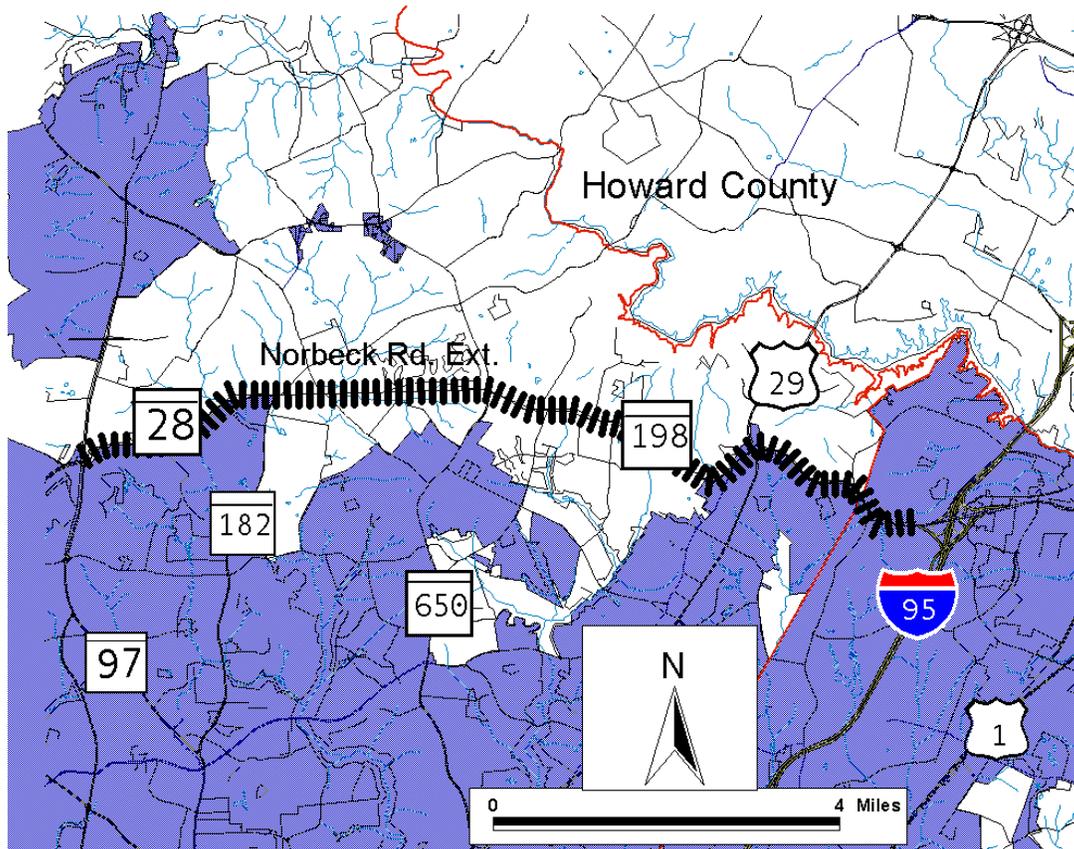


**MD 28/MD 198 CORRIDOR IMPROVEMENT STUDY
MONTGOMERY COUNTY, MARYLAND AND PRINCE GEORGE'S COUNTY,
MARYLAND**

**COMBINED PURPOSE AND NEED &
ALTERNATIVES RETAINED FOR DETAILED STUDY PACKAGE
MARCH 2016**



 Priority Funding Area



EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

The Maryland State Highway Administration (SHA) initiated planning for the MD 28/MD198 Corridor Improvement Study in 2001 to address the transportation conditions and capacity limitations along the MD28/MD198 corridor in Montgomery and Prince George's counties. The project was reinitiated by SHA in 2013. The MD 28/MD 198 study area extends a distance of approximately 10.6 miles along MD28/MD198, from east of MD 97 to west of I-95.

PURPOSE AND NEED

The purpose of the MD 28/MD 198 Corridor Improvement Study is to improve local traffic safety and operations for motorists, bicyclists, and pedestrians traveling along the MD 28/MD 198 corridor and across intersecting roads, while managing access. In addition, the purpose of the study is to preserve the rural and suburban quality of life by addressing localized traffic issues, while considering local planning visions and state growth policies for communities along the corridor.

Approved area master plans for the study corridor describe visions, goals, and objectives for the roadway and recommend features for the adjacent communities. Objectives include retaining the rural character of adjacent communities and protecting sensitive environmental areas. Recommended features include the construction of hiker-biker trails and sidewalks and the addition of landscaping. In locations where a proposed alternative for this study would differ from the approved area master plans, the environmental document will assess the impact of such change on development patterns, surrounding communities, and sensitive environmental areas, including the Patuxent River Watershed and the Upper Paint Branch Special Protection Area.

MD 28 and MD 198 is experiencing peak hour congestion in areas along portions of the corridor between I-95 and MD 97, particularly east of MD 97, in the vicinity of US 29 and Burtonsville commercial area, and near Sweitzer Lane. The project will address local operational and capacity deficiencies projected to result from planned and future development in and around the study area. The resulting congestion is expected to cause stop-and-go conditions along the roadways, especially at study-area intersections projected to experience failing conditions by 2040. The roadway segments between the intersections will experience peak-hour capacity constraints imposed by: projected traffic volumes; the absence of mid-block through lanes on two-lane roadways; the absence of storage lanes for left turns; and the absence of deceleration lanes for right turns.

The 2010-2012 study corridor crash rate was lower than the statewide average for similar types of roadways; however, the crash type defined as "other" occurred along portions of the corridor at a rate significantly higher than the statewide average. At 34 percent, rear-end crashes occur most frequently and result from congested conditions along the corridor. The MD 28/MD 198 study corridor also lacks continuous sidewalks and bicycle facilities, which are not called for in some area master plans.

ALTERNATIVE DESCRIPTIONS

Recognizing the unique characteristics of the existing roadway features and adjacent communities along the corridor, SHA separated the corridor into five similar segments (Segments A through E) during the

development of the conceptual Build Alternatives. The proposed Build Alternatives are presented below by corridor segment, with descriptions of base improvements and option improvements along the corridor.

Preliminary Alternatives

Two build alternatives (**See Figures 10 – 16**), shown in five segments across the corridor, along with the No-Build Alternative (**See Figure 9**), were presented at the Alternatives Public Workshop held in Silver Spring, Maryland on March 19, 2015 (**See Appendix C**). The study team has received mixed comments and opinions from the public regarding the MD 28/MD 198 Corridor Improvement Study alternative features as discussed below.

Alternative 1 -No-Build:

Under Alternative 1, the No-Build Alternative, no major improvements are proposed. Minor short-term improvements would occur as part of routine maintenance and safety operations. The No-Build Alternative does not address the purpose and need for the project. It serves as a baseline for comparing the impacts and benefits associated with the Build alternatives.

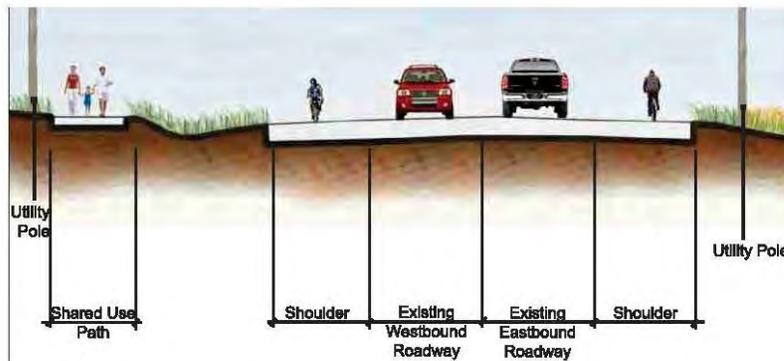
Alternative 2 – Transportation Systems Management (TSM)/Transportation Demand Management (TDM)

Alternative 2 improves bicycle and pedestrian provisions as base improvements, with access management and intersection improvements as options that could be included with the base improvements for some of the corridor segments.

Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road)

The base Alternative 2 has the following features:

- Ties into the planned MD 97/MD 28 Interchange improvements;
- Constructs continuous eight-foot-wide open shoulders in each direction to accommodate on-road bicycles;
- Constructs a 10-foot-wide shared use path on the north side to accommodate pedestrians and recreational bicyclists;
- Constructs a five-foot-wide sidewalk on the south side from Norbeck Boulevard to Bailey's Lane East to provide pedestrian access; and
- Re-aligns MD 28 to the north from Barn Ridge Drive to Whitehaven Road, in Aspen Hill to improve roadway geometry.



**Figure ES-1 – Alternative 2 Base Improvement
Segment A Typical Section**

The base Alternative 2 would require approximately 11.33 acres of Right-of-Way and impact 407 linear feet of streams and 7.3 acres of woodlands.

The access management option includes three access roads along MD 28:

- North Side - Coolidge Avenue to 3201 Norbeck Road;
- North Side - Wintergate Drive to 2801 Norbeck Road; and
- South Side – Keltrip Court to Woods Center Road (one-way westbound)

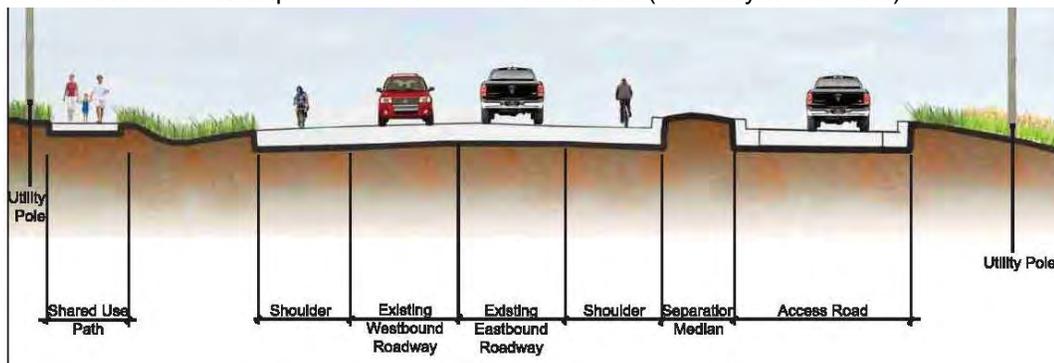


Figure ES-2 – Alternative 2 Access Management Option Improvement Segment A Typical Section

The access management option would require approximately 2.61 additional acres of Right-of-Way and would impact an additional 1.07 acres of woodlands as compared to the base Alternative 2. No additional stream impacts would occur.

The intersection improvement option includes a roundabout at Wintergate Drive. This option would require approximately 0.36 additional acre Right-of-Way as compared to the base Alternative 2. No additional stream or woodland impacts would occur.

Segment B: CO7445 (Norbeck Road) from MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue)

This segment is owned and maintained by the Montgomery County. The study team has coordinated with the Montgomery County Department of Transportation to develop this alternative. The base Alternative 2 widens the existing eight-foot-wide shared-use path along the north side to 10 feet.

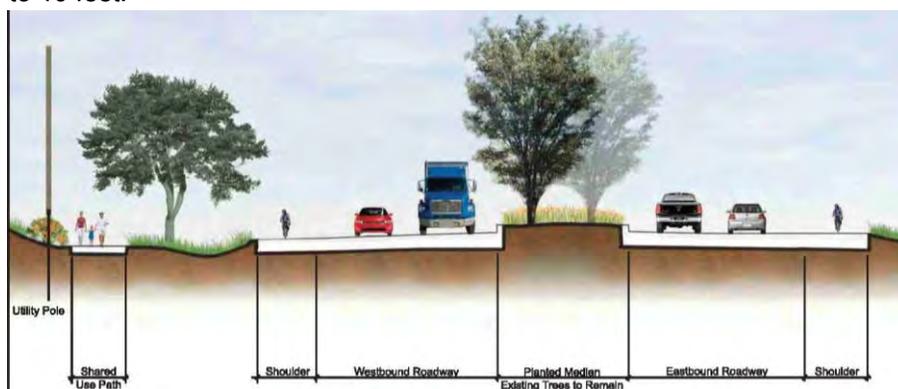


Figure ES-3 – Alternative 2 Base Improvement Segment B Typical Section

The intersection improvement option converts the right turn lanes on Norwood Road to through-right turn lanes.

The improvements proposed in this segment would not require Right-of-Way or impact streams or woodlands.

Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike - Southern Spur)

The base Alternative 2 provides the following improvements:

- Constructs a continuous six-foot-wide closed shoulder in each direction to accommodate on-road bicycles;
- Constructs a 10-foot-wide shared-use path on the south side to accommodate pedestrians and recreational bicyclists; and
- Re-aligns MD 198 to the north from east of Burtonsville Drive to Santini Road, in Burtonsville to improve roadway geometry.

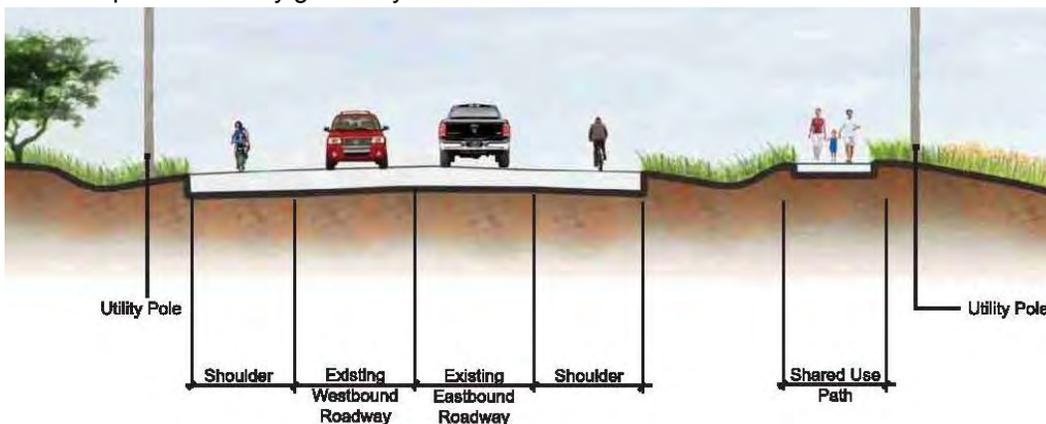


Figure ES-4 – Alternative 2 Base Improvement Segment C Typical Section

The base Alternative 2 would require approximately 18.87 acres of Right-of-Way and impact 41 linear feet of streams and 4.29 acres of woodlands.

The access management option provides a closed-section three-lane roadway with a continuous two-way center left turn lane or six-foot-wide median.

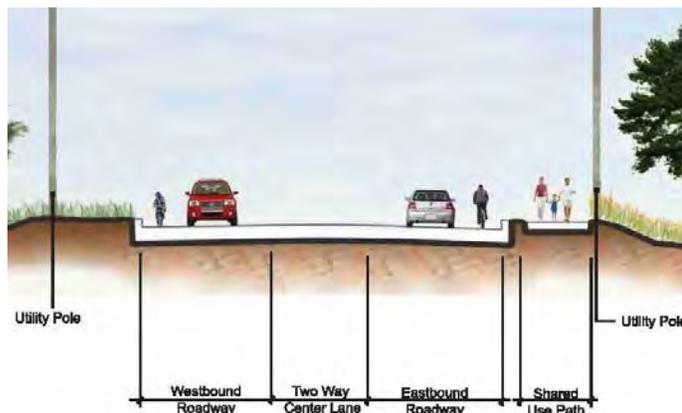


Figure ES-5 – Alternative 2 Access Management Option Center Turn Lane Improvement Segment C Typical Section

The two-way center turn lane option would require an additional 0.34 acre of Right-of-Way as compared to the base Alternative 2 and decrease woodland impacts by 0.95 acre.

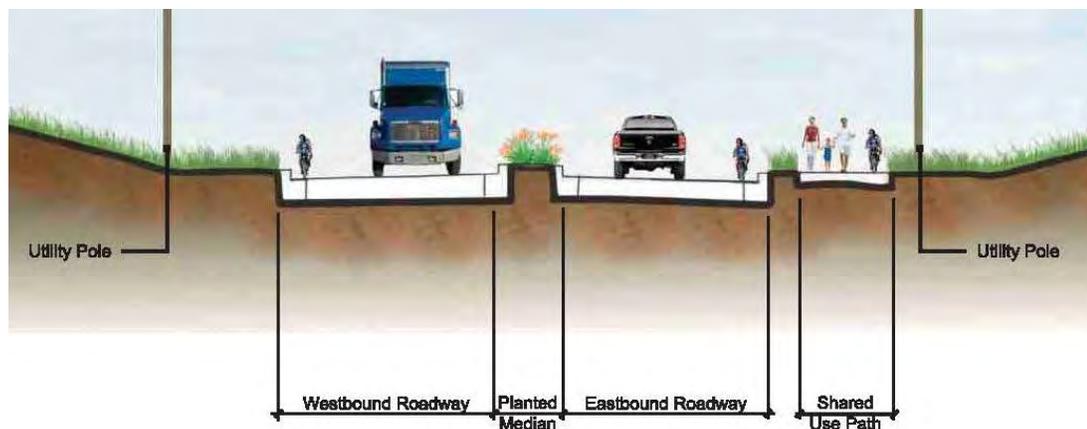


Figure ES-6 – Alternative 2 Access Management Option 6' Median Improvement Segment C Typical Section

The six-foot-wide median option would require approximately 0.65 less acres of Right-of-Way as compared to the base Alternative 2 and decrease woodland impacts by 1.33 acres. No additional stream impacts would occur with the access management options.

The intersection improvement option provides the following improvements:

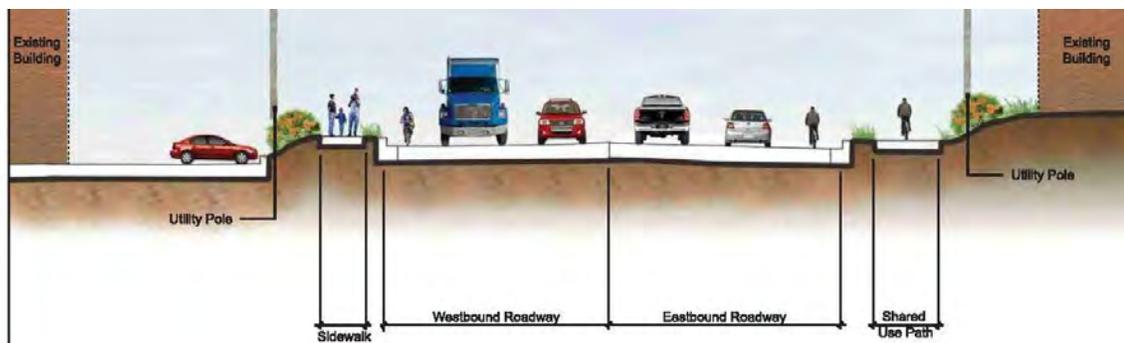
- Adds a second left turn lane on the northbound, southbound and westbound approaches at MD 650; and
- Constructs a roundabout at Good Hope Road, Thompson Road, and Peach Orchard Road.

The MD 650 intersection improvement option would require approximately 1.23 additional acres of Right-of-Way and impact an additional 0.04 acre of woodlands as compared to the base Alternative 2. The Good Hope Road roundabout would require approximately 2.18 additional acres of Right-of-Way and impact an additional 2.06 acres of woodlands as compared to the base Alternative 2. The Thompson Road roundabout would require approximately 1.96 additional acres of Right-of-Way and impact an additional 0.17 acre of woodlands as compared to the base Alternative 2. The Peach Orchard Road roundabout would require approximately 0.75 additional acre of Right-of-Way and impact an additional 0.27 acre of woodlands as compared to the base Alternative 2. No additional stream impacts would occur with the intersection improvement options.

Segment D: MD 198 (Sandy Spring Road) from Old Columbia Pike (Southern Spur) to US 29 (Columbia Pike)

The base Alternative 2 provides the following improvements:

- Constructs a continuous six-foot-wide closed shoulder in each direction to accommodate on-road bicycles;
- Constructs a five-foot-wide sidewalk along the north side of MD 198 to provide pedestrian access; and
- Constructs a 10-foot-wide shared-use path along the south side of MD 198 to accommodate pedestrians and recreational bicyclists.



**Figure ES-7 – Alternative 2 Base Improvement
Segment D Typical Section**

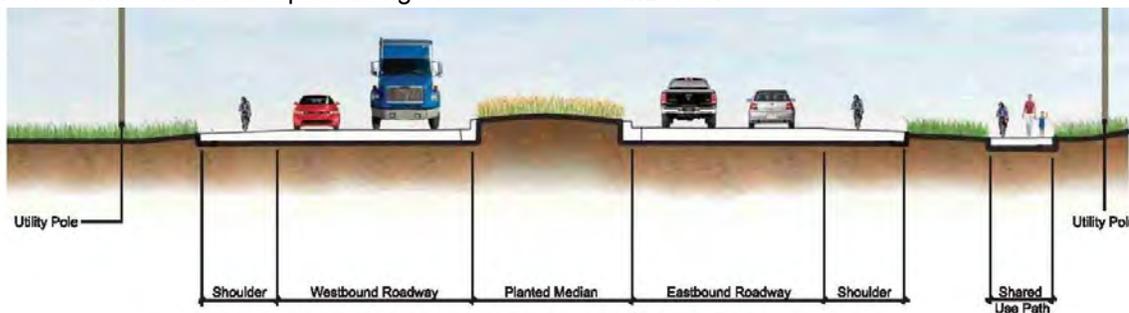
The base Alternative 2 would require approximately 0.85 additional acres of Right-of-Way and 14 linear feet of streams. No additional woodlands impacts would occur.

The intersection improvement option adds a second westbound left turn lane and converts the shared right-through lanes to separate through and right turn lanes on the eastbound and northbound approaches at Old Columbia Pike.

The intersection improvement option would require approximately 1.67 additional acres of Right-of-Way as compared to the base Alternative 2. No changes in impacts to streams or woodlands would occur with this option.

Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95

From US 29 to just east of Riding Stable Road is in Montgomery County, however, the remaining portion of this segment is in the Prince George's County. The base Alternative 2 provides a 10-foot-wide shared-use path along the south side of MD 198.



**Figure ES-8 – Alternative 2 Base Improvement
Segment E Typical Section**

The base Alternative 2 would impact approximately 4.4 acres of Right-of-Way, 36 linear feet of streams and 0.60 acre of woodlands.

The intersection improvement option adds a second northbound left turn lane at McKnew Road. This option would impact approximately 0.49 additional acres of Right-of-Way and would impact an additional 0.43 acre of woodlands as compared to the base Alternative 2. No changes in streams impacts would occur with this option.

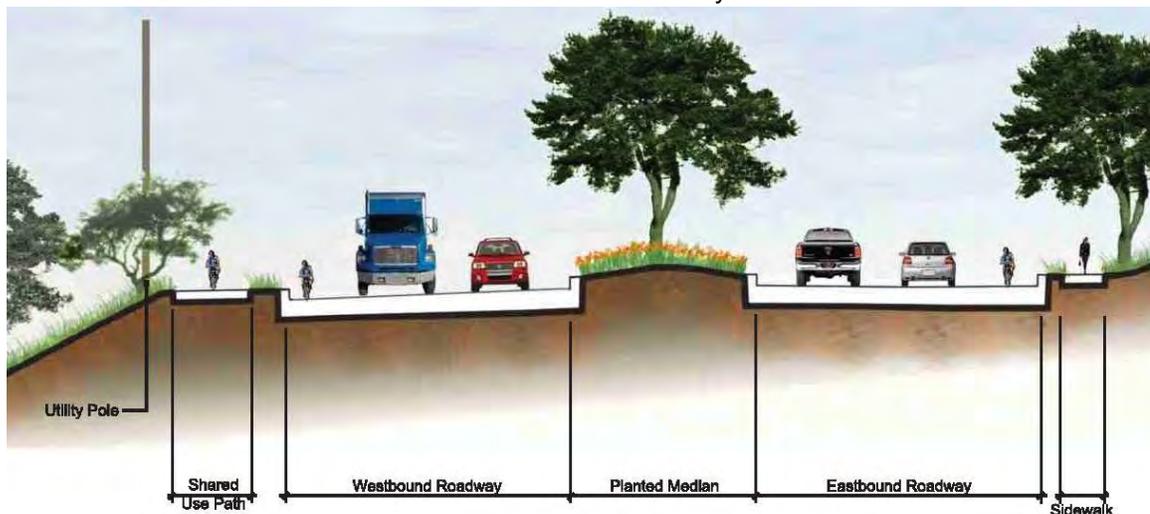
Alternative 3 – Typical Section Improvements

Alternative 3 improves bicycle and pedestrian provisions similarly to Alternative 2, but includes other roadway capacity improvements in the base improvements, with similar access management and intersection improvement options that could be included with the base improvements along some of the corridor segments as described below.

Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

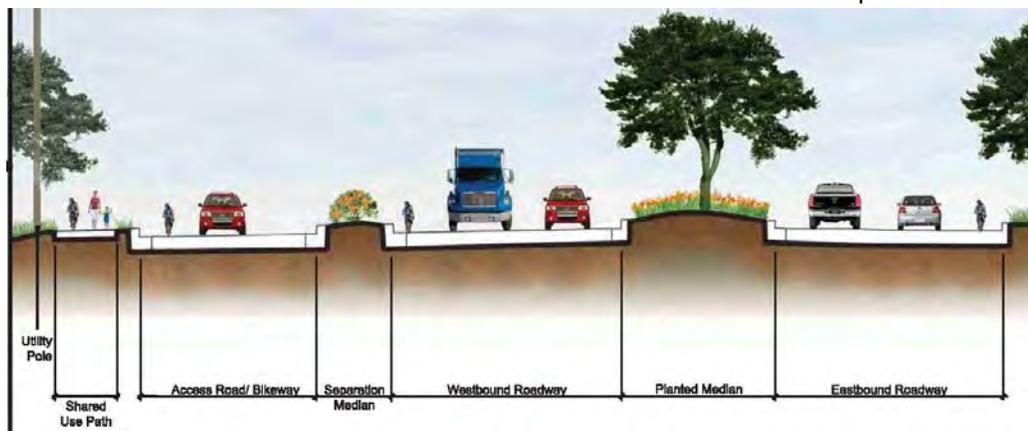
- Constructs a four-lane, divided, closed-section roadway with continuous six-foot-wide shoulders in each direction to accommodate on-road bicycles



**Figure ES-9 – Alternative 3 Base Improvement
Segment A Typical Section**

The base Alternative 3 would require approximately 25.16 acres of Right-of-Way and impact 457 linear feet of streams and 16.2 acres of woodlands.

The access management option provides three access roads in the same location as the Alternative 2 option with a revision to the southern road to accommodate two way travel and an 830 foot extension of the western limit to 2412 Norbeck Road instead of Keltrip Court.



**Figure ES-10 – Alternative 3 Access Management Option Improvement
Segment A Typical Section**

This option would require approximately 2.14 additional acres of Right-of-Way and impact an additional 0.51 acre of woodlands as compared to the base Alternative 3. No changes in streams impacts would occur with this option.

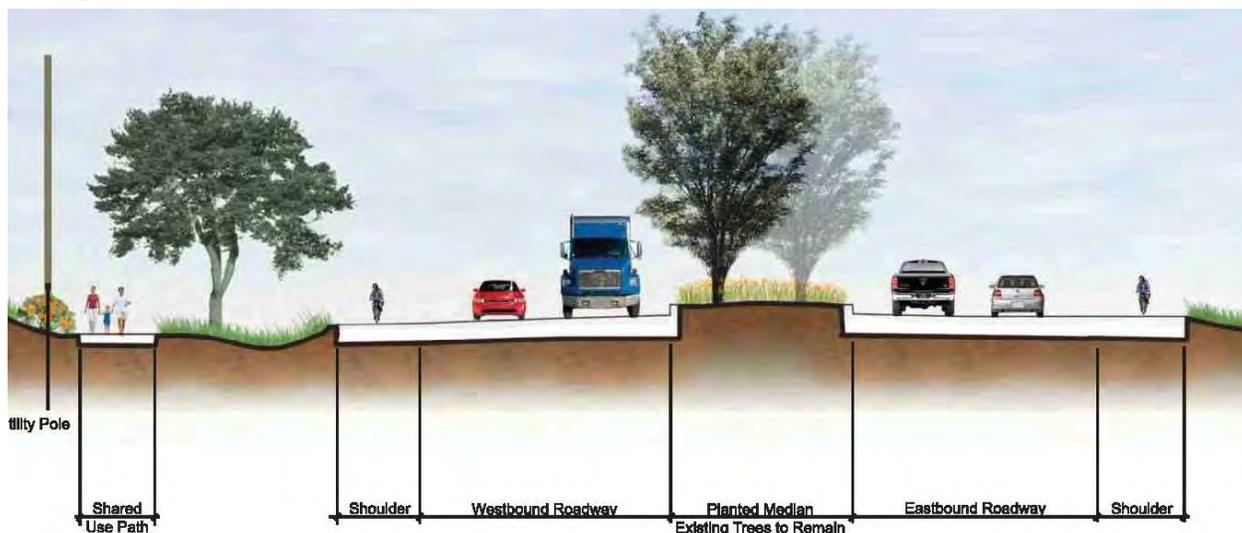
The intersection improvement option is the same as the Alternative 2 option.

The intersection improvement option would require approximately 0.43 additional acre of Right-of-Way and 0.32 acre of woodlands to the base Alternative 3. No changes in streams impacts are expected with this option.

Segment B: CO7445 (Norbeck Road) MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

- Constructs a four-lane, divided, open-section roadway east of Norwood Road to west of MD 650



**Figure ES-11 – Alternative 3 Base Improvement
Segment B Typical Section**

The base Alternative 3 would require approximately 8.12 acres of Right-of-Way and impact 385 linear feet of streams and 12.43 acres of woodlands.

The intersection improvement option is the same as the Alternative 2 option. No changes in impacts would occur with this option.

Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike – Southern Spur)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

- Constructs a combination of a four-lane, divided, open-section roadway and a closed-section roadway with a continuous six- to eight-foot-wide shoulder in each direction to accommodate on-road bicycles

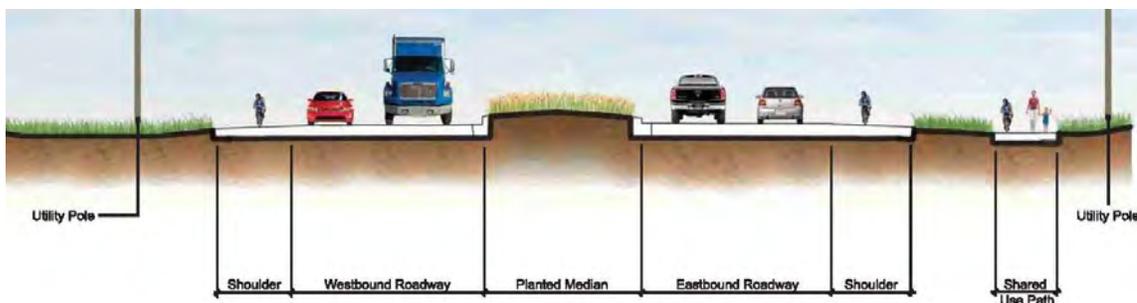


Figure ES-12 – Alternative 3 Base Improvement Open Section Segment C Typical Section

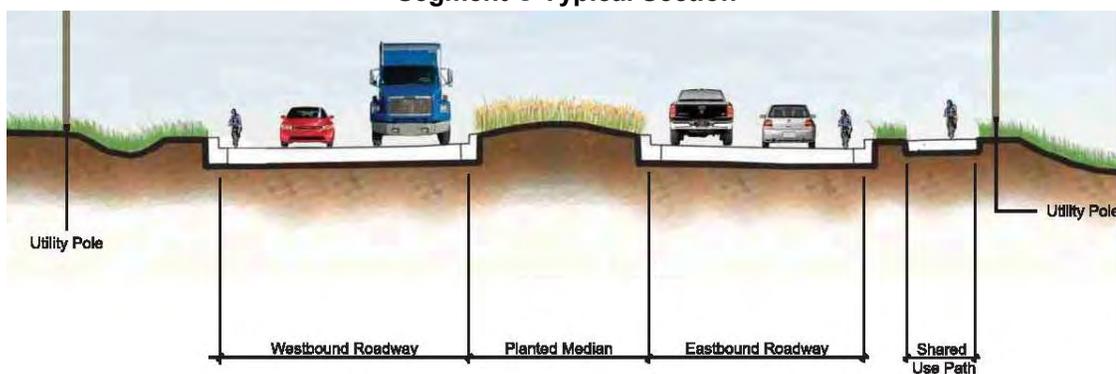


Figure ES-13 – Alternative 3 Base Improvement Closed Section Segment C Typical Section

The base Alternative 3 would require approximately 49.99 acres of Right-of-Way and impact 125 linear feet of streams and 5.14 acres of woodlands.

The access management option is the same as the Alternative 2 option. The two-way center turn lane option would decrease the Right-of-Way required by approximately 7.12 acres, and reduce stream impacts by 9 linear feet and woodland impacts by 0.45 acre as compared to the base Alternative 3.

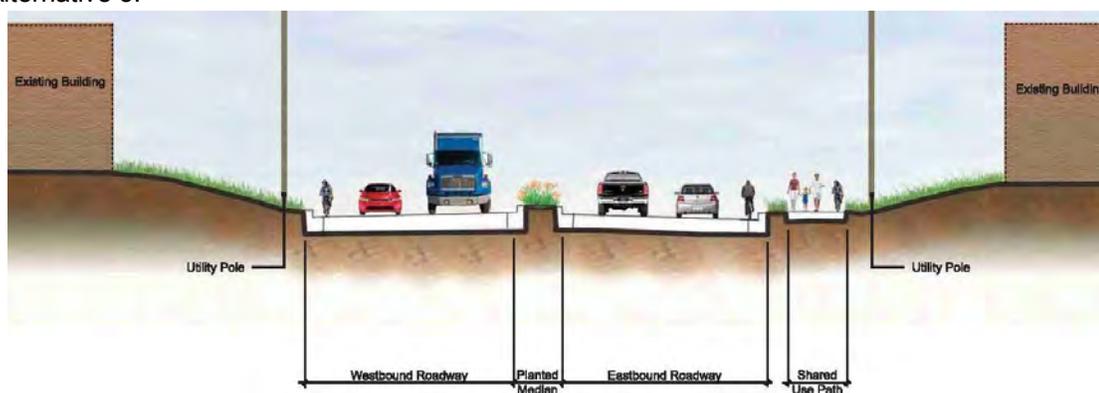


Figure ES-14 – Alternative 3 Access Management Option Improvement Segment C Typical Section

The six-foot median would decrease the Right-of-Way required by 5.2 acres and decrease woodland impacts by 0.13 acre; stream impacts would be increased by 4 linear feet as compared to the base Alternative 3.

The intersection improvement option is the same as the Alternative 2 option except as follows:

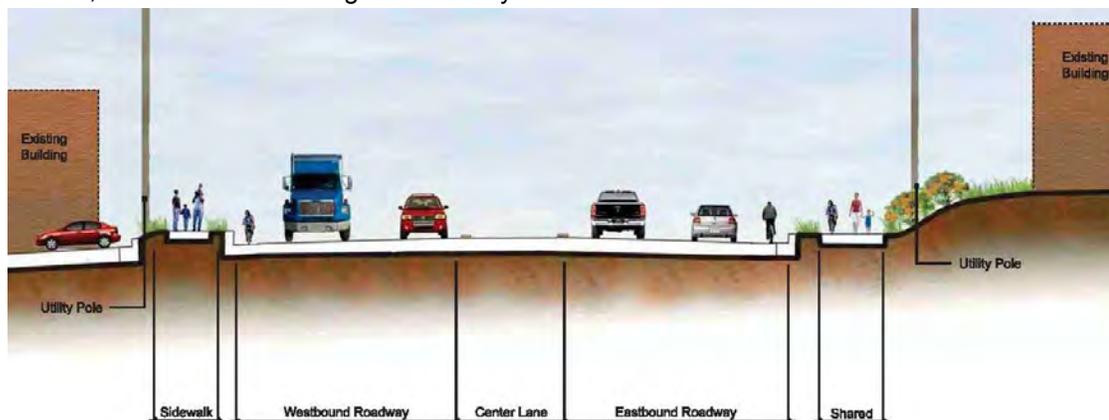
- Adds a second left turn lane on the northbound and southbound approaches, a third eastbound through lane, and a westbound shared through-left turn lane at MD 650

The MD 650 Intersection Improvement option would require approximately 0.12 additional acres of Right-of-Way with no changes in woodland impacts as compared to the base Alternative 3. The Good Hope Road roundabout would require approximately 1.71 additional acres of Right-of-Way and impact an additional 1.64 acres of woodlands as compared to the base Alternative 3. The Thompson Road roundabout would require approximately 1.74 additional acres of Right-of-Way with no changes in woodland impacts as compared to the base Alternative 3. The Peach Orchard Road roundabout would decrease Right-of-Way required by approximately 0.09 acre and would impact approximately 0.08 additional acre of woodlands as compared to the base Alternative 3. The intersection improvement options would not change stream impacts.

Segment D: MD 198 (Sandy Spring Road) from CO2445 (Old Columbia Pike – Southern Spur) to US 29 (Columbia Pike)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

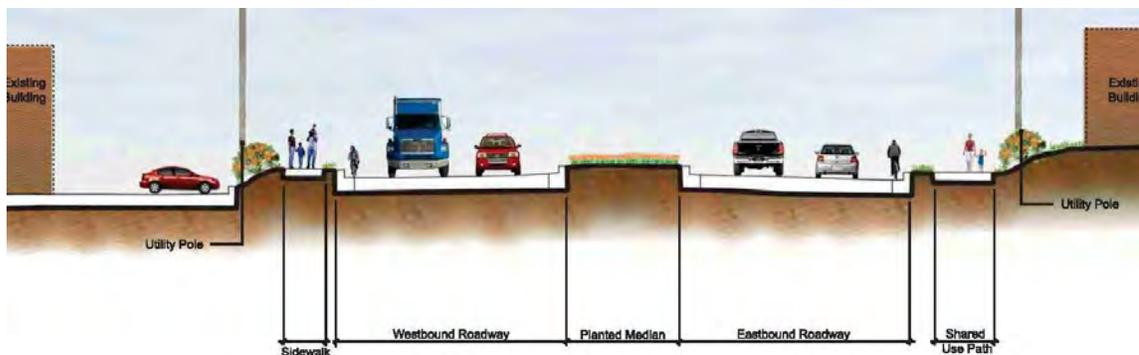
- Constructs a five-lane closed-section roadway with a continuous center two-way left-turn lane, while accommodating on-road bicycles



**Figure ES-15 – Alternative 3 Base Improvement
Segment D Typical Section**

The base Alternative 3 would require approximately 1.92 acres of Right-of-Way and would impact 57 linear feet of streams. No woodlands would be impacted.

The access management option provides a closed-section four-lane roadway with an 18-foot-wide median, while accommodating on-road bicycles.



**Figure ES-16 – Alternative 3 Access Management Option Improvement
 Segment D Typical Section**

This option would decrease Right-of-Way required by approximately 0.21 acre and decrease stream impacts by 9 linear feet as compared to the base Alternative 3. No impacts to woodlands would occur with this option.

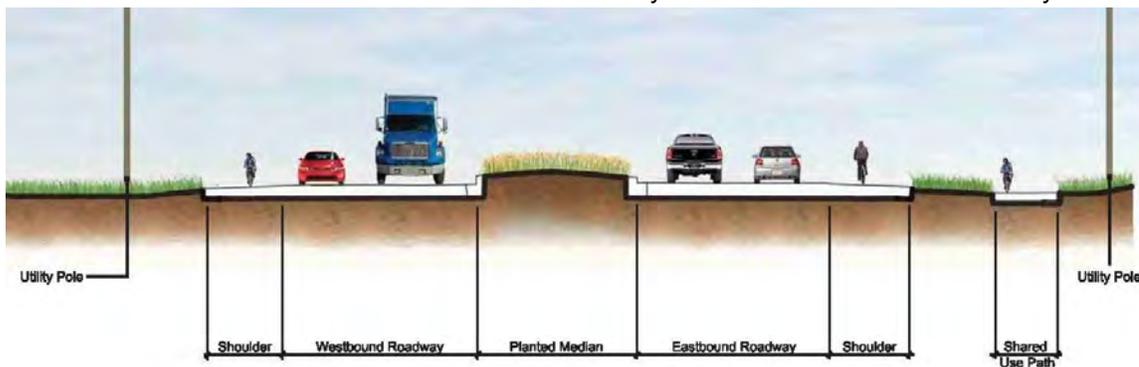
The intersection improvement option adds a second westbound left turn lane and converts the shared right-through lanes to separate through and right turn lanes on the eastbound and northbound approaches, and adds a second northbound right turn lane at Old Columbia Pike.

The intersection improvement option would require approximately 0.18 additional acres of Right-of-Way as compared to the base Alternative 3. No impacts to streams or woodlands would occur with this option.

Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95

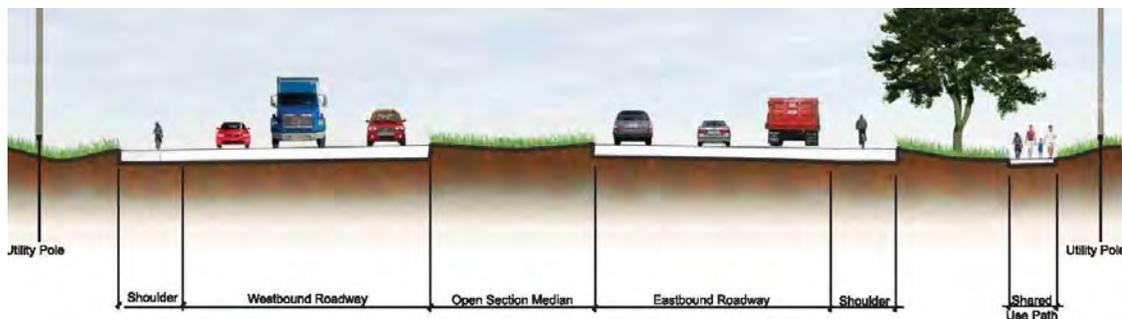
The base Alternative 3 has the same features as the base Alternative 2 except as follows:

- Constructs a four-lane and six-lane divided roadway that accommodates on-road bicycles



**Figure ES-17 – Alternative 3 Base Improvement Closed Section
 Segment E Typical Section**

The base Alternative 3 would require approximately 6.38 acres of Right-of-Way and would impact 36 linear feet of streams and 0.98 acre of woodlands.



**Figure ES-18 – Alternative 3 Base Improvement Open Section
Segment E Typical Section**

The intersection improvement option adds a second westbound left turn lane and eliminates the northbound left turns at McKnew Road, and moves the traffic signal to and adds a median break at Cedar Tree Drive, while adding a westbound left and double northbound left turn lanes at Cedar Tree Drive.

The intersection improvement option would require approximately 0.53 additional acres of Right-of-Way and would impact an additional 0.46 acre of woodlands as compared to the base Alternative 3. No stream impacts would occur with this option.

Alternatives Retained for Detailed Study

The proposed alternatives and options retained for detailed study include provisions to enhance the multimodal characteristics across the entire corridor including provisions for on-road and off-road bicycle use and for pedestrians. These provisions also provide improved access for cyclists and pedestrians to transit services along the corridor. Recognizing the varying roadway conditions and communities along the corridor led to the identification of the five corridor segments. This allows for the consideration of different and unique improvement alternatives that may be applied individually to each of the segments. For example, only the No-Build Alternative 1 has been retained for detailed study along segment B (MD 182 to MD 650).

The following alternatives are recommended to be retained for detailed study.

Alternative 1 - No-Build (See Figure 9)

No major improvements are proposed under Alternative 1, the No-Build Alternative. Minor short-term improvements would occur as part of routine maintenance and safety operations. The No-Build Alternative does not address the purpose and need for the project. It serves as a baseline for comparing the impacts and benefits associated with the Build alternatives. The Montgomery County Department of Transportation (MCDOT) staff supports the retention of the No-Build Alternative.

Build Alternatives

Segments of Build Alternatives 2 and 3 provide reasonable improvements within the roadway network to relieve locally generated congestion while managing access; and improving safety and traffic operations for motorists, bicyclists and pedestrians traveling along the corridor as measured by Level of Service (LOS) for vehicle operation and Level of Comfort (LOC) for cyclists and pedestrians.

Alternative 2 – Transportation Systems Management (TSM)/Transportation Demand Management (TDM)

Alternative 2 provides bicycle and pedestrian improvements as a base alternative, with access management and intersection improvement options.

Alternative 2 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) (See Figure 10)

The base Alternative 2 is consistent with the project's purpose and need and is compatible with full implementation of the Master Plan features. This alternative provides safety and operational improvements for bicyclists and pedestrians while maintaining the rural/suburban quality of life within the project area. The base Alternative 2 would have moderate impacts to socioeconomic and environmental resources (i.e., streams and approximately 85 properties). Public comments (see **Appendix C**) about this alternative included concerns about ways in which access from driveways and side streets would be improved. MCDOT staff supports the retention of this alternative.

The access management option for this alternative is consistent with the project's purpose and need and provides more of the Master Plan features than the base Alternative 2. This option provides safety and operational improvements for motorists, bicyclists, and pedestrians. This option would increase impacts to socioeconomic and environmental resources (streams and approximately six more properties than the base Alternative 2 would impact). Public comments about this option included concerns about the number of property impacts. MCDOT staff supports the retention of this option.

Alternative 2 - Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike Southern Spur) (See Figures 11 and 12)

The base Alternative 2 is consistent with the project's purpose and need and provides continuous bicycle and pedestrian facilities. This alternative provides safety and operational improvements for bicyclists and pedestrians while maintaining the rural/suburban quality of life and supporting State growth policies. The base Alternative 2 would impact the Montgomery County designated Upper Paint Branch Special Protection Area (SPA), which encompasses the Paint Branch mainstem and tributaries, cultural resources, socioeconomic resources, cemeteries, other environmental resources, and approximately 111 properties. Public comments included concerns about how the base Alternative 2 would improve access from driveways and side streets. MCDOT staff supports the retention of this alternative.

The two-way center turn lane access management option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option provides safety improvements for motorists while managing access and supporting State growth policies. This option would increase impacts to the SPA, cultural resources, socioeconomic resources, cemeteries, other environmental resources, and approximately 13 more properties than the base Alternative 2. Public comments about this option included support for access management and concerns for the safety of bicyclists and pedestrians.

The six-foot median access management option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option provides safety improvements for motorists and pedestrians while managing access and supporting State growth policies. The installation of roundabouts would help address the increased need for U-turns that

would result from this option. This option would result in slightly increased impacts to the SPA, cultural resources, socioeconomic resources, cemeteries, environmental resources, and approximately nine more properties than the base Alternative 2. Public comments included support for access management along this segment with no clear preference for the method, along with safety and operational concerns for bicyclists that may result with this option.

The MD 650 turn lanes intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. It would require a profile adjustment to the Montgomery County-owned segment of Norbeck Road west of the intersection to improve sight distance. This option could provide some safety improvements for bicyclists and pedestrians sight distance, but is generally neutral with regard to rural/suburban quality of life, access management, and State growth policies for communities. This option would slightly increase impacts to socioeconomic and environmental resources and approximately seven more properties than the base Alternative 2. Public comments about this option raised concerns about sight distance at the intersection.

The Good Hope Road roundabout intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option would assist with the U-turn movements when combined with the six-foot median option, and could calm traffic. It could also adversely impact emergency vehicles and make it more difficult for trucks to traverse the corridor segment. Although this option does not improve operations for bicyclists and pedestrians at the intersection—as bicyclists would typically be directed to navigate the roundabout by using the off-road shared-use path—the option does provide improvements for access management and supports State growth policies for communities. This option would slightly increase impacts to woodlands and the Edgewood II historic property and approximately six more properties than the base Alternative 2. Public comments about this option provided no clear preference for or against the option. MCDOT staff supports the retention of this option.

The Thompson Road roundabout intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option would also assist with the U-turn movements when combined with the six-foot median option, and could calm traffic. It could adversely impact emergency vehicles and make it more difficult for trucks to traverse the corridor segment. This option does not improve operations for bicyclists and pedestrians at the intersection—as bicyclists would typically be directed to navigate the roundabout by using the off-road shared-use path, but it does provide improvements for access management and supports State growth policies for communities. This option would slightly increase impacts to woodlands and approximately ten more properties than the base Alternative 2. Public comments about this option provided no clear preference for or against roundabouts in this segment. MCDOT staff does not support the retention of this option and states it is likely that only one roundabout between Peach Orchard Road and Thompson Road would be necessary, and due to its higher classification, Peach Orchard Road would be MCDOT staff's preference. This option has been retained due to U-turn and traffic calming benefits along with providing an alternate location for a roundabout if an issue is raised at either of the other two roundabout locations.

The Peach Orchard Road roundabout intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option would also assist with the U-turn movements when combined with the six-foot median option, and could calm traffic. It could adversely impact emergency vehicles and make it more

difficult for trucks to traverse the corridor segment. This option does not improve operations for bicyclists and pedestrians at the intersection—as bicyclists would typically be directed to navigate the roundabout by using the off-road shared-use path, but it does provide improvements for access management and supports State growth policies for communities. This option would slightly increase impacts to wetlands and the Spencer-Carr House historic property and approximately seven more properties than the base Alternative 2. Public comments about this option provided no clear preference for or against the option. MCDOT staff supports the retention of this option and states it is likely that only one roundabout between Peach Orchard Road and Thompson Road would be necessary, and due to its higher classification, Peach Orchard Road would be MCDOT staff's preference.

Alternative 2 - Segment D: MD 198 (Sandy Spring Road) from Old Columbia Pike (Southern Spur) to US 29 (Columbia Pike) (See Figure 13)

The base Alternative 2 is consistent with the project's purpose and need. This alternative provides operational improvements for bicyclists and pedestrians while maintaining the suburban quality of life and supporting State growth policies for communities, but does not address motorists' access management and safety concerns. The base Alternative 2 would impact approximately 14 properties and parking area for businesses. Public comments about this alternative included concerns about bicyclist safety. MCDOT staff supports the retention of this alternative.

The intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option provides safety improvements for motorists and bicyclists, access management, suburban quality of life, and supports State growth policies for communities. This option would impact approximately 11 more properties than the base Alternative 2. Public comments about this option included concerns for bicyclist safety along with the skew of Old Columbia Pike and the difficulty in turning left or right at this intersection due to conflicts with the school bus stop. The other public concerns expressed were about the potential impacts to the businesses.

Alternative 2 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 (See Figure 14)

The base Alternative 2 is consistent with the project's purpose and need and with the Master Plan, since it provides consistent bicycle and pedestrian facilities along the corridor segment. This alternative provides safety and operational improvements for bicyclists and pedestrians while maintaining the suburban quality of life and supporting State growth policies for communities. The base Alternative 2 would have low to moderate impacts on socioeconomic and environmental resources and approximately 54 properties. Public comments indicated no strong preference for or against this alternative. MCDOT staff supports the retention of this alternative.

Alternative 3 – Typical Section Improvements

Alternative 3 provides bicycle/pedestrian/roadway improvements as a base alternative, with access management and intersection improvement options.

Alternative 3 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) (See Figure 15)

The base Alternative 3 is consistent with the project's purpose and need, and with Master Plan features for the corridor segment. This alternative provides safety and operational improvements

for motorists, bicyclists, and pedestrians while managing access and supporting State growth policies for communities. The base Alternative 3 would increase impacts to socioeconomic and environmental resources (Batchellors Run and East Norbeck Local Park), but would impact one less property than the base Alternative 2. The bridge crossing the Intercounty Connector (ICC) would require widening. Public comments about this alternative were positive and supportive. MCDOT staff supports the retention of the base Alternative 3 and notes that it is the only project segment on the County's State Transportation Priorities Letter.

The access management option is consistent with the project's purpose and need when the option is included as part of the base Alternative 3. This option provides safety and operational improvements for motorists, bicyclists, and pedestrians while managing access and supporting State growth policies for communities. This option would impact approximately eight more properties than the base Alternative 3 would impact. Public comments about this option included concerns about property impacts.

Alternative 3 - Segment D: MD 198 (Sandy Spring Road) from CO2445 (Old Columbia Pike – Southern Spur) to US 29 (Columbia Pike) (See Figure 16)

The base Alternative 3 is consistent with the project's purpose and need, and with Master Plan features. This alternative provides positive safety improvements for motorists, bicyclists, and pedestrians while managing access and supporting State growth policies for communities. The base Alternative 3 would increase impacts to resources, including impacts to approximately five more properties than the base Alternative 2. Public comments included concerns about pedestrian safety, but owners of adjacent business properties favored this option. MCDOT staff supports the retention of this alternative.

The access management option is consistent with the project's purpose and need and with Master Plan features. This alternative provides positive safety improvements for motorists, and pedestrians while managing access and supporting State growth policies for communities. This option would not increase impacts to resources. Public comments about this option included concerns about pedestrian and bicyclist safety. MCDOT staff supports the retention of this option.

The intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 3. This option provides safety and operational improvements for motorists and bicyclists, access management, suburban quality of life, and State growth policies for communities. This option would impact approximately two more properties than the base Alternative 3 would impact. Public comments about this option included concerns about pedestrian and bicyclist safety. MCDOT staff supports the retention of this option.

Alternatives Not Retained for Detailed Study

The following alternatives are recommended not to be retained for detailed study.

Alternative 2 - Transportation Systems Management (TSM)/Transportation Demand Management (TDM)

Alternative 2 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) - Intersection Improvement Option

This intersection improvement option would require altering the ICC Bridge, replacing an existing signal, and changing driver expectations. It would not improve safety and operations for bicyclists and pedestrians and would cause slightly higher impacts to socio-economic and environmental resources than the base Alternative 2. Most public comments about the option were negative and unsupportive. MCDOT staff supports the dropping of this option.

Alternative 2 - Segment B: CO7445 (Norbeck Road) MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) - Base Alternative and Intersection Improvement Option

Although the improvements under this alternative and option would impact few resources, they would involve minor widening of existing facilities, would add no new functions for users of the segment, and are not consistent with developing projects cost-effectively to meet the project's purpose and need. This option includes safety improvements for motorists, bicyclists, and pedestrians; access management; and is consistent with State growth policies for communities. Public comments expressed no positive support for these improvements.

Alternative 2 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 - Intersection Improvement Option

The improvements under this option would result in slightly higher resource impacts, including impacts to approximately three more properties than the base Alternative 2. This option includes safety improvements for motorists, bicyclists, and pedestrians; access management; suburban quality of life; and recognizes State growth policies. Although the public expressed some support for this option and this option would impact few resources, it would involve minor widening of existing facilities, would add no new functions for users of the segment, and is not consistent with developing projects cost-effectively to meet the project's purpose and need.

Alternative 3 - Typical Section Improvements

Alternative 3 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) - Intersection Improvement Option

This alternative would require altering the ICC Bridge, replacing an existing signal, and changing driver expectations. This option would not improve safety and operations for bicyclists and pedestrians and would impact approximately two more properties than the base Alternative 3 would impact. Most public comments about the option were negative and unsupportive. MCDOT staff supports the dropping of this option.

Alternative 3 - Segment B: CO7445 (Norbeck Road) MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) - Base Alternative and Intersection Improvement Option

Improvements under this option would impact few socio-economic and environmental resources; increase the safety of motorists, bicyclists, and pedestrians; provide access management; recognize State growth policies for communities, and add functions for users of the corridor segment. However, they are not consistent with developing projects cost-effectively to meet the project's purpose and need. In addition, the public expressed no support for these improvements. MCDOT staff supports the dropping of these improvements and notes that the option's proximity to the ICC constitutes an overall negative impact.

Alternative 3 - Segment C: Base Alternative

This alternative would likely direct traffic away from parallel roadways (such as the ICC) resulting in increased congestion. It would not improve operations for motorists and would slightly increase impacts to resources. Approximately 28 more properties would be impacted under this alternative than under Alternative 2 – Segment C. Most public comments about the alternative were negative and unsupportive. The Maryland Department of Planning expressed concerns about Smart Growth, since the improvements would lie outside the Priority Funding Area (PFA). MCDOT staff supports the dropping of this alternative and provides that its proximity to the ICC constitutes an overall negative impact.

Alternative 3 - Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike - Southern Spur) Access Management Options

If implemented independent of the base Alternative 3, options under Alternative 3 - Segment C would simply be implementing the same Access Management Options as Alternative 2.

Alternative 3 - Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike Southern Spur) Intersection Improvement Options

If implemented independent of the base Alternative 3, options under Alternative 3 - Segment C would simply be implementing the same Access Management Options as Alternative 2.

Alternative 3 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 - Base Alternative

This alternative would not substantially improve traffic operations. Improvements would involve minor widening of existing facilities, would not substantially increase roadway function for users of the segment (when compared to Alternative 2), and are not consistent with developing projects cost-effectively to meet the project's purpose and need. Public comments about this alternative were negative and unsupportive. MCDOT staff notes that Segment E is primarily in the City of Laurel in Prince George's County.

Alternative 3 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 - Intersection Improvement Option

This option would impact approximately three more properties than the base Alternative 3. It would improve the safety of motorists, bicyclists, and pedestrians; provide access management; improve rural/suburban quality of life, and recognize State growth policies. Public comments about this option were unsupportive and included concerns about the removal of parking space along Cedar Tree Drive.

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I. INTRODUCTION

The Maryland State Highway Administration (SHA) and the Federal Highway Administration (FHWA) are conducting a project planning study along the MD 28/MD 198 Corridor between MD 97 (Georgia Avenue) and I-95, a distance of approximately 10.6 miles. The study is located in Montgomery and Prince George's counties.

The 2014 Highway Needs Inventory (HNI) includes the MD 28/ MD 198 study corridor in several segments. For several segments of the study corridor, the HNI recommends an upgrade. The HNI recommends Divided Highway Reconstruct for the following areas: MD 198 from I-95 to the Montgomery/ Prince George's county line; MD 198 from US 29A to MD 650; and MD 28 from MD 182 to MD 97. The Montgomery County Executive and the Montgomery County Council have identified project planning for the widening and safety improvements of MD 28 as a top priority, and the Prince George's County Executive and County Council highlight efforts to implement Pedestrian Safety Enhancements on State-maintained Roadways.

The Federal Functional Classification of MD 198 is an urban principal arterial from the eastern study limits to Good Hope Road, and a rural minor arterial from Good Hope Road west to MD 650. MD 28 has a Federal Functional Classification of urban minor arterial within the study area. These classifications are considered appropriate given the nature of traffic using these facilities and the need to access adjacent land uses, and there is no intention of revising the classification of roadway facilities along this corridor.

A. Study Area

The MD 28/MD 198 Corridor Improvement Study area encompasses MD 198 (Sandy Spring Road) west of I-95 in Prince George's County; and MD 198 (Spencerville Road), Norbeck Road and MD 28 (Norbeck Road) east of MD 97 in Montgomery County (**See Figure 1**). The eastern study area terminus is the I-95 corridor in Prince George's County. The western study area terminus is located east of the intersection of MD 28 with MD 97 (Georgia Avenue) in Montgomery County. This study will be closely coordinated with the current MD 97 at MD 28 Intersection Improvement Project being conducted by SHA, which has design underway. The MD 28/MD 198 Corridor Improvement Study is in Maryland's Secondary Development and Evaluation program.

B. Land Use

The study area encompasses five master plans, each of which call for the widening of MD 28/ MD 198 to improve safety and alleviate traffic congestion along the corridor. There is one master plan associated with the study area in Prince George's County: "Subregion I," which covers the communities of Beltsville, Calverton, Montpelier, South Laurel, West Laurel, and Vansville. It was adopted by the Prince George's County Planning Board of the Maryland-National Capital Park and Planning Commission (M-NCPPC) in March 1990, and approved by the Prince George's District Council in October 1990. In August 2009, the master plan was amended, and approved by the District Council in June 2010. In Montgomery County, the study area is covered by four master plans that have been adopted by the Montgomery County Council: Aspen Hill (1994), Cloverly (1997), Fairland (1997), and Olney (2005). Generally, the MD 28 / MD 198 study corridor includes a mix of low suburban, suburban, industrial, and commercial land uses. The residential use is predominately larger lot single-family homes, with the highest density at the age-restricted Leisure World community at the western end of the study area.

The eastern portion of the study area within Prince George's County along MD 198 varies in land use. North of MD 198 is predominantly low suburban and suburban while south of MD 198 is comprised mostly

of industrial and commercial uses. The Subregion I Master Plan (1990) calls for the continuation of the low-density residential development pattern that currently exists along the MD 198 corridor in this area. The Subregion I Master Plan (1990) envisions upgrading MD 198 to six lanes from I-95 to the Montgomery County boundary. The Subregion I Master plan classifies MD 198 (A-1) as an arterial from Anne Arundel County to Montgomery County. The Subregion 1 Master Plan and Proposed Sectional Map Amendment (2009) calls for the area between the Montgomery County Line and Sweitzer Lane to become a "Livable Communities Landscape Project." The plan also recommends traffic-calming measures along MD 198 at the entrance to Prince George's County from Montgomery County.

In Montgomery County, the Fairland Master Plan identifies the area north of MD 198 to the Howard County line as predominantly rural, and south of MD 198 as predominantly suburban with low-density single family residential use. There are several recommendations for MD 198 in the Fairland Master Plan (as shown in the Appendix), including two primary proposals:

1. Widen MD 198 to four travel lanes.
2. Provide a new cross section in the Burtonsville commercial area that consists of four travel lanes, a 16 to 20-foot median with selected turning lanes, and adequate space for street trees and sidewalks/bikeway on both sides. Access to shops along MD 198 should be controlled and consolidated to improve safety and circulation for pedestrians and vehicles.

The Fairland Master Plan classifies MD198 as a Major Highway (M-76) from Prince George's County to the western boundary of the master plan.

In the Cloverly area, MD 198 (Spencerville Road) passes through mixed single-family residential and agricultural land uses. The Cloverly Master Plan calls for single-family residential development along MD 198. The Plan states that MD 198 should be widened to four lanes between MD 650 and Oursler Road. The Plan recommends that the right-of-way be approximately 70 feet in the commercial area between Thompson Road and a point 360 feet east of Batson Road. Due to close proximity of buildings to the road, turning, acceleration, and deceleration lanes are not recommended in this section. A Class I (separate off-road) bicycle path is recommended along the entire length of MD 198 through Cloverly. The Cloverly Master Plan classifies MD 198 as a Major Highway (M-76) from Oursler Road to New Hampshire Avenue (MD 650).

Montgomery County has completed construction of Norbeck Road Extended (NRE) between MD 182 and MD 650 as a part of Montgomery County's Capital Improvement Program (CIP). Sufficient public right-of-way has been reserved for four lanes. The Master Plan states that an equestrian underpass should be constructed where NRE crosses the Northwest Branch. In addition, a Class I bicycle path should be constructed to maximize safety. The NRE project is consistent with the area's master plan. The Cloverly Master Plan classifies NRE as a Major Highway (M-18) from New Hampshire Avenue (MD 650) to Layhill Road (MD 182).

In the Aspen Hill area of Montgomery County, the intersection of MD 28 and MD 97 serves as a center of the community. The dominant land use is single-family residential east of this intersection. The Aspen Hill Plan proposes that MD 28 be reconstructed as a four-lane divided highway. The Aspen Hill Master Plan classifies MD 28 as a Major Highway (M-18) from Layhill Road (MD 182) to the western boundary of the master plan.

In the Olney area of Montgomery County, the dominant land use in the southeast quadrant is residential. The Olney Master Plan supports Aspen Hill Plan's vision for MD 28 as a "green corridor" with control of

access maintained by the use of service roads where feasible. A shared-use path should also be constructed along the north side of Norbeck Road to complete path connectivity and provide access to East Norbeck Local Park. Service road, where feasible along the north side of Norbeck Road, can also function as a shared-use path. The Olney Master Plan classifies MD 28 as a Major Highway (M-18) from MD 115 to MD 182 (**See Appendix A**).

According to county planners, there is one development proposed that may impact the traffic patterns in the MD 28/MD 198 corridor. No such developments are proposed in Montgomery County. In Prince George's County, the proposed major development that will have an impact on MD 198 is the Konterra Town Center. Konterra Town Center is planned to be located in the vicinity of I-95 and Van Dusen Road. The site has been zoned to include a mall since 1990 and the zoning was extended in 1997. Design plans have been approved and final plats have been issued for the Konterra Business Center, Town Center East, Sweitzer Lane, and Business Campus at Muirkirk segments of the community.

Throughout analysis zones surrounding the study corridor, projected growth in households, population and employment is as follows (**Table 1**):

Table 1. Projected Household, Population and Employment Growth

	2010	2040	Growth
Households	68,321	80,314	18%
Population	186,214	210,690	13%
Employment	41,151	75,282	83%

Source: Input to MWCOC Round 8.1 Land Use Forecasts provided by Montgomery and Prince George's counties
Note: The projected traffic volumes in Figures 2 & 3 along the corridor are based on trip generation and distribution throughout the entire travel demand forecasting model area. Those traffic volumes are not influenced by area of development analyzed in Table 1.

Previous statements from the Montgomery County Council, Montgomery County Planning Board and the Citizen's Stakeholders Group formed for this study emphasize strong local opposition to any corridor improvements that are not consistent with the guidelines of the local master plans and protection goals established for the Upper Paint Branch Special Protection Area and Patuxent Watershed.

Several proposed SHA transportation improvements in proximity of this project's study area are currently in the planning and design phases or are currently under construction. The improvements that are associated include the following projects in MDOT's Consolidated Transportation Program (CTP):
 Projects planned within the vicinity of the MD28/MD198 corridor include:

- **Development and Evaluation Program**
 - MD 97 at MD 28 – Study to construct improvements at MD 28 / MD 97.
 - MD 97 Georgia Avenue – Bus Rapid Transit Study from Glenmont Metro Station to Olney.
 - US 29 Interchanges – Interchanges at Stewart Lane, Tech Road, Musgrove Road, Fairland, Greencastle Road and Blackburn Road.

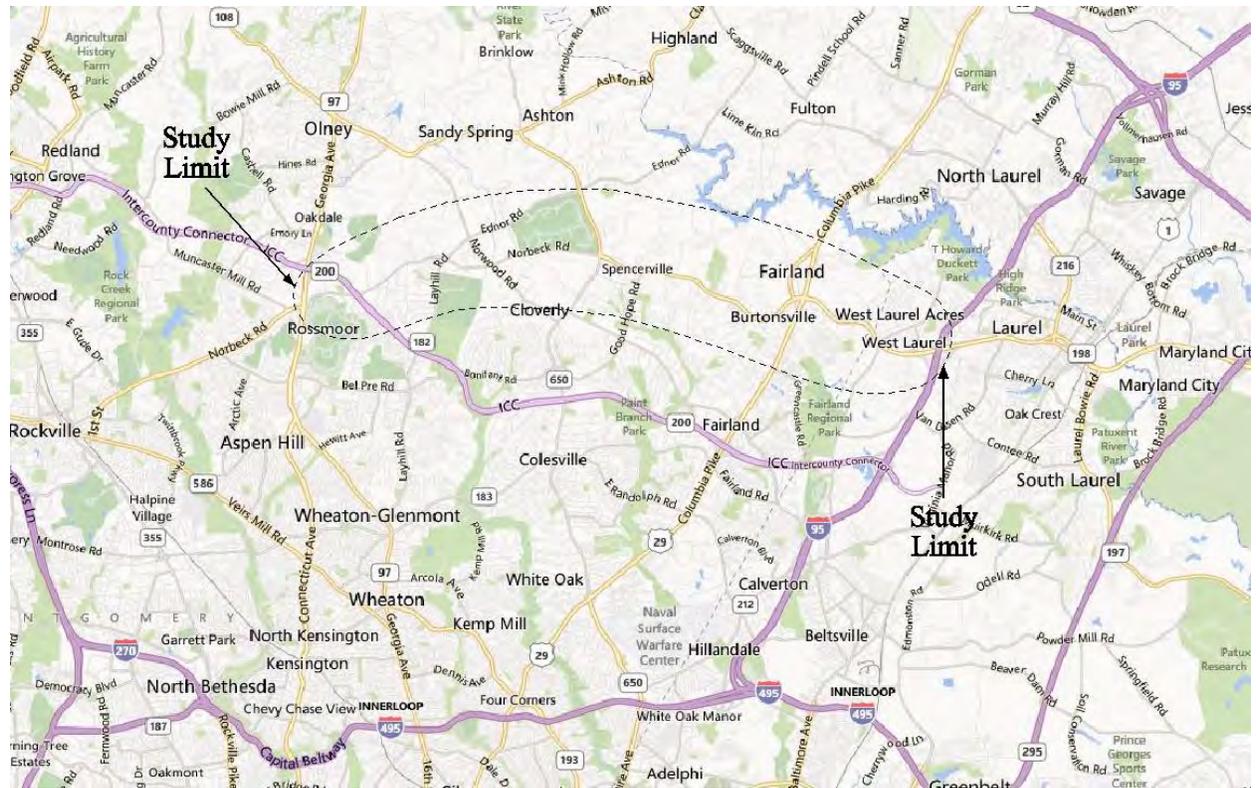


Figure 1. MD 28/MD 198 Project Study Area.

II. PURPOSE AND NEED

A. Existing Conditions

The existing typical sections of MD 28 and MD 198 vary along the study corridor. MD 198 from Van Dusen Road (east of I-95) to just west of I-95 in Prince George's County is a six-lane divided section. From that point west to US 29 in Montgomery County, MD 198 is a four-lane divided section. The existing typical section for MD 198 transitions from a four-lane undivided section in Burtonsville west of US 29 to a two-lane section from west of Burtonsville to MD 650 (New Hampshire Avenue). The existing typical section of Norbeck Road is a four-lane divided highway at the intersection of MD 198 and MD 650. Just west of MD 650, Norbeck Road transitions to a two-lane facility until just east of Norwood Road, where it transitions back to a four-lane divided highway to just west of MD 182 (Layhill Road). MD 28 from just west of MD 182 (Layhill Road) to MD 97 (Georgia Avenue) is a two-lane roadway.

These roadways provide uncontrolled access throughout the 10.63-mile study corridor with 296 access points, which are comprised of predominantly private residential driveways (**See Table 2**).

Table 2. Summary of Existing Access Points along MD 28/MD 198

Roadway Segment	Length (mi)	Residential	Commercial	Government	Public Street
MD 97 to MD 650	4.97	54	8	1	22
MD 650 to US 29	3.38	72	53	2	18
US 29 to I-95	2.28	26	17	7	16
TOTAL	10.63	152	78	10	56

B. Project Purpose

The purpose of the MD 28/MD 198 Corridor Improvement Study is to:

- Improve local traffic safety and operations for motorists, bicyclists, and pedestrians traveling along the MD 28/MD 198 corridor and across intersecting roads, while managing access; and;
- Preserve the rural and suburban quality of life by addressing localized traffic issues, while considering local planning visions and state growth policies for communities along the corridor.

Approved area master plans along the study corridor describe visions, goals and objectives for the roadway facilities, such as retaining rural character of adjacent communities and protection of sensitive environmental areas. These area master plans also recommend such features as hiker-biker trails and sidewalks, landscaping, etc. In locations where a proposed alternative for this study would differ from the approved area master plans, the environmental document will assess the impact of such change on the development patterns as well as community impacts in the surrounding area and sensitive environmental areas (e.g., the Patuxent Watershed, the Upper Paint Branch Special Protection Area, etc.).

C. Project Need

This project is needed to address projected operational and capacity deficiencies that will occur as a result of planned and future development in and around the forecast model area (see Master Plan Considerations section). MD 28 and MD 198 is experiencing peak hour congestion in areas along portions of the corridor between I-95 and MD 97, particularly east of MD 97, in the vicinity of US 29 and the Burtonsville commercial area, and near Sweitzer Lane. It is expected that congestion will increase as a result of planned and future development. Congestion will continue to worsen leading to stop-and-go

conditions, particularly at several intersections in the study area which are projected to experience failing condition by the 2040 design year. The segments between the intersections will experience peak hour capacity constraints imposed both by projected traffic volumes and by the lack of mid-block through lanes on the two-lane facilities and the lack of storage lanes for left turns and deceleration lanes for right turns constrain intersection operations.

While the reported crash rate along the study corridor between 2010 and 2012 is lower than the statewide average for certain types of crashes, crash types described as "other" occurred at a rate significantly higher than their respective statewide average crash rate along portions of the corridor. The dominant crash type along the study corridor is rear-end crashes (34%), which may be a result of the congested conditions along the corridor. These conditions are expected to worsen as development occurs and congestion increases. This study corridor is also an area where sidewalks and bicycle facilities are absent and in some instances not called for by design in master plans.

1. Traffic Volumes, Operations and Safety (See Appendix B for Traffic Data)

The travel demand analysis for this study was developed using the MWCOG regional travel demand model. The regional travel demand forecasts were developed using version 2.3.39 of the regional model, along with Round 8.1 Cooperative Forecasts and the 2012 Constrained Long-Range Plan (CLRP). In addition to these inputs, local data sources such as the Burtonsville Sector Plan and Traffic Impact Studies (TISs) within the vicinity of the study area (i.e. Konterra Town Center East) were also evaluated in order to represent a comprehensive analysis.

Existing (2013) traffic volumes were developed for the MD 28/MD 198 corridor after consulting recent 13-hour turning movement and 48-hour classified traffic counts within the study area taken on a Tuesday, Wednesday or Thursday when local schools were in session. Annual Average Daily Traffic (AADT) and peak hour traffic volumes were developed using appropriate traffic trends factors and standard volume balancing techniques.

The development of the 2040 forecasts was based on methodologies outlined in the NCHRP-255 Report: *Highway Traffic Data for Urbanized Area Project Planning and Design*, using existing and forecast model outputs. Screenlines were developed to refine the traffic volumes from the regional travel demand model, and adjustments were made based on actual counts that were observed in 2012 and 2013.

The AADT volumes in the year 2013 on MD 28 range from 35,350 west of MD 97 to 19,300 west of MD 182. These are projected to grow to 45,175 and 24,725 respectively in 2040 under no-build conditions. The ADT volume in year 2013 on Norbeck Road is 15,800, and is projected to be 24,124 from MD 182 to MD 650 in 2040.

The AADT volumes on MD 198 in the year 2013 range from 19,925 east of MD 650 to a high of 45,250 east of I-95, adjacent to the study limit. Future year 2040 volumes under no-build conditions will grow to range from 29,800 east of MD 650 to 58,900 east of I-95. Intersection capacity constraints significantly limit traffic growth along MD 198 from MD 650 to US 29. The year 2013 AADT volumes and the year 2040 AADT forecasts are illustrated in **Figures 2 through 7**.

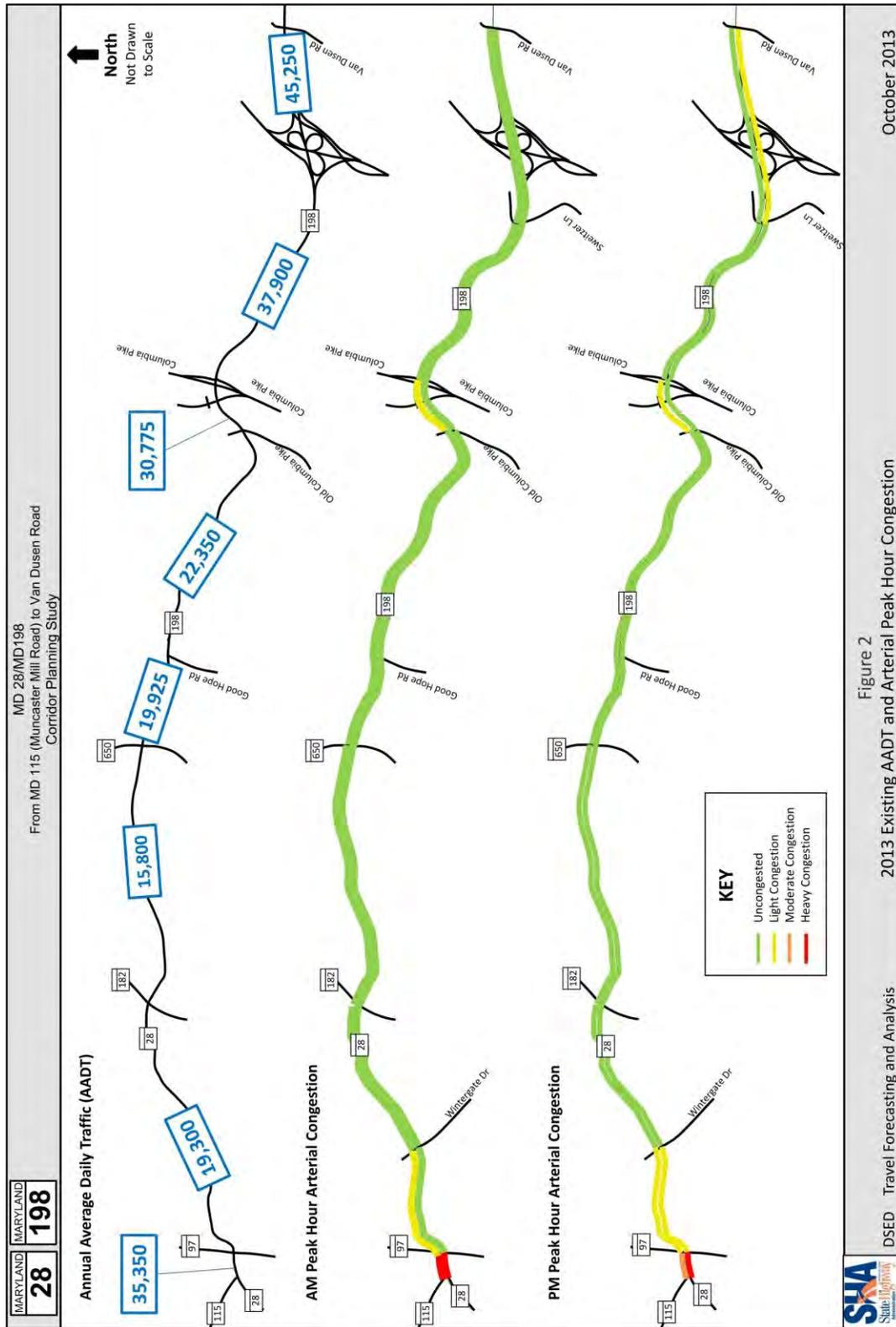


Figure 2. 2013 Existing AADT and Arterial Peak Hour Congestion

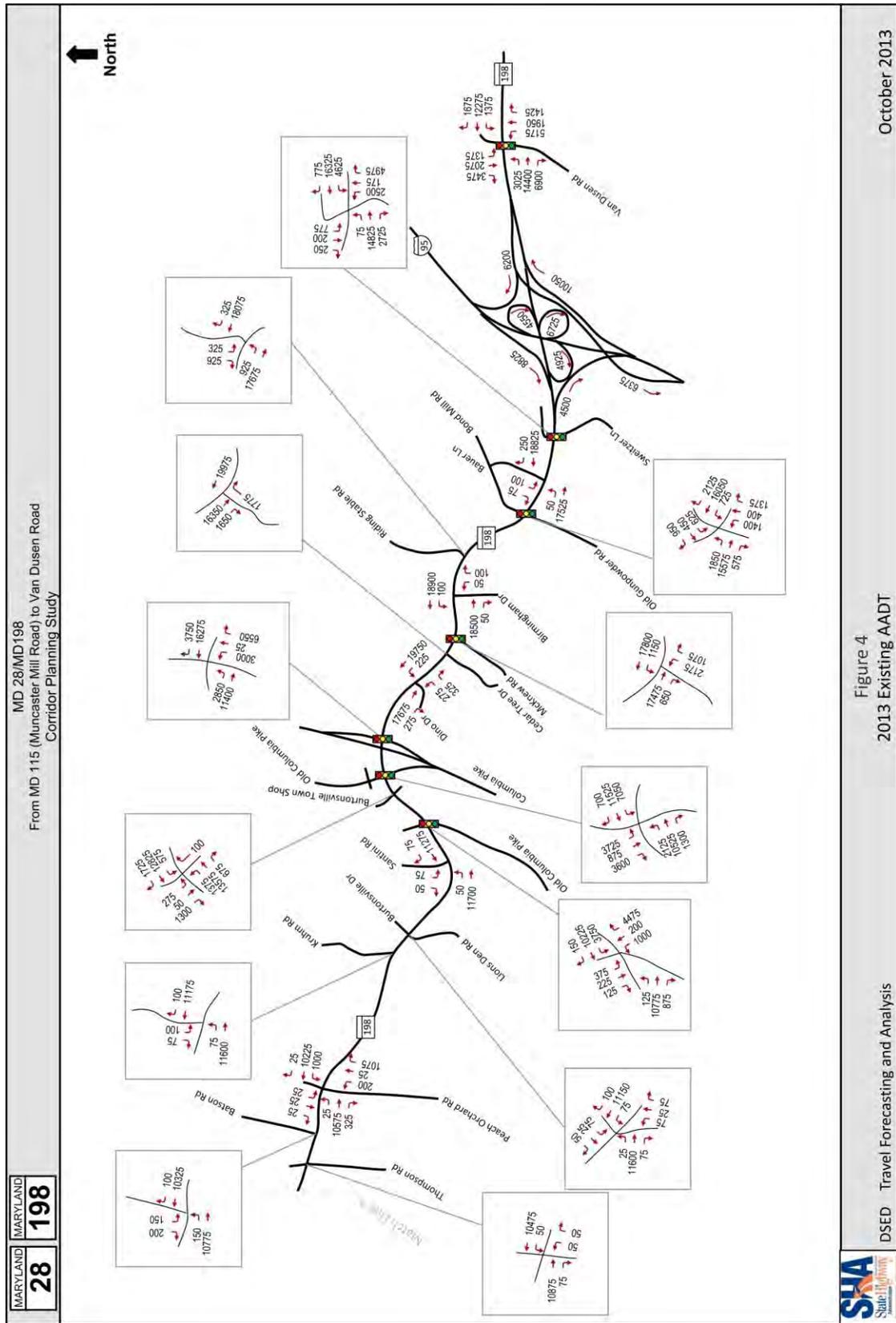


Figure 4. 2013 Existing AADT (Thompson Road to Van Dusen Road)

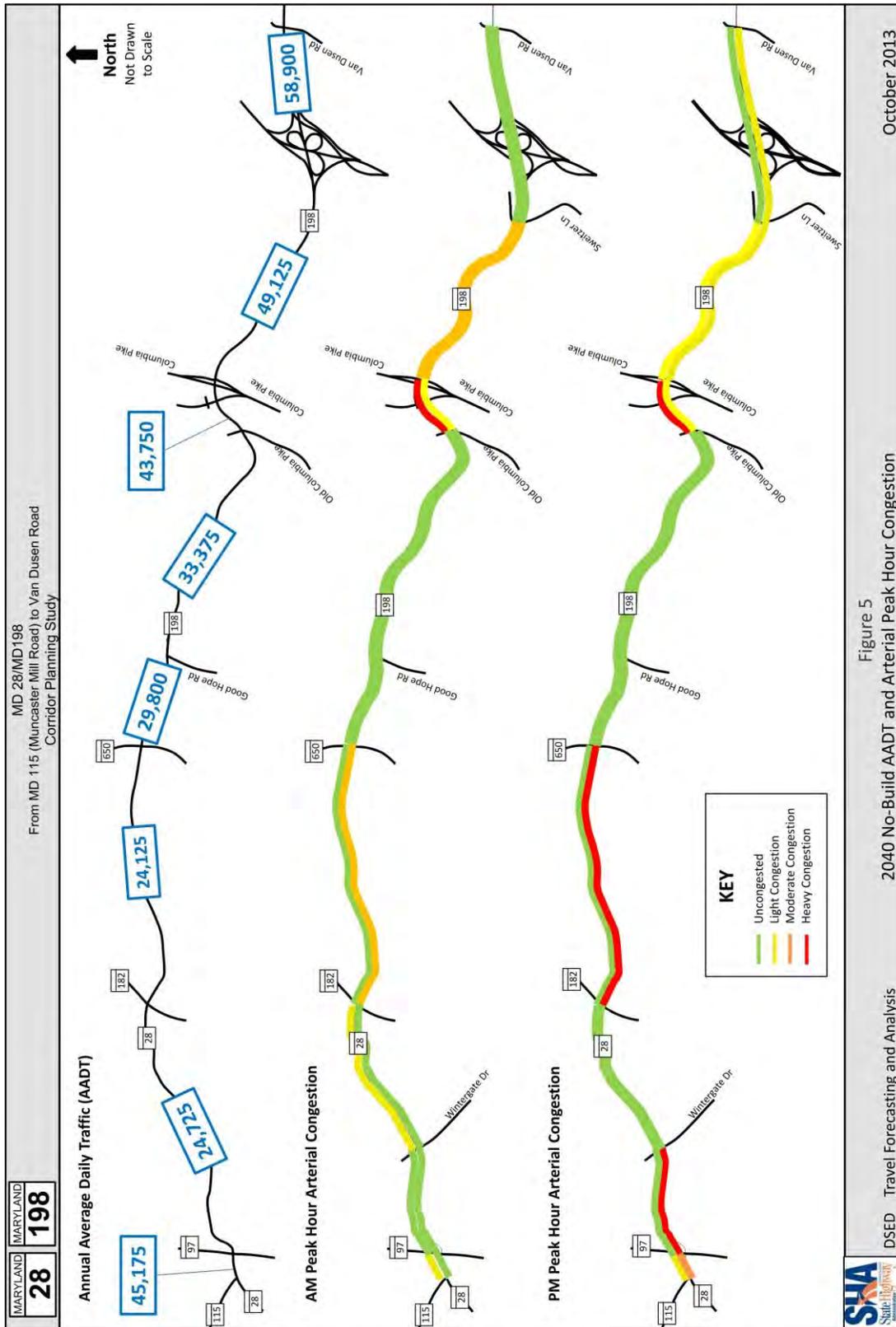


Figure 5. 2040 No-Build AADT and Arterial Peak Hour Congestion

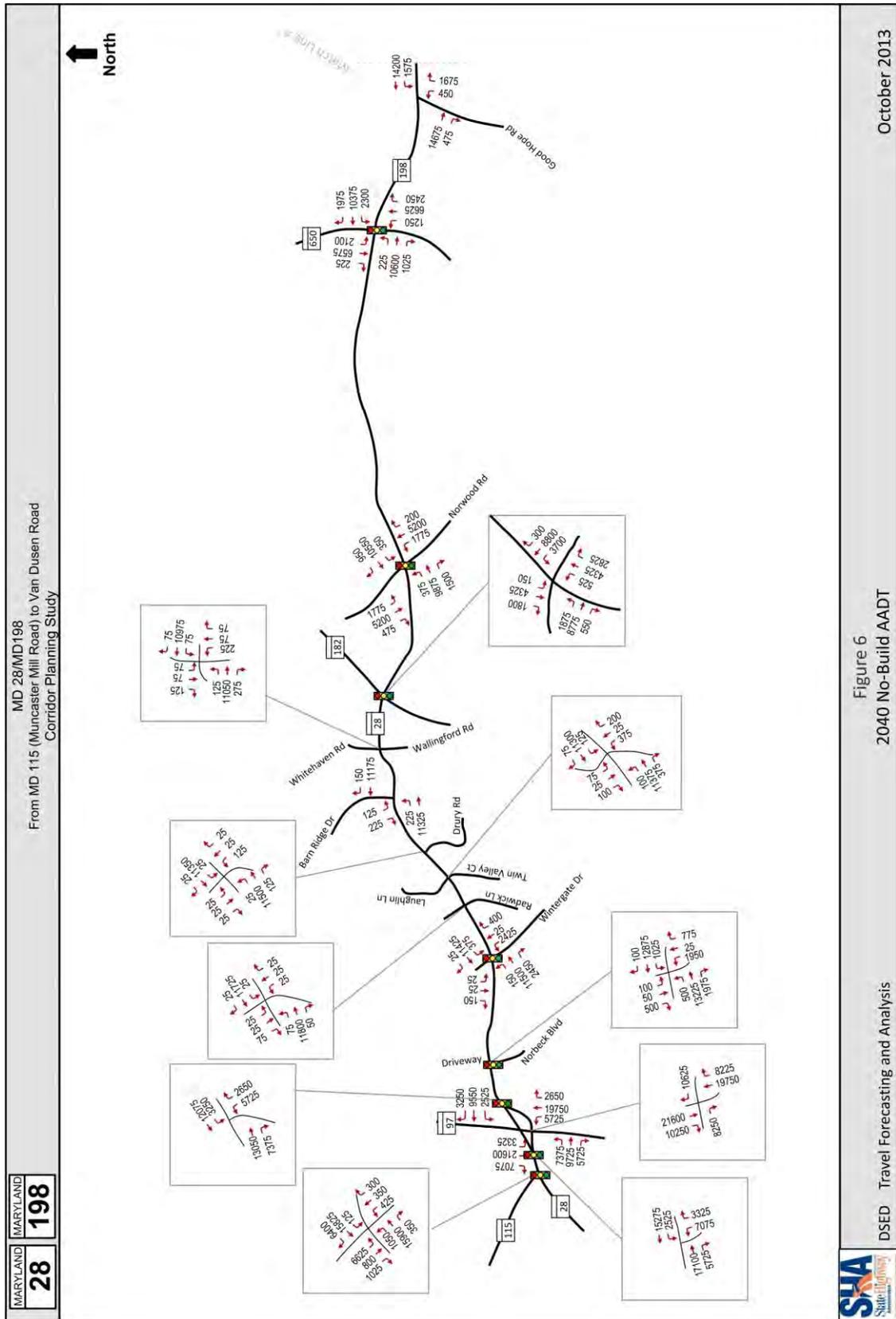


Figure 6. 2040 No-Build AADT (MD 115 to Good Hope Road)

October 2013

Figure 6
 2040 No-Build AADT

DSED Travel Forecasting and Analysis



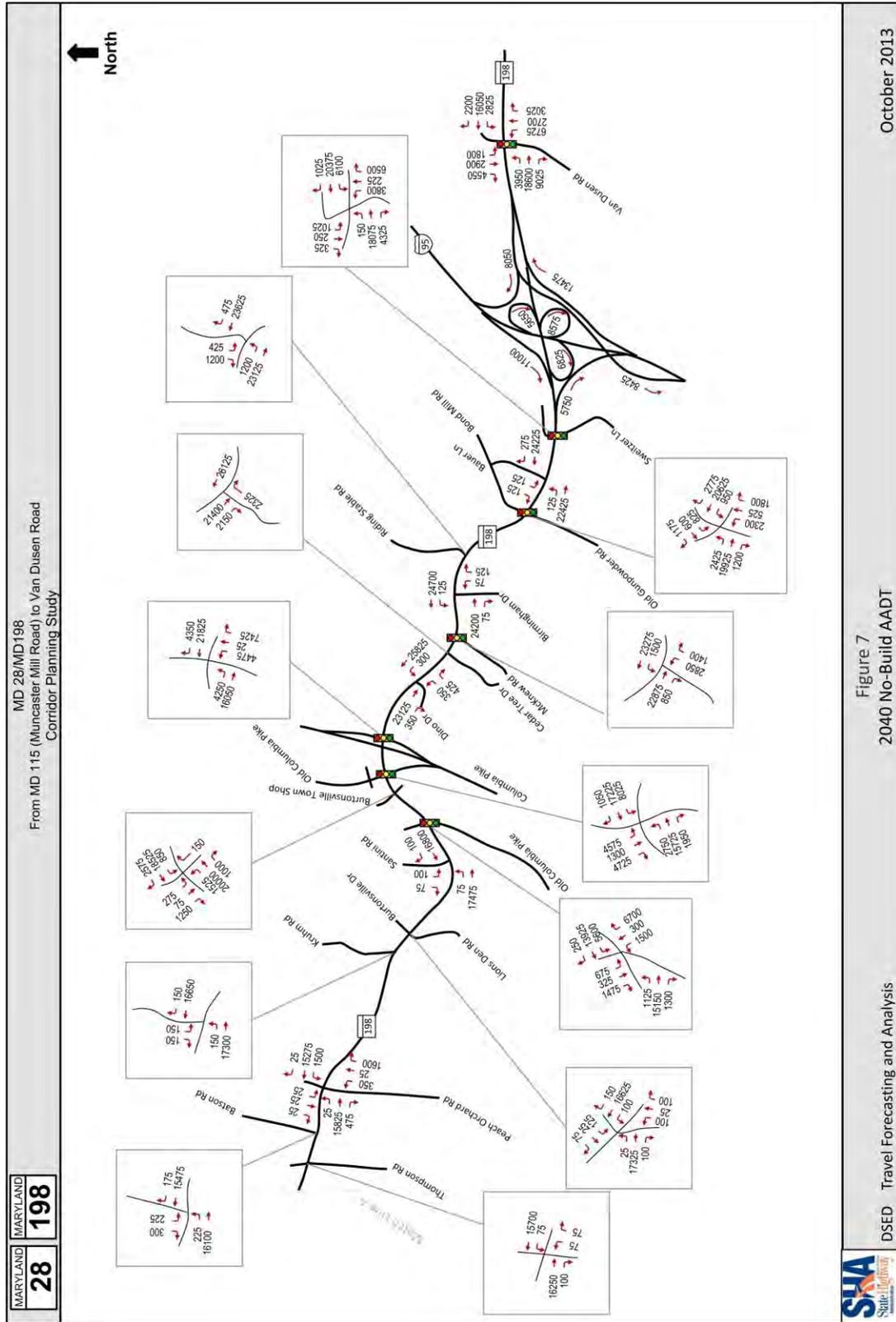


Figure 7. 2040 No-Build AADT (Thompson Road to Van Dusen Road)

Table 3. MD 28/MD 198 Annual Average Daily Traffic (AADT)

MD 28/MD 198 Segment	Annual Average Daily Traffic (AADT)			
	2013	2040	Increase	% Increase
MD 115 to MD 97	35,350	45,175	9,825	28%
MD 97 to MD 182	19,300	24,725	5,425	28%
MD 182 to MD 650	15,800	24,125	8,325	53%
MD 650 to Good Hope Rd	19,925	29,800	9,875	50%
Good Hope Rd to Old Columbia Pike	22,350	33,375	11,025	49%
Old Columbia Pike to US 29	30,775	43,750	12,975	42%
US 29 to I-95	37,900	49,125	11,225	30%
I-95 to Van Dusen Rd	45,250	58,900	13,650	30%

2. Roadway Network Measures of Performance

The adequacy of roadway capacity is determined using a measure called the volume-to-capacity, or v/c, ratio. The v/c ratio is the ratio of the peak hour volume carried by a roadway or intersection, and its hourly capacity expressed in vehicles per hour. Roadways may have traffic volumes that exceed or are forecast to exceed capacity. This would result in a v/c ratio that exceeds 1.00, and indicates the need for capacity improvements. Otherwise, if existing or committed levels of capacity exceed traffic volumes, the v/c ratio will be less than 1.00.

Level of service (LOS) is a scale measuring the freedom of mobility or severity of congestion experienced by drivers. The LOS scale ranges from A to F. LOS A represents free flow movement of traffic with little or no congestion. LOS F represents failure with stop-and-go conditions and long queues of traffic. LOS D occurs near a critical boundary where traffic flows become unstable. This level is generally considered acceptable during peak hours of traffic flow on streets and highways in urban and suburban areas. At LOS E, the roadway is operating near capacity, and day-to-day delays are very unpredictable. LOS is normally determined for the peak hours of the typical weekday. These levels have been determined through traffic research, and are related to measurable traffic characteristics such as delays, speeds, traffic density or v/c ratios.

3. Traffic Analysis Results

Table 3 summarizes the results of an analysis of roadway capacity and level of service conducted for the 14 intersections and 8 link segments along the MD 28/MD 198 corridor. Under existing year 2013 conditions, most intersections along both MD 28 and MD 198 operate at LOS E or better during the AM and PM peak hours. Under year 2040 no-build conditions, nearly half of the intersections are forecasted to approach or exceed capacity. Most of the 2 lane segments (the study corridor west of Old Columbia Pike) currently operate at LOS D and are projected to become slightly more congested by 2040. It should be noted that the improvement in LOS and v/c ratios experienced by the intersections and road segment in the vicinity of MD 28 @ MD 97 and MD 28 @ Norbeck Blvd (between the years 2013 and 2040) is largely due to geometric improvements associated with the interchange that is assumed to be constructed at MD 28 @ MD 97.

Though the capacities of most roadways are constrained by the limitations imposed by traffic signals, the physical characteristics of the MD 28/MD 198 corridor roadways present a situation requiring special consideration for traffic analysis. Many of the intersections along the two-lane sections of the corridor from MD 97 to Old Columbia Pike have auxiliary or turning lanes. These lanes drop away between intersections. Therefore, the two-lane sections of the corridor between intersections may impose a larger

constraint on capacity than indicated by the intersections on each end of a two-lane roadway segment. Two-lane segments of MD 28 from MD 97 to MD 182, and MD 198 from MD 650 to Old Columbia Pike are forecasted to carry volumes over 24,725 vehicles per day in 2040. For planning purposes, the following guidelines are typically used. A two-lane minor arterial roadway will begin to breakdown when ADT volumes reach 16,000, and major arterials begin to breakdown when ADT volumes reach 18,000. At the forecasted level of traffic on two-lane arterials, these segments will experience peak hour capacity constraints imposed by the lack of mid-block through lanes. These mid-block constraints could exceed the constraints imposed by signalized intersections along the segments of the corridor.

Table 4 presents the system wide performance measures generated under 2013 Existing and 2040 No-Build conditions as predicted by SimTraffic. A review of these measures of effectiveness (MOE) indicate substantial decrease in each performance measure along the corridor in the 2040 No-build condition as compared to existing conditions.

Table 4. MD 28/MD 198 Intersections - V/C & LOS Analysis Results

Location	2013 Existing		2040 No-Build	
	AM Peak LOS (vc)	PM Peak LOS (vc)	AM Peak LOS (vc)	PM Peak LOS (vc)
MD 28 at:				
MD 115 (Muncaster Mill Road)	D (0.84)	C (0.76)	F (1.07)	E (0.91)
MD 97 (Georgia Avenue)*	F (1.13)	E (0.95)	B [^] (0.71) B ^{^^} (0.64)	C [^] (0.81) D ^{^^} (0.84)
Norbeck Boulevard	C (0.79)	D (0.83)	A (0.59)	B (0.65)
Wintergate Drive	C (0.78)	C (0.72)	E (0.99)	E (0.92)
MD 182 (Layhill Road)	A (0.51)	A (0.53)	A (0.61)	C (0.76)
Norwood Road (at Norbeck Rd)	B (0.69)	B (0.66)	E (0.99)	F (1.03)
MD 198 (Sandy Spring Road and Spencerville Road) at:				
MD 650 (New Hampshire Avenue)	A (0.61)	B (0.67)	B (0.63)	F (1.02)
Old Columbia Pike	B (0.71)	B (0.71)	F (1.05)	F (1.01)
US 29 (Columbia Pike) SB Ramps	C (0.80)	C (0.78)	F (1.12)	F (1.11)
Relocate US 29-NB Ramps	B (0.67)	B (0.69)	D (0.87)	D (0.89)
McKnew Road	C (0.79)	B (0.69)	F (1.03)	D (0.90)
Old Gunpowder Road / Bond Mill Road	B (0.68)	C (0.75)	D (0.88)	E (0.96)
Sweitzer Lane	A (0.57)	B (0.68)	C (0.75)	D (0.89)
Van Dusen Road	A (0.50)	B (0.64)	C (0.73)	D (0.90)

*Under 2040 No-Build, MD 28 @ MD 97 is assumed to be reconstructed as an interchange

[^]LOS for SB Ramps intersection within MD 97 interchange

^{^^}LOS for NB Ramps intersection within MD 97 interchange

Table 5. MD 28/MD 198 Roadway Link - LOS Analysis Results

Roadway Segment	# of Travel Lanes	2013 Existing		2040 No-Build	
		AM Peak LOS	PM Peak LOS	AM Peak LOS	PM Peak LOS
<i>MD 28 (eastbound) at:</i>					
MD 115 to MD 97	4/5	F	F	C	E
MD 97 to Wintergate	2	C	D	B	F
Wintergate to MD 182	2	B	B	B	C
<i>Norbeck Road (eastbound) at:</i>					
to MD 650	2/4	C	C	E	F
<i>MD 198 (eastbound) at:</i>					
MD 650 to Old Columbia Pike	2	B	B	B	B
Old Columbia Pike to US 29 NB Ramps	4	C	C	D	D
US 29 NB Ramps to Sweitzer Lane	4	C	C	E	D
Sweitzer Lane to Van Dusen Road	4/6	C	D	C	D
<i>MD 198 (westbound) at:</i>					
Van Dusen Road to Sweitzer Lane	4/6	B	B	B	B
Sweitzer Lane to US 29 NB Ramps	4	C	C	E	D
US 29 NB Ramps to Old Columbia Pike	4	D	D	F	F
Old Columbia Pike to MD 650	2	B	B	C	B
<i>MD 198/Norbeck Road (westbound) at:</i>					
MD 650 to MD 182	2/4	B	C	C	C
<i>MD 28 (westbound) at:</i>					
MD 182 to Wintergate	2	B	B	D	B
Wintergate to MD 97	2	D	D	B	B
MD 97 to MD 115	4/5	F	E	D	D

Table 6. MD 28/MD 198 System Wide MOE Results

MOE	AM Peak		PM Peak	
	2013 Existing	2040 No-Build	2013 Existing	2040 No-Build
Total Delay (hrs)	629	2,047	1,008	1,610
Delay/Veh (secs)	94	233	141	175
Travel Time (hrs)	1,682	3,620	2,116	3,189
Average Speed (mph)	27	17	22	19
Fuel consumed (gal)	1,684	2,361	1,716	2,318
Unserviced Vehicles (no.)	1	760	135	794

Table 5 and **Table 6** summarize the results of an analysis of roadway capacity and level of service conducted for the 14 intersections and 8 link segments along the MD 28 / MD 198 corridor. Under existing year 2013 conditions, most intersections along both MD 28 and MD 198 operate at LOS E or better during the AM and PM peak hours. Under year 2040 no-build conditions, nearly half of the intersections are forecasted to approach or exceed capacity. Most of the 2 lane segments (the study corridor west of Old Columbia Pike) currently operate at LOS D and are projected to become slightly more

congested by 2040. It should be noted that the improvement in LOS and v/c ratios experienced by the intersections and road segment in the vicinity of MD 28 @ MD 97 and MD 28 @ Norbeck Blvd (between the years 2013 and 2040) is largely due to geometric improvements associated with the interchange that is assumed to be constructed at MD 28 @ MD 97.

From 2010 through 2012, the MD 28/MD 198 corridor experienced 458 police-reported crashes. The highest number of crashes was recorded on MD 28 from MD 115 to MD 182, and on MD 198 from MD 650 to the Prince George's County line. Of the 458 police-reported crashes that occurred along the study corridor, approximately 45% of the crashes resulted in injuries and one crash resulted in a fatality. As seen in the chart below, the crash rate for other crashes (38.4 crashes per 100 Million Vehicle Miles Traveled) is significantly higher than the statewide average. See **Figure 8**.

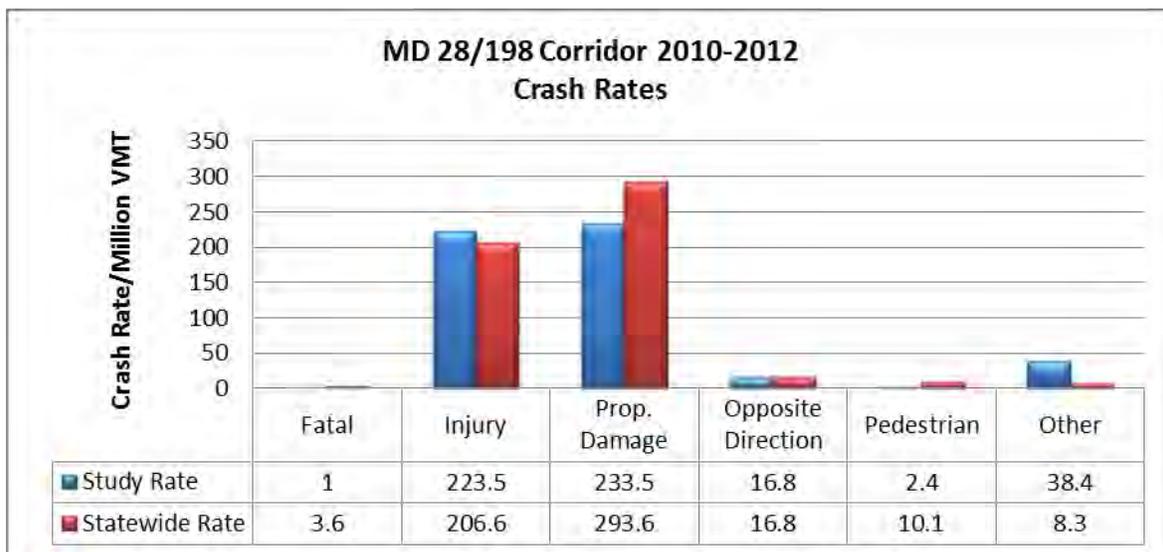


Figure 8. MD 28/MD 198 Corridor Crash Rates (2010-2012)

Table 7 summarizes the crash history on MD 28. The segment of MD 28 from MD 115 to MD 182 experienced a total of 124 police-reported crashes during the three-year study period of 2010 through 2012. The resulting crash rate was 185.0 crashes per 100 million vehicle miles of travel (crashes/100mvm), which was lower than the statewide average rate of 196.2 crashes/100mvm for all similarly designed state-maintained highways. Rear end, other and truck related collisions reported on this roadway occurred at a rate significantly higher than the respective statewide average crash rate for similar roadways while opposite direction, angle, pedestrian, fixed object, and parked vehicle crashes occurred at a rate lower than the statewide average.

Table 7. Traffic Safety Analysis (Crash Report) MD 28 from MD 115 to MD 182

Crashes	2010	2011	2012	TOTAL 2010 - 2012	STUDY RATE	STATE RATE
Fatal	-	-	-	0	0.0	1.3
Number Killed	-	-	-	0	-	-
Injury	22	22	16	60	89.5	79.7
Number Injured	35	36	22	93	-	-
Property Damage	25	24	15	64	95.5	115.3
Total Accidents	47	46	31	124	185.0	196.2
ADT	22,589	22,589	20,589	-	-	-
VMT(millions)	23.0	23.0	21.0	67.0	-	-
Rate (Acc per 100)	204.3	200.0	147.5	-	-	-
Crash Type						
Opposite Direction	4	1	-	5	7.5	8.9
Rear End	17	26	13	56	83.5*	64.2
Sideswipe	4	6	5	15	22.4	15.8
Left Turn	4	8	3	15	22.4	18.8
Angle	8	1	2	11	16.4	39.2
Pedestrian	1	-	-	1	1.5	4.1
Parked Vehicles	-	-	-	0	0.0	2.4
Fixed Object	7	1	5	13	19.4	29.0
Truck Related	7	8	3	18	26.9*	11.9
Night Time	11	7	12	30	24.0	31.0
Wet Surface	149	10	2	21	17.0	21.0
Other	2	3	3	8	11.9*	3.3

*Significantly higher than the Statewide Average

Table 8 summarizes the crash history on Norbeck Road. This roadway segment from MD 115 to MD 182 experienced a total of 19 police-reported crashes during the three-year study period of 2010 through 2012. Crash rates have not been developed for this segment of roadway. Rear end collisions had the highest number of reported crashes.

Table 8. Traffic Safety Analysis (Crash Report) Norbeck Road from MD 182 to MD 650

Crashes	2010	2011	2012	TOTAL 2010 - 2012
Fatal	0	0	0	0
Number Killed	-	-	-	0
Injury	0	5	4	9
Number Injured	0	6	7	13
Property Damage	3	3	4	10
Total Crashes	3	8	8	19
ADT	-	-	-	-
VMT(millions)	-	-	-	-
Rate (Acc per 100) MVM)	-	-	-	-
Crash Type				
Opposite Direction	-	1	1	2
Rear End	1	3	4	8
Sideswipe	1	-	-	1
Left Turn	-	2	1	3
Angle	-	-	-	0
Pedestrian	-	-	-	0
Parked Vehicles	-	-	-	0
Fixed Object	1	2	2	5
Truck Related	1	-	-	1
Night Time	0	1	4	5
Wet Surface	-	2	-	2

Table 9 summarizes the crash history on MD 198. The study section of MD 198 from MD 650 to the Prince George's County Line experienced a total of 206 crashes during the same study period. The resulting crash rate was 136.8 crashes/100mvm, which was lower than its comparative statewide average rate of 181.5 crashes/100mvm for similar roadways. Opposite direction and other crash rates along this section of the road were significantly higher than statewide averages while rear end, sideswipe, angle, pedestrian, fixed object and parked vehicle crashes occurred at a rate lower than the statewide average.

Table 9. Traffic Safety Analysis (Crash Report) MD 198 from MD 650 to County Line

Crashes	2010	2011	2012	TOTAL 2010- 2012	STUDY RATE	STATE RATE
Fatal	1	-	-	1	0.7	1.3
Number Killed	1	-	-	1	-	-
Injury	34	37	26	97	64.4	74.3
Number Injured	58	58	34	150	-	-
Property Damage	44	48	16	108	71.7	105.9
Total Crashes	79	85	42	206	136.8	181.5
ADT	28,772	28,772	26,772	-	-	-
VMT(millions)	51.4	51.4	47.9	150.6	-	-
Rate (Acc per 100 MVM)	153.8	165.5	87.7	-	-	-
Crash Type						
Opposite Direction	8	4	2	14	9.3*	6.0
Rear End	28	23	9	60	39.8	65.4
Sideswipe	14	4	3	21	13.9	17.6
Left Turn	8	11	4	23	15.3	15.4
Angle	11	21	12	44	29.2	33.6
Pedestrian	-	-	-	0	0.0	4.1
Parked Vehicles	-	1	1	2	1.3	1.7
Truck Related	8	9	4	21	13.9	11.2
Night Time	21	31	17	69	33.0	31.0
Wet Surface	12	13	10	35	17.0	21.0
Fixed Object	8	16	8	32	21.2	25.4
Other	2	5	3	10	6.6*	3.1

* Significantly higher than the Statewide Average

Table 10 summarizes the crash experience on MD 198. The study section of MD 198 from the Prince George's County Line to Van Dusen Road experienced a total of 109 crashes during the same study period. The resulting crash rate was 103.3 crashes/100mvm, which was lower than its comparative statewide average rate of 125.9 crashes/100mvm for similar roadways. Other crash rates along this section of the road were significantly higher than statewide averages while opposite direction, rear end, sideswipe, left turn, angle, pedestrian and parked vehicle accidents occurred at a rate lower than the statewide average.

Table 10. Traffic Safety Analysis (Crash Report) MD 198 from County Line to Van Dusen Road

Crashes	2010	2011	2012	TOTAL 2010-2012	STUDY RATE	STATE RATE
Fatal	-	-	-	0	0.0	1.0
Number Killed	-	-	-	0	-	-
Injury	14	15	10	39	37.0	52.6
Number Injured	19	19	11	49	-	-
Property Damage	27	23	20	70	66.3	72.4
Total Crashes	41	38	30	109	103.3	125.9
ADT	43,458	43,458	41,458	-	-	-
VMT(millions)	35.7	35.7	34.1	105.5	-	-
Rate (Acc per 100 MVM)	114.9	106.5	87.9	-	-	-
Crash Type						
Opposite Direction	-	-	-	0	0.0	1.9
Rear End	12	8	12	32	30.3	54.6
Sideswipe	5	4	3	12	11.4	13.8
Left Turn	1	4	1	6	5.7	9.4
Angle	8	2	3	13	12.3	17.8
Pedestrian	-	1	-	1	0.9	1.9
Parked Vehicles	-	-	-	0	0.0	0.5
Truck Related	7	3	2	12	11.4	7.7
Night Time	9	21	6	36	33.0	31.0
Wet Surface	5	11	5	21	19.0	21.0
Fixed Object	9	9	6	24	22.7	17.5
Other	6	10	5	21	19.9*	1.9

* Significantly higher than the Statewide Average

Studies have concluded that elderly drivers experience a high rate of accidents, injuries and fatalities. Historically, approximately 19% of the population in census blocks encompassing the corridor is over the age of 65.

The intersection of MD 28 and MD 182 was identified as a Priority Candidate Safety Improvement Intersection (CSII) location in 2011. This intersection had a Severity Index of 36 that year, which placed it within the top 10% severity index for SHA District 3, which encompasses Montgomery and Prince George's counties. MD 198, from Old Columbia Pike to US 29, and between the ramps at the I-95 interchange was identified as Secondary Candidate Safety Improvement Segments (CSIS) in 2011 and 2010 respectively. MD 198 in the vicinity of Burtonsville had a Severity Index of 58 in 2011, and through the I-95 interchange had a Severity Index of 61 in 2010. These two values were within the top 25% severity index for SHA District 3 for those years qualifying them as Secondary Candidate Safety Improvement Locations.

4. Intermodal Connectivity

The study area is directly served by several transit providing agencies. The Washington Metropolitan Area Transit Authority (WMATA) Metrobus provides local bus service along MD 198 from the Burtonsville Crossing Park and Ride to Silver Spring via Old Columbia Pike. Commuter Metrobus route service is provided from the Burtonsville Crossing Park and Ride to Laurel via MD 198 and to Silver Spring via Old Columbia Pike and US 29. In addition, a Metrobus commuter route crosses the corridor along MD 650 and major Metrobus routes exist along MD 97 at the western limits of the project. The Montgomery County Ride On Transit Service serves the MD 28 portion of the corridor between the Norbeck Park and Ride lot and Wintergate Drive. Nearby the study corridor in Prince George's County, public transportation in the Laurel area is served by the Regional Transit Agency (RTA) of Central Maryland.

Three park and ride lots within the MD 28 / MD 198 study corridor serve commuters with an additional lot nearby. They are located at the intersection of MD 198 and Van Dusen Road, behind the Burtonsville Crossing shopping center at the intersection of US 29 and MD 198, and at the northeast quadrant of the intersection of MD 97 and MD 28 (Norbeck Park & Ride). The lot at MD 198 and Van Dusen Road (Laurel Fringe Parking) has 62 spaces and has an annual average usage of 26 percent. The lot at US 29 and MD 198 has 475 spaces. This lot is served by WMATA bus service. The lot at MD 97 and MD 28 has 236 spaces and is served by WMATA and the Montgomery County Ride On bus service as well. This lot is reporting a 6 percent average annual usage rate.

It is important to consider both bicycle and pedestrian accessibility as part of this project. These types of improvements are specifically recommended in the Fairland, Cloverly and Aspen Hill Master Plans; however, some master plans specifically do not recommend sidewalks along portions of the corridor.

D. Conclusion

The proposed study is needed to provide traffic operation and safety improvements to enhance the quality of life related to localized traffic congestion within the MD 28 / MD 198 corridor from east of MD 97 to I-95. Corridor improvements are needed to relieve projected increased intersection congestion and improve area link capacity. The forecast increase of travel demand along the corridor is expected to lower the level of service at 10 intersections from Norbeck Boulevard to Sweitzer Lane by 2040. Nine of these intersections are expected to operate at level of service D or worse during the 2040 No-Build peak hour. Six roadway links along the corridor are expected to be operating at level of service D or worse in the 2040 No-Build peak hour. In addition, improvements will provide an opportunity to manage/limit access in order to discourage sprawl development outside the PFAs in addressing smart growth issues and enhance pedestrian and bicycle facilities.

This study is also necessary to address the long-term traffic capacity needs in the MD 28/MD 198 corridor. According to MWCOG Round 8.1 land use forecasts, the corridor is expected to experience additional population and employment growth. Projected development in the analysis zones surrounding the corridor will increase the average traffic volume along the study roadways, resulting in increased conflicts along the corridor, and may result in increased accident experiences.

Though most accident rates are currently below statewide averages, portions of the corridor have experienced opposite direction, rear end, and truck related accidents at rates higher than statewide average rate for similar roadways.

III. ALTERNATIVES ANALYSIS

The identification, consideration and analysis of alternatives are key to the National Environmental Policy Act (NEPA) process and a goal of objective decision making. **Table 11** presents the design guidelines used when developing alternatives for the MD 28/MD198 Corridor Improvement Study.

A. Design Guidelines

Table 11. Design Guidelines for MD 28/MD 198 Corridor Improvement Study.

Design Elements	Existing Condition	Planning Criteria
Functional Classification	Urban Other Principal Arterial	Urban Other Principal Arterial
Terrain	Rolling	Rolling
Design Year ADT (2040)	19,300 - MD 97 to MD 182 15,800 - MD 182 to MD 650 19,925 - MD 650 to Good Hope 22,350 Good Hope to Old Columbia 30,775 Old Columbia to US-29 37,900 US 29 to I-95	24,725 - MD 97 to MD 182 24,125 - MD 182 to MD 650 29,800 - MD 650 to Good Hope 33,375 Good Hope to Old Columbia 43,750 Old Columbia to US-29 49,125 US-29 to I-95
Percentage of Trucks	6% - MD 97 to MD 182 8% - MD 650 to Old Columbia 7.5% - Old Columbia to US-29 6.5% US 29 to Riding Stable 7.5% Riding Stable to I-95	6% - MD 97 to MD 182 8% - MD 650 to Old Columbia 7.5% - Old Columbia to US-29 6.5% US 29 to Riding Stable 7.5% Riding Stable to I-95
Posted Speed Limit	40 MPH - MD 97 to MD 182 45 MPH - MD 182 to MD 650 40 MPH - MD 650 to Santini Rd 30 MPH - Santini Rd to Dino Dr 40 MPH - Dino Drive to Woottens Dr 45 MPH - Woottens Dr to I-95	40 MPH - MD 97 to MD 182 45 MPH - MD 182 to MD 650 40 MPH - MD 650 to Santini Rd 30 MPH - Santini Rd to Dino Dr 40 MPH - Dino Drive to Woottens Dr 45 MPH - Woottens Dr to I-95
Design Speed	30 MPH horizontal curve west of Barn Ridge 35 MPH crest curve west of Oak Hill 35 MPH crest curve east of Allnut 35 MPH crest and sag curve at Kruhm	45 MPH
Lane Width (ft) Through Lane Width Turn Lane Width	11' 11'	12' 12'
Shoulder Width (ft) Left Right	0'-2' 0'-2'	2' gutter 8' open / 6' closed
Bridge Width (ft)	50'	50' – Alternative 2 108' – Alternative 3
Maximum Superelevation	N/A	4%
Horizontal Alignment – Minimum Curve Radius (ft)	530'	730'
Vertical Alignment Crest (K) Sag (K)	K(Max)=410, K(Min)=19 K(Max)=290, K(Min)=37	>61 >79
Maximum Vertical Grade	6.50%	6.50%

Minimum Stopping Sight Distance	>360'	>360'
Normal Cross Slope	2%	2%
Vertical Clearance (ft)	N/A	16'
Lateral Offset to Obstruction	N/A	Minimum 1.5'
Clear Zone	Varies	Traffic Barrier, where warranted
Side Slopes	2:1 Maximum	2:1 Maximum
ADA Compliance		
ADA Compliant Sidewalks	No	Yes
Median Widths	N/A	4'-20'
Bicycle Compatibility	No	Yes

B. Preliminary Alternatives

Two build alternatives, shown across five segments of the corridor, along with the No-Build Alternative, were presented at the Alternatives Public Workshop held in Silver Spring, Maryland on March 19, 2015 (See **Appendix C**). The following alternatives were presented at the workshops:

Alternative 1 -No-Build

Under Alternative 1, the No-Build Alternative, no major improvements are proposed. Minor short-term improvements would occur as part of routine maintenance and safety operations. The No-Build Alternative does not address the purpose and need for the project. It serves as a baseline for comparing the impacts and benefits associated with the Build alternatives.

In addition to the No-Build Alternative, two build alternatives are being considered. Recognizing the unique characteristics of the existing roadway features and adjacent communities along the corridor, the corridor was separated into five similar segments (Segments A through E) during development of the preliminary Build Alternatives. The proposed Build Alternatives are presented below by corridor segment, with descriptions of base improvements and option improvements along the corridor.

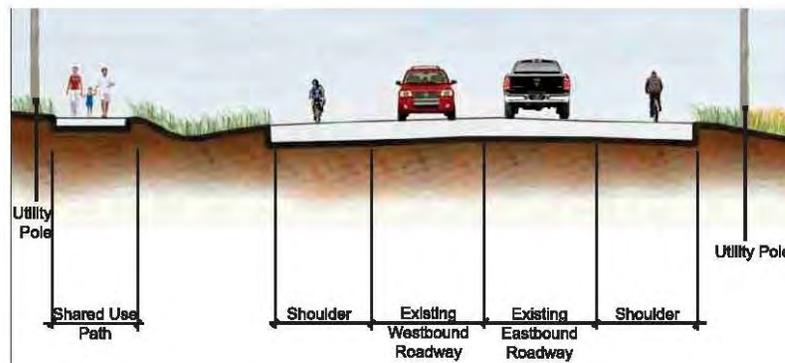
Alternative 2 – Transportation Systems Management (TSM)/Transportation Demand Management (TDM)

Alternative 2 improves bicycle and pedestrian provisions as base improvements, with access management and intersection improvements as options that could be included with the base improvements for some of the corridor segments.

Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road)

The base Alternative 2 has the following features:

- Ties into the planned MD 97/MD 28 Interchange improvements;
- Constructs continuous eight-foot-wide open shoulders in each direction to accommodate on-road bicycles;
- Constructs a 10-foot-wide shared use path on the north side to accommodate pedestrians and recreational bicyclists;
- Constructs a five-foot-wide sidewalk on the south side from Norbeck Boulevard to Bailey's Lane East to provide pedestrian access; and
- Re-aligns MD 28 to the north from Barn Ridge Drive to Whitehaven Road, in Aspen Hill to improve roadway geometry.

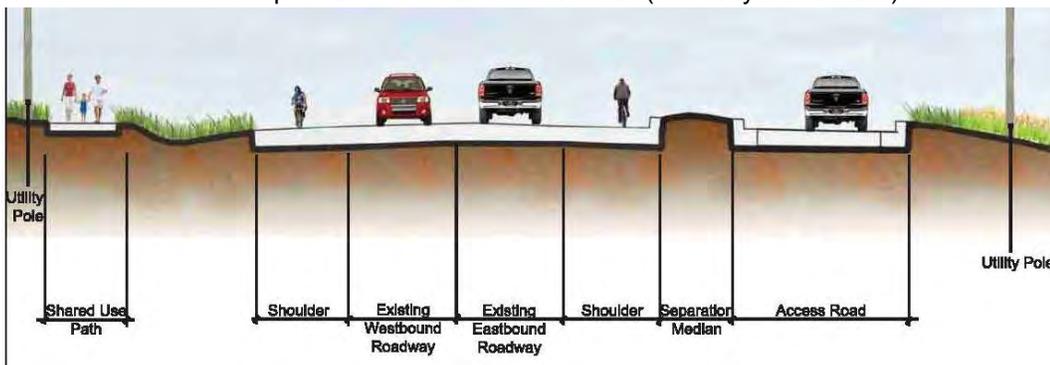


**Figure 9 – Alternative 2 Base Improvement
 Segment A Typical Section**

The base Alternative 2 would require approximately 11.33 acres of Right-of-Way and impact 407 linear feet of streams and 7.3 acres of woodlands.

The access management option includes three access roads along MD 28:

- North Side - Coolidge Avenue to 3201 Norbeck Road;
- North Side - Wintergate Drive to 2801 Norbeck Road; and
- South Side – Keltrip Court to Woods Center Road (one-way westbound)



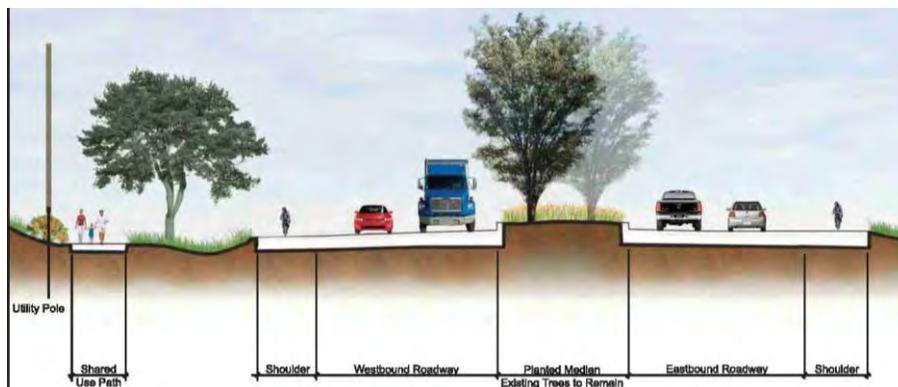
**Figure 10– Alternative 2 Access Management Option Improvement
 Segment A Typical Section**

The access management option would require approximately 2.61 additional acres of Right-of-Way and would impact an additional 1.07 acres of woodlands as compared to the base Alternative 2. No additional stream impacts would occur.

The intersection improvement option includes a roundabout at Wintergate Drive. This option would require approximately 0.36 additional acre Right-of-Way as compared to the base Alternative 2. No additional stream or woodland impacts would occur.

Segment B: CO7445 (Norbeck Road) from MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue)

This segment is owned and maintained by the Montgomery County. The study team has coordinated with the Montgomery County Department of Transportation to develop this alternative. The base Alternative 2 widens the existing eight-foot-wide shared-use path along the north side to 10 feet.



**Figure 11 – Alternative 2 Base Improvement
 Segment B Typical Section**

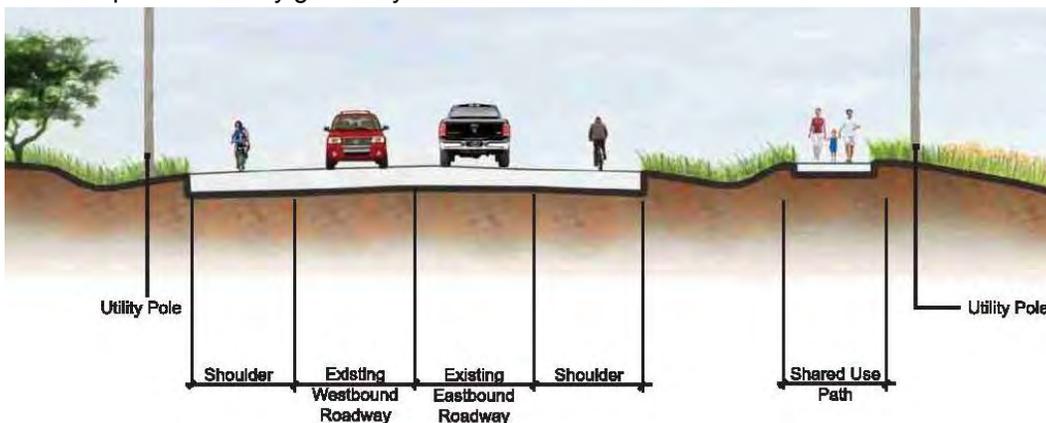
The intersection improvement option converts the right turn lanes on Norwood Road to through-right turn lanes.

The improvements proposed in this segment would not require Right-of-Way or impact streams or woodlands.

Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike - Southern Spur)

The base Alternative 2 provides the following improvements:

- Constructs a continuous six-foot-wide closed shoulder in each direction to accommodate on-road bicycles;
- Constructs a 10-foot-wide shared-use path on the south side to accommodate pedestrians and recreational bicyclists; and
- Re-aligns MD 198 to the north from east of Burtonsville Drive to Santini Road, in Burtonsville to improve roadway geometry.



**Figure 12 – Alternative 2 Base Improvement
 Segment C Typical Section**

The base Alternative 2 would require approximately 18.87 acres of Right-of-Way and impact 41 linear feet of streams and 4.29 acres of woodlands.

The access management option provides a closed-section three-lane roadway with a continuous two-way center left turn lane or six-foot-wide median.

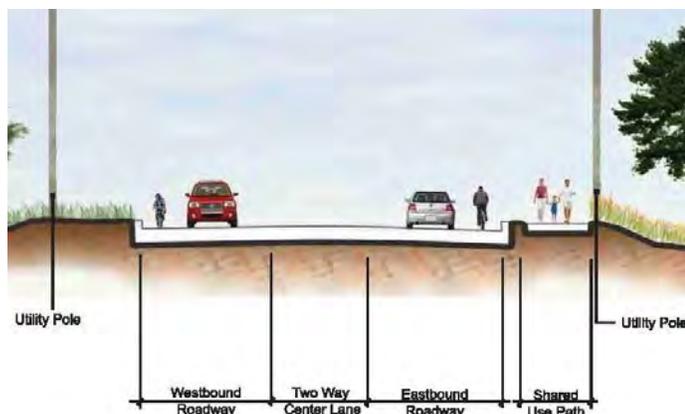


Figure 13– Alternative 2 Access Management Option Center Turn Lane Improvement Segment C Typical Section

The two-way center turn lane option would require an additional 0.34 acre of Right-of-Way as compared to the base Alternative 2 and decrease woodland impacts by 0.95 acre.

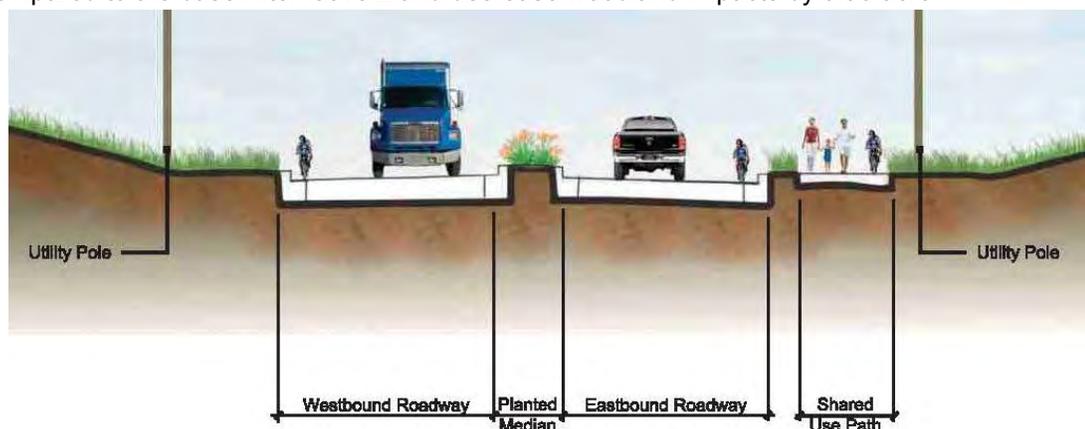


Figure 14 – Alternative 2 Access Management Option 6' Median Improvement Segment C Typical Section

The six-foot-wide median option would require approximately 0.65 less acres of Right-of-Way as compared to the base Alternative 2 and decrease woodland impacts by 1.33 acres. No additional stream impacts would occur with the access management options.

The intersection improvement option provides the following improvements:

- Adds a second left turn lane on the northbound, southbound and westbound approaches at MD 650; and
- Constructs a roundabout at Good Hope Road, Thompson Road, and Peach Orchard Road.

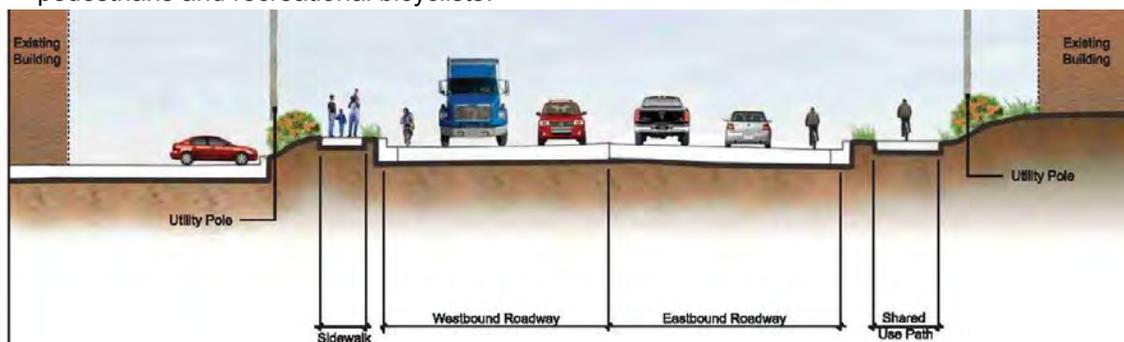
The MD 650 intersection improvement option would require approximately 1.23 additional acres of Right-of-Way and impact an additional 0.04 acre of woodlands as compared to the base Alternative 2. The Good Hope Road roundabout would require approximately 2.18 additional acres of Right-of-Way and impact an additional 2.06 acres of woodlands as compared to the base Alternative 2. The Thompson Road roundabout would require approximately 1.96 additional acres of Right-of-Way and impact an additional 0.17 acre of woodlands as compared to the base Alternative 2. The Peach Orchard Road roundabout would require approximately 0.75 additional acre of Right-of-Way and impact an additional 0.27 acre of woodlands as compared to the base

Alternative 2. No additional stream impacts would occur with the intersection improvement options.

Segment D: MD 198 (Sandy Spring Road) from Old Columbia Pike (Southern Spur) to US 29 (Columbia Pike)

The base Alternative 2 provides the following improvements:

- Constructs a continuous six-foot-wide closed shoulder in each direction to accommodate on-road bicycles;
- Constructs a five-foot-wide sidewalk along the north side of MD 198 to provide pedestrian access; and
- Constructs a 10-foot-wide shared-use path along the south side of MD 198 to accommodate pedestrians and recreational bicyclists.



**Figure 15 – Alternative 2 Base Improvement
Segment D Typical Section**

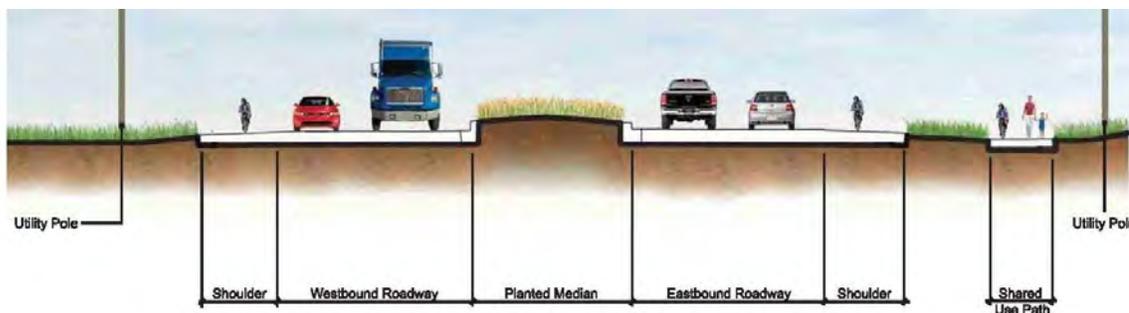
The base Alternative 2 would require approximately 0.85 additional acres of Right-of-Way and 14 linear feet of streams. No additional woodlands impacts would occur.

The intersection improvement option adds a second westbound left turn lane and converts the shared right-through lanes to separate through and right turn lanes on the eastbound and northbound approaches at Old Columbia Pike.

The intersection improvement option would require approximately 1.67 additional acres of Right-of-Way as compared to the base Alternative 2. No changes in impacts to streams or woodlands would occur with this option.

Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95

From US 29 to just east of Riding Stable Road is in Montgomery County, however, the remaining portion of this segment is in the Prince George's County. The base Alternative 2 provides a 10-foot-wide shared-use path along the south side of MD 198.



**Figure 16 – Alternative 2 Base Improvement
 Segment E Typical Section**

The base Alternative 2 would impact approximately 4.4 acres of Right-of-Way, 36 linear feet of streams and 0.60 acre of woodlands.

The intersection improvement option adds a second northbound left turn lane at McKnew Road. This option would impact approximately 0.49 additional acres of Right-of-Way and would impact an additional 0.43 acre of woodlands as compared to the base Alternative 2. No changes in streams impacts would occur with this option.

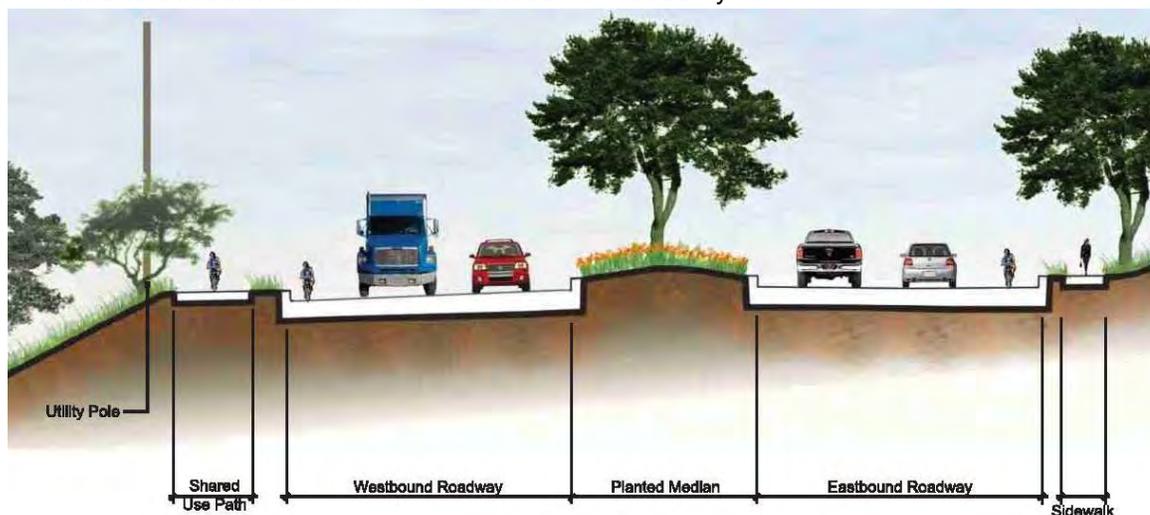
Alternative 3 – Typical Section Improvements

Alternative 3 improves bicycle and pedestrian provisions similarly to Alternative 2, but includes other roadway improvements in the base improvements, with similar access management and intersection improvement options that could be included with the base improvements along some of the corridor segments as described below.

Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

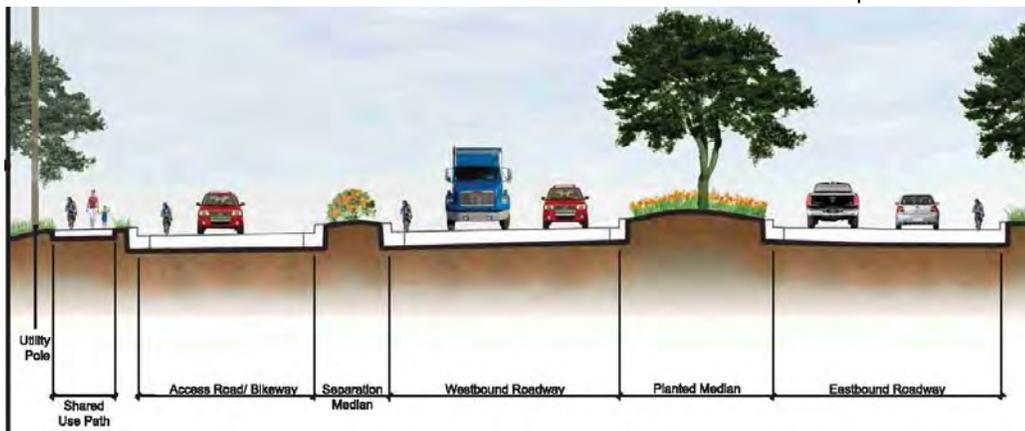
- Constructs a four-lane, divided, closed-section roadway with continuous six-foot-wide shoulders in each direction to accommodate on-road bicycles



**Figure 17 – Alternative 3 Base Improvement
 Segment A Typical Section**

The base Alternative 3 would require approximately 25.16 acres of Right-of-Way and impact 457 linear feet of streams and 16.2 acres of woodlands.

The access management option provides three access roads in the same location as the Alternative 2 option with a revision to the southern road to accommodate two way travel and an 830 foot extension of the western limit to 2412 Norbeck Road instead of Keltrip Court.



**Figure 18– Alternative 3 Access Management Option Improvement
Segment A Typical Section**

This option would require approximately 2.14 additional acres of Right-of-Way and impact an additional 0.51 acre of woodlands as compared to the base Alternative 3. No changes in streams impacts would occur with this option.

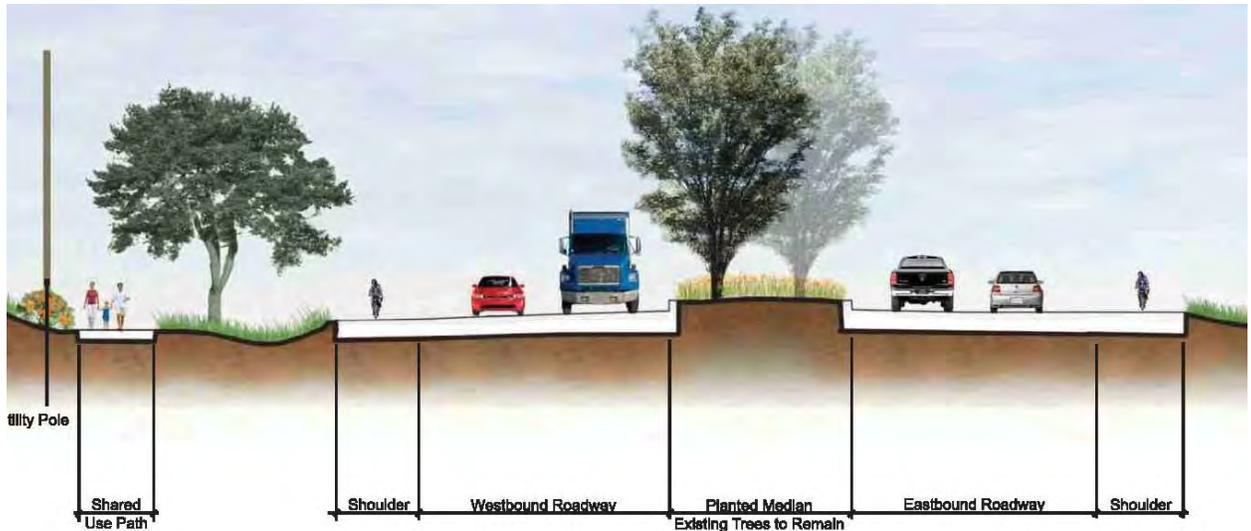
The intersection improvement option is the same as the Alternative 2 option.

The intersection improvement option would require approximately 0.43 additional acre of Right-of-Way and 0.32 acre of woodlands to the base Alternative 3. No changes in streams impacts are expected with this option.

Segment B: CO7445 (Norbeck Road) MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

- Constructs a four-lane, divided, open-section roadway east of Norwood Road to west of MD 650



**Figure 19 – Alternative 3 Base Improvement
 Segment B Typical Section**

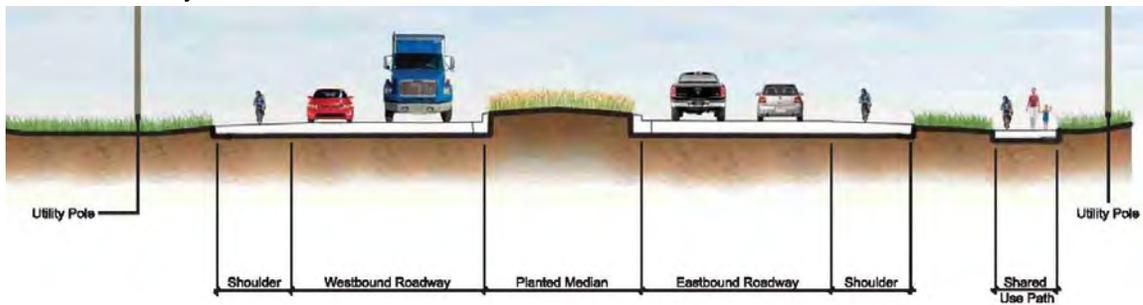
The base Alternative 3 would require approximately 8.12 acres of Right-of-Way and impact 385 linear feet of streams and 12.43 acres of woodlands.

The intersection improvement option is the same as the Alternative 2 option. No changes in impacts would occur with this option.

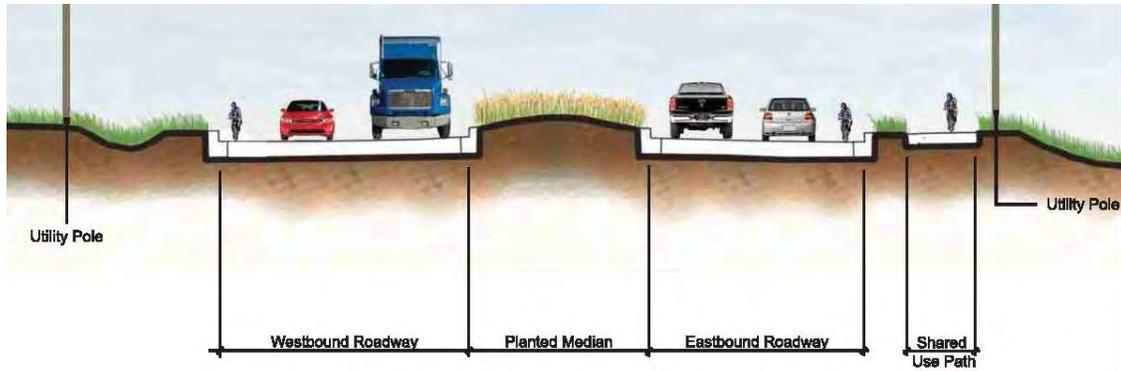
Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike – Southern Spur)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

- Constructs a combination of a four-lane, divided, open-section roadway and a closed-section roadway with a continuous six- to eight-foot-wide shoulder in each direction East to accommodate on-road bicycles



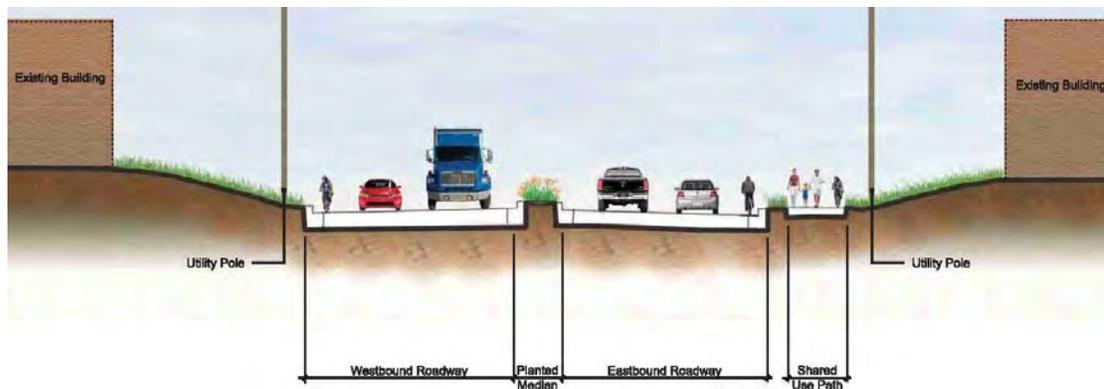
**Figure 20 – Alternative 3 Base Improvement Open Section
 Segment C Typical Section**



**Figure 21 – Alternative 3 Base Improvement Closed Section
 Segment C Typical Section**

The base Alternative 3 would require approximately 49.99 acres of Right-of-Way and impact 125 linear feet of streams and 5.14 acres of woodlands.

The access management option is the same as the Alternative 2 option. The two-way center turn lane option would decrease the Right-of-Way required by approximately 7.12 acres, and reduce stream impacts by 9 linear feet and woodland impacts by 0.45 acre as compared to the base Alternative 3.



**Figure 22 – Alternative 3 Access Management Option Improvement
 Segment C Typical Section**

The six-foot median would decrease the Right-of-Way required by 5.2 acres and decrease woodland impacts by 0.13 acre; stream impacts would be increased by 4 linear feet as compared to the base Alternative 3.

The intersection improvement option is the same as the Alternative 2 option except as follows:

- Adds a second left turn lane on the northbound and southbound approaches, a third eastbound through lane, and a westbound shared through-left turn lane at MD 650

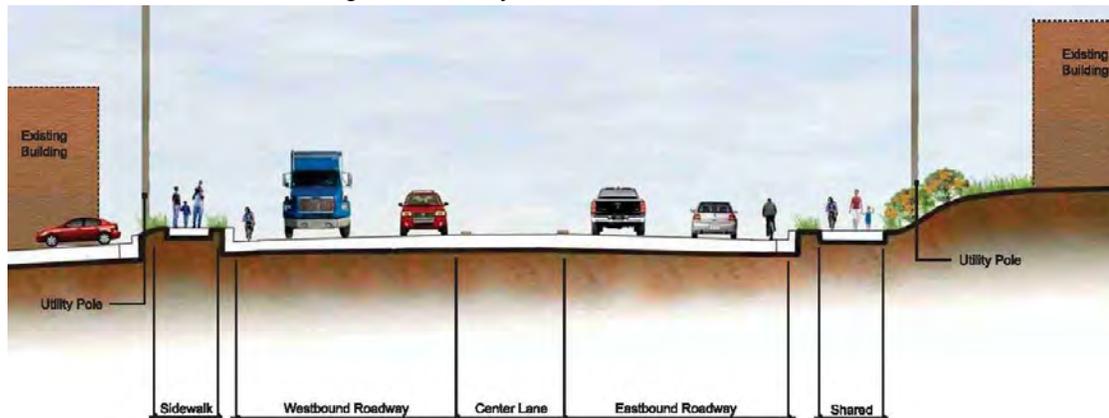
The MD 650 Intersection Improvement option would require approximately 0.12 additional acres of Right-of-Way with no changes in woodland impacts as compared to the base Alternative 3. The Good Hope Road roundabout would require approximately 1.71 additional acres of Right-of-Way and impact an additional 1.64 acres of woodlands as compared to the base Alternative 3. The Thompson Road roundabout would require approximately 1.74 additional acres of Right-of-Way with no changes in woodland impacts as compared to the base Alternative 3. The Peach Orchard Road roundabout would decrease Right-of-Way required by approximately 0.09 acre and

would impact approximately 0.08 additional acres of woodlands as compared to the base Alternative 3. The intersection improvement options would not change stream impacts.

Segment D: MD 198 (Sandy Spring Road) from CO2445 (Old Columbia Pike – Southern Spur) to US 29 (Columbia Pike)

The base Alternative 3 has the same features as the base Alternative 2 except as follows:

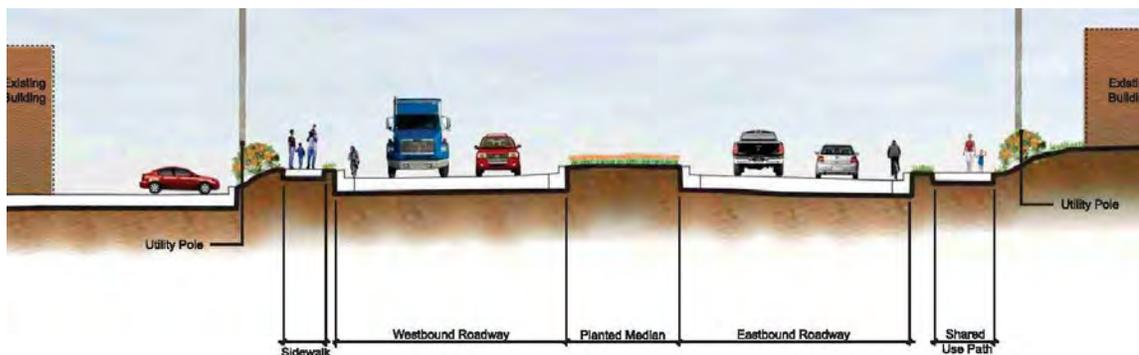
- Constructs a five-lane closed-section roadway with a continuous center two-way left-turn lane, while accommodating on-road bicycles



**Figure 23 – Alternative 3 Base Improvement
Segment D Typical Section**

The base Alternative 3 would require approximately 1.92 acres of Right-of-Way and would impact 57 linear feet of streams. No woodlands would be impacted.

The access management option provides a closed-section four-lane roadway with an 18-foot-wide median, while accommodating on-road bicycles.



**Figure 24 – Alternative 3 Access Management Option Improvement
Segment D Typical Section**

This option would decrease Right-of-Way required by approximately 0.21 acre and decrease stream impacts by 9 linear feet as compared to the base Alternative 3. No impacts to woodlands would occur with this option.

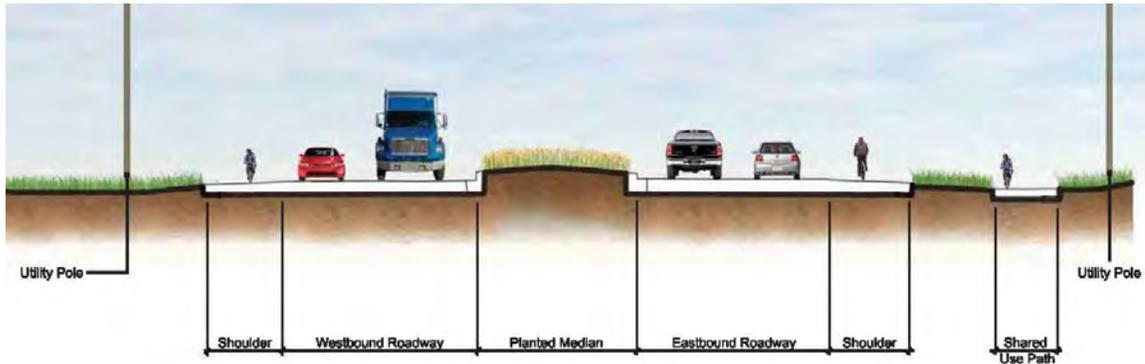
The intersection improvement option adds a second westbound left turn lane and converts the shared right-through lanes to separate through and right turn lanes on the eastbound and northbound approaches, and adds a second northbound right turn lane at Old Columbia Pike.

The intersection improvement option would require approximately 0.18 additional acres of Right-of-Way as compared to the base Alternative 3. No impacts to streams or woodlands would occur with this option.

Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95

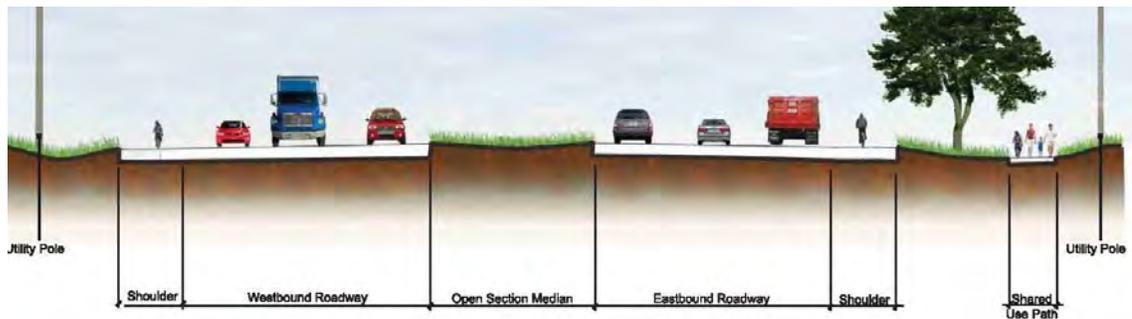
The base Alternative 3 has the same features as the base Alternative 2 except as follows:

- Constructs a four-lane and six-lane divided roadway that accommodates on-road bicycles



**Figure 25 – Alternative 3 Base Improvement Closed Section
Segment E Typical Section**

The base Alternative 3 would require approximately 6.38 acres of Right-of-Way and would impact 36 linear feet of streams and 0.98 acre of woodlands.



**Figure 26 – Alternative 3 Base Improvement Open Section
Segment E Typical Section**

The intersection improvement option adds a second westbound left turn lane and eliminates the northbound left turns at McKnew Road, and moves the traffic signal to and adds a median break at Cedar Tree Drive, while adding a westbound left and double northbound left turn lanes at Cedar Tree Drive.

The intersection improvement option would require approximately 0.53 additional acres of Right-of-Way and would impact an additional 0.46 acre of woodlands as compared to the base Alternative 3. No stream impacts would occur with this option.

C. Alternatives Analysis/Screening

Each alternative was qualitatively analyzed to determine overall feasibility. Criteria used to screen the alternatives include elements of the Purpose and Need, and potential Socioeconomic, Environmental and Cultural Resource impacts. Through use of a qualitative evaluation matrix (See Tables 12-1 through

12-4), consistent criterion were applied to all alternatives to determine the rationale for retaining or dropping each alternative. For details on the alternatives evaluation, **See Appendix E.**

Table 12-1. MD 28/MD 198 Corridor Improvement Study Build Alternatives Analysis Criteria – Alternative 2 Segments A and B

CRITERIA	Alternative 2, Segment A: MD 97 (Georgia Avenue) to MD 182 (Layhill Road) Transportation Systems Management/ Transportation Demand Management (TSM/TDM)			Alternative 2, Segment B: MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) Transportation Systems Management/ Transportation Demand Management (TSM/TDM)	
	Base Alternative (Bicycle/Pedestrian Features)	Access Management Provisions Option	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian Features)	Intersection Improvement Option
	Widen shoulders, 5' sidewalk to south, 10' shared-use path to north	3 Frontage Roads	Wintergate Drive Roundabout	Widen shared-use path to 10' on north	Norwood Road Turn Lanes
Meets Purpose and Need					
Does Alternative improve local traffic safety and operations for motorists?	Neutral	Positive	Positive	Neutral	Positive
Does Alternative improve local traffic safety and operations for bicyclists?	Positive	Positive	Negative	Positive	Negative
Does Alternative improve local traffic safety and operations for pedestrians?	Positive	Positive	Negative	Positive	Neutral
Does Alternative manage Access?	Neutral	Positive	Neutral	Neutral	Neutral
Does Alternative preserve rural/suburban quality of life?	Positive	Neutral	Negative	Neutral	Neutral
Does Alternative consider local planning visions and state growth policies for communities?	Positive	Positive	Neutral	Neutral	Neutral
Other Considerations					
Number of impacted properties	85	+6	+3	0	+0
Number of potential displacements	5	+0	+0	0	+0
Number of historic/archeological sites impacted	1	+0	+0	0	+0
Number of parks impacted	0	+0	+0	0	+0
Linear feet of stream impacted	407	+0	+0	0	+0
Acres of wetlands impacted	0.13	+0	+0	0	+0
Acres of 100-year floodplain impacted	1.61	+0.17	+0	0.15	+0
Acres of woodlands impacted	7.30	+1.07	+0	0	+0
Number of specimen trees impacted	67	+8	+1	0	+0
Level of effort to construct	Medium	Medium	High	Low	Low
Cost (\$millions)	38-43	+(8-9)	+(1.5-2)	3-3.5	+(0.5)

Table 12-2. MD 28/MD 198 Corridor Improvement Study Build Alternatives Analysis Criteria – Alternative 2 Segments C, D and E

CRITERIA	Alternative 2, Segment C: MD 650 (New Hampshire Avenue) to Old Columbia Pike Transportation Systems Management/Transportation Demand Management (TSM/TDM)							Alternative 2, Segment D: Old Columbia Pike to US 29 Transportation Systems Management/Transportation Demand Management (TSM/TDM)		Alternative 2, Segment E: US 29 to I-95 Transportation Systems Management/Transportation Demand Management (TSM/TDM)	
	Base Alternative (Bicycle/Pedestrian Features)	Access Management Provisions Option		Intersection Improvement Option				Base Alternative (Bicycle/Pedestrian Features)	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian Features)	Intersection Improvement Option
	Widen shoulders, 10' shared-use path to South	2-Way Center Turn	6' Median	MD 650 Turn Lanes	Good Hope Roundabout	Thompson Roundabout	Peach Orchard Roundabout	Widen Shoulders, 5' sidewalk to North, 10' shared-use path to South	Old Columbia Pike Turn Lanes	10' shared-use path to South	McKnew Road Turn Lanes
Meets Purpose and Need											
Does Alternative improve local traffic safety and operations for motorists?	Neutral	Positive	Positive	Positive	Positive	Positive	Positive	Neutral	Positive	Neutral	Positive
Does Alternative improve local traffic safety and operations for bicyclists?	Positive	Neutral	Negative	Negative	Negative	Negative	Negative	Positive	Negative	Positive	Negative
Does Alternative improve local traffic safety and operations for pedestrians?	Positive	Negative	Positive	Neutral	Negative	Negative	Negative	Positive	Neutral	Positive	Negative
Does Alternative manage Access?	Neutral	Positive	Positive	Neutral	Positive	Positive	Positive	Neutral	Neutral	Neutral	Neutral
Does Alternative preserve rural/suburban quality of life?	Positive	Negative	Positive	Neutral	Neutral	Neutral	Neutral	Positive	Neutral	Positive	Neutral
Does Alternative consider local planning visions and state growth policies for communities?	Positive	Positive	Positive	Neutral	Neutral	Neutral	Neutral	Positive	Neutral	Positive	Neutral
Other Considerations											
Number of impacted properties	111	+13	+9	+7	+6	+10	+7	14	+11	54	+3
Number of potential displacements	16	+1	+0	+0	+0	+2	+0	4	+6	0	+0
Number of historic/archeological sites impacted	4	+0	+0	+0	+1	+0	+1	0	+0	0	+0
Number of parks impacted	1	+0	+0	+0	+0	+0	+0	0	+0	0	+0
Linear feet of stream impacted	41	-41	-41	+0	+0	+0	+0	14	+0	36	+0
Acres of wetlands impacted	0.13	+0.02	-0.02	+0	+0	+0	+0.23	0	+0	0	+0
Acres of 100-year floodplain impacted	0.19	+0.06	+0.03	+0	+0	+0	+0	0	+0	0	+0
Acres of woodlands impacted	4.29	-0.95	-1.33	+0.04	+2.06	+0.17	+0.27	0	+0	0.60	+0.43
Number of specimen trees impacted	74	+3	+1	+2	+10	+6	+0	3	+1	3	+0
Level of effort to construct	Medium	Medium	Medium	Low	Medium	Medium	Medium	High	High	Low	Medium
Cost (\$millions)	42-46	+(13-14)	+(16-18)	+(7-8)	+(7-7.5)	+(5-6)	+(4-5)	3-3.5	+(5-6)	10-11	+(1-2)

Table 12-3. MD 28/MD 198 Corridor Improvement Study Build Alternatives Analysis Criteria– Alternative 3 Segments A and B

CRITERIA	Alternative 3, Segment A: MD 97 (Georgia Avenue) to MD 182 (Layhill Road) Typical Section Improvement			Alternative 3, Segment B: MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) Typical Section Improvement	
	Base Alternative (Bicycle/Pedestrian/Road Features)	Access Management Provisions Option	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian/Road Features)	Intersection Improvement Option
	4-Lane Divided Roadway with wide shoulders, 5' sidewalk to South, 10' shared-use path to North	3 Frontage Roads	Wintergate Drive Roundabout	4-Lane Divided Roadway, Widen shared-use path to 10' on North	Norwood Road Turn Lanes
Meets Purpose and Need					
Does Alternative improve local traffic safety and operations for motorists?	Positive	Positive	Positive	Positive	Positive
Does Alternative improve local traffic safety and operations for bicyclists?	Positive	Positive	Negative	Positive	Negative
Does Alternative improve local traffic safety and operations for pedestrians?	Positive	Positive	Negative	Positive	Neutral
Does Alternative manage Access?	Positive	Positive	Positive	Neutral	Neutral
Does Alternative preserve rural/suburban quality of life?	Neutral	Neutral	Negative	Neutral	Neutral
Does Alternative consider local planning visions and state growth policies for communities?	Positive	Positive	Neutral	Negative	Neutral
Other Considerations					
Number of impacted properties	84	+8	+2	8	+0
Number of potential displacements	5	+0	+0	0	+0
Number of historic/archeological sites impacted	1	+0	+0	0	+0
Number of parks impacted	1	+0	+0	0	+0
Linear feet of stream impacted	457	+0	+0	385	+0
Acres of wetlands impacted	0.33	+0	+0	0.09	+0
Acres of 100-year floodplain impacted	3.01	+0	+0	3.86	+0
Acres of woodlands impacted	16.20	+0.51	+0.32	12.43	+0
Number of specimen trees impacted	71	+0	+3	13	+0
Level of effort to construct	High	Medium	High	Medium	Low
Cost (\$millions)	95-105	+(6.5-7.5)	+(1.5-2)	34-37.5	+(0.5)

Table 12-4. MD 28/MD 198 Corridor Improvement Study Build Alternatives Analysis Criteria – Alternative 3 Segments C, D and

CRITERIA	Alternative 3, Segment C: MD 650 (New Hampshire Avenue) to Old Columbia Pike Typical Section Improvement Alternative							Alternative 3, Segment D: Old Columbia Pike to US 29 Typical Section Improvement Alternative			Alternative 3, Segment E: US 29 to I-95 Typical Section Improvement Alternative	
	Base Alternative (Bicycle/ Pedestrian/Road Features)	Access Management Provisions Option		Intersection Improvement Option				Base Alternative (Bicycle/ Pedestrian/Road Features)	Access Management Provisions Option	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian/Road Features)	Intersection Improvement Option
	4-Lane Divided w/ wide shoulders, 10' shared-use path to South	2-Way Center Turn	6' Median	MD 650 Turn Lanes	Good Hope Roundabout	Thompson Roundabout	Peach Orchard Roundabout	5-Lane Roadway with wide shoulders, 5' sidewalk to North, 10' shared-use path to South	18' Median	Old Columbia Pike Turn Lanes	4- and 6- Lane Divided Roadway, 10' shared-use path to South	Relocate signal from McKnew to Cedar Tree Drive and revise turn lanes
Meets Purpose and Need												
Does Alternative improve local traffic safety and operations for motorists?	Negative	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Does Alternative improve local traffic safety and operations for bicyclists?	Positive	Neutral	Negative	Negative	Negative	Negative	Negative	Positive	Negative	Negative	Positive	Negative
Does Alternative improve local traffic safety and operations for pedestrians?	Positive	Negative	Positive	Neutral	Negative	Negative	Negative	Positive	Positive	Neutral	Positive	Neutral
Does Alternative manage Access?	Positive	Positive	Positive	Neutral	Positive	Positive	Positive	Positive	Positive	Neutral	Neutral	Neutral
Does Alternative preserve rural/suburban quality of life?	Negative	Negative	Neutral	Neutral	Neutral	Neutral	Neutral	Negative	Neutral	Neutral	Negative	Neutral
Does Alternative consider local planning visions and state growth policies for communities?	Negative	Positive	Positive	Neutral	Neutral	Neutral	Neutral	Positive	Positive	Neutral	Positive	Positive
Other Considerations												
Number of impacted properties	139	-3	-5	+1	+0	+0	+0	19	+0	+2	57	+3
Number of potential displacements	26	-8	-7	+0	+0	+0	+0	11	-1	+0	0	+0
Number of historic/archeological sites impacted	4	+0	+0	+0	+0	+0	+0	0	+0	+0	0	+0
Number of parks impacted	1	+0	+0	+0	+0	+0	+0	0	+0	+0	0	+0
Linear feet of stream impacted	125	-9	+4	+0	+0	+0	+0	57	-9	+0	36	+0
Acres of wetlands impacted	0.33	-0.08	-0.03	+0	+0	+0	+0.13	0	+0	+0	0	+0
Acres of 100-year floodplain impacted	0.42	-0.13	-0.01	+0	+0	+0	+0	0	+0	+0	0	+0
Acres of woodlands impacted	5.14	-0.45	-0.13	+0	+1.64	+0	+0.08	0	+0	+0	0.98	+0.46
Number of specimen trees impacted	83	-1	-1	+0	+8	+1	+0	3	+0	+1	11	+0
Level of effort to construct	High	Medium	Medium	Low	Medium	Medium	Medium	High	High	High	Low	Medium
Cost (\$millions)	105-116	-(7-8)	-(9-10)	+(7-8)	+(3.5-4)	+(3-4)	+(0.5-1)	10+11	-(0.5-1)	+(1)	30-33	+(1.5-2)

D. Alternatives Retained for Detailed Study

SHA recommends retaining the following alternatives for further consideration. Qualitative impacts for all alternatives are shown in **Tables 12-1 through 12-4**, and potential quantitative impacts for the alternatives retained for detailed study (ARDS) are shown in **Tables 13-1 through 13-4**.

The proposed alternatives retained for detailed study include provisions to enhance the multimodal characteristics across the entire corridor including provisions for on-road and off-road bicycle use and for pedestrians. These provisions also provide improved access for cyclists and pedestrians to transit services along the corridor. Recognizing the varying roadway conditions and communities along the corridor led to the identification of the five corridor segments. This allows for the consideration of different and unique improvement alternatives that may be applied individually to each of the segments. For example, only the No-Build Alternative 1 has been retained for detailed study along segment B (MD 182 to MD 650)."

Alternative 1 - No-Build (See Figure 9)

No major improvements are proposed under Alternative 1, the No-Build Alternative. Minor short-term improvements would occur as part of routine maintenance and safety operations. The No-Build Alternative does not address the purpose and need for the project. It serves as a baseline for comparing the impacts and benefits associated with the Build alternatives. The Montgomery County Department of Transportation (MCDOT) staff supports the retention of the No-Build Alternative.

Build Alternatives

Segments of Build Alternatives 2 and 3 provide reasonable improvements within the roadway network to relieve locally generated congestion while managing access; and improving safety and traffic operations for motorists, bicyclists and pedestrians traveling along the corridor.

Alternative 2 – Transportation Systems Management (TSM)/Transportation Demand Management (TDM)

Alternative 2 provides bicycle and pedestrian improvements as a base alternative, with access management and intersection improvement options.

Alternative 2 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) (See Figure 10)

The base Alternative 2 is consistent with the project's purpose and need and is compatible with full implementation of the Master Plan features. This alternative provides safety and operational improvements for bicyclists and pedestrians while maintaining the rural/suburban quality of life within the project area. The base Alternative 2 would have moderate impacts to socioeconomic and environmental resources (i.e., Batchellors Run and approximately 85 properties). Public comments about this alternative included concerns about ways in which access from driveways and side streets would be improved. MCDOT staff supports the retention of this alternative.

The access management option for this alternative is consistent with the project's purpose and need and provides more of the Master Plan features than the base Alternative 2. This option provides safety and operational improvements for motorists, bicyclists, and pedestrians. This

option would increase impacts to socioeconomic and environmental resources (Batchellors Run and approximately six more properties than the base Alternative 2 would impact). Public comments about this option included concerns about the number of property impacts. MCDOT staff supports the retention of this option.

Alternative 2 - Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike Southern Spur) (See Figures 11 and 12)

The base Alternative 2 is consistent with the project's purpose and need and provides continuous bicycle and pedestrian facilities. This alternative provides safety and operational improvements for bicyclists and pedestrians while maintaining the rural/suburban quality of life and supporting State growth policies. The base Alternative 2 would impact the Montgomery County designated Upper Paint Branch Special Protection Area (SPA), which encompasses the Paint Branch mainstem and tributaries, cultural resources, socioeconomic resources, cemeteries, other environmental resources, and approximately 111 properties. Public comments about this alternative included concerns about the ways in which access from driveways and side streets would be improved. MCDOT staff supports the retention of this alternative.

The two-way center turn lane access management option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option provides safety improvements for motorists while managing access and supporting State growth policies. This option would increase impacts to the SPA, cultural resources, socioeconomic resources, cemeteries, other environmental resources, and approximately 13 more properties than the base Alternative 2. Public comments about this option included support for access management and concerns for the safety of bicyclists and pedestrians.

The six-foot median access management option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option provides safety improvements for motorists and pedestrians while managing access and supporting State growth policies. The installation of roundabouts would help address the increased need for U-turns that would result from this option. This option would result in slightly increased impacts to the Upper Paint Branch Special Protection Area (SPA), cultural resources, socioeconomic resources, cemeteries, environmental resources, and approximately nine more properties than the base Alternative 2. Public comments about this option included support for access management and safety and operational concerns for bicyclists.

The MD 650 turn lanes intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. It would require a profile adjustment to the Montgomery County-owned segment of Norbeck Road west of the intersection to improve sight distance. This option is generally neutral with regard to safety improvements for bicyclists and pedestrians, rural/suburban quality of life, access management, and State growth policies for communities. This option would slightly increase impacts to socioeconomic and environmental resources and approximately seven more properties than the base Alternative 2. Public comments about this option raised concerns about sight distance at the intersection.

The Good Hope Road roundabout intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option would assist with the U-turn movements when combined with the six-foot median option, and could calm traffic. It could also adversely impact emergency vehicles and make it more difficult for trucks to traverse the corridor segment. Although this option does not improve safety and

operations for bicyclists and pedestrians at the intersection—as bicyclists would typically be directed to navigate the roundabout by using the off-road shared-use path—the option does provide improvements for access management and supports State growth policies for communities. This option would slightly increase impacts to woodlands and the Edgewood II historic property and approximately six more properties than the base Alternative 2. Public comments about this option provided no clear preference for or against the option. MCDOT staff supports the retention of this option.

The Thompson Road roundabout intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option would also assist with the U-turn movements when combined with the six-foot median option, and could calm traffic. It could adversely impact emergency vehicles and make it more difficult for trucks to traverse the corridor segment. This option does not improve safety and operations for bicyclists and pedestrians at the intersection—as bicyclists would typically be directed to navigate the roundabout by using the off-road shared-use path, but it does provide improvements for access management and supports State growth policies for communities. This option would slightly increase impacts to woodlands and approximately ten more properties than the base Alternative 2. Public comments about this option provided no clear preference for or against the option. MCDOT staff does not support the retention of this option and states it is likely that only one roundabout between Peach Orchard Road and Thompson Road would be necessary, and due to its higher classification, Peach Orchard Road would be MCDOT staff's preference. This option has been retained due to U-turn and traffic calming benefits in case an issue is raised at the locations of either of the other two roundabouts.

The Peach Orchard Road roundabout intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option would also assist with the U-turn movements when combined with the six-foot median option, and could calm traffic. It could adversely impact emergency vehicles and make it more difficult for trucks to traverse the corridor segment. This option does not improve safety and operations for bicyclists and pedestrians at the intersection—bicyclists would typically be directed to navigate the roundabout by using the off-road shared-use path, but it does provide improvements for access management and supports State growth policies for communities. This option would slightly increase impacts to wetlands and the Spencer-Carr House historic property and approximately seven more properties than the base Alternative 2. Public comments about this option provided no clear preference for or against the option. MCDOT staff supports the retention of this option and states it is likely that only one roundabout between Peach Orchard Road and Thompson Road would be necessary, and due to its higher classification, Peach Orchard Road would be MCDOT staff's preference.

Alternative 2 - Segment D: MD 198 (Sandy Spring Road) from Old Columbia Pike (Southern Spur) to US 29 (Columbia Pike) (See Figure 13)

The base Alternative 2 is consistent with the project's purpose and need. This alternative provides operational improvements for bicyclists and pedestrians while maintaining the suburban quality of life and supporting State growth policies for communities, but does not address motorists' access management and safety concerns. The base Alternative 2 would impact approximately 14 properties and parking area for businesses. Public comments about this

alternative included concerns about bicyclist safety. MCDOT staff supports the retention of this alternative.

The intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 2. This option provides safety improvements for motorists and bicyclists, access management, suburban quality of life, and supports State growth policies for communities. This option would impact approximately 11 more properties than the base Alternative 2. Public comments about this option included concerns for bicyclist safety along with the skew of Old Columbia Pike and the difficulty in turning left or right at this intersection due to conflicts with the school bus. The other concerns were about the potential impacts to the businesses.

Alternative 2 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 (See Figure 14)

The base Alternative 2 is consistent with the project's purpose and need and with the Master Plan, since it provides consistent bicycle and pedestrian facilities along the corridor segment. This alternative provides safety and operational improvements for bicyclists and pedestrians while maintaining the suburban quality of life and supporting State growth policies for communities. The base Alternative 2 would have low to moderate impacts on socioeconomic and environmental resources and approximately 54 properties. Public comments indicated no strong preference for or against this alternative. MCDOT staff supports the retention of this alternative.

Alternative 3 – Typical Section Improvements

Alternative 3 provides bicycle/pedestrian/roadway improvements as a base alternative, with access management and intersection improvement options.

Alternative 3 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) (See Figure 15)

The base Alternative 3 is consistent with the project's purpose and need, and with Master Plan features for the corridor segment. This alternative provides safety and operational improvements for motorists, bicyclists, and pedestrians while managing access and supporting State growth policies for communities. The base Alternative 3 would increase impacts to socioeconomic and environmental resources (Batchellors Run and East Norbeck Local Park), but would impact one less property than the base Alternative 2. . The bridge crossing the Intercounty Connector (ICC) would require widening. Public comments about this alternative were positive and supportive. MCDOT staff supports the retention of the base Alternative 3 and notes that it is the only project segment on the County's State Transportation Priorities Letter.

The access management option is consistent with the project's purpose and need when the option is included as part of the base Alternative 3. This option provides safety and operational improvements for motorists, bicyclists, and pedestrians while managing access and supporting State growth policies for communities. This option would impact approximately eight more properties than the base Alternative 3 would impact. Public comments about this option included concerns about property impacts.

Alternative 3 - Segment D: MD 198 (Sandy Spring Road) from CO2445 (Old Columbia Pike – Southern Spur) to US 29 (Columbia Pike) (See Figure 16)

The base Alternative 3 is consistent with the project's purpose and need, and with Master Plan features. This alternative provides positive safety improvements for motorists, bicyclists, and pedestrians while managing access and supporting State growth policies for communities. The base Alternative 3 would increase impacts to resources, including impacts to approximately five more properties than the base Alternative 2. . Public comments included concerns about pedestrian safety, but owners of adjacent business properties favored this option. MCDOT staff supports the retention of this alternative.

The access management option is consistent with the project's purpose and need and with Master Plan features. This alternative provides positive safety improvements for motorists, and pedestrians while managing access and supporting State growth policies for communities. This option would not increase impacts to resources. Public comments about this option included concerns about pedestrian and bicyclist safety. MCDOT staff supports the retention of this option.

The intersection improvement option is consistent with the project's purpose and need when the option is included as part of the base Alternative 3. This option provides safety and operational improvements for motorists and bicyclists, access management, suburban quality of life, and State growth policies for communities. This option would impact approximately two more properties than the base Alternative 3 would impact. Public comments about this option included concerns about pedestrian and bicyclist safety. MCDOT staff supports the retention of this option.

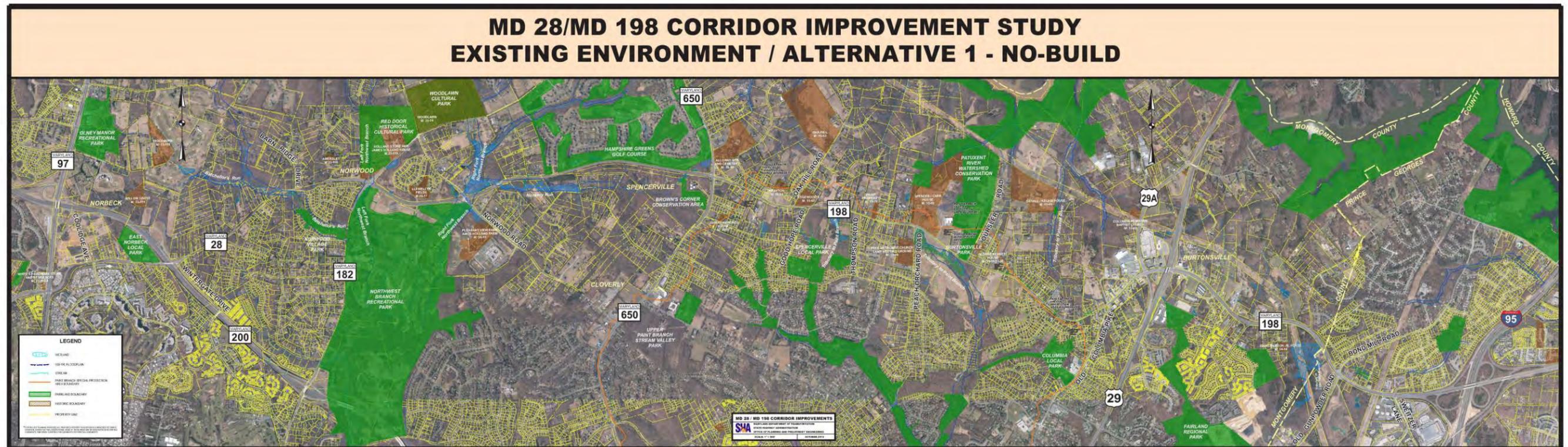


Figure 27. Alternative 1 – No-Build.

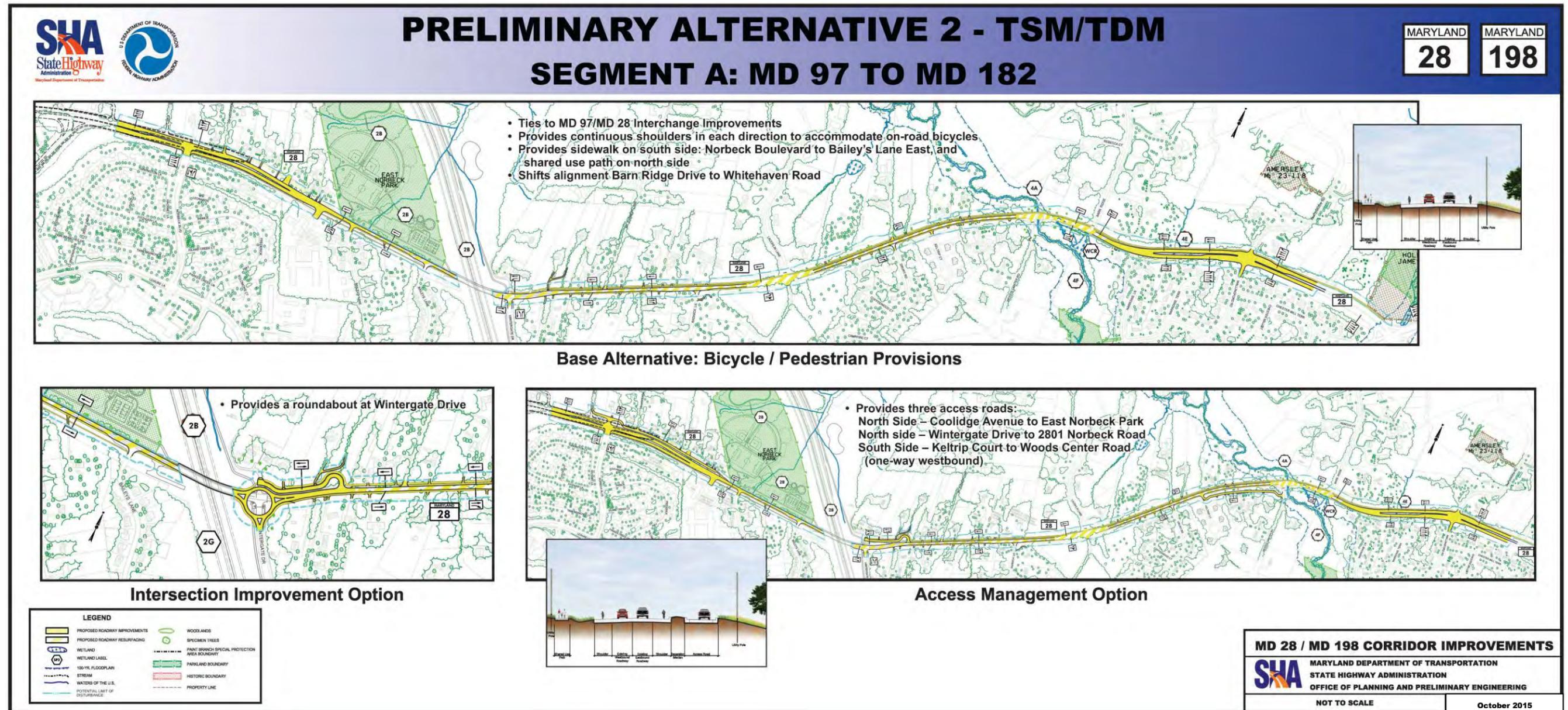


Figure 28. Alternative 2 – Segment A.

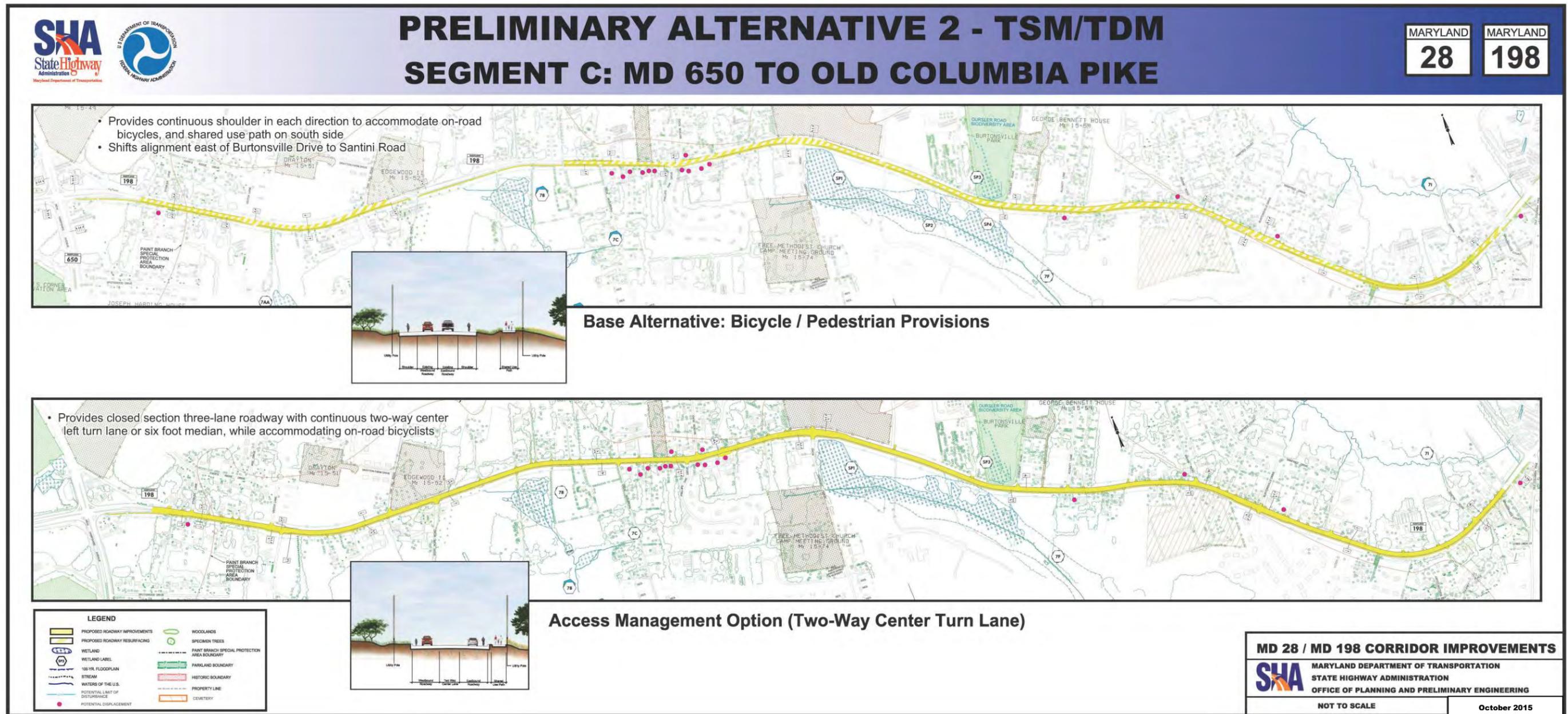


Figure 29. Alternative 2 – Segment C.

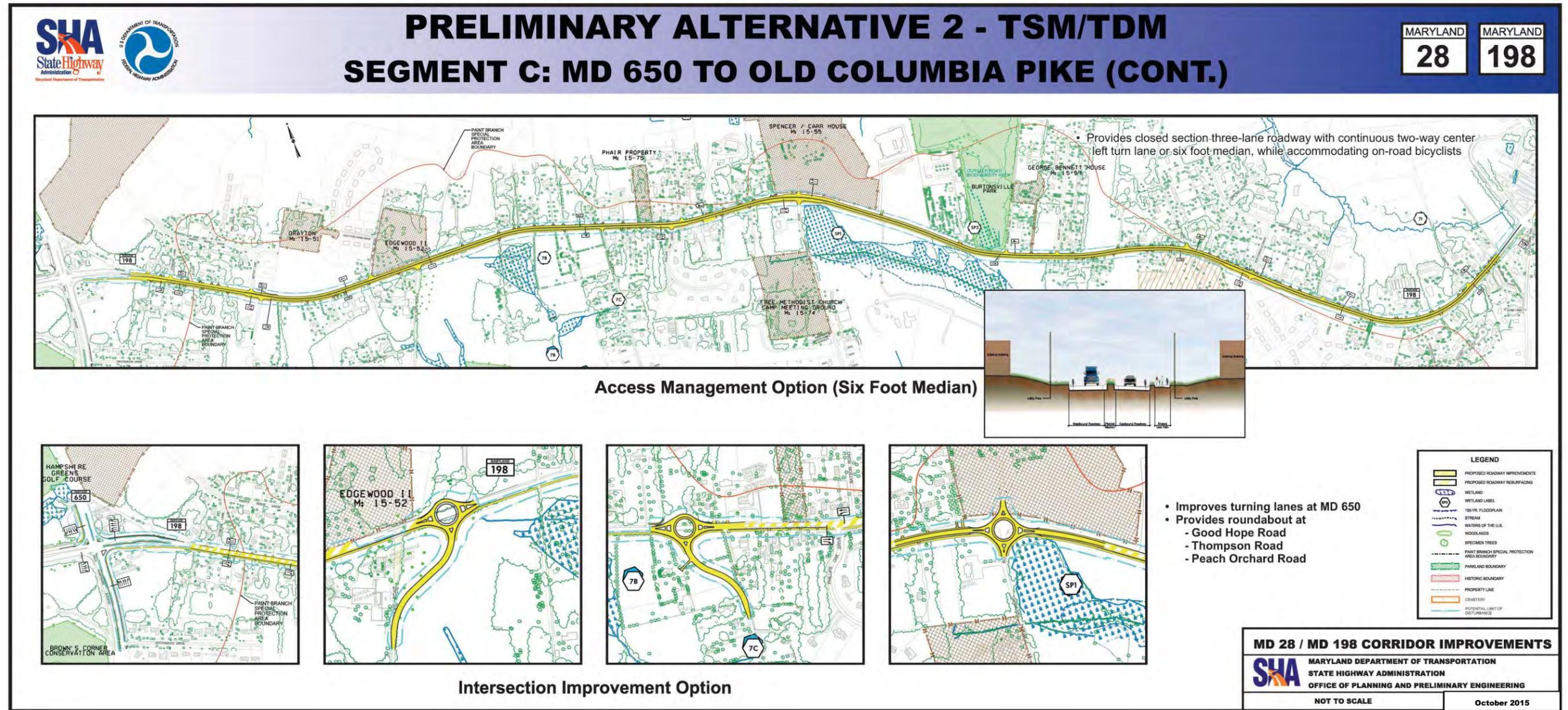


Figure 30. Alternative 2 – Segment C (CON'T).

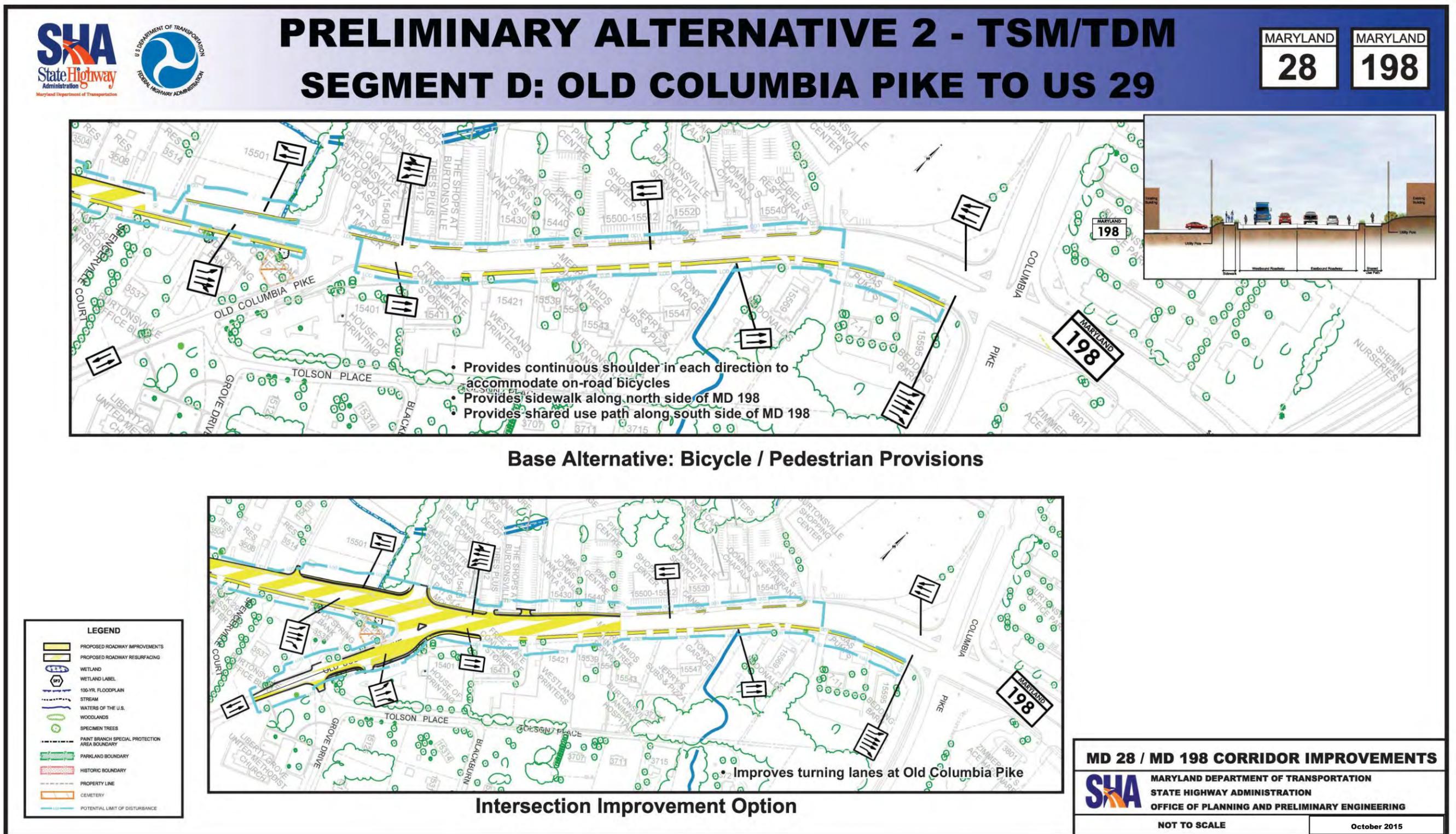


Figure 31. Alternative 2 – Segment D.

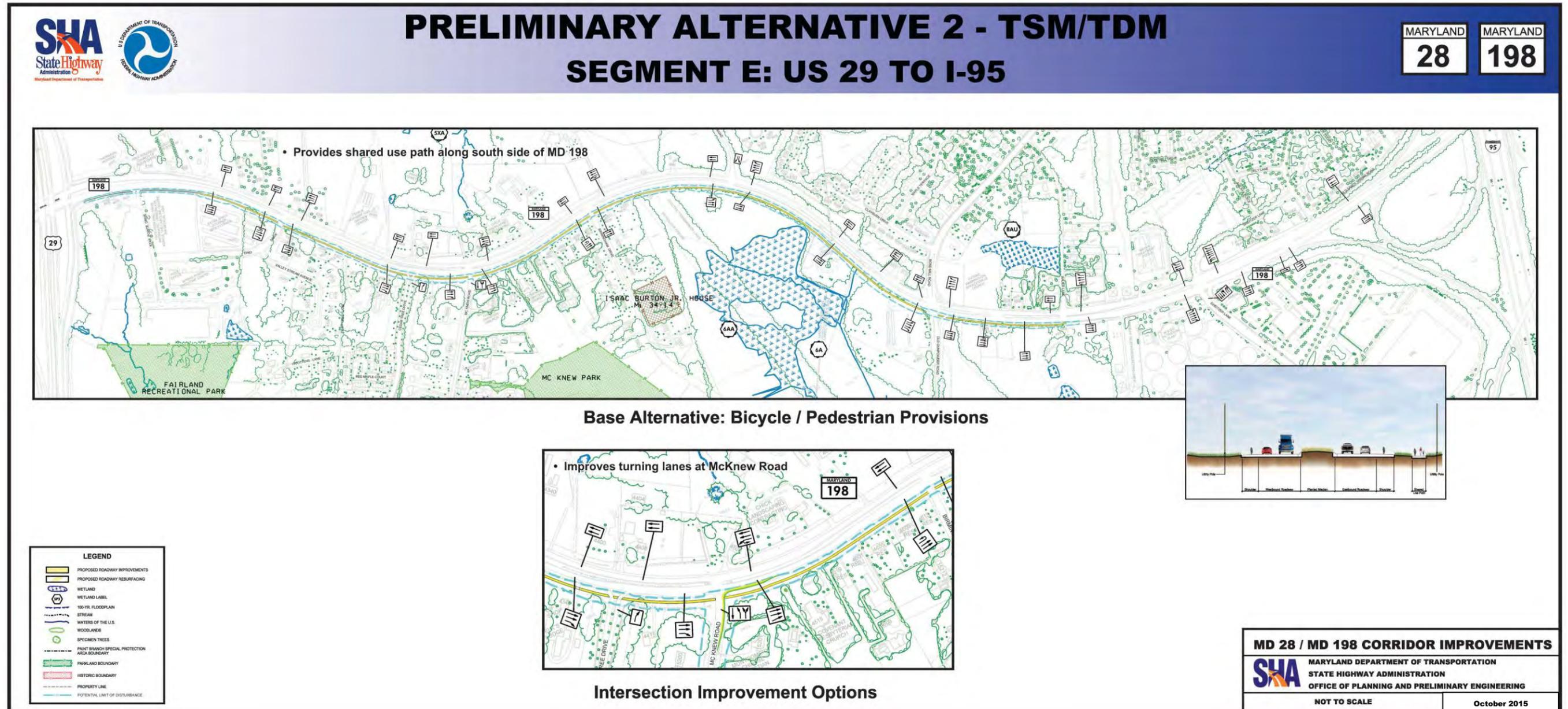


Figure 32. Alternative 2 – Segment E.

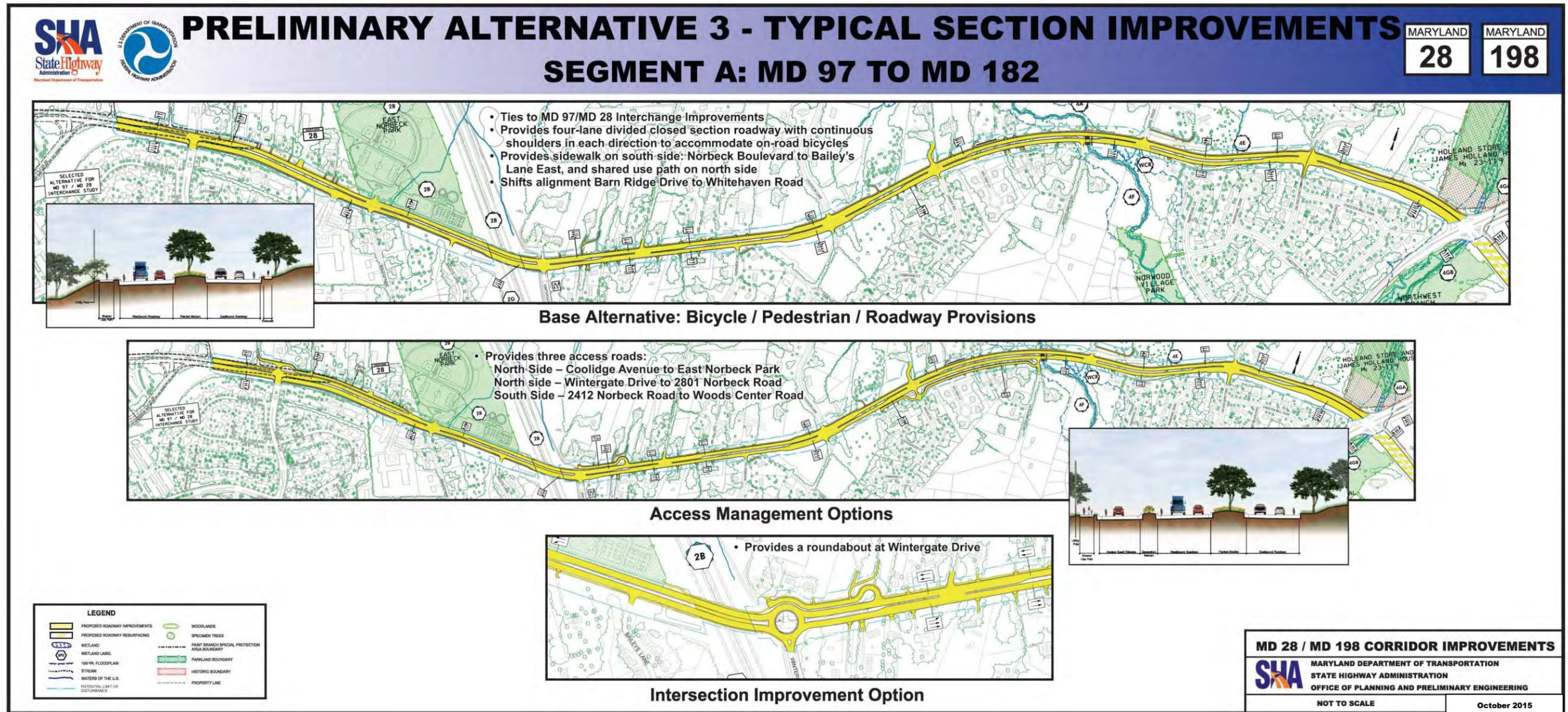


Figure 33. Alternative 3 – Segment A.

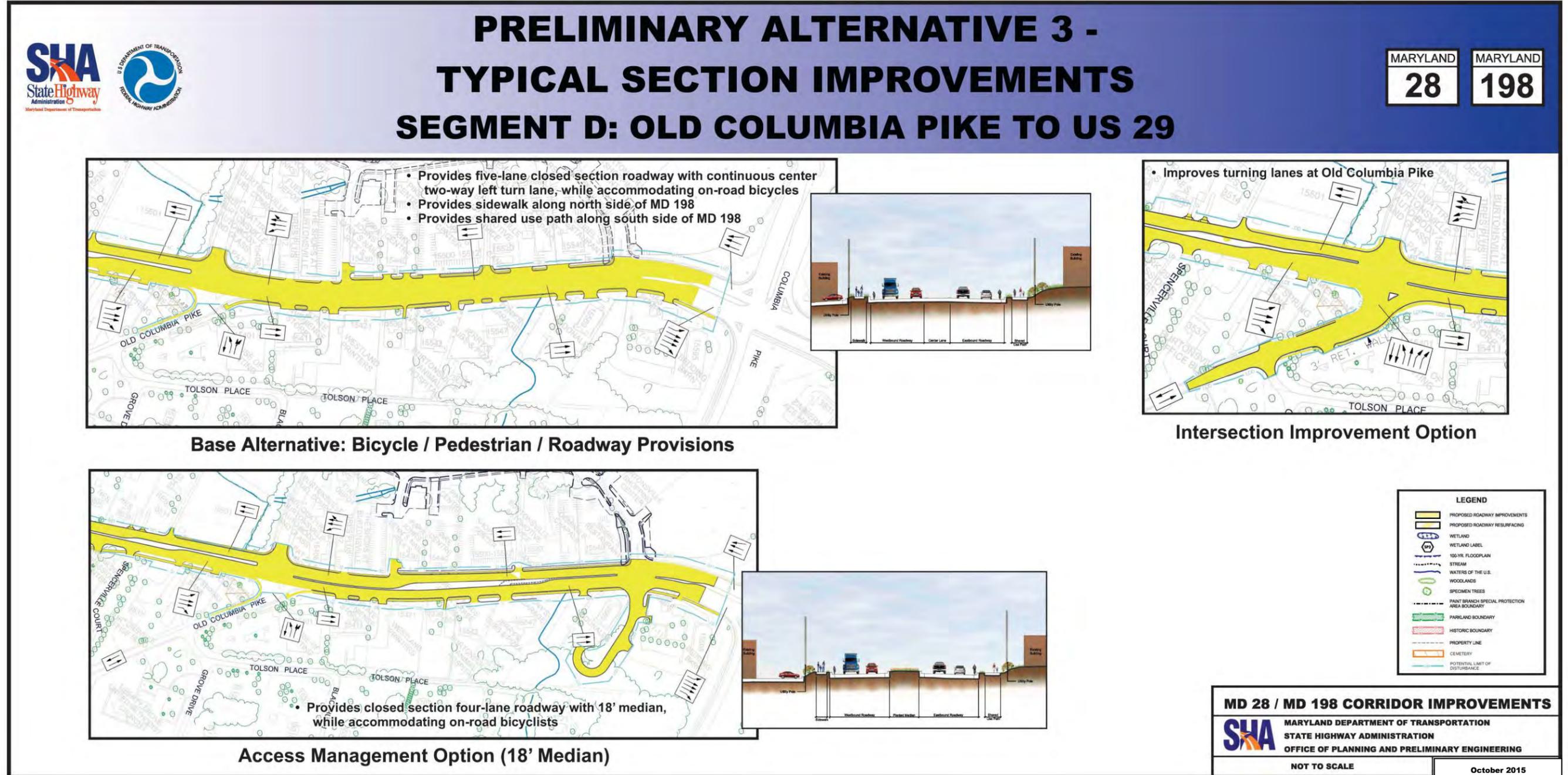


Figure 34. Alternative 3 – Segment D.

E. Alternatives Not Recommended for Detailed Study

SHA recommends dropping these alternatives from further consideration:

Alternative 2 - Transportation Systems Management (TSM)/Transportation Demand Management (TDM)

Alternative 2 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) - Intersection Improvement Option

This intersection improvement option would require altering the ICC Bridge, replacing an existing signal, and changing driver expectations. It would not improve safety and operations for bicyclists and pedestrians and would cause slightly higher impacts to socio-economic and environmental resources than the base Alternative 2. Most public comments about the option were negative and unsupportive. MCDOT staff supports the dropping of this option.

Alternative 2 - Segment B: CO7445 (Norbeck Road) MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) - Base Alternative and Intersection Improvement Option

Although the improvements under this alternative and option would impact few resources, they would involve minor widening of existing facilities, would add no new functions for users of the segment, and are not consistent with developing projects cost-effectively to meet the project's purpose and need. This option includes safety improvements for motorists, bicyclists, and pedestrians; access management; and is consistent with State growth policies for communities. Public comments expressed no positive support for these improvements.

Alternative 2 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 - Intersection Improvement Option

The improvements under this option would result in slightly higher resource impacts, including impacts to approximately three more properties than the base Alternative 2. This option includes safety improvements for motorists, bicyclists, and pedestrians; access management; suburban quality of life; and recognizes State growth policies. Although the public expressed some support for this option and this option would impact few resources, it would involve minor widening of existing facilities, would add no new functions for users of the segment, and is not consistent with developing projects cost-effectively to meet the project's purpose and need.

Alternative 3 - Typical Section Improvements

Alternative 3 - Segment A: MD 28 (Norbeck Road) from MD 97 (Georgia Avenue) to MD 182 (Layhill Road) - Intersection Improvement Option

This alternative would require altering the ICC Bridge, replacing an existing signal, and changing driver expectations. This option would not improve safety and operations for bicyclists and pedestrians and would impact approximately two more properties than the base Alternative 3 would impact. Most public comments about the option were negative and unsupportive. MCDOT staff supports the dropping of this option.

Alternative 3 - Segment B: CO7445 (Norbeck Road) MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) - Base Alternative and Intersection Improvement Option

Improvements under this option would impact few socio-economic and environmental resources; increase the safety of motorists, bicyclists, and pedestrians; provide access management;

recognize State growth policies for communities, and add functions for users of the corridor segment. However, they are not consistent with developing projects cost-effectively to meet the project's purpose and need. In addition, the public expressed no support for these improvements. MCDOT staff supports the dropping of these improvements and notes that the option's proximity to the ICC constitutes an overall negative impact.

Alternative 3 - Segment C: Base Alternative

This alternative would likely direct traffic away from parallel roadways (such as the ICC) resulting in increased congestion. It would not improve operations for motorists and would slightly increase impacts to resources. Approximately 28 more properties would be impacted under this alternative than under Alternative 2 – Segment C. Most public comments about the alternative were negative and unsupportive. The Maryland Department of Planning expressed concerns about Smart Growth, since the improvements would lie outside the Priority Funding Area (PFA). MCDOT staff supports the dropping of this alternative and provides that its proximity to the ICC constitutes an overall negative impact.

Alternative 3 - Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike - Southern Spur) Access Management Options

If implemented independent of the base Alternative 3, options under Alternative 3 - Segment C would simply be implementing the same Access Management Options as Alternative 2.

Alternative 3 - Segment C: MD 198 (Spencerville Road) from MD 650 (New Hampshire Avenue) to CO4552 (Old Columbia Pike Southern Spur) Intersection Improvement Options

If implemented independent of the base Alternative 3, options under Alternative 3 - Segment C would simply be implementing the same Access Management Options as Alternative 2.

Alternative 3 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 - Base Alternative

This alternative would not substantially improve traffic operations. Improvements would involve minor widening of existing facilities, would not substantially increase roadway function for users of the segment (when compared to Alternative 2), and are not consistent with developing projects cost-effectively to meet the project's purpose and need. Public comments about for this alternative were negative and unsupportive. MCDOT staff notes that Segment E is primarily in the City of Laurel in Prince George's County.

Alternative 3 - Segment E: MD 198 (Sandy Spring Road) from US 29 (Columbia Pike) to I-95 - Intersection Improvement Option

This option would impact approximately three more properties than the base Alternative 3. It would improve the safety of motorists, bicyclists, and pedestrians; provide access management; improve rural/suburban quality of life, and recognize State growth policies. Public comments about this option were unsupportive and included concerns about the removal of parking space along Cedar Lane.

IV. ENVIRONMENTAL OVERVIEW AND IMPACT ASSESSMENT

Environmental resources within the MD 28/MD 198 study area have been identified through the preliminary stages of the project planning process (See Figure 17). A summary of potential impacts, based upon conceptual engineering for each alternative can be found in Tables 13-1 to 13-4.

A. Socioeconomic Environmental and Cultural Resources

1. Land Use

The study area encompasses five master planning areas, each of which calls for the widening of MD 28/MD 198 to improve safety and alleviate traffic congestion along the study corridor. One master plan is associated with the portion of the study area in Prince George's County: "Subregion I," while the other four master plans are associated with the portion of the study area in Montgomery County: Aspen Hill (1994), Cloverly (1997), Fairland (1997), and Olney (2005). Generally, the MD 28/MD 198 study corridor includes a mix of suburban, industrial, and commercial land uses. The residential uses reflect predominately large lot single-family homes, with the highest density at the Leisure World community at the western end of the study area.

Maryland's Smart Growth legislation was enacted to limit sprawl and direct state funding for growth-related projects toward county-designated Priority Funding Areas (PFAs). Priority Funding Areas are geographic growth areas defined by State law and designated by local jurisdictions as targets for economic development. The project termini on the east and west ends of the study area are located within existing PFAs. MD 28 between MD 97 and MD 182 on the western end of the study corridor forms the northern boundary of the PFA, as does the section of MD 198 that passes through and east of Burtonsville. However, the mid-section of the MD 28 / MD 198 study corridor between MD 182 (Layhill Road) and Burtonsville is not located within a PFA. Prior to receiving state funding for construction and/or engineering and right-of-way acquisition, the project will be evaluated by both the Maryland Department of Transportation (MDOT) and the Maryland Department of Planning (MDP) for compliance with the 1997 Smart Growth and Neighborhood Conservation – Priority Funding Areas Act.

2. Environmental Justice Populations

In compliance with Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," SHA Will avoid disproportionately high and/or adverse effects on minority and/or low –income populations throughout the study area. A preliminary review of 2010 Census data reveals the presence of minority and low-income populations, particularly Hispanic or Latino, Black or African American, and Asian groups, south of Norbeck Road from west of MD 200 to MD 182, along Norbeck Road extended from Norwood Road to MD 650 and along MD 198 from US 29 to the Montgomery/Prince George's county line. Further public outreach and additional research of study area demographic and economic characteristics will be completed as the study progresses.

3. Displacements and Right-of-Way

The existing SHA-owned right-of-way along the MD 28/MD 198 study corridor varies from as narrow as 20 feet to as wide as approximately 180 feet. Additional right-of-way along the study corridor would be required to accommodate proposed roadway reconfigurations to address the project's purpose and need. Up to 253 properties would be impacted for Alternative 2 and up to 84 would be impacted for Alternative 3. Both residential and business displacements are anticipated as a result of any of the ARDS.

Residential displacements range from 5 to 19 for Alternative 2 and only 5 for Alternative 3. Business displacements range from 5 to 9 for Alternative 2 and 9 to 10 for Alternative 3. Church, school and cemetery impacts are anticipated with some segments of the ARDS. Church and school impacts range from 5 to 20 for Alternative 2 with 1 displacement for Segment D: intersection improvement option. Impacts for Alternative 3 range from 5 to 7 with no displacements. However, all build alternatives would require right-of-way from residential and business/institutional property owners. See below for a list of churches, schools and cemeteries impacted by the ARDS:

Alternative 2

- Segment A
 - The Church of Agape
 - Norbeck Community Church
 - Emmanuel Jesus Christ Church
 - Our Lady of Grace Catholic Church
 - New Apostolic Church
- Segment C
 - Spencerville Free Methodist Church
 - Jafaria Community Center
 - Burtonsville Baptist Church
 - Korean Seventh Day Adventist Church
 - Valley Brook Community Church
 - Spencerville Adventist Academy
 - Union Cemetery (up to 0.43 acre)
 - Merson Cemetery (up to 0.07 acre)
- Segment D
 - Church of Pentecost
 - Liberty Grove United Methodist Church
- Segment E
 - Montgomery Chinese Christian Church
 - Covenant Presbyterian Church

Alternative 3

- Segment A, Base Alternative
 - Norbeck Animal Clinic
 - The Church of Agape
 - Norbeck Community Church
 - Emmanuel Jesus Christ Church
 - Our Lady of Grace Catholic Church
 - New Apostolic Church
- Segment D
 - Church of Pentecost
 - Liberty Grove United Methodist Church

4. Cultural Resources

a. Historic Properties

An assessment of historic resources within the study corridor identified the following ten historic standing structures within the Area of Potential Effect (APE) that SHA has recommended as eligible for listing on the National Register of Historic Places (NRHP) and is coordinating with the Maryland Historical Trust (MHT) on eligibility determination:

- White's Hardware
- Llewelyn Fields
- Drayton
- Edgewood II
- Free Methodist Church Camp Meeting Ground
- George Bennett House
- Holland Store-James Holland House
- Spencer-Carr House
- William Phair Property
- Isaac Burton Jr. House

The Montgomery County Heritage Area (MCHA) (in Montgomery County) and the Anacostia Trails Heritage Area (ATHA) (in Prince George's County) intersect the MD 28/MD 198 study corridor: Coordination is on-going with the MHT to identify additional resources in the APE that have not been previously evaluated for NRHP eligibility and determine the impacts of the project on significant cultural resources in the study area. MHT has concurred with the number of historic properties in the study area and agree no additional historic properties were identified within the APE.

With the exception of the No-Build Alternative, five historic resources could potentially be impacted by the ARDS:

- Edgewood II
 - Impacted by Alternative 2, Segment C, Base Alternative (0.12 acre)
- George Bennett House
 - Impacted by Alternative 2, Segment C, Base Alternative (less than 0.01 acre)
- Holland Store-James Holland House
 - Impacted by Alternative 2, Segment C, Base Alternative (0.19 acre)
- Spencer-Carr House
 - Impacted by Alternative 2, Segment C, Base Alternative (0.35 acre)
- William Phair Property
 - Impacted by Alternative 2, Segment C, Base Alternative (0.05 acre)

b. Archeology

An assessment of archeological potential for the study corridor identified three archeological sites that were determined to be potentially significant for the information they may contain and will require Phase II archeological evaluations. Depending upon the outcome of any Phase II evaluations, Phase III data recovery excavations may be warranted. As design plans for the area are further developed, SHA will continue to coordinate with MHT to determine the possible impacts the alternatives may have on significant historic or archeological sites, as required under *36 CFR 800.4*.

5. Parklands

Parkland and recreational opportunities are present in the MD 28/MD198 study area, including:

- East Norbeck Local Park,
- Hampshire Greens Golf Course,
- Northwest Branch Recreational Park, and
- Burtonsville Local Park.

The ARDS could impact approximately 0.18 to 0.23 acre of Burtonsville Local Park under base Alternative 2, Segment C and approximately 0.90 acre of East Norbeck Local Park under base Alternative 3, Segment A. Coordination with local officials will continue throughout the planning study to ensure impacts have been minimized to the greatest extent possible to these parkland and recreational facilities. Any use of a publicly-owned and used park/recreational area/associated trail and/or significant historic site or archeological resource will require evaluation under Section 4(f) of the US DOT Act of 1966, as federal funds are being used for the current development phase of this project.

B. Natural Environmental Resources

1. Aquatic Resources

Several aquatic resources are located within the study area, including a variety of streams and associated tributaries, wetlands and 100-year designated floodplains. Approximately 2.7 miles of MD 198 east of MD 650 is within the Montgomery County designated Upper Paint Branch Special Protection Area (SPA), which encompasses the Paint Branch mainstem and tributaries, between MD 650 and Old Columbia Pike. The SPA includes the headwaters of Paint Branch which is designated as a Use III naturally reproducing trout stream. SHA will coordinate with M-NCPPC and the Montgomery County Department of Environmental Protection (MC DEP) staff regarding proposed improvements and mitigation for impacts within the SPA, potential impervious surface area within the SPA is summarized in Tables 13-1 through 13-4. The project has the potential to impact wetlands, floodplains, and watersheds associated with several high quality streams, both directly and cumulatively, which have been the focus of extensive restoration and preservation efforts. Efforts will be included throughout the project planning process to evaluate avoidance, minimization, and mitigation of these impacts to the extent possible via coordination with Federal, State, and County natural resource agencies.

a. Waters of the U.S. (Streams and Wetlands)

Impacts to streams within the study area as a result of the ARDS range from 0 to 508 linear feet. The streams include: Bel Pre Creek (Use IV), Batchellor's Run (Use IV), Left and Right Fork Northwest Branch (Use IV), Nursery Run (Use IV), two unnamed tributaries to Nursery Run (Use IV), Paint Branch (Use III), two unnamed tributaries to Paint Branch (Use III), Little Paint Branch (Use I), Bear Branch (Use I), Walker Branch (Use I), and unnamed tributaries to Patuxent River / Reservoir (Use I-P). Impacts to these streams could potentially affect water quality and aquatic habitat within the watersheds.

Palustrine wetlands have been identified within the study area using Watershed Resources Registry (WRR) mapping, DNR wetland mapping (Maryland only), and windshield surveys. This information has

been combined with field reconnaissance to determine the extent of wetland impacts for all build ARDS; impacts to wetlands within the study area are anticipated to be less than one acre, ranging from 0.11 to 0.38 acre as a result of the ARDS.

b. Floodplains

The ARDS are anticipated to impact approximately 0.15 to 3.01 acres of 100-year floodplains associated with Batchellor's Run, Left Fork Northwest Branch and an unnamed tributary to Paint Branch.

2. Rare, Threatened and Endangered Species/Terrestrial Habitat and Wildlife

Coordination with the US Fish and Wildlife Service (FWS), MD Department of Natural Resources (DNR) Integrated Policy and Review Unit (IPRU), and DNR-Wildlife and Heritage Services (WHS) has been initiated to identify the presence of any federal- or state-listed rare, threatened, or endangered species within the project area. The FWS indicated that no federally proposed or listed endangered or threatened species occur within the project area. The DNR-IPRU recommended conservation measures to avoid and minimize impacts to the Paint Branch and unnamed tributaries. In addition, The DNR-IPRU noted records of Acuminate Crayfish, a species in Greatest Conservation Need within the project area, emphasizing the need to prevent sediment or debris from reaching the streams.

The Maryland DNR-WHS indicated areas of potential concern that are located within the study area and emphasized the importance of maintaining water quality and hydrology, given that the rare, threatened or endangered species are associated with wetland habitats. The areas and associated species are listed below:

- McKnew Bog: state-listed threatened Halberd-leaved Greenbrier (*Smilax pseudochina*)
- Spencerville Seeps: state-listed threatened Featherbells (*Stenanthium gramineum*)
- Good Hope Spring, Asa Road Spring, Whitehaven Seep, Batchellors Run Road Spring, and Belle Cote Drive Springs: Maryland watchlist Potomac Stygobromid (*Stygobromus tenuis potomacus*)

The DNR-WHS also noted that portions of the forested project area contain Forest Interior Dwelling Bird (FIDS) habitat. Most forest impacts would occur along the existing roadway alignment and no major changes to the interior forested habitat used by FIDS are expected. Field reviews revealed no champion trees, but a number of specimen trees within the study corridor were identified. The ARDS are anticipated to impact approximately 4.29 to 16.71 acres of woodlands and 67-179 specimen trees.

SHA will continue to coordinate with DNR and FWS regarding potential impacts to rare, threatened or endangered species.

Green infrastructure is the strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserve ecosystem functions and provide associated benefits to human populations. The DNR, using satellite imagery, road and stream locations, and biological data, has identified a green infrastructure network for the state of Maryland. The green infrastructure network is composed of core areas, hubs, and corridors. Unfragmented natural areas, called hubs, include large blocks of contiguous interior forest and large wetland complexes. Linear stretches of land called corridors consist of stream valleys and ridge tops that allow animals and seeds to move between hubs and areas of disconnect between the hubs and corridors which are called gaps. Alternative 2 would impact approximately 0.23 acre of hubs, 3.51 acres of corridors, and 1.91 acre of gaps. Alternative 3 would impact approximately 3.18 acres of corridors and 0.98 acre of gaps. Potential effects of the impacts to

the green infrastructure network include loss of habitat and habitat fragmentation. There are currently no mitigation requirements for impacts to Green Infrastructure, but SHA will use knowledge of the network to enhance other types of mitigation as discussed below.

SHA, in coordination with County planners and regulatory agencies, has used green infrastructure data throughout the planning and design phases to locate areas of land that could be targeted for protection or restoration to help ensure habitat for Maryland's plants and wildlife, as well as to promote a healthier environment including improved outdoor recreation, clean drinking water, and erosion prevention. At the time Maryland's Green Infrastructure Assessment (2003) was published, it was determined that 74 percent of Maryland's Green Infrastructure is unprotected; and 13 percent of hubs, and less than one percent of corridors were in areas managed primarily for natural values. Green infrastructure will be utilized to identify gaps and areas of maximum ecological benefit for mitigation. In addition, the Watershed Resources Registry (WRR) was used to identify high-quality resource areas throughout the corridor. As the study progresses impacts to these areas will be avoided or minimized where possible. The WRR will also be used as a tool to identify a variety of preservation and restoration opportunities for possible project impact mitigation efforts.

3. Hazardous Materials

A hazardous materials site inventory identified 100 properties with underground storage tanks (USTs), leaking storage tanks (LUSTs), properties that may be of concern (e.g., gas stations), and any reported spills of oil and hazardous substances within the MD 28/MD 198 study corridor. A detailed hazardous materials assessment will be conducted during the next stage of the project planning study. Coordination with the Maryland Department of the Environment (MDE) would occur, if required, prior to and/or during construction to minimize the potential for adverse effects as a result of treatment, storage, cleanup, or disposal of hazardous waste.

4. Air Quality and Noise Analysis

Air-quality and noise analyses will be prepared during the next stage of the project planning study.

Table 13-1. Summary of Environmental Impacts – Alternative 2 Segments A and B

RESOURCE IMPACTS	Alternative 1 No-Build	Alternative 2, Segment A: MD 97 (Georgia Avenue) to MD 182 (Layhill Road) Transportation Systems Management/ Transportation Demand Management (TSM/TDM)			Alternative 2, Segment B: MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) Transportation Systems Management/ Transportation Demand Management (TSM/TDM)	
		Base Alternative (Bicycle/Pedestrian Features)	Access Management Provisions Option	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian Features)	Intersection Improvement Option
		Widen shoulders, 5' sidewalk to south, 10' shared-use path to north	3 Frontage Roads	Wintergate Drive Roundabout	Widen shared-use path to 10' on north	Norwood Road Turn Lanes
Community Effects						
Residential No. Displacements/No. Impacts /Acres	0/0/0	5/78/9.88	+0/+6/+2.61	+0/+3/+0.36	0/0/0	+0/+0/+0
Commercial No. Displacements/No. Impacts/Acres	0/0/0	0/1/0.17	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Church / School No. Displacements/No. Impacts/Acres	0/0/0	0/5/1.06	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Historic / Archeological No. Displacements/No. Impacts/Acres	0/0/0	0/1/0.19	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Parks / Recreation No. Displacements/No. Impacts/Acres	0/0/0	0/0/0	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Right-of-Way (Acres)	0	11.33	+2.61	+0.36	0	+0
Natural Environment						
Streams Number/Linear Feet/Square Feet	0/0/0	3/407/13,197	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Wetlands (Acres)	0	0.13	+0	+0	0	+0
100-Year Floodplain (Acres)	0	1.61	+0.17	+0	0.15	+0
Woodlands (Acres)	0	7.30	+1.07	+0	0	+0
Specimen Trees (Number)	0	67	+8	+1	0	+0
UPBSPA Impervious Surface (Acres)	10.20	0	+0	+0	0	+0
Cost (\$Millions)	0	38-43	+(8-9)	+(1.5-2)	3-3.5	+(0.5)
Total Cost by Segment (\$Millions)	0	38-54			3-4	

Table 13-2. Summary of Environmental Impacts – Alternative 2 Segments C, D and E

RESOURCE IMPACTS	Alternative 2, Segment C: MD 650 (New Hampshire Avenue) to Old Columbia Pike Transportation Systems Management/Transportation Demand Management (TSM/TDM)							Alternative 2, Segment D: Old Columbia Pike to US 29 Transportation Systems Management/Transportation Demand Management (TSM/TDM)		Alternative 2, Segment E: US 29 to I-95 Transportation Systems Management/Transportation Demand Management (TSM/TDM)	
	Base Alternative (Bicycle/Pedestrian Features)	Access Management Provisions Option		Intersection Improvement Option				Base Alternative (Bicycle/Pedestrian Features)	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian Features)	Intersection Improvement Option
	Widen shoulders, 10' shared-use path to South	2-Way Center Turn	6' Median	MD 650 Turn Lanes	Good Hope Roundabout	Thompson Roundabout	Peach Orchard Roundabout	Widen Shoulders, 5' sidewalk to North, 10' shared-use path to South	Old Columbia Pike Turn Lanes	10' shared-use path to South	McKnew Road Turn Lanes
Community Effects											
Residential No. Displacements/No. Impacts/Acres	11/87/14.13	+1/+12/-0.14	+0/+9/-0.93	+0/+6/+1.13	+0/+3/+2.12	+2/+8/+1.90	+0/+5/+0.53	0/0/0	+0/+3/+0.13	0/33/2.11	+0/+3/+0.49
Commercial No. Displacements/No. Impacts/Acres	5/13/2.14	0/0/+0.06	-0/-1/+0.04	+0/+1/+0.10	+0/+0/+0	+0/+0/+0	+0/+1/+0.25	4/13/0.83	+5/+7/+1.22	0/19/2.05	+0/+0/+0
Church / School No. Displacements/No. Impacts/Acres	0/6/1.70	+0/+1/+0.28	0/+1/+0.15	+0/+0/+0	+0/+2/+0.04	+0/+2/+0.06	+0/+0/+0	0/1/0.02	+1/+1/+0.32	0/2/0.24	+0/+0/+0
Historic / Archeological No. Displacements/No. Impacts/Acres	0/4/0.52	+0/+0/+0.28	+0/+0/+0.14	+0/+0/+0	+0/+1/+0.02	+0/+0/+0	+0/+1/-0.03	0/0/0	+0/+0/+0	0/0/0	+0/+0/+0
Parks / Recreation No. Displacements/No. Impacts/Acres	0/1/0.23	+0/+0/-0.03	+0/+0/-0.05	+0/+0/+0	+0/+0/+0	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0	0/0/0	+0/+0/+0
Right-of-Way (acres)	18.87	+0.34	-0.65	+1.23	+2.18	+1.96	+0.75	0.85	+1.67	4.40	+0.49
Natural Environment											
Streams Number/Linear Feet/Square Feet	1/41/679	0/0/0	0/0/0	+0/+0/+0	+0/+0/+0	+0/+0/+0	+0/+0/+0	1/14/64	+0/+0/+0	1/36/258	+0/+0/+0
Wetlands (Acres)	0.13	+0.02	-0.02	+0	+0	+0	+0.23	0	+0	0	+0
100-Year Floodplain (Acres)	0.19	+0.06	+0.03	+0	+0	+0	+0	0	+0	0	+0
Woodlands (Acres)	4.29	-0.95	-1.33	+0.04	+2.06	+0.17	+0.27	0	+0	0.60	+0.43
Specimen Trees (Number)	74	+3	+1	+2	+10	+6	+0	3	+1	3	+0
UPBSPA Impervious Surface (Acres)	15.43	+1.22	+0.46	+0.00	+0.60	+0.79	+0.16	0	+0	0	+0
Cost (\$Millions)	42-46	+(13-14)	+(16-18)	+(7-8)	+(7-7.5)	+(5-6)	+(4-5)	3-3.5	+(5-6)	10-11	+(1-2)
Total Cost By Segment(\$Millions)	42-104.5							3-9.5		10-13	

Table 13-3. Summary of Environmental Impacts – Alternative 3 Segments A and B

RESOURCE IMPACTS	Alternative 3, Segment A: MD 97 (Georgia Avenue) to MD 182 (Layhill Road) Typical Section Improvement			Alternative 3, Segment B: MD 182 (Layhill Road) to MD 650 (New Hampshire Avenue) Typical Section Improvement	
	Base Alternative (Bicycle/Pedestrian/Road Features)	Access Management Provisions Option	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian/Road Features)	Intersection Improvement Option
	4-Lane Divided Roadway with wide shoulders, 5' sidewalk to South, 10' shared-use path to North	3 Frontage Roads	Wintergate Drive Roundabout	4-Lane Divided Roadway, Widen shared-use path to 10' on North	Norwood Road Turn Lanes
Community Effects					
Residential No. Displacements/No. Impacts/Acres	5/76/21.55	+0/+8/+2.04	+0/+1/+0.37	0/7/7.78	+0/+0/+0
Commercial No. Displacements/No. Impacts/Acres	0/1/0.18	+0/+0/+0	+0/+1/+0.06	0/1/0.34	+0/+0/+0
Church / School No. Displacements/No. Impacts/Acres	0/5/1.63	+0/+0/+0.10	+0/+0/+0	0/0/0	+0/+0/+0
Historic / Archeological No. Displacements/No. Impacts/Acres	0/1/0.90	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Park / Recreation No. Displacements/No. Impacts/Acres	0/1/0.90	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Right-of-Way (acres)	25.16	+2.14	+0.43	8.12	+0
Natural Environment					
Streams Number/Linear Feet/Square Feet	4/457/15,887	0/0/0	+0/+0/+0	5/385/4516	+0/+0/+0
Wetlands (Acres)	0.33	0	+0	0.09	+0
100-Year Floodplain (Acres)	3.01	0	+0	3.86	+0
Woodlands (Acres)	16.20	+0.51	+0.32	12.43	+0
Specimen Trees (Number)	71	+8	+3	13	+0
UPBSPA Impervious Surface (Acres)	0	+0	+0	0	+0
Cost (\$Millions)	95-105	+(6.5-7.5)	+(1.5-2)	34-37.5	+(0.5)
Total Cost by Segment (\$Millions)	95-114.5			34-38	

Table 13-4. Summary of Environmental Impacts – Alternative 3 Segments C, D and E

RESOURCE IMPACTS	Alternative 3, Segment C: MD 650 (New Hampshire Avenue) to Old Columbia Pike Typical Section Improvement Alternative							Alternative 3, Segment D: Old Columbia Pike to US 29 Typical Section Improvement Alternative			Alternative 3, Segment E: US 29 to I-95 Typical Section Improvement Alternative	
	Base Alternative (Bicycle/ Pedestrian/Road Features)	Access Management Provisions Option		Intersection Improvement Option				Base Alternative (Bicycle/ Pedestrian/Road Features)	Access Management Provisions Option	Intersection Improvement Option	Base Alternative (Bicycle/Pedestrian/Road Features)	Intersection Improvement Option
	4-Lane Divided w/ wide shoulders, 10' shared-use path to South	2-Way Center Turn	6' Median	MD 650 Turn Lanes	Good Hope Roundabout	Thompson Roundabout	Peach Orchard Roundabout	5-Lane Roadway with wide shoulders, 5' sidewalk to North, 10' shared-use path to South	18' Median	Old Columbia Pike Turn Lanes	4- and 6- Lane Divided Roadway, 10' shared-use path to South	McKnew Road Turn Lanes
Community Effects												
Residential No. Displacements/No. Impacts/Acres	20/114/36.48	-8/-3/-6.96	-7/-5/-5.13	+0/+1/+0.09	+0/+0/+1.71	+0/+0/+1.74	+0/+0/+0.12	0/0/0	+0/+0/+0	+0/+0/+0	0/35/2.93	+0/+3/+0.53
Commercial No. Displacements/No. Impacts/Acres	5/14/7.09	-0/-0/-0.05	+0/+0/+0.03	+0/+0/+0.03	+0/+0/+0	+0/+0/+0	+0/+0/+0.18	10/19/1.74	-1/-0/-0.19	+0/+2/+0.14	0/19/3.01	+0/+0/+0
Church / School No. Displacements/No. Impacts/Acres	0/6/2.91	-0/-0/-0.03	-0/-0/-0.01	+0/+0/+0	+0/+0/+0	+0/+0/+0	+0/+0/+0	1/0/0.18	-0/-0/-0.02	+0/+1/+0.04	0/3/0.44	+0/+0/+0
Historic / Archeological No. Displacements/No. Impacts/Acres	1/4/3.16	-0/-0/-0.02	-0/-0/-0.03	+0/+0/+0	+0/+0/+0	+0/+0/+0	-0/-0/-0.39	0/0/0	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Park / Recreation No. Displacements/No. Impacts/Acres	0/1/0.35	-0/-0/-0.06	-0/-0/-0.06	+0/+0/+0	+0/+0/+0	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0	+0/+0/+0	0/0/0	+0/+0/+0
Right-of-Way (Acres)	49.99	-7.12	-5.20	+0.12	+1.71	+1.74	-0.09	1.92	-0.21	+0.18	6.38	+0.53
Natural Environment												
Streams Number/Linear Feet/Square Feet	2/125/2,469	0/-9/-251	0/+4/+33	0/0/0	0/0/0	0/0/0	0/0/0	1/57/397	-0/-9/-83	+0/+0/+0	1/36/258	+0/+0/+0
Wetlands (Acres)	0.33	-0.08	-0.03	0	0	0	+0.13	0	-0	+0	0	+0
100-Year Floodplain (Acres)	0.42	-0.13	-0.01	0	0	0	0	0	-0	+0	0	+0
Woodlands (Acres)	5.14	-0.45	-0.13	0	+1.64	0	+0.08	0	-0	+0	0.98	+0.46
Specimen Trees (Number)	83	-1	-1	0	+8	+1	0	3	-0	+1	11	+0
UPBSPA Impervious Surface (Acres)	21.63	+2.44	-1.90	+0.00	+0.25	+0.35	-0.55	0	+0	+0	0	+0
Cost (\$Millions)	105-116	-(7-8)	-(9-10)	+(7-8)	+(3.5-4)	+(3-4)	+(0.5-1)	10-11	-(0.5-1)	+(1)	30-33	+(1.5-2)
Total Cost by Segment (\$Millions)	105-115							10-11			30-35	

V. PUBLIC INVOLVEMENT STRATEGY AND AGENCY COORDINATION

A. Public Involvement

Public involvement is a key element of the MD 28/MD 198 Corridor Improvement Study. Currently, the MD 28/MD 198 corridor serves residents in the project study area as well as commuters and others traveling through Maryland. As the project progresses, the study team will continue to provide information to and interact with the public through the following:

- Project newsletters / postcards;
- Project information locations (i.e. libraries, welcome centers);
- Meetings with communities, upon request;
- Stakeholders Group meetings;
- Public workshops; and,
- Project webpage.

Public outreach activities provide an opportunity for the public to learn about the project and understand how the project may affect their communities. Outreach also involves gaining feedback from the public in order to incorporate their concerns and views into the transportation decision making process. Outreach efforts including newsletters, meeting advertisements and meeting brochures included a contact for limited English proficiency (LEP) communities.

In fall 2013, the project initiation announcement was mailed to residents and businesses in the study area informing them of the project planning study.

1. Project Newsletters and Postcards

Project newsletters are mailed periodically to residents within the MD 28/MD 198 study corridor area, as well as to those who have requested to be added to the project mailing list. Newsletters are designed to inform the community of the project status and schedule, provide study details, and can also serve as invitations to upcoming public events such as workshops or hearings.

Initially, when the study team receives a comment via standard mail, at a public meeting or the webpage, a postcard is mailed to the stakeholder acknowledging receipt of their comment. In addition to the postcards, detailed responses to comments are then provided, in a timely manner.

2. Project Information Locations

Project information will continue to be disseminated to the public at different key milestones of the project planning study through mailings, open public meetings and the project webpage.

3. Presentations to Communities

As part of the study's outreach, if a stakeholder (e.g., communities, businesses, special interest groups, elected officials, local government entities) requests a presentation or meeting, the study team will honor that request. To date, presentations have been given to the following:

- Stakeholders Group Meeting – February 25, 2015
- Burtonsville Property Owner – February 26 and May 27, 2015
- Alternatives Public Workshop – March 19, 2015
- Leisure World – April 14, 2015

4. Stakeholders Group Meetings

In February 2015, a Stakeholders Group Meeting was held for the project. The purpose of the Stakeholders Group Meeting is to gain a local perspective on the project from the stakeholders in the study area. The Stakeholders Group consists of 13 members who are residents, business owners, elected officials, local government officials and representatives of special interest groups. The group does not issue formal recommendations or make decisions. However, by meeting in a small group, members become knowledgeable of the planning process and applicable laws the Authority must comply with, and provide the study team with a valuable local perspective as the project planning study progresses. The meeting was held on Wednesday, February 25, 2015 at the Marilyn J. Praisner Library.

In February and May 2015, individual meetings were held with Burtonsville Property Owners to review proposed changes/improvements to the MD 28/MD 198 corridor that would impact Burtonsville Property. These meetings were held on Thursday, February 26, 2015 and Wednesday, May 27, 2015.

In April 2015, a meeting was held with Leisure World to present the Preliminary Alternatives (with a focus on Segment A of the project) to members of the Leisure World community. This allowed members to share their thoughts/concerns and ask specific questions about the preliminary alternatives.

The project team will meet with the Stakeholders several more times, throughout the progression of the project planning study. Meeting minutes from the various group meetings are included in **Appendix C**.

5. Public Workshops

In fall 2013, an informational postcard was mailed out to all community members within the MD 28/MD 198 study corridor informing the public the project was back on schedule. This mailing was followed up by a newsletter in spring 2014 detailing what has changed in the planning study and to inform the public of the upcoming public workshops. An Informational Public Workshop was held open to the public: an Informational Workshop (June 17, 2014). The purpose of the workshop was to inform the public the project planning study had resumed and to review what has been done, what has changed and to seek public feedback on the current improvement concepts for the project.

In spring 2015, the Alternatives Public Workshop was held near the study area at James Blake High School in Silver Spring, Maryland on March 19, 2015. The purpose of the workshop was for the public to review the purpose and need for the project, review the preliminary alternatives, ask questions and provide comments to study team members. Materials presented at the public workshops, as well as a summary of comments received, are located in **Appendix C**.

Many comment cards were submitted during and after the workshops. The comments from the public provided valuable information regarding community facilities in the area, and questions and concerns regarding the MD 28/MD 198 corridor and the proposed preliminary alternatives. The comments received from the public at the Alternatives Public Workshop are a key element in the decision making process for the ARDS. Based on the study team's assessment, it was determined that there is strong support from the public for improvements to the corridor in the form of a build alternative. However, there was not one preliminary alternative preferred by a majority over another alternative, but rather a mix of preferences for the various options presented for the corridor. The study team took these various preferences into account during the ARDS process.

Upon completion of the draft environmental document, a Public Hearing will be held for interested parties to provide testimony on the document for the project record. Currently, the Public Hearing is anticipated to take place in the Summer/Fall of 2016.

6. Project Webpage

The MD 28/MD 198 Corridor Improvement Study webpage can be accessed through SHA's Project Lifecycle webpage (<http://apps.roads.maryland.gov/WebProjectLifeCycle/countyProjects.aspx?county=15>). The project webpage features announcements, updates and information on the project, background on the study area, and an on-line comment form.

B. Agency Coordination

A series of Interagency Review Meetings have been held since the resumption of the project: February 19, 2014, March 19, 2014, May 21, 2014, and November 19, 2014. On May 29, 2014, the MD 28/MD 198 Corridor Improvement Study team met with Federal, State and Local agency representatives for a Field Review Meeting to review the project area. Throughout these meetings, agency representatives were presented with information on why the study is being conducted, how the study will evaluate different ways to improve the MD 28/MD 198 corridor, the known environmental and community resources and how the team is reaching out to the public. A question and answer session was held after each presentation at the meetings. Several agencies asked the team to conduct further research on certain environmental issues. Other agencies provided input on additional environmental and community resources valuable to the MD 28/MD 198 study area. A summary of all meeting minutes can be found in **Appendix D**.

The MD 28/MD 198 Corridor Improvement Study team will continue to find the best means to effectively communicate with these agencies throughout project planning.