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1.0 OVERVIEW OF IMPROVEMENT RECOMMENDATIONS

The evaluation of existing conditions, development of year 2035 forecasts, and evaluation of future year 2035 conditions was conducted to determine the existing and projected deficiencies in the transportation system along each of the seven study corridors. This analysis illustrated locations with existing or projected poor intersection Level of Service, roadway capacity constraints, lack of transit accessibility, and/or lack of pedestrian and bicycle connectivity. Cube and Synchro analysis was used to determine the roadway improvements needed to maintain an acceptable LOS along the seven corridors in the future. Based on the results of the travel demand forecasting and highway capacity analysis, roadway widening was recommended for both the College Parkway and MD 177 corridors [described in Technical Memorandum (TM) 3-4]:

- **College Parkway** - Widening from 2 to 4 lanes from west of Jones Station Road to MD 179.
- **MD 177** - Widening from 2 to 4 lanes between Jumpers Hole Road and MD 648/Waterford Road.

In addition, there are a number of intersection and bicycle lane improvement recommendations within the MIIF study corridors, as outlined in TM 3-4:

- Additional left turn lane on southbound approach of MD 2 at College Parkway
- Additional eastbound auxiliary lane on College Parkway between MD 2 and Anne Arundel Community College Entrance
- Additional left turn lane on eastbound approach of College Parkway at MD 179
- Bicycle lanes on Forest Drive
- Bicycle lanes on MD 173
- Bicycle lanes on MD 177
- Bicycle lanes on MD 214
- Potential roundabout at MD 2 and MD 256
- Bicycle lanes on MD 256/MD 468

While bicycle and pedestrian improvements do not have the same degree of right-of-way impacts as roadway projects, these improvements were also evaluated in the footprint assessment, as these elements constitute a majority of the study recommendations. The purpose of the footprint assessment was to determine the right-of-way impacts of the potential improvements and identify improvements that would have significant property impacts; these would likely meet public resistance and require further coordination by the County.

2.0 IMPACT ASSESSMENT

For the roadway widening and intersection improvement segments, County GIS data was used to compare the proposed typical cross sections through each corridor to the existing right-of-way available in order to identify any constraints and any areas of environmental sensitivity that need to be considered.
2.1 RIGHT-OF-WAY CONSIDERATIONS

Planning-level estimates of the required right-of-way to support the suggested corridor recommendations were conducted for each corridor (included in Appendix A). These estimates were developed by overlaying GIS files from Anne Arundel County onto conceptual improvement designs in Microstation to determine potential right-of-way acquisition or easement needs, impacts to the natural and built environment, and order of magnitude costs.

2.1.1 College Parkway:

The width of county-owned right-of-way on College Parkway ranges from 110 to 200 feet, as the County had previously planned for College Parkway to be widened to 4 lanes from west of Jones Station Road to MD 179. The proposed cross section of College Parkway is recommended to include an additional two 12’ travel lanes, an 18’ median, 5’ bicycle lanes, and 5’ sidewalks in both directions, and the planned extension of the Peninsula Trail on the north side of the roadway. Due to the large width of County-owned right-of-way, there were no right-of-way impacts associated with this cross section.

Figure 1: Proposed College Parkway Cross Section from West of Jones Station Rd to MD 179
Figure 2: College Parkway Footprint Assessment

Proposed Extension of Peninsula Trail

Proposed 4 Lane Cross Section
Additional left turn lane along southbound MD 2 at College Parkway: This improvement can be constructed within the existing median on MD 2. The existing median is 17’ which would be reduced to 6’ to accommodate an 11’ left turn lane. This improvement would also require an additional eastbound auxiliary lane on College Parkway between MD 2 and Anne Arundel Community College Entrance: There would be a small right-of-way impact associated with the auxiliary lane on College Parkway with one parcel being impacted as shown in Figure 3. Detailed right-of-way impact calculations are included in Appendix A.

Figure 3: MD 2 at College Parkway

As referenced in TM 3-4, the New Jersey Jug Handle, Continuous Flow Intersection, and Michigan Left concepts were not recommended at this time due to right-of-way impacts and/or potential operational issues, which is why the Triple Left Turn option was recommended. Moreover, the New Jersey Jug Handle would not perform as well operationally as the Triple Left Turn option, as the New Jersey Jug Handle would require an additional split phase at the intersection that the existing conditions and other alternatives do not. As illustrated in Figure 4, the New Jersey Jug Handle concept would also have the greatest right-of-way impact, and it is recommended that this concept be removed from future consideration. The Continuous Flow Intersection and Michigan Left concepts have better Level of Service results than the Triple Left option, but the Continuous Flow Intersection requires significantly more right-of-way as shown in Figure 5. The Michigan Left shows promise as a potential strategy if demand exceeds the Triple Left option in the future. The Michigan Left has minor right-of-way impacts and the operational issues associated with the dual right turn lane could be mitigated through the detailed traffic micro-simulation and preliminary design process.
Figure 4: MD 2 at College Parkway- New Jersey Jug Handle
Figure 5: MD 2 at College Parkway- Continuous Flow Intersection
Figure 6: MD 2 at College Parkway- Michigan Left

- Minor Right-of-Way Impact
- Dual Right Turn Lane
- Michigan Left Turn
Additional left turn lane on eastbound approach of College Parkway at MD 179: There are no right-of-way impacts associated with this improvement as illustrated in Figure 7.

Figure 7: MD 2 at MD 179

2.1.2 Forest Drive:

Bicycle Lanes on Forest Drive: An additional 10’ of roadway would be needed to accommodate bicycle lanes on Forest Drive. As this roadway was recently streetscaped and reconstructed by the County, the bicycle lanes on this corridor would be implemented on a future reconstruction project which would likely not occur in the next 25 years given the typical lifecycle of highway projects.

The footprint assessment for Forest Drive illustrates that there would be right-of-way impacts at multiple locations along the corridor when bicycle lanes are added on a future reconstruction project. It is highly recommended not to retrofit, or prepare a separate PS&E exclusively for bicycle lanes given the cost of roadway reconstruction which was just encumbered by the County on the recent improvements.

Additional concept designs were developed for the proposed Access Management and Complete Streets plans in the Chinquapin Round Road area to determine the potential construction impacts of these improvements. Further detailed analysis and coordination with the local neighborhoods is required to determine the specific traffic impacts of these improvements and gauge the public and local business response to the construction of these improvements. These plans are shown on Figures 11 and 12.
Figure 8: Forest Drive Proposed Roadway Cross Sections
Two Lane- From Old Solomons Road to Chinquapin Round Road

Six Lane- From Chinquapin Round Road to East of Hilltop Lane
Four Lane- From East of Hilltop Lane to East of Hillsmere Drive
Figure 9: Forest Drive Bicycle Lanes- West End
Figure 10: Forest Drive Bicycle Lanes- East End

Proposed Sidewalks and Bicycle Lanes

Right-of-Way Impacts
Figure 11: Forest Drive Potential Access Management Plan

- Blocked driveways - minimal construction impact
- Proposed driveway requires permit
Figure 12: Forest Drive Potential Complete Streets Plan

Residential Right-of-Way Impacts

Potential Environmental Impacts
2.1.3 MD 173/Fort Smallwood Road:

**Bicycle Lanes on MD 173:** Bicycle lanes would be striped on the existing shoulders of MD 173, and there would be no right-of-way impacts.

**Figure 13: MD 173 Proposed Typical Cross Section - No Change from Existing**
Figure 14: MD 173 Bicycle Lanes

Proposed Bicycle Lanes on Existing Shoulders
2.1.4 **MD 177/Mountain Road:**

**Bicycle Lanes on MD 177:** The County’s “Mountain Road Study” recommended a preferred alternative cross section that included bicycle lanes as illustrated in Figure 15. This cross section would be constructed between MD 648/Waterford Road and Edwin Raynor Boulevard. The analysis from TM 3-4 recommended matching this proposed cross section from Edwin Raynor Boulevard to MD 100.

The Mountain Road Study established the proposed right-of-way for the preferred concept and completed cost estimates including right-of-way impact analysis. Areas of right-of-way impacts were computed and categorized by adjacent land uses. The zoning categories along Mountain Road were determined using the “My Anne Arundel Zoning Viewer,” available on the County’s Office of Planning and Zoning website.

**Figure 15: MD 177 Proposed Typical Cross Section**
Mountain Road Study Three-Lane Concept - MD 648/Waterford Road to MD 100
Construction cost estimates for the Mountain Road Study were developed based on the Maryland State Highway Administration (SHA) 2012 Highway Construction Cost Estimating Manual. The estimate includes costs associated with roadway reconstruction, new traffic signals, signing, utility impacts, and the costs associated with the County’s previously planned improvements to provide 5’ bike lanes in each direction along Edwin Raynor Boulevard from MD 100 to MD 173. The utility impacts were also included in the construction costs for the Mountain Road Study.

The available right-of-way along MD 177 varies greatly throughout the study corridor. One segment between Woods Road and Lake Shore Drive is only 36’ wide, which is less than the paved width of roadway. Most sections are between 50’ and 80’, depending on the turn-lane configurations. The segment between MD 10 and MD 2 is approximately 100’ wide. See Figure 16 for the proposed cross section of the widening from Jumpers Hole Road to MD 648/Waterford Road. Detailed right-of-way calculations are included in Appendix A.

Figure 16: Proposed MD 177 Cross Section from Jumpers Hole Road to MD 648

The footprint assessment indicated that there is sufficient right-of-way for the widening west of Mountain View Way, with no right-of-way impacts, provided the widening occurs on the north side of the existing roadway. East of Mountain View Way, the right-of-way on MD 177 is reduced and a number of properties would be impacted. A total of twenty-two parcels would be impacted by the widening in this area.
Figure 17: MD 177 Footprint Assessment- West of Mountain View Way

Alignment could be shifted to north

Existing R.O.W.
Figure 18: MD 177 Footprint Assessment- East of MD 648

Numerous Impacted Properties

Stoney Creek
To improve the eastern segment of MD 177, The County’s “Mountain Road Study” recommended a three-lane preferred alternative cross section that included bicycle lanes as illustrated in Figure 15. The analysis from TM 3-4 recommended matching this proposed cross section from Edwin Raynor Boulevard to MD 100 as well. The MIIF Study team also recommends a narrower buffer between the proposed sidewalks and curbing, to minimize at least 6’ of right-of-way impacts, as shown in Figure 19.

**Figure 19: Proposed MD 177 Cross Section from MD 648 to MD 100**

![Typical Cross Section](image)

### 2.1.5 MD 214/Central Avenue:

**Bicycle Lanes on MD 214:** The bicycle lanes would be striped on the shoulders of MD 214 from MD 424 to Pike Ridge Road and east of MD 468. The shoulders would need to be improved to MSHA standards for bicycle lanes to safely accommodate bicycle lanes east of MD 468. The section from Pike Ridge Road to Stepneys Lane would require additional roadway surface to accommodate the bicycle lanes, and would be located inside of the right-turn lanes. Sidewalks are also recommended to be implemented within this segment.

**Travel Lane Extensions:** The segment of MD 214 east of Stepneys Lane is recommended to be a four-lane roadway, with through lanes extended eastward to the MD 468 intersection. There would be minor right-of-way impacts on both sides of MD 214 within this segment, with several properties potentially impacted. There would also be some minor impacts in other portions of the corridor due to the shoulder/bicycle lane improvements. **Figure 20** illustrates a portion of the proposed two lane concept with bicycle lanes.

**Figure 20: MD 214 Proposed Roadway Cross Sections**
Two Lanes from MD 424 to Pike Ridge Rd

Four Lane-From West of MD 2 to MD 468

Two Lane from MD 468 to Shoreham Beach Road
Figure 21: MD 214 Footprint Assessment- West of Pike Ridge Road

Bicycle Lanes on Existing Shoulders
Figure 22: MD 214 Footprint Assessment- Pike Ridge Road to MD 468
Figure 23: MD 214 Footprint Assessment - East of MD 468

Improve shoulders to MSHA standards for bike lanes
2.1.6 **MD 256/Deale Road & MD 468/Shady Side Road:**

The proposed bicycle lanes would be striped on the shoulders of MD 256/Deale Road and MD 468/Shady Side Road which would require improving the shoulders to SHA standards at some locations. There would be minor right-of-way impacts associated with these improvements.

**Figure 24: MD 256 & MD 468 Proposed Typical Cross Section- Same as Existing**
Figure 25: MD 256 & MD 468 Footprint Assessment

- Minor R.O.W Impact
- Proposed Bicycle Lanes
- Improve Shoulders on MD 256 and MD 468
Roundabout at MD 2 at MD 256: As Figure 26 illustrates, a roundabout can be accommodated within the existing right-of-way at the intersection of MD 2 at MD 256. The diameter could be increased beyond the 100’ that is shown on the concept without right-of-way impacts. A mountable curb is recommended for the roundabout area to accommodate heavy trucks.

Figure 26: Potential Roundabout at MD 2 and MD 256

2.1.7 MD 665/Aris T. Allen Boulevard:

MD 665 was recommended for detailed study as a part of a larger US 50 corridor study. Therefore, there are no recommendations for this corridor at this time outside of future bicycle compatibility. The County is currently studying a multi-use off-road path parallel to MD 665.
2.2 ENVIRONMENTAL FEATURES

A preliminary assessment of the impact of the proposed roadway cross sections to streams and wetlands is summarized, based on the available County GIS mapping.

2.2.1 College Parkway:

There are two streams associated with the Magothy River that terminate just north of College Parkway. The locations are:
- east of Jones Station Road/Kimwood Road
- east of Bellrive Road

The stream east of Jones Station Road terminates approximately 60’ north of College Parkway which is beyond the limits of the widening. Therefore, this stream would not be impacted by the widening. However, appropriate erosion control measures should be taken during construction to mitigate run-off to this area. The stream east of Bellrive Road terminates approximately 200’ north of College Parkway which is also beyond the limits of the widening.

2.2.2 MD 177/Mountain Road:

There are several streams that traverse MD 177 throughout the study corridor, and a pond in close proximity to the roadway. These include:

- Stoney Creek west of Solley Road
- Eli Cove Creek west of Outing Avenue
- Main Creek west of MD 100
- Cooks Pond just south of MD 177 at Dock Road

Stoney Creek would be impacted by the proposed roadway widening between Jumpers Hole Road and MD 648/Waterford Road. The widening would likely require new box culverts at this location, and proper planning is important to ensure this resource is not adversely affected during construction.

2.2.3 MD 214/Central Avenue:

There are several streams that traverse MD 214 throughout the study corridor. These include:

- Beards Creek east of Beards Point Road
- Scotts Cove Branch west of Pike Ridge Road
- Glebe Branch west of MD 468
- Pooles Gut west of Shoreham Beach Road

Beards Creek and Scotts Cove Branch are west of Pike Ridge Road and would not be impacted by the proposed bicycle lane improvements in that cross section, as the bicycle lanes would be striped on the existing shoulders. Glebe Branch will be impacted by the programmed improvements at MD 214 and MD 468. Pooles Gut is over 100’ north of MD 214 and would not be impacted by the proposed bicycle lanes on the shoulders.

2.2.4 MD 256/Deale Road & MD 468/Shady Side Road:

There are several streams and rivers that traverse or are nearby the MD 256/468 the study corridor. These include:

- Tracy’s Creek east of Franklin Gibson Road
- Rockhold Creek directly east of Tracy’s Creek
- Deep Cove Creek south of MD 468 (Muddy Creek Road)
- South Creek south of Shady Rest Road

The bridges over Tracy’s Creek and Rockhold Creek are recommended to have shared bike lanes as there is not sufficient width to accommodate exclusive bike lanes. Given the low traffic volumes and cost of bridge reconstruction, this is the most feasible approach for these segments. Deep Cove Creek does not impact MD 256 as it terminates prior to crossing the roadway. The South Creek would be potentially impacted during shoulder improvements and mitigation measures should be taken during the shoulder restriping process.

3.0 COST ESTIMATES

Planning-level cost estimates were developed for the recommended improvements along the study corridors using MSHA cost estimating procedures, estimated construction quantities based on the concept designs, and unit bid prices from past construction projects. The costs do not include right-of-way acquisition as these costs can vary widely across a corridor. The MSHA planning level cost estimating procedures account for items that cannot be designed and estimated without detailed survey information (i.e. preliminary design phase) such as drainage culverts, bridges, and utility relocation, by adding these items as a percentage of excavation, asphalt paving, and striping costs which can be estimated during the concept design phase.

The roadway quantities used to develop the cost estimates for the capacity improvements and the planning level construction cost estimates are included in Appendix B.

The impacted right-of-way for each corridor is summarized in Table 1.

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