Install automated speed enforcement at MD 187.
- **Recommended Improvements:**
  - **Automated Red Light Enforcement:** Install red light cameras at signalized intersections.
  - **Pedestrian Refuge Island:** Add a refuge island at each signalized intersection.
  - **High Visibility Crosswalks:** Mark crosswalks with high-visibility colors.
  - **Rapid Rectangular Flashing Beacons (RRFB):** Install RRFB at each signalized intersection.

**SEGMENT 4**

- **Focus:** Connect the MD 187 to the Glencar Road.
- **Key Features:**
  - **Limited Crossing Opportunities:** There are limited crossing opportunities within the area.
  - **Automated Speed Enforcement:** Install automated speed enforcement at MD 187.
- **Recommended Improvements:**
  - **Automated Red Light Enforcement:** Install red light cameras at signalized intersections.
  - **Pedestrian Refuge Island:** Add a refuge island at each signalized intersection.
  - **High Visibility Crosswalks:** Mark crosswalks with high-visibility colors.
  - **Rapid Rectangular Flashing Beacons (RRFB):** Install RRFB at each signalized intersection.

**SEGMENT 5**

- **Focus:** Connect the MD 187 to the Shady Grove Road.
- **Key Features:**
  - **Limited Crossing Opportunities:** There are limited crossing opportunities within the area.
  - **Automated Speed Enforcement:** Install automated speed enforcement at MD 187.
- **Recommended Improvements:**
  - **Automated Red Light Enforcement:** Install red light cameras at signalized intersections.
  - **Pedestrian Refuge Island:** Add a refuge island at each signalized intersection.
  - **High Visibility Crosswalks:** Mark crosswalks with high-visibility colors.
  - **Rapid Rectangular Flashing Beacons (RRFB):** Install RRFB at each signalized intersection.

**SEGMENT 6**

- **Focus:** Connect the MD 187 to the Old Town.
- **Key Features:**
  - **Limited Crossing Opportunities:** There are limited crossing opportunities within the area.
  - **Automated Speed Enforcement:** Install automated speed enforcement at MD 187.
- **Recommended Improvements:**
  - **Automated Red Light Enforcement:** Install red light cameras at signalized intersections.
  - **Pedestrian Refuge Island:** Add a refuge island at each signalized intersection.
  - **High Visibility Crosswalks:** Mark crosswalks with high-visibility colors.
  - **Rapid Rectangular Flashing Beacons (RRFB):** Install RRFB at each signalized intersection.
WHAT ARE THE CORE AREAS?

The segment Ryland Drive – Ipswich Road includes the following elements:

- **Bicycles**
- **Pedestrians**
- **Other Modal Users**

**Ryland Drive – Ipswich Road** includes a variety of elements that contribute to the overall transportation network. These elements include:

- **Bicycle Lanes**
- **Pavement Markings**
- **Sidewalks**
- **Street Furniture**

**Core Area**

- **Pedestrian Hybrid Beacons (PHB)**
- **Pedestrian Refugia**
- **Shovel Beds**

**Elements**

- **Hybrid Rectangular Flashing Beacons (RRFB)**
- **Pedestrian Islanders**
- **Pedestrian Curb Extensions**

**Other Modal Users**

- **Automated Speed Enforcement**
- **Automated Red Light Enforcement**
- **Preclearance**

**Toolkit Elements in the Cross-Section**

- **Turns**
- **Curve Radius**
- **Speed**
- **Enforcement**
- **Pedestrian & Bike**

**Multimodal Needs on the Corridor**

- **Segment 1**
- **Segment 2**
- **Segment 3**
- **Segment 4**
- **Segment 5**
- **Segment 6**
- **Segment 7**

**WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?**

- **Traffic Signal**
- **Pedestrian Crossing**
- **Curb Extensions**
- **Bicycle Lanes**

**Enforcement**

- **Automated Speed Enforcement**
- **Automated Red Light Enforcement**

**PEDESTRIAN & BIKE ENFORCEMENT**

- **Speed**
- **Enforcement**
- **Pedestrian & Bike**

**OTHER**

- **Median Tree Canopy Coverage**

**TOOLKIT ELEMENTS IN THE CROSS-SECTION**

- **Turns**
- **Curve Radius**
- **Speed**
- **Enforcement**
- **Pedestrian & Bike**

**MULTIMODAL NEEDS ON THE CORRIDOR**

- **Segment 1**
- **Segment 2**
- **Segment 3**
- **Segment 4**
- **Segment 5**
- **Segment 6**
- **Segment 7**

**WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?**

- **Traffic Signal**
- **Pedestrian Crossing**
- **Curb Extensions**
- **Bicycle Lanes**

**Enforcement**

- **Automated Speed Enforcement**
- **Automated Red Light Enforcement**

**PEDESTRIAN & BIKE ENFORCEMENT**

- **Speed**
- **Enforcement**
- **Pedestrian & Bike**

**OTHER**

- **Median Tree Canopy Coverage**

**MULTIMODAL NEEDS ON THE CORRIDOR**

- **Segment 1**
- **Segment 2**
- **Segment 3**
- **Segment 4**
- **Segment 5**
- **Segment 6**
- **Segment 7**

**WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?**

- **Traffic Signal**
- **Pedestrian Crossing**
- **Curb Extensions**
- **Bicycle Lanes**

**Enforcement**

- **Automated Speed Enforcement**
- **Automated Red Light Enforcement**

**PEDESTRIAN & BIKE ENFORCEMENT**

- **Speed**
- **Enforcement**
- **Pedestrian & Bike**

**OTHER**

- **Median Tree Canopy Coverage**

**MULTIMODAL NEEDS ON THE CORRIDOR**

- **Segment 1**
- **Segment 2**
- **Segment 3**
- **Segment 4**
- **Segment 5**
- **Segment 6**
- **Segment 7**

**WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?**

- **Traffic Signal**
- **Pedestrian Crossing**
- **Curb Extensions**
- **Bicycle Lanes**

**Enforcement**

- **Automated Speed Enforcement**
- **Automated Red Light Enforcement**

**PEDESTRIAN & BIKE ENFORCEMENT**

- **Speed**
- **Enforcement**
- **Pedestrian & Bike**

**OTHER**

- **Median Tree Canopy Coverage**
**WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?**

- **Element Name:** Buffered bike lanes include safety features such as paint, rubber curbs, and other elements. They can be installed in areas with high pedestrian volumes and are effective in reducing accidents.

- **Element Name:** Bicycle turn pockets are small areas designed to provide a safer turn for cyclists. They can be installed in areas where cyclists are forced to turn left or right in traffic.

- **Element Name:** Pedestrian crosswalks include features such as high-visibility paint, push buttons, and crosswalk signs. They can be installed at intersections and other pedestrian crossings.

- **Element Name:** Sidewalks can be improved with features such as rubber curbs, green paint, and other elements. They can be installed in areas with high pedestrian volumes.

- **Element Name:** Speed enforcements, including automated speed and red light cameras, can be installed in areas with high pedestrian volumes.

- **Element Name:** Traffic calming measures, including speed bumps, can be installed in areas with high pedestrian volumes.

**MULTIMODAL NEEDS ON THE CORRIDOR**

- **Element Name:** The study corridor includes MD 187, which has the highest rate of injury crashes.

- **Element Name:** The Wildwood Manor area has the third highest rate of injury crashes.

- **Element Name:** The highest segment for bicycle and pedestrian crashes is MD 187.

- **Element Name:** The segment of MD 187 with the highest pedestrian crashes is “undesirable” for pedestrians due to the stressful environment.

- **Element Name:** MD 187 is “undesirable” for pedestrians due to the stressful environment.

- **Element Name:** Converting one travel lane per direction could be evaluated.

**TOOLKIT ELEMENTS IN THE CROSS-SECTION**

<table>
<thead>
<tr>
<th>Element Name</th>
<th>Curb Radius</th>
<th>Speed Enforcement</th>
<th>Pedestrian &amp; Bike</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Bump</td>
<td>5.5’</td>
<td>Push buttons</td>
<td>Parking meters</td>
<td>Parking meters</td>
</tr>
<tr>
<td>Rubber Curbs</td>
<td>6.5’</td>
<td></td>
<td></td>
<td>Parking meters</td>
</tr>
<tr>
<td>Bike Lanes</td>
<td>11’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Lanes</td>
<td>11’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Lanes</td>
<td>11’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Multimodal needs on the corridor: The corridor links the Wildwood Shopping Center and Georgetown Square, the two retail centers. However, the corridor is limited in its ability to accommodate bicyclists and pedestrians due to wide vehicular lanes, high speed, and a lack of dedicated bicycle facilities. Driveway conflicts, access points, and pedestrian scale elements are directly addressed in the proposed design.

What tools are applicable to address the needs?

<table>
<thead>
<tr>
<th>TOOLS</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enforce</td>
<td>Automated speed camera, pedestrian crossing enforcement</td>
</tr>
<tr>
<td>Enhance</td>
<td>High-visibility pedestrian-scale lighting, medium tree canopy coverage</td>
</tr>
<tr>
<td>Access</td>
<td>Pedestrian-scale hybrid beacons (PHB), push buttons at crosswalks</td>
</tr>
<tr>
<td>Speed</td>
<td>25' speed limit, 40' speed limit at intersections in town center areas</td>
</tr>
<tr>
<td>Curb</td>
<td>Minimum, narrow, and straight curb radius, rubber bumps, and green paint</td>
</tr>
<tr>
<td>Tree</td>
<td>Minimum tree canopy coverage, high visibility pedestrian-scale lighting</td>
</tr>
</tbody>
</table>

Toolkit elements in the cross-section:

- 🟢 Protected signalized or 2nd phase pedestrian
- 🟡 Curb
- 🟠 Raised concrete median

Other elements:

- 🟢 Minimum tree canopy coverage
- 🟡 Medium tree canopy coverage
- 🟠 High-visibility pedestrian-scale lighting
- 🟣 Protected signalized or 2nd phase pedestrian

The buffered bike lanes could include safety features such as non-removable bike pockets, rumble strips, and green paint. Sidewalks are constructed every block, or every 800'-1000'.

Access points at Exxon and Sandy Hill pose challenges. Access points at Wildwood Manor could be consolidated. Right-turn on red left-turns are permitted. Protected bike lanes, and green paint, narrow and straight curb radius, rubber bump, and green paint, extend every block, or every 800'-1000'.
MULTIMODAL NEEDS ON THE CORRIDOR

- Segment 1: Proposed along and north of Rock Spring Drive.
- Segment 2: From MD 187 to Tuckerman Lane
- Segment 3: From Tuckerman Lane to the stressful environment.
- Segment 4: Bus Rapid Transit facilities, and three travel lanes per direction add
- Segment 5: Non-landscaped sidewalks, no dedicated bicycle
- Segment 6: The Vision Zero High Injury Network. Non-landscaped
- Segment 7: “Safe” for walking. Segment 6 is “high stress” for people walking and biking over I-270 creates a

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

- Tactile pedestrian identification beacons (HIBs) could be added at
- Pedestrian refuge islands, Rapid Rectangular Flashing Beacon (RRFB), and curb extensions where
- Safe pedestrian crossing every block, or relatively long block
- High-visibility crosswalks at all approaches
- Push-buttons consolidated driveways
- High-speed cameras could be added to enforcement
- Pedestrian & bike

TOOLKIT ELEMENTS IN THE CROSS-SECTION

- TURNS
  - Protected Turn
  - Painted Arrows
  - 40 mph
  - 35 mph
  - 30 mph
  - 20 mph
  - 15 mph
  - 10 mph
  - 5 mph

- ENFORCEMENT
  - Enforcement
  - 40 mph
  - 35 mph
  - 30 mph
  - 20 mph
  - 15 mph
  - 10 mph
  - 5 mph

- PEDESTRIAN & BIKE
  - High-visibility crosswalks at all approaches
  - Push-buttons
  - Pedestrian refuge islands

OTHER
- Signalized 6.5' 10' 139' 104' 800'-1000' could include elements such as continuous...
The County’s Pedestrian Level of Comfort rating is limited to traditional traffic signals at Tuckerman Lane, protective center medians, and bicycle lanes located at Tilden Middle School. The buffered bike lanes could include safety features such as removable flex posts, quick curbs, and rubber bumps, and green paint. Long-term, a 17’ bus and vehicle lane per direction and part of the median. Safe pedestrian crossings are warranted, and a medium level of intervention is suitable for Segment 7. Converting one travel lane per direction provides space for buffered bike lanes, and additional buffer for people walking can create a slower moving walking and biking environment. The space would be converted from one travel lane per direction and part of the median. Safe pedestrian crossings are warranted, and a medium level of intervention is suitable for Segment 7. Converting one travel lane per direction provides space for buffered bike lanes, and additional buffer for people walking can create a slower moving walking and biking environment.

WHAT TOOLS ARE APPLICABLE TO ADDRESS THE NEEDS?

- Reduce the speed limit from 40 mph to 35 mph.
- Install pedestrian Hybrid Beacons (PHB) at intersections in the core area.
- Encourage east–west enforcement.
- Minimize, narrow, and consolidate driveways.
- Install High-Visibility Crosswalks in the core area.
- Increase crosswalk spacing.
- Transform right turn pockets. Providing space for people biking and additional buffer for people walking can create a slower moving walking and biking environment.
- The buffered bike lanes could include safety features such as removable flex posts, quick curbs, and rubber bumps, and green paint. Long-term, a 17’ bus and vehicle lane per direction and part of the median. Safe pedestrian crossings are warranted, and a medium level of intervention is suitable for Segment 7. Converting one travel lane per direction provides space for buffered bike lanes, and additional buffer for people walking can create a slower moving walking and biking environment.

MULTIMODAL NEEDS ON THE CORRIDOR

The County’s Traffic Environmental Scorecard rate is rated “high-stress” for bicycling and is on the remaining portion has similar characteristics which is 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 crossings are warranted, and a medium level of intervention is suitable for Segment 7. Converting one travel lane per direction provides space for buffered bike lanes, and additional buffer for people walking can create a slower moving walking and biking environment.
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 for standalone 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 which may be championed by partners and the local community.

Overview
Near-Term Improvements

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 these near-term improvements.
<table>
<thead>
<tr>
<th>ID</th>
<th>Segment</th>
<th>Intersection</th>
<th>Improvement Type</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Sycamore Road</td>
<td>Pedestrian Accommodations or Signage</td>
<td>Improve driver awareness of pedestrians when turning</td>
<td>Pedestrian/Median Extension, S turn Traffic Yield to Pedestrian, High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Oak Place</td>
<td>Pedestrian Accommodations or Signage</td>
<td>Improve driver awareness of pedestrians when turning</td>
<td>Pedestrian/Median Extension, Sturn Traffic Yield to Pedestrian, High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Spruce Avenue</td>
<td>Pedestrian Accommodations or Signage</td>
<td>Improve driver awareness of pedestrians when turning</td>
<td>Pedestrian/Median Extension, Sturn Traffic Yield to Pedestrian, High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Waycross Drive</td>
<td>Pedestrian Accommodations or Signage</td>
<td>Improve driver awareness of pedestrians when turning</td>
<td>Pedestrian/Median Extension, Sturn Traffic Yield to Pedestrian, High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Rock Spring Drive</td>
<td>No High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Len Lane</td>
<td>No High Visibility Crosswalk</td>
<td>Improve visibility of conflicting pedestrian crossing of side-street</td>
<td>High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Tuckerman Lane</td>
<td>No High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Cedarwood Drive</td>
<td>No High Visibility Crosswalk</td>
<td>Improve visibility of school crossing of side-street</td>
<td>High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Charles W. Woodward High School</td>
<td>No High Visibility Crosswalk</td>
<td>Improve visibility of school crossing of side-street</td>
<td>High Visibility Crosswalk</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>All</td>
<td>Access Management</td>
<td>Modify driveways as fronting properties develop/develop</td>
<td>Minimize, narrow, and consolidate driveways</td>
<td>Below</td>
<td></td>
</tr>
</tbody>
</table>
Mid-Term Strategies

Projects that would take several years to design and implement are ideal opportunities for implementation in the mid-term. These include

- installation of countermeasures such as new traffic signals and pedestrian facilities to improve the frequency of safe crossing

Minor intersection retrofits at locations where visibility of yield-controlled approaches is compromised, or not ideal due to other factors, that can be improved and deployed in this timeframe. These could include

- traffic signals
- pedestrian hybrid beacons to increase the frequency of safe crossing

or not the intersection was within a high crash area as determined from

- the Crash History map in Chapter 2.

As described below the tables on pages 52 and 53, the scoring considered proximity to schools, proximity to bus stops, and whether the intersection was within a high crash area as determined from the Crash History map in Chapter 2.

In addition, efforts such as improving access management by consolidating access along the corridor can improve safety by reducing conflict points. This type of effort would need to 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 strategies proposed in the tables 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).

Mid-Term Improvements

- Bus stop changes/relocations (e.g., leading pedestrian interval).
- Signal operation adjustments.
- Crosswalk improvements (e.g., rectangular rapid flashing beacons, or signage).
- Pedestrian accommodations.

New signalized crossing.

- Installation of countermeasures such as new traffic signals and pedestrian facilities to improve the frequency of safe crossing
## Mid-Term Improvements

<table>
<thead>
<tr>
<th>ID</th>
<th>Segment/Intersection</th>
<th>Improvement Type</th>
<th>Description</th>
<th>Potential Treatments</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>McKinley Street</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$1</td>
</tr>
<tr>
<td>2</td>
<td>Lincoln Street</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$1</td>
</tr>
<tr>
<td>3</td>
<td>Devonshire Road</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$1</td>
</tr>
<tr>
<td>5</td>
<td>Center Drive</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$1</td>
</tr>
<tr>
<td>7</td>
<td>Black Oak Lane</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$0</td>
</tr>
<tr>
<td>8</td>
<td>Alta Vista Road</td>
<td>New or High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk (north leg)</td>
<td>$1</td>
</tr>
<tr>
<td>10</td>
<td>Beach Avenue</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$2</td>
</tr>
<tr>
<td>12</td>
<td>Cheshire Drive</td>
<td>New or High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk (south and east legs)</td>
<td>$1</td>
</tr>
<tr>
<td>13</td>
<td>I-495 EB Exit Ramp</td>
<td>Pedestrian Accomodations or Signing</td>
<td>Emphasize pedestrian priority Install RRFB or HAWK</td>
<td>$$$  / $$</td>
<td>$1</td>
</tr>
<tr>
<td>15</td>
<td>I-495 EB Entry Ramp</td>
<td>Pedestrian Accomodations or Signing</td>
<td>Emphasize pedestrian priority Install RRFB or HAWK</td>
<td>$$$  / $$</td>
<td>$2</td>
</tr>
<tr>
<td>17</td>
<td>Kingswood Road</td>
<td>New or High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk (south and east legs)</td>
<td>$1</td>
</tr>
<tr>
<td>18</td>
<td>Lone Oak Drive</td>
<td>Bus Stop Changes</td>
<td>Consider consolidating Bus Stop</td>
<td>LPI</td>
<td>$2</td>
</tr>
<tr>
<td>19</td>
<td>Manor Oak Way</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$2</td>
</tr>
<tr>
<td>20</td>
<td>Chilton High School</td>
<td>New or High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk</td>
<td>$2</td>
</tr>
<tr>
<td>21</td>
<td>1970s NWS (1)</td>
<td>Pedestrian Accomodations or Signing</td>
<td>Emphasize pedestrian priority at uncontrolled crossing Install RRFB or HAWK</td>
<td>$$$  / $$</td>
<td>$1</td>
</tr>
<tr>
<td>22</td>
<td>I-495 EB Exit Ramp</td>
<td>Pedestrian Accomodations or Signing</td>
<td>Emphasize pedestrian priority Install RRFB or HAWK</td>
<td>$$$  / $$</td>
<td>$1</td>
</tr>
<tr>
<td>23</td>
<td>I-495 EB Entry Ramp</td>
<td>Pedestrian Accomodations or Signing</td>
<td>Emphasize pedestrian priority Install RRFB or HAWK</td>
<td>$$$  / $$</td>
<td>$2</td>
</tr>
<tr>
<td>25</td>
<td>Tuckerman Lane</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$1</td>
</tr>
<tr>
<td>28</td>
<td>Edinboro Lane</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians in crosswalk</td>
<td>LPI</td>
<td>$2</td>
</tr>
<tr>
<td>29</td>
<td>Rosemont Lane</td>
<td>New or High Visibility Crosswalk</td>
<td>Improve visibility of conflicting crosswalk</td>
<td>High Visibility Crosswalk</td>
<td>$1</td>
</tr>
<tr>
<td>30</td>
<td>Nicholson Lane/Tilden Lane</td>
<td>Pedestrian Accomodations or Signing</td>
<td>Emphasize pedestrian priority Install RRFB or HAWK</td>
<td>$$$  / $$</td>
<td>$1</td>
</tr>
</tbody>
</table>

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

**Higher Priority (2 points)**
- More than 1 point

**Low Priority (<2 points)**
- Within 100 ft 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 diet/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)

<table>
<thead>
<tr>
<th>#</th>
<th>Segment</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4 Manor Oak Way</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians</td>
<td>$</td>
</tr>
<tr>
<td>4</td>
<td>I-495 WB Entry</td>
<td>Geometric Improvement</td>
<td>Reduce turning speeds across crosswalk</td>
<td>$</td>
</tr>
<tr>
<td>8</td>
<td>3 Maplewood Park Ramp</td>
<td>Geometric Improvement</td>
<td>Reduce turning speeds across crosswalk</td>
<td>$</td>
</tr>
<tr>
<td>10</td>
<td>5 &amp; 6 Rock Spring</td>
<td>Geometric Improvement</td>
<td>Reduce turning speeds across crosswalk</td>
<td>$</td>
</tr>
<tr>
<td>12</td>
<td>5 &amp; 6 Cheshire Drive</td>
<td>Signal Operations Improvement</td>
<td>Reduce turning conflicts with pedestrians</td>
<td>$</td>
</tr>
</tbody>
</table>

## Long-Term Improvements (Cross-Section Improvements by Segment)

<table>
<thead>
<tr>
<th>#</th>
<th>Segment</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1 McKinley Street</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>5</td>
<td>1 Lincoln Street</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>7</td>
<td>1 Greentree Road</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>9</td>
<td>1 W Cedar Lane</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>11</td>
<td>2 Beach Avenue</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>13</td>
<td>3 &amp; 4 I-495 WB Exit</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>15</td>
<td>3 I-495 EB Entry</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>17</td>
<td>2 Nicholson Lane</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
<tr>
<td>19</td>
<td>5 &amp; 6 Rock Spring Drive</td>
<td>Modify Cross-Section</td>
<td>Modify corners concurrent with street reconstruction</td>
<td>$$$</td>
</tr>
</tbody>
</table>

## Long-Term Improvements (Maximum curb radius of 25’)

<table>
<thead>
<tr>
<th>#</th>
<th>Segment</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1 McKinley Street</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>4</td>
<td>3 &amp; 4 I-495 WB Exit</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>6</td>
<td>5 &amp; 6 Rock Spring Drive</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>8</td>
<td>1 Nicholson Lane</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>10</td>
<td>5 &amp; 6 Rock Spring Drive</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
</tbody>
</table>

## Long-Term Improvements (Maximum curb radius of 5’)

<table>
<thead>
<tr>
<th>#</th>
<th>Segment</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1 McKinley Street</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>4</td>
<td>3 &amp; 4 I-495 WB Exit</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>6</td>
<td>5 &amp; 6 Rock Spring Drive</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>8</td>
<td>1 Nicholson Lane</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
</tbody>
</table>

## Long-Term Improvements (Maximum curb radius of 12’)

<table>
<thead>
<tr>
<th>#</th>
<th>Segment</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1 McKinley Street</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>4</td>
<td>3 &amp; 4 I-495 WB Exit</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>6</td>
<td>5 &amp; 6 Rock Spring Drive</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>8</td>
<td>1 Nicholson Lane</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
</tbody>
</table>

## Long-Term Improvements (Maximum curb radius of 20’)

<table>
<thead>
<tr>
<th>#</th>
<th>Segment</th>
<th>Description</th>
<th>Potential Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1 McKinley Street</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>4</td>
<td>3 &amp; 4 I-495 WB Exit</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>6</td>
<td>5 &amp; 6 Rock Spring Drive</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>8</td>
<td>1 Nicholson Lane</td>
<td>Tighten Curb Radii</td>
<td>Along segment</td>
<td>$$$</td>
</tr>
<tr>
<td>Segment</td>
<td>Improvement Type</td>
<td>Description</td>
<td>Potential Treatment</td>
<td>Summary</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>2</td>
<td>Speed Management</td>
<td>Seek opportunities to install speed cameras</td>
<td>Encourage automated speed enforcement</td>
<td>#</td>
</tr>
<tr>
<td>3</td>
<td>Speed Management</td>
<td>Seek opportunities to install red light cameras</td>
<td>Encourage automated red light enforcement</td>
<td>#</td>
</tr>
<tr>
<td>4</td>
<td>Speed Management</td>
<td>Seek opportunities to install red light cameras</td>
<td>Encourage automated red light enforcement</td>
<td>#</td>
</tr>
<tr>
<td>5</td>
<td>Speed Management</td>
<td>Reduce posted speed limit</td>
<td>Aim for target speed of 35 mph</td>
<td>#</td>
</tr>
<tr>
<td>6</td>
<td>Speed Management</td>
<td>Reduce posted speed limit</td>
<td>Aim for target speed of 35 mph</td>
<td>#</td>
</tr>
<tr>
<td>7</td>
<td>Speed Management</td>
<td>Reduce posted speed limit</td>
<td>Aim for target speed of 35 mph</td>
<td>#</td>
</tr>
</tbody>
</table>

Long-Term Improvements (Cross-Discipline improvements by Segment)