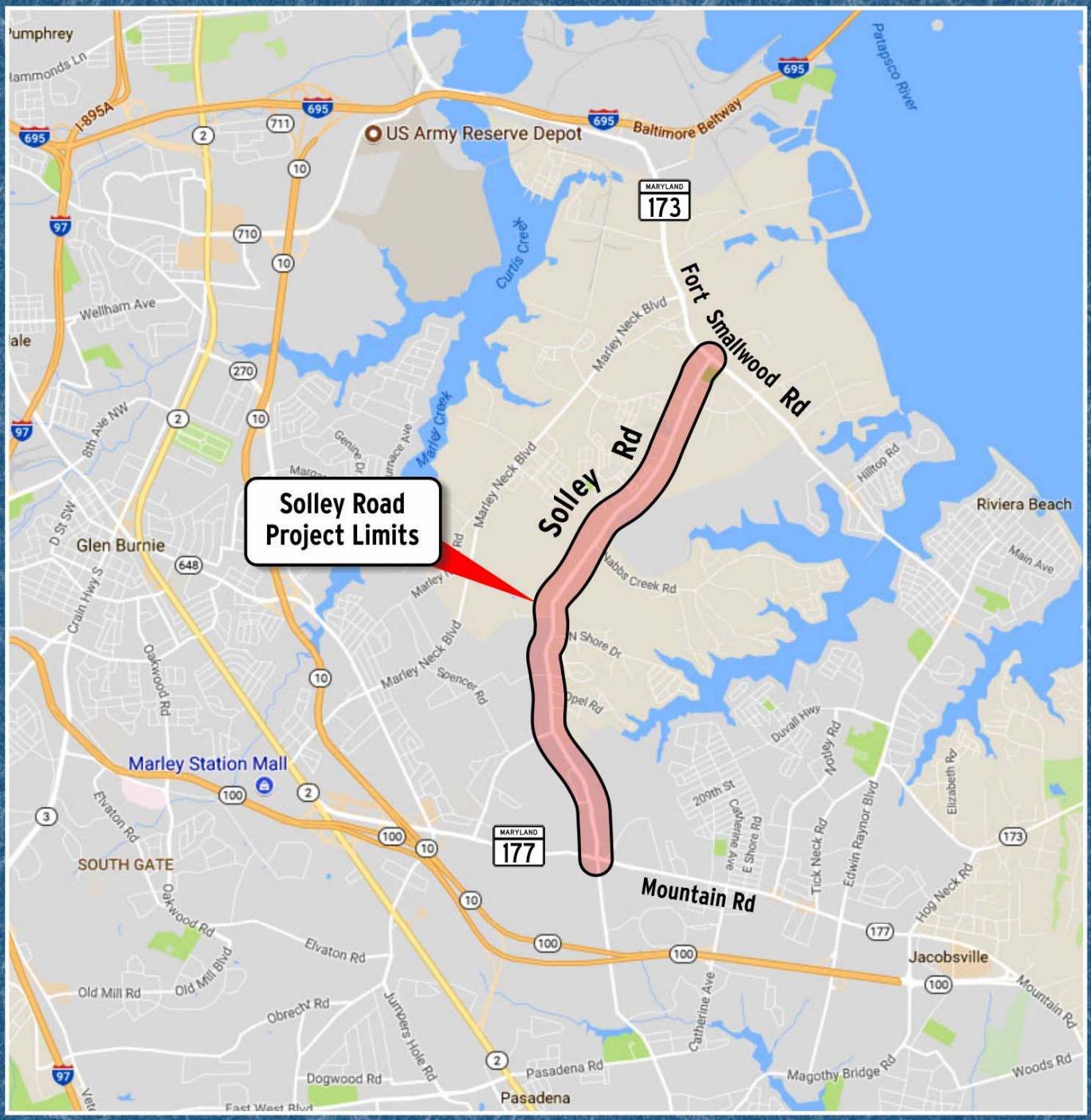
SOLLEY ROAD IMPROVEMENTS STUDY

From Mountain Road (MD 177) to Fort Smallwood Road (MD 173)

Anne Arundel County, Maryland

Project No. H545900
Contract No. H545905



Prepared for
Anne Arundel County DPW

Prepared by
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January 2018

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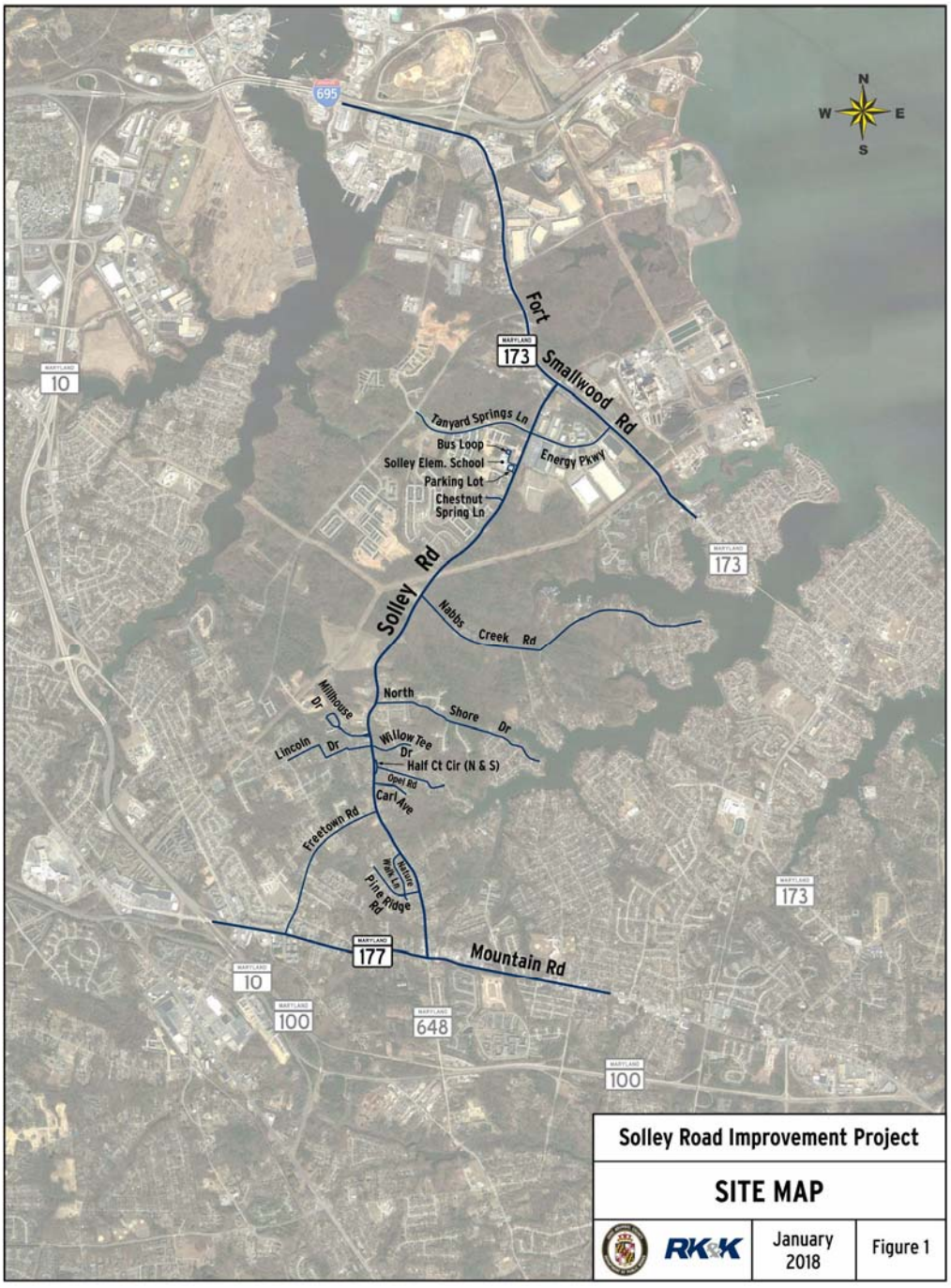
EXECUTIVE SUMMARY

Background and Purpose: The Anne Arundel County Department of Public Works (DPW) has completed an improvement study for Solley Road between MD 177 (Mountain Road) and MD 173 (Fort Smallwood Road) to identify potential near-term and long-term safety, capacity and operational improvements that will enhance auto, bicycle and pedestrian travel in the 3.9 mile corridor. (See map below)



Recent crash data, including fatalities in the vicinity of Chestnut Springs Drive in 2014 and 2015, has generated interest by the County and community to reevaluate the project corridor. This study includes traffic counts, analysis of existing and future traffic (2040) operations, speed and crash analysis, assessment of existing roadway geometry and typical section, development of potential typical section and horizontal and vertical geometric improvements, environmental and utility impact assessment, cost estimates and development of short-term and long-term improvement options.

Existing Conditions: Solley Road is classified as a minor arterial and is generally a two-lane undivided open section roadway with minimal paved shoulders and sidewalks. In areas of more recent residential subdivision development, shoulders and right turn lanes with curb and gutter have been added to enhance access into the adjacent communities. In the final ¾ mile segment of the corridor north of Chestnut Springs Lane, the roadway has been widened to a three lane undivided section with a two-way left turn lane (TWLTL) and curb and gutter and sidewalk along the northbound roadway. The roadway carries approximately 6,600 vehicles per day and the posted speed limit is 40 mph. The speed limit is reduced to 30 mph in the vicinity of the Solley Elementary School.

Traffic Analysis: Traffic data was based on existing counts provided by DPW as well as new turning movement count data collected during the AM and PM peak periods at several intersections along Solley Road. Traffic data was adjusted to Year 2017 and 2040 levels using an annual growth rate of 1.5% as determined using the regional travel demand model. Operational analyses were conducted for the Year 2017 and Year 2040 conditions using Synchro 9 with the HCM Signalized and Unsignalized Intersection methodologies to determine the Level of Service (LOS) and delay at 17 intersections along the corridor:

1. Mountain Road (MD 177)
2. Fort Smallwood Road (MD 173)
3. Energy Parkway
4. Elementary School – Bus Loop
5. Solley Elementary School – Parking Lot
6. Chestnut Springs Lane
7. Nabbs Creek Road
8. North Shore Road
9. Millhouse Drive
10. Lincoln Drive/Willow Tree Drive
11. Half Court Circle (north end)
12. Half Court Circle (south end)
13. Carl Avenue
14. Freetown Road
15. Nature Walk Lane
16. Powhatan Road
17. Pine Ridge Road

The results of the analyses indicate the following:

- **2017:** All intersections operate at LOS D or better during the AM and PM peak hours

- **2040 No-Build:** All intersections operate at LOS D or better during the AM and PM peak hours except
  - MD 177 operates at LOS F during the AM and PM peak hours
  - MD 173 would operate at LOS E during the PM peak hour
  - Freetown Road would operate at a LOS F during the PM peak hour

- **2040 Improvement Options**
  - Using optimized signal timings, MD 177 would improve to LOS E during the AM peak hour but would remain at LOS F during the PM
  - Under Option 2 (provide a separate northbound right-turn lane and concurrent left-turn phasing), MD 177 would improve to LOS E during AM and LOS D during the PM
  - Using optimized signal timings MD 173 would improve to LOS D during the PM peak hour.
  - Constructing a roundabout at Freetown Road would improve to LOS A

Crash History Evaluation: Historical crash data along the 3.9-mile segment of Solley Road, from Mountain Road (MD 177) to Fort Smallwood Road (MD 173), was provided by Maryland SHA for 2011 through 2016. During the 6-year crash study period, 131 crashes were reported; 51 crashes (39%) occurred at intersections as follows:

Table 1: Intersection Crashes

Intersection	No. of Crashes
Mountain Road (MD 177)	4
Pine Ridge Rd	4
Powhatan Beach Rd	4
Nature Walk Lane	2
Freetown Road	2
Lincoln Drive / Meadow Tree Drive	4
North Shore Drive	10
Nabbs Creek Road	9
Chestnut Spring Lane	1
Energy Parkway	7
Fort Smallwood Road (MD 173)	4

Table 2 summarizes crashes by lighting condition, severity, and type. The crash data shows a prevalence of fixed object crashes, which comprise 44% of the total crashes within the study corridor. Fixed-object crashes were mostly associated with trees/shrubbery, and poles (utility poles, sign poles and other poles). The crashes include 58 fixed-object (44%), 17 rear-end (13%), 17 angle (13%), 12 opposite direction (9%), 7 sideswipe (5%), and 3 left-turn (2%), with 17 (13%) crashes whose types were not specified. Additionally, 15 crashes (12%) were attributed to the influence of alcohol.

Table 2: Crash Data Summary

Year	Lighting Conditions			Severity			Crash Type							Alcohol		Total
	Day	Night	Other	PDO	Injury	Fatal	Opposite Direction	Rear End	Side Swipe	Left Turn	Angle	Fixed Object	Other	Yes	No	
2011	8	6	0	10	4	0	1	0	1	0	2	9	1	2	12	**14**
2012	8	5	0	7	6	0	2	0	0	1	3	7	0	1	12	**13**
2013	13	16	0	13	16	0	4	5	2	1	3	11	3	4	25	**29**
2014	15	11	1	16	10	1	0	3	2	1	3	12	6	3	24	**27**
2015	13	9	1	14	8	1	4	4	0	0	3	10	2	2	21	**23**
2016	14	8	3	15	10	0	1	5	2	0	3	9	5	3	23	**25**
Total	**71**	**55**	**5**	**75**	**54**	**2**	**12**	**17**	**7**	**3**	**17**	**58**	**17**	**15**	**116**	**131**

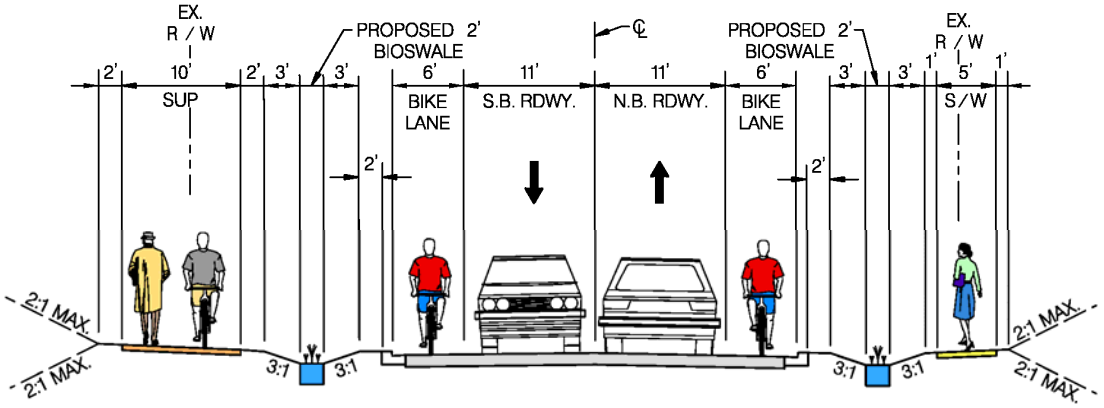
Volume Evaluation: The daily volume at the southern end of the study corridor (8,140 vpd) is about 23% higher than the lowest volume, which was measured near the middle of the corridor (6,590 vpd). At the northern end of the study corridor, the daily volume (6,800 vpd) is about 3% higher than the lowest volume near the middle of the corridor. The daily truck percentage along the entire study corridor is 7%.

Speed Evaluation: Speed studies determined that the 85th-percentile speeds exceed the 40 MPH posted speed throughout the corridor. Measured speeds were:

- 46 MPH northbound and 45 MPH southbound between Energy Parkway and Solley Elementary School
- 50 MPH northbound and 48 MPH southbound south of Nabbs Creek Road
- 52 MPH northbound and 51 MPH southbound between Freetown Road and Shady Brook Drive

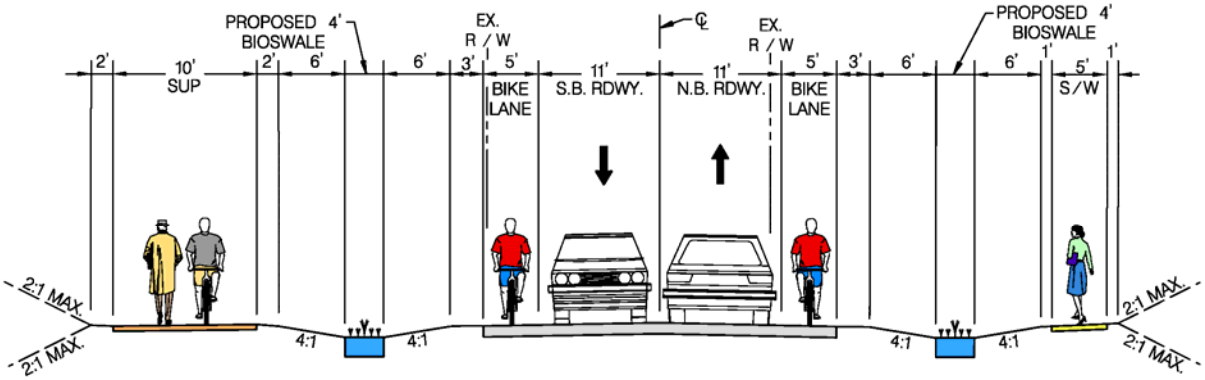
Long Term Improvements: Based on the results of the analyses, it is recommended that the entire corridor include a 10-foot shared use path along the southbound roadway, a 5-foot sidewalk along the northbound roadway and 6-foot bike lanes / shoulders along both sides of the roadway to improve bicycle and pedestrian travel. Proposed 11-foot northbound and southbound travel lanes, 10-foot left turn lanes, and reduced shoulder widths are shown to minimize impacts and reduce travel speeds. All sections would provide 20 foot or wider clear zones should significantly reduce roadside fixed object crashes. The proposed typical sections for the Solley Road Improvements are presented below in more detail.

Two-Lane Closed Section: From MD 177 (Station 10+00) to North Shore Drive (Station 99+50) the proposed improvements consist of a two-lane closed section roadway with bio-swales, bike lanes, sidewalk and shared use path within a proposed right-of-way of approximately 75 feet.



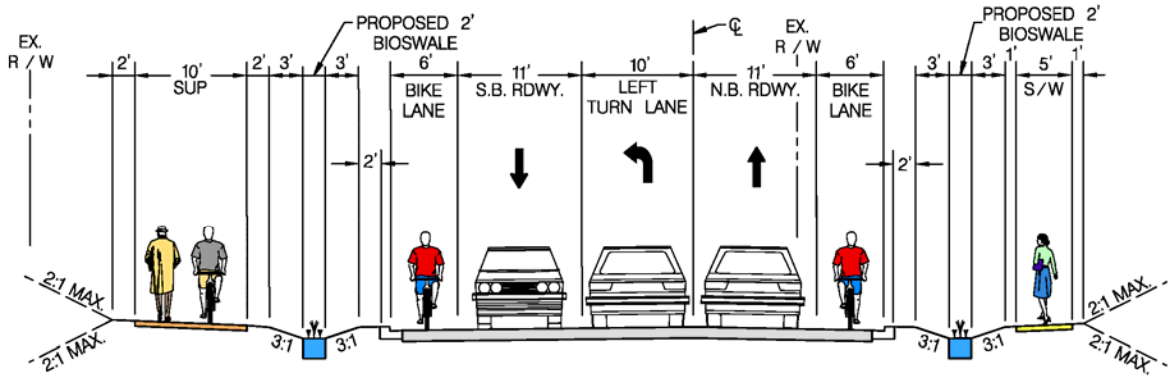
PROPOSED 2 LANE CLOSED TYPICAL SECTION
MOUNTAIN ROAD (MD 177) TO STA. 99+50

Two-Lane Open Section: From North Shore Drive (Station 99+50) to Chestnut Springs Lane (Station 170+00), the roadway will consist of a two-lane open section roadway with bike lanes, bio-swales, sidewalk and shared use path within a proposed right-of-way of approximately 90 feet.



PROPOSED 2 LANE OPEN TYPICAL SECTION
STA. 99+50 TO STA. 170+00

Three-Lane Closed Section: From Chestnut Springs Lane (Station 170+00) to Fort Smallwood Road (Station 215+00), the proposed roadway will consist of a three-lane closed section with a continuous two-way center left turn lane, bike lanes, bio-swales, sidewalk and shared use path within a proposed right-of-way of approximately 85 feet.



PROPOSED 3 LANE CLOSED TYPICAL SECTION
STA. 170+00 TO FORT SMALLWOOD ROAD (MD 173)

Other proposed long-term improvements include the following:

- Left turn lanes are also proposed at several intersections to reduce rear end and angle crashes
- Potential roundabouts are proposed at five intersections to calm travel speeds and improve intersection safety for motorists, cyclists and pedestrians
- Horizontal and vertical alignment improvements are proposed at substandard locations
- Adding a separate right-turn lane along northbound Waterford Road at Mountain Road and replacement of the existing north-south signal split-phasing with exclusive-permissive left-turn phasing.

Short Term Improvements: Proposed short-term improvements consist of additional pavement markings, signage, lighting, utility pole relocations, and clearing vegetation to enhance driver awareness, improve visibility, and reduce roadside obstacles.

Four specific hot spots are noted below that could be improved in the near future with minimal effort.

Hot Spot #1: Powhatan Beach Road to Nature Walk Lane

1. Remove existing trees within close proximity of the roadway
2. Relocate utility poles and mailboxes further back from the roadway where feasible; GIS mapping indicates that right-of-way may be available along the southbound roadway.

3. Install Type 2 or Type 3 Object Markers at each utility pole within the County-owned right of way. A Type 3 object marker is recommended for the utility pole located on the SE corner of the Powhatan Beach Road intersection
4. Install double-width white edge line pavement markings along northbound and southbound Solley Road, and extend the markings around the SE and NE corner radii at the Powhatan Beach Rd intersection
5. Install a rolled asphalt curb around the SE corner radius at the Powhatan Beach Road intersection
6. Add additional lighting to the existing utility poles along the corridor.

Hot Spot #2: 525 foot segment south of North Shore Drive

1. Remove the trees along southbound Solley Road located within the County right-of-way
2. Remove any trees within the County right-of-way on the NE corner of the North Shore Drive intersection
3. Refresh all white edge line pavement markings along this entire segment, including new markings to delineate the raised concrete channelization island on the NE corner of the North Shore Drive intersection
4. Fill in any noticeable ruts along the existing edge of pavement.
5. Relocate southbound 'Trucks Entering Highway' sign from approximately station 97+00 to station 101+00.
6. Install an advance warning intersection sign, W2-2 L & R with a W16-8P sign, in the southbound and northbound directions respectively, approaching North Shore Drive along Solley Road. The MUTCD recommends a distance of 250 to 325 feet for this type of sign under the prevailing speed conditions.
7. Relocate utility poles further back from the roadway where feasible; GIS mapping indicates that right-of-way may be available along the southbound roadway.
8. Reconstruct the roadway between Millhouse Drive (Station 85) and North Shore Drive (Station 95) to improve the substandard horizontal curve. The realignment will improve the design speed of the roadway to 40 mph and expand the clear zones along the roadway.

Hot Spot #3: Nabbs Creek Road to 800' north of the power line crossing

1. Refresh all white edge line pavement markings along this entire segment, and consider installing double-width white edge lines within the winding road segment
2. Install Type 2 Object Markers at each utility pole within the County-owned right of way
3. Remove trees located within 20 feet of northbound and southbound Solley Road located within the County right-of-way; GIS mapping indicates that significant right-of-way is available for clearing.
4. Relocated southbound blue destination signs from approximately station 136+00 to station 138+00.
5. Relocate utility poles further back from the roadway where feasible; GIS mapping indicates that right-of-way is available along the northbound and southbound roadways.

6. Construct a shoulder and drainage swale along southbound Solley Road at Nabbs Creek Road; relocate the guardrail to the edge of the new shoulder; relocate utility poles behind the guardrail and beyond the guardrail deflection zone
7. Reconstruct the roadway with the new proposed typical roadway section to improve the horizontal and vertical geometry and widen the shoulders and clear zones.

Hot Spot #4: 1500 foot segment south of Solley Elementary School

1. Refresh all white edge line pavement markings along this entire segment, and consider installing double-width white edge lines within the winding road segment.
2. Install Type 2 Object Markers at each utility pole within the County-owned right of way.
3. Remove the large trees along northbound and southbound Solley Road located within the County right-of-way; GIS mapping indicates right-of-way is available for additional clearing
4. Relocate utility poles further back from the roadway where feasible; GIS mapping indicates that right-of-way is available along the northbound and southbound roadways.
5. Reconstruct the roadway between Station 162+ and Station 175+ (beginning of existing 3-lane section) to improve the horizontal and vertical geometry, widen shoulders and clear zones and provide improved pedestrian and bicycle facilities.

Signing and Pavement Marking Improvements: In addition to the 4 key hot spot improvements identified above, the following signing and pavement marking improvements may be applied along the corridor to further enhance safety and operations:

- Trim vegetation obstructing signs along the corridor in both directions
- Install object markers on utility poles within the clear zone
- Add advisory speed limit signs to the four (4) Winding Curve signs (W1-5) located on the corridor in both directions. Advisory speed limit of 30 MPH is recommended. Curveware test shows that driving at the curves failed at the 40 mph posted speed limit
- Install additional speed limit signs along the northern section of Solley Road.
- Relocate southbound side chevron sign closest to the North Shore intersection to the curve, approximately 400 feet south of North Shore Drive
- Relocate the Freetown Road advance warning intersection sign (W2-2L) in the northbound direction along Solley Road to be closer to the intersection. It is currently approximately 1,000 feet away from the intersection, but the MUTCD recommends a distance of 250 to 325 feet for this type of sign under the prevailing speed conditions.
- Remove the 3 construction signs that were left over from a developer project near Freetown Road.
- Install a stop sign at the hidden roadway on the west side of Solley Road, 750 feet North of North Shore Drive, and install a W2-2R sign with “Hidden Roadway” plaque in the southbound direction prior to the roadway.

- Install an object marker on the existing stop sign post on the island at North Shore Drive intersection, facing the northbound vehicles.
- Reinstall the raised pavement markers along the corridor to increase nighttime visibility.
- Consider installing edgeline reflectors and/or rumble strips where there are no houses.
- Reinstall pavement markings along the entire corridor. The pavement markings appear to be recently-installed along the corridor but lack reflectivity at night. Install double-width white edge lines along the entire length of Solley Road to enhance visibility of the road edge and to make the road appear narrower to drivers to reduce speeds.
- Install (or re-install) pavement markings along the intersection corner radii at Powhatan Beach Rd, Freetown Rd, North Shore Dr (including the channelization island), and Nabbs Creek Rd.
- Consider extending the taper length along the northbound roadway at the Millhouse Drive intersection; the current taper length is 130 feet, whereas the standard taper length should be 300 feet for the prevailing speed conditions.
- Relocate stop sign on Powhaten Beach Road closer to intersection and add stop bar as you approach Solley Road.
- Repair three (3) overhead street lights that were observed as non-functioning during recent nighttime field visits:
    - SW corner of MD 173 at Solley Rd
    - West side of Solley Rd between Shore Forest Dr and North Shore Dr
    - NW corner of Lincoln Dr at Solley Rd

Left Turn Lanes: In addition to the four hot spots, there are seven (7) intersections along Solley Road that meet SHA's traffic volume criteria for providing a separate left turn lane as stated in the SHA Access Manual. These locations are as follows:

1. Northbound left turn onto Pine Ridge Road
2. Southbound left turn onto Powhatan Beach Road
3. Northbound left turn onto Freetown Road
4. Southbound left turn onto northern intersection of Half Circle (Old County Road)
5. Northbound left turn onto Willow Tree Drive and Southbound left turn onto Lincoln Drive
6. Southbound left turn onto North Shore Drive
7. Southbound left turn onto Nabbs Creek Road

Based on the tally of crashes, the construction of separate left turn lanes as short-term safety improvements should be given priority at Pine Ridge Road, Freetown Road, and North Shore Drive.

Bicycle and Pedestrian Improvements: The study corridor serves residential communities along the entire corridor with relatively dense development south of North Shore Drive and north of the power lines (Station 144) with the ongoing development of Tanyard Springs. In addition, there is continued planned growth in the northern segment of the corridor with the planned expansion of the Brandon Woods Business Park. To serve the development of the corridor, the County should consider improvements to Solley Road that will improve bicycle and pedestrian

access between communities, businesses, schools, parks and other community facilities. Potential short term improvements included the following.

1. **Bicycle and Pedestrian Improvements from 300 feet South of Chestnut Springs Lane to MD 173 (Station 170 to Station 215):** The County could construct new bike lanes, shared use path and sidewalk improvements along this 4500 foot segment of the corridor to provide improved access and connectivity for pedestrians and bicyclists. The improvements would provide connectivity between the expanding residential and industrial development, Solley Elementary School, Solley Park and Orchard Beach Volunteer Fire Station.

2. **Bicycle and Pedestrian Improvements from MD 177 to Willow Tree Drive / Lincoln Drive (Station 10 to Station 81):** The County could construct new bike lanes, shared use path and/or sidewalk improvements along this 7100 foot segment of the corridor to provide improved access and connectivity for pedestrians and bicyclists between the multiple residential communities located along Solley Road (many with existing sidewalk facilities) and the commercial areas located along Mountain Road.

Roundabouts: Roundabouts could be installed along the corridor to help control travel speeds and improve intersection operations and safety. Roundabouts would:

- Eliminate crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the potential severity of the conflict points.
- Lower delay (for side street traffic).
- Enhance pedestrian crossings of Solley Road by reducing speeds on Solley Road and providing refuge islands for pedestrians.

The five intersections listed below were identified as potential locations for the installation of roundabouts:

1. Freetown Road (would significantly reduce delay and improve 2040 traffic operations) – Station 60+00
2. Lincoln Drive/Willow Tree Drive - Station 81+25
3. North Shore Road – Station 95+50
4. Nabbs Creek Road – Station 134+25
5. Energy Parkway / Tanyard Springs Lane – Station 198+00

Geometric Improvements: There is 1 vertical curve and 2 horizontal curves that need to be improved to address insufficient horizontal and vertical sight distance. Each of those locations could be improved in the short-term as a separate project as funding becomes available. The roadway realignment could be completed in the short-term even if the ultimate typical section isn't constructed until a later date. The three locations include:

Description of Substandard Roadway Feature	Station Limits
Substandard vertical curve immediately south of Freetown Road	49+00 to 56+00
Substandard horizontal curve near North shore Drive	87+00 to 100+75
Substandard horizontal curve near waste facility	106+30 to 110+75

Minor Roadway Improvements: There are several improvements noted below which could be implemented in the near future to improve multimodal travel operations and safety within the corridor.

- **Complete Sidewalk to Solley Park:** Construct missing 75 foot segment of existing sidewalk along northbound Solley Road just south of the park entrance.
- **Upgrade Existing Sidewalk along Northbound Roadway North of Chestnut Springs Lane to conform with ADA guidelines:** Upgrade existing sidewalk as needed to meet ADA requirements between Solley Elementary School and Solley Park along northbound roadway; improvements may include providing passing zones at 200 foot intervals and verify proper grades and cross slopes.
- **Extend Sidewalk or Shared Use Path (SUP) along Southbound Roadway from Solley Elementary School To Tanyard Springs Lane:** Perform ultimate roadway widening between station 184+00 to Tanyard Springs Lane (Station 198+00) to provide pedestrian connectivity along the southbound roadway; sidewalk/SUP will provide connections to new residential communities, school, Solley United Methodist Church and Solley Park; provide controlled roadway crossing at Tanyard Springs Lane intersection (signal or roundabout).
- **Remove Paved Two Way Left Turn Lane and Construct Raised Landscaped Median between Solley United Methodist Church and Tanyard Springs Lane** to calm traffic and improve water quality.
- **Provide Bike Lanes and/or Shared Use Path along Solley Road between Tanyard Springs Lane and MD 173:** Construct full width widening for approximately 300 feet north of Tanyard Springs Lane and replace striped medians with raised landscaped medians between Tanyard Springs Lane and Fort Smallwood Road; restripe roadway between Tanyard Springs Lane and Fort Smallwood Road to provide an 11-foot travel lane and 6-foot bike lane in each direction.
- **Remove Half Circle and provide "T" connection between Opel Road and Solley Road** to simplify intersection operations and provide improved sight lines from intersection.
- **Relocate Utility Poles to Back of Existing Right-of-Way:** Several utility poles are located in close proximity (less than 5 feet) from the edge of roadway and should be relocated out of the clear zone (16 feet) where feasible; GIS mapping indicates that additional right-of-way is available in many locations to relocate the poles further from the roadway. The potential pole relocations are listed in the table below:

Potential Utility Pole Relocations

Northbound		Southbound		
Sta. 24+60	Sta. 143+40	Sta. 39+00	Sta. 103+70	Sta. 165+00
Sta. 33+30	Sta. 151+75	Sta. 40+00	Sta. 129+60	Sta. 167+60
Sta. 37+40	Sta. 153+90	Sta. 41+40	Sta. 132+40	Sta. 171+60
Sta. 38+50	Sta. 156+75	Sta. 43+75	Sta. 134+80	Sta. 173+70
Sta. 40+00	Sta. 157+60	Sta. 47+30	Sta. 136+90	Sta. 175+30
Sta. 41+60	Sta. 158+00	Sta. 56+20	Sta. 139+00	Sta. 177+10
Sta. 43+70	Sta. 158+90	Sta. 57+00	Sta. 140+80	Sta. 178+40
Sta. 134+75	Sta. 161+30	Sta. 58+60	Sta. 141+50	Sta. 180+25
Sta. 137+60	Sta. 162+75	Sta. 79+10	Sta. 143+00	Sta. 181+30
Sta. 139+20	Sta. 170+50	Sta. 84+10	Sta. 145+50	Sta. 195+20
Sta. 140+50	Sta. 172+00	Sta. 86+70	Sta. 147+50	Sta. 196+40
Sta. 142+10		Sta. 88+30	Sta. 150+20	Sta. 199+00
		Sta. 90+60	Sta. 157+50	

- **Clear Vegetation at Intersections to Improve Sight Distance:** Vegetation should be cleared at several intersections to improve sight lines as follows:

  Southbound:
  - South of Chestnut Springs Lane.
  - South of Freetown Road
  - South of Thelma Road
  - North of Shady Brook Drive

  Northbound:
  - North of Nabbs Creek Road
  - North of North Shore Drive

Estimated Costs: The total estimated construction cost for the long-term improvements is $45 million dollars based on a major quantities estimate using SHA Project Planning methodologies. Right-of-way acquisition cost is approximately $23 million dollars. The engineering cost is estimated at $7 million dollars, resulting in a total project cost of approximately $75 million dollars to accommodate all the recommended long-term improvements. The estimated costs for the short-term improvements will vary depending on the improvements selected.

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Speed Data Analysis

Signal Warrant Analysis

SHA Crash Data from 2011 through 2016

APPENDIX B – Concept Plans (Sheets 1 to 15)

APPENDIX C – Cost Estimate

APPENDIX D – Draft Report Review Comments

I. INTRODUCTION

Objective: The Anne Arundel County Department of Public Works (DPW) has prepared a preliminary improvement study for Solley Road between MD 177 (Mountain Road) and MD 173 (Fort Smallwood Road) to identify potential near-term and long-term safety, capacity and operational improvements that will enhance auto, bicycle and pedestrian travel in the 3.9 mile corridor **(see Figure 1)**. Recent crash data, including a fatality at Chestnut Springs Drive, has generated interest by the County to reevaluate the project corridor. This study includes traffic counts, analysis of existing and future traffic (2040) operations, crash analysis, assessment of existing roadway geometry and roadway typical section, development of potential typical section and horizontal and vertical geometric improvements, environmental and utility impact assessment and cost estimates.

Prior Solley Road Studies: Prior studies for the corridor were prepared in the 80s, 90s and 2000s. Lukas Associates performed a study of Solley Road in 1986 which included traffic projections for the 2006 design year. John E. Harms, Jr. and Associates, Inc. performed the North Shore Drive Extension Feasibility Study (NSDEFS) in 1996, which was intended to evaluate the feasibility of a connector road between Solley Road and Marley Neck Road (by extending either North Shore Drive or Nabbs Creek Road). The NSDEFS included 1996 traffic counts and traffic projections were developed for the 2005 design year. RK&K prepared an updated Solley Road study in 1997 which utilized data from the 1986 Solley Road study, 1996 NSDEFS, and 1997 traffic volumes.

Other Studies and Projects: Several studies and projects in the study area are ongoing or have recently been completed as follows:

1. *Transportation Facility Planning – Mountain Road (MD 177) Commercial Corridor Study (Solley Road/Waterford Road to Edwin Raynor Boulevard);* AADPW & SHA, March 2015

2. *Arterial Congestion Management Studies Final Report – MD 177 Corridor from Magothy Beach Road to MD 2; SHA District 5,* July 2015

3. *Traffic Impact Analysis for Marley Woods;* Star Spangled Investments, LLC, June 2016

4. *Traffic Impact Study – Brandon Woods Business Park, Phase* III; Chesapeake Real Estate Group; February 2017

    - Brandon Woods III - Phase 1 under review includes 500,400 sf warehouse with access only to Energy Parkway. Ultimate development, including Phase 1, to include a total of 800,000 sf warehouse and 32,800 sf office building, with an additional access to Solley Road for car access only.

5. *Traffic Forecasting Study – Solley Road @ Energy Parkway/Tanyard Springs Lane Extended*: AADPW, June 2017

    - Tanyard Springs Parcel D almost complete which includes 169 townhomes
    - The Pointe at Tanyard Springs almost complete which includes 101 townhomes

6. *Solley Road Improvements at Chestnut Springs Lane*: AADPW; currently in final design
7. 7926 Solley Road - 24,500 sf outdoor storage area/parking - completed
8. American Auto & Truck Parts - 7,200 sf storage building with outdoor storage area - completed
9. North Shore Landing - almost complete - 50 single-family homes
10. North Shore Forest - under construction - 60 townhomes
11. Millhouse Creek - may be completed - 91 townhomes
12. Shady Brook Addition - complete
13. Freetown Village (on Freetown Road) - 48 additional units

Figure 1: Site Map

II. EXISTING CONDITIONS

Existing Roadway: Solley Road is classified as a minor arterial in the Anne Arundel County General Development Plan (April 2009) and is generally a two-lane undivided open section roadway with minimal paved shoulders and sidewalks. In areas of more recent residential subdivision development, shoulders and right turn lanes with curb and gutter have been added to enhance access into the adjacent communities. In the final ¾ mile segment of the corridor north of Chestnut Springs Lane, the roadway has been widened to a three lane undivided section with a two-way left turn lane (TWLTL) and curb and gutter and sidewalk along the northbound roadway.

The corridor has very limited clear zones adjacent to the travelways with utility poles and trees frequently located within 10 feet of the roadway. Street lighting (cobra head fixtures) are intermittently mounted on the adjacent utility poles. The MD 177 and MD 173 intersections are signalized. All of the remaining intersections are stop-controlled on the intersecting side street. The roadway carries approximately 6,600 vehicles per day and the posted speed limit is 40 mph. The speed limit is reduced to 30 mph in the vicinity of the Solley Elementary School. The roadway design was evaluated for a 40 mph design speed in accordance with the Anne Arundel County DPW design standards. Existing Solley Road contains three substandard horizontal and vertical segments noted in the table below that need to be improved to address insufficient horizontal and vertical sight distance along the corridor. Substandard segments are discussed in further detail on page 24 of this report.

Description of Substandard Roadway Feature	Station Limits
Substandard vertical curve immediately south of Freetown Road	49+00 to 56+00
Substandard horizontal curve near North shore Drive	87+00 to 100+75
Substandard horizontal curve near waste facility	106+30 to 110+75

Land Use: Per the County zoning map, the existing land use generally consists of low and low-medium density residential development in the southern segment of the corridor with commercial/retail development near the Mountain Road intersection. Several recent townhouse developments have been approved along Solley Road which are expected to expand the residential areas. North of North Shore Drive, the land use consists of a closed landfill along the southbound roadway and undeveloped forested areas. Further north, land uses consist of the ongoing medium density Tanyard Springs residential development, the Brandon Woods Business Park, and a mix of existing and planned light industrial development north of Energy Parkway. The Brandon Shores Power Plant (heavy industrial) is located on the north side of MD 173 at the Solley Road intersection.

Community Facilities: Several educational, religious, emergency service and park facilities are located along the corridor as follows:

- Armiger Fire Station (Station 30) – 330 Mountain Road; 250 feet east of Solley Road
- Hall United Methodist Church – 7780 Solley Road, at Nabbs Creek Road intersection
- Solley Elementary School – 7608 Solley Road, 1200 feet south of Energy Parkway
- Orchard Beach Volunteer Fire Station No. 11 – 7549 Solley Road, 1000 feet south of MD 173
- Solley Park – 7535 Solley Road, 800 feet south of MD 173

III. TRAFFIC ANALYSIS

TRAFFIC FORECASTING

Existing Traffic: An operational and safety analysis was performed for the study corridor to identify current operational and safety needs and to support the design of the proposed roadway improvements. The study corridor consists of more than 25 intersecting state, county, and private access roadways. Seventeen (17) of the intersecting roadways were considered for this study including two (2) signalized intersections and 15 unsignalized intersections as noted below.

Signalized intersections:

1. Mountain Road (MD 177)
2. Fort Smallwood Road (MD 173)

Unsignalized intersections:

1. Energy Parkway
2. Elementary School – Bus Loop
3. Solley Elementary School – Parking Lot
4. Chestnut Springs Lane
5. Nabbs Creek Road
6. North Shore Road
7. Millhouse Drive
8. Lincoln Drive/Willow Tree Drive
9. Half Court Circle (north end)
10. Half Court Circle (south end)
11. Carl Avenue
12. Freetown Road
13. Nature Walk Lane
14. Powhatan Road
15. Pine Ridge Road

RK&K utilized 2015 traffic volume data from previous studies provided by Anne Arundel County DPW at the following intersections along Solley Road:

- Solley Road and Fort Smallwood Road (MD 173)
- Solley Road and Freetown Road
- Solley Road and Mountain Road (MD 177)

The data from previous studies was adjusted to Year 2017 levels using an annual growth rate of 1.5% as determined using the regional travel demand model. RK&K collected new turning movement count data during the AM and PM peak periods (7:00 – 9:00 AM and 4:30 – 6:30 PM) at the following intersections along Solley Road:

- Solley Road and Energy Parkway
- Solley Road and Nabbs Creek Road
- Solley Road and North Shore Road
- Solley Road and Lincoln Drive/Willow Tree Drive

To coincide with the arrival and dismissal times for Solley Elementary School, the following two intersections had turning movement counts performed from 8:00 – 9:30 AM and 3:30 – 6:00 PM:

- Solley Road and Solley Elementary School – Bus Loop
- Solley Road and Solley Elementary School – Parking Lot

In addition to the data provided by DPW, and the turning movement counts collected by RK&K, the ITE Trip Generation manual, 9th edition, was used to estimate trips generated by the other minor streets along Solley Road where no counts were performed during the AM and PM peak periods. These streets are mostly those serving small groups of dwelling units with access only to and from Solley Road (i.e., streets unlikely to carry through traffic). The trips were generated based on the number of dwelling units of single-family detached homes and residential condominium/townhouses along the minor streets. **Table 1** summarizes the trip generated using ITE Trip Generation, the minor streets, directional distribution, and land use. The trips generated were used to estimate AM and PM peak hour turning movement volumes for the locations using the directional split of traffic along Solley Road as determined from the other locations where traffic counts were performed.

Table 1: ITE Trip Generation Distribution

Street	Land Use	AM			PM		
		In	Out	Total	In	Out	Total
Carl Avenue	Single-family detached homes	5	14	**19**	15	9	**24**
Chestnut Spring Lane		2	5	**7**	6	3	**9**
Half Court Circle		16	48	**64**	54	31	**85**
Pine Ridge Road		26	78	**104**	88	51	**139**
Nature Walk Lane		5	15	**20**	17	10	**27**
Powhatan Road		15	46	**61**	52	30	**82**
Millhouse Drive	residential condominium/townhouse	7	33	**40**	32	16	**48**

Table 2 summarizes the balanced AM and PM peak hour volumes along the corridor for the individual turning movements at each intersection.

RK&K also conducted volume and speed studies on Solley Road at three different locations: Between Freetown Road and Shady Brook Drive near the south end, south of Nabbs Creek Road near the middle, and between Solley Elementary School at Energy Parkway near the north end. These counts were performed using automatic data recorders with road tubes over two multi-day periods in April 2017 and September 2017.

The daily volume at the southern end of the study corridor (8,140 vpd) is about 23% higher than the lowest volume, which was measured near the middle of the corridor (6,590 vpd). At the northern end of the study corridor, the daily volume (6,800 vpd) is about 3% higher than the lowest volume near the middle of the corridor. The daily truck percentage along the entire study corridor is 7%, as determined by counts at the three locations described above.

The posted speed limit along Solley Road is 40 MPH. The speed studies were conducted along Solley Road, at the three locations described above, to determine the current operational free-flow speeds in the northbound and southbound directions. Near the north end of Solley Road between Energy Parkway and Solley Elementary School, the average 85th-percentile speed in the northbound direction is 45 MPH, and in the southbound direction is 46 MPH. Near the middle of the corridor, south of Nabbs Creek Road, the 85th-percentile speed in the northbound direction is 50 MPH, and the 85th-percentile speed in the southbound direction is 48 MPH. Near the south end of Solley Road between Freetown Road and Shady Brook Drive, the average 85th-percentile speed in the northbound direction is 52 MPH, and in the southbound direction is 51 MPH. Travel speeds are highest in the southern portion of the study corridor, where drivers typically exceed the posted speed limit by 11 to 12 MPH. However, the typical travel speeds are excessive along the entire corridor.

Table 2: Existing (2017) Balanced Traffic Volumes

Intersections		Northbound			Southbound			Eastbound			Westbound		
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
MD 177	AM	150	76	45	65	111	147	28	168	58	73	600	66
	PM	120	126	113	109	134	68	122	605	148	69	374	98
Pine Ridge Rd	AM	12	158	-	-	276	14	20	-	48	-	-	-
	PM	47	300	-	-	285	38	21	-	26	-	-	-
Powhatan Rd	AM	-	171	7	8	267	-	-	-	-	23	-	15
	PM	-	294	27	23	309	-	-	-	-	14	-	13
Nature Walk Ln	AM	3	183	-	-	267	2	5	-	8	-	-	-
	PM	8	299	-	-	326	7	3	-	6	-	-	-
Freetown Rd	AM	26	162	-	-	247	99	24	-	22	-	-	-
	PM	45	256	-	-	257	75	115	-	76	-	-	-
Carl Ave	AM	-	184	2	3	338	-	-	-	-	8	-	4
	PM	-	363	8	7	328	-	-	-	-	4	-	4
Half Court Cir South	AM	-	181	7	0	313	-	-	-	-	28	-	0
	PM	-	339	28	0	320	-	-	-	-	15	-	0
Half Court Cir North	AM	-	181	0	8	313	-	-	-	-	0	-	15
	PM	-	339	0	23	320	-	-	-	-	0	-	14
Lincoln Dr	AM	16	178	2	0	272	38	16	1	23	26	18	5
	PM	21	298	34	7	311	27	38	11	15	17	5	1
Millhouse Dr	AM	3	196	-	-	291	4	11	-	19	-	-	-
	PM	18	319	-	-	336	15	6	-	9	-	-	-
North Shore Rd	AM	-	188	19	12	215	-	-	-	-	80	-	29
	PM	-	237	88	31	308	-	-	-	-	43	-	10
Nabbs Creek Rd	AM	-	192	25	19	153	-	-	-	-	74	-	45
	PM	-	178	69	75	303	-	-	-	-	36	-	33
Chestnut Springs Ln	AM	2	235	-	-	170	0	2	-	2	-	-	-
	PM	2	209	-	-	376	5	1	-	2	-	-	-
Solley ES – Parking Lot	AM	46	191	-	-	115	88	93	-	55	-	-	-
	PM	13	197	-	-	334	31	67	-	47	-	-	-
Solley ES – Bus Loop	AM	8	276	-	-	194	12	13	-	9	-	-	-
	PM	10	254	-	-	353	17	13	-	12	-	-	-

Intersections		Northbound			Southbound			Eastbound			Westbound		
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
Energy Pkwy/ Tanyard Springs Ln	AM	2	256	31	48	170	5	10	5	21	15	1	21
	PM	15	197	55	25	306	9	4	5	11	53	13	96
MD 173	AM	248	1	38	0	2	6	13	408	147	74	1,239	1
	PM	210	1	86	4	3	13	5	1,141	257	80	651	0

Speed and Crash History Evaluation: Historical crash data along the 3.9-mile segment of Solley Road, from Mountain Road (MD 177) to Fort Smallwood Road (MD 173), was provided by Maryland SHA's Office of Traffic and Safety, Traffic Development and Support Division (OOTS-TDSD). The crash data included a 6-year period from January 1, 2011 through December 31, 2016. During the 6-year crash study period, 131 crashes were reported along Solley Road. Of the 131 crashes that occurred during the 6-year period, 51 crashes (39%) occurred at intersections. The numbers and locations for these intersection crashes are as follows:

Table 3: Intersection Crashes

Intersection	No. of Crashes
Mountain Road (MD 177)	4
Pine Ridge Rd	4
Powhatan Beach Rd	4
Nature Walk Lane	2
Freetown Road	2
Lincoln Drive / Meadow Tree Drive	4
North Shore Drive	10
Nabbs Creek Road	9
Chestnut Spring Lane	1
Energy Parkway	7
Fort Smallwood Road (MD 173)	4

Table 4 summarizes crashes by lighting condition, severity, and type. The crash data shows a prevalence of fixed object crashes, which comprise 44% of the total crashes within the study corridor. Fixed-object crashes were mostly associated with trees/shrubbery, and poles (utility poles, sign poles and other poles). The crashes include 58 fixed-object (44%), 17 rear-end (13%), 17 angle (13%), 12 opposite direction (9%), 7 sideswipe (5%), and 3 left-turn (2%), with 17 (13%) crashes whose types were not specified. Additionally, 15 crashes (12%) were attributed to the influence of alcohol.

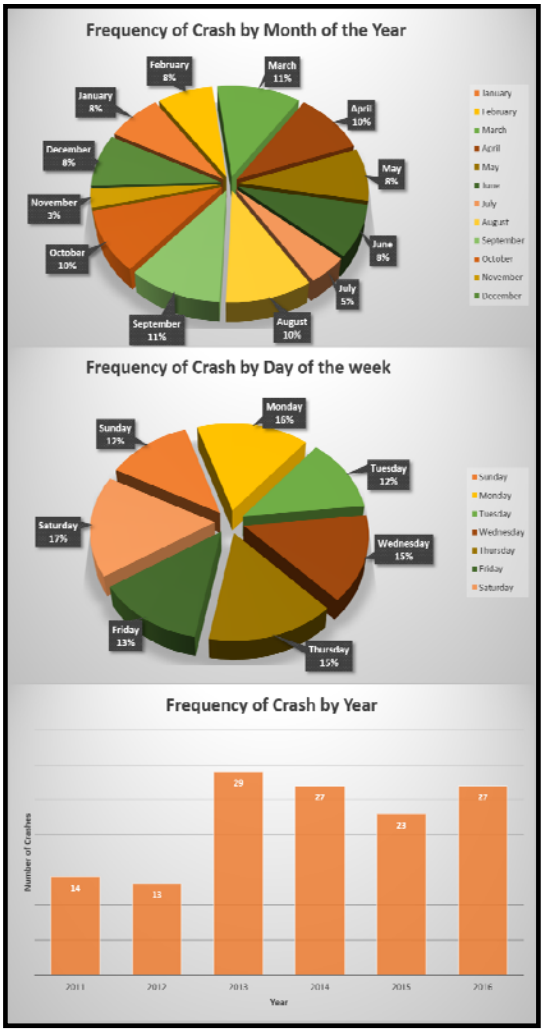
Table 4: Crash Data Summary

Year	Lighting Conditions			Severity			Crash Type							Alcohol		Total
	Day	Night	Other	PDO	Injury	Fatal	Opposite Direction	Rear End	Side Swipe	Left Turn	Angle	Fixed Object	Other	Yes	No	
2011	8	6	0	10	4	0	1	0	1	0	2	9	1	2	12	**14**
2012	8	5	0	7	6	0	2	0	0	1	3	7	0	1	12	**13**
2013	13	16	0	13	16	0	4	5	2	1	3	11	3	4	25	**29**
2014	15	11	1	16	10	1	0	3	2	1	3	12	6	3	24	**27**
2015	13	9	1	14	8	1	4	4	0	0	3	10	2	2	21	**23**
2016	14	8	3	15	10	0	1	5	2	0	3	9	5	3	23	**25**
Total	**71**	**55**	**5**	**75**	**54**	**2**	**12**	**17**	**7**	**3**	**17**	**58**	**17**	**15**	**116**	**131**

There were two (2) fatal crashes during the 6-year period, which occurred in 2014 and 2015. Property Damage Only (PDO) (57%) and Injury Crashes (41%) are the other crash severity types. Per the crash data, the 2014 fatal crash resulting in one fatality and one injury was a fixed-object crash that occurred during nighttime under wet road surface conditions. The driver was under influence of alcohol and crashed into a sign post along Solley Road, near the Chestnut Springs Lane intersection. The 2015 fatal crash was an opposite direction crash which resulted in two fatalities and five injuries. The crash, which occurred between two opposing vehicles on Solley Road near Chestnut Springs Lane, took place on dry pavement conditions during nighttime hours. The driver responsible for the crash was under the influence of alcohol and speeding.

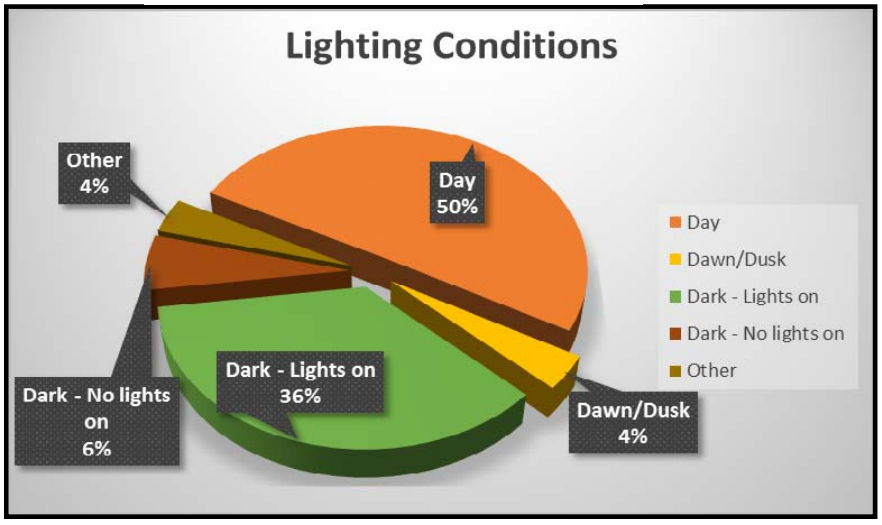
Figure 2 presents information regarding the frequency of crashes by year, month, and day of week. Based on the figure below, the months with the most crashes along the corridor was March and September. The month with the lowest crash occurrence was November. Other than November (four crashes), and July (six crashes), the remaining months throughout each year had 10 to 15 crashes (8% to 11%) occur per month. Examining crash occurrence by day of the week shows the highest number of crashes occurred on a Saturday, Monday, Thursday and Wednesday (22, 21, 20, 19 crashes, respectively). During the 6-year crash period, 2013 was the peak year with 29 crashes.

Figure 2: Crash Data Frequency



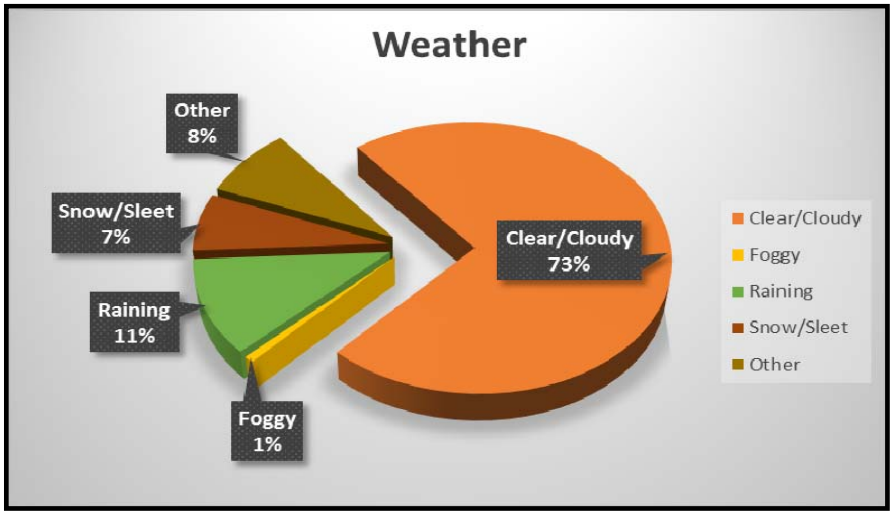
Of the 131 reported crashes, 71 (54%) crashes occurred during daylight conditions, and 55 (42%) occurred during nighttime conditions, with 5 crashes whose lighting conditions were not specified. However, per **Figure 3**, only 6% of the crashes that occurred during nighttime conditions involved a vehicle without visible headlights. Also, there is intermittent street lighting present along the corridor and lighting is generally provided at each intersection. Note that seventy percent (70%) of the crashes that occurred at North Shore Drive occurred during the night time, even though there is a street light at that intersection. Therefore, this suggests the presence of roadway lighting likely has little impact in the overall crash pattern along the study corridor.

Figure 3: Lighting Conditions



Per **Figure 4**, 95 crashes (73%) occurred during clear/cloudy weather conditions with a dry pavement surface; therefore, it can be concluded that weather and pavement surface conditions are not likely contributing factors for these crashes.

Figure 4: Weather Conditions



Future Traffic: Current Year 2017 traffic volumes were adjusted using an annual traffic growth rate of 1.5% from the regional travel demand model to reflect traffic conditions in Year 2040. The growth rate was applied to the existing traffic volumes to determine Year 2040 traffic forecasts. The projected 2040 ADT along Solley Road is 4,620 vpd per direction (9,240 vpd total). **Table 5** summarizes the projected Year 2040 balanced AM and PM peak hour volumes along the corridor for the individual turning movements at each intersection.

Table 5: Projected Future Balanced Traffic Volume

Intersections		Northbound			Southbound			Eastbound			Westbound		
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
MD 177	AM	210	115	65	85	140	185	45	235	80	100	840	100
	PM	170	170	160	150	185	95	170	845	205	95	525	140
Pine Ridge Rd	AM	10	250	-	-	360	15	20	-	50	-	-	-
	PM	45	435	-	-	405	40	20	-	25	-	-	-
Powhatan Rd	AM	-	265	5	10	350	-	-	-	-	25	-	15
	PM	-	430	25	25	430	-	-	-	-	15	-	15
Nature Walk Ln	AM	5	275	-	-	350	0	5	-	10	-	-	-
	PM	10	435	-	-	450	5	5	-	5	-	-	-
Freetown Rd	AM	35	245	-	-	320	130	40	-	30	-	-	-
	PM	65	375	-	-	350	100	170	-	105	-	-	-
Carl Ave	AM	-	285	0	5	440	-	-	-	-	10	-	5
	PM	-	535	10	5	445	-	-	-	-	5	-	5
Half Court Cir South	AM	-	285	5	0	415	-	-	-	-	30	-	0
	PM	-	510	30	0	435	-	-	-	-	15	-	0
Half Court Cir North	AM	-	285	0	10	415	-	-	-	-	0	-	15
	PM	-	510	0	25	435	-	-	-	-	0	-	15
Lincoln Dr	AM	20	275	5	0	375	55	15	0	25	25	20	5
	PM	30	445	50	10	430	40	40	10	15	15	5	0
Millhouse Dr	AM	5	290	-	-	410	5	10	-	20	-	-	-
	PM	20	465	-	-	470	15	5	-	10	-	-	-
North Shore Rd	AM	-	275	25	15	305	-	-	-	-	110	-	40
	PM	-	345	125	45	425	-	-	-	-	60	-	15
Nabbs Creek Rd	AM	-	280	35	25	215	-	-	-	-	105	-	65
	PM	-	265	95	105	420	-	-	-	-	50	-	45
Chestnut Springs Ln	AM	0	345	-	-	240	0	0	-	0	-	-	-
	PM	0	310	-	-	525	5	0	-	0	-	-	-
Solley ES – Parking Lot	AM	45	300	-	-	185	105	105	-	55	-	-	-
	PM	15	295	-	-	485	30	70	-	45	-	-	-
Solley ES – Bus Loop	AM	10	395	-	-	280	10	15	-	10	-	-	-
	PM	10	355	-	-	505	15	15	-	10	-	-	-
Energy Pkwy/ Tanyard Springs Ln	AM	5	360	45	65	240	5	15	5	30	20	0	30
	PM	20	275	75	35	430	15	5	5	15	75	20	135
MD 173	AM	350	0	55	0	5	10	20	570	200	105	1,735	0
	PM	295	0	120	5	5	20	5	1,595	365	110	910	0

OPERATIONAL ANALYSIS

Existing Conditions: An operational analysis was conducted for existing Year 2017 conditions using Synchro 9 with the HCM Signalized and Unsignalized Intersection methodologies to determine the Level of Service (LOS) and delay. The balanced peak hour volumes and existing lane geometry of the intersections were modeled. **Table 6** summarizes the results of the analysis of the intersections along the corridor by approach and overall delay, with the analyses incorporating the peak hour factors (PHFs) determined from the traffic volume count data.

Table 6: Existing Conditions Operational Analysis

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MD 177	AM	E	61.7	D	37.5	B	16.4	D	35.8	D	37.6
	PM	F	98.2	E	60.9	C	31.0	C	33.5	D	48.6
Pine Ridge Rd	AM	A	0.6	A	0	B	11.2	-	-	A	1.7
	PM	A	1.1	A	0	B	14	-	-	A	1.5
Powhatan Rd	AM	A	0	A	0.2	-	-	B	11.2	A	1
	PM	A	0	A	0.6	-	-	B	12.8	A	0.8
Nature Walk Ln	AM	A	0.1	A	0	B	10.7	-	-	A	0.3
	PM	A	0.2	A	0	B	11.6	-	-	A	0.3
Freetown Rd	AM	A	1.2	A	0	B	12.5	-	-	A	1.7
	PM	A	1.3	A	0	C	20.3	-	-	A	5.3
Carl Ave	AM	A	0	A	0.1	-	-	B	11.6	A	0.3
	PM	A	0	A	0.2	-	-	B	12.8	A	0.2
Half Court Cir South	AM	A	0	A	0	-	-	B	12.6	A	0.7
	PM	A	0	A	0	-	-	B	14.7	A	0.3
Half Court Cir North	AM	A	0	A	0.2	-	-	A	9.3	A	0.4
	PM	A	0	A	0.5	-	-	B	10.4	A	0.5
Lincoln Dr	AM	A	0.9	A	0	B	12.9	C	16.6	A	2.9
	PM	A	0.6	A	0.3	C	18.8	C	20.0	A	2.9
Millhouse Dr	AM	A	0.1	A	0	B	11.1	-	-	A	0.7
	PM	A	0.4	A	0	B	12.4	-	-	A	0.5
North Shore Rd	AM	A	0	A	0.8	-	-	B	13.9	A	2.7
	PM	A	0	A	0.8	-	-	C	16.7	A	1.9
Nabbs Creek Rd	AM	A	0	A	1.3	-	-	B	12.8	A	3.3
	PM	A	0	A	1.7	-	-	B	14.6	A	2.6
Chestnut Springs Ln	AM	A	0.1	A	0	B	10.3	-	-	A	0.2
	PM	A	0.1	A	0	B	11.5	-	-	A	0.1
Solley ES – Parking Lot	AM	A	2.4	A	0	C	16.1	-	-	A	6.2
	PM	A	1.0	A	0	C	16.3	-	-	A	4.2
Solley ES – Bus Loop	AM	A	0.5	A	0	B	11.7	-	-	A	1.0
	PM	A	0.4	A	0	B	13.0	-	-	A	1.1
Energy Pkwy/ Tanyard Springs Ln	AM	A	0.1	A	1.7	B	13.5	B	14.7	A	3.1
	PM	A	0.7	A	0.6	C	17.6	C	16.3	A	4.7
MD 173	AM	D	43.9	B	10.4	A	8.8	B	13.7	B	16.2
	PM	D	40.8	C	24.0	C	23.3	B	16.0	C	23.6

The results indicate the intersections along Solley Road operate at LOS D or better in terms of overall delay during the AM and PM peak hours. However, the northbound approach at the intersection of Solley Road and MD 177 operates at LOS E during the AM peak hour, and at LOS F during the PM peak hour. The southbound approach at this intersection operates at LOS E only during the PM peak hour.

Future Conditions – Year 2040 No-Build Alternative: An operational analysis was conducted for the Year 2040 No-Build Alternative conditions using Synchro 9 with the HCM Signalized and Unsignalized Intersection methodologies to determine the Level of Service (LOS) and delay. Signal timings (cycle lengths, splits and offsets) were held unchanged from the existing conditions analysis so that the results would reflect the true impacts of the projected traffic growth along the corridor. The balanced projected Year 2040 peak hour volumes and existing lane geometry of the intersections were modeled. **Table 7** summarizes the results of the Year 2040 No-Build Alternative analysis of the intersections along the corridor by approach and overall delay, with the analyses incorporating the peak hour factors (PHFs) determined from the traffic volume count data.

The results show the intersection of Solley Road at MD 177 would operate at LOS F under Year 2040 No-Build conditions during both the AM and PM peak hours. The northbound approach would also operate at LOS F during the AM and PM peak hours. During the PM peak hour, the eastbound approach at the intersection of Solley Road and Freetown Road would operate at LOS F, but the overall intersection would operate at LOS C, as shown in **Table 7**. The eastbound and westbound approaches at the intersection of Solley Road and Lincoln Drive would both operate at LOS E during the PM peak hour.

An additional analysis was performed to determine if the Year 2040 No-Build Alternative traffic operations at the intersection of Solley Road and MD 177, which would operate at LOS F overall during both the AM and PM peak hours, could be improved by optimizing the signal timings based on the Year 2040 volumes, which are higher than the existing volumes due to projected traffic growth. The results of this additional analysis for the MD 177 intersection are summarized in **Table 8**. The findings indicate that optimizing the existing signal timings (cycle length and splits) to account for the projected future traffic growth by Year 2040 would improve the overall LOS during the AM peak hour, from LOS F to LOS E. The intersection would continue to operate at LOS F during the PM peak hour; however, the delay would reduce by approximately 15 sec/veh, compared to the non-optimized signal timing condition. Optimizing the signal timing at the MD 177 intersection would likely reduce delay for the eastbound and westbound MD 177 approaches during both the AM and PM peak hours in Year 2040, except for the westbound approach during the PM peak hour, which would see an increase in delay resulting in LOS F (versus LOS E without optimization). The optimization would increase delay and worsen the LOS on the northbound and southbound approaches. These unexpected results are likely the result of the splits being optimized in favor of the peak travel direction on the major street at this intersection (i.e., westbound MD 177 during the AM and eastbound MD 177 during the PM), which would improve the overall intersection LOS but have a detrimental impact on LOS along the minor street (Solley Road and Waterford Road) approaches.

The analysis results in **Table 7** show the intersection of Solley Road and MD 173 would operate at a LOS E overall during the PM peak hour in Year 2040 using the existing signal timing. Likewise, the eastbound approach of MD 173 at this intersection would operate at LOS F during the PM peak hour. Optimizing the signal timing at this intersection based on projected Year 2040 traffic volumes would yield the results shown in **Table 8**. These results show the overall intersection performance of Solley Road at MD 173 would improve to LOS D during the PM peak hour, and the eastbound approach would improve to LOS D as well.

Table 7: Year 2040 No-Build Conditions Operational Analysis

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MD 177	AM	F	71.7	D	40.3	C	22.5	F	156	F	95.7
	PM	F	232	E	66.0	F	87.1	E	79.9	F	107
Pine Ridge Rd	AM	A	0.3	A	0	B	12.5	-	-	A	1.4
	PM	A	0.8	A	0	C	16.5	-	-	A	1.2
Powhatan Rd	AM	A	0	A	0.2	-	-	B	13.1	A	0.9
	PM	A	0.8	A	0	C	16.5	-	-	A	1.2
Nature Walk Ln	AM	A	0.1	A	0	B	11.7	-	-	A	0.3
	PM	A	0.2	A	0	C	15.1	-	-	A	0.3
Freetown Rd	AM	A	1.2	A	0	C	16.7	-	-	A	2.4
	PM	A	1.4	A	0	F	106	-	-	D	26.2
Carl Ave	AM	A	0	A	0.1	-	-	C	15.0	A	0.4
	PM	A	0	A	0.1	-	-	C	16.5	A	0.2
Half Court Cir South	AM	A	0	A	0	-	-	C	15.6	A	0.6
	PM	A	0	A	0	-	-	C	20.1	A	0.3
Half Court Cir North	AM	A	0	A	0.2	-	-	B	10.0	A	0.3
	PM	A	0	A	0.5	-	-	B	12.0	A	0.4
Lincoln Dr	AM	A	0.8	A	0	C	16.2	D	25.3	A	3.0
	PM	A	0.6	A	0.3	E	36.1	E	36.5	A	3.7
Millhouse Dr	AM	A	0.1	A	0	B	12.7	-	-	A	0.6
	PM	A	0.4	A	0	B	14.8	-	-	A	0.4
North Shore Rd	AM	A	0	A	0.7	-	-	C	24.2	A	4.3
	PM	A	0	A	0.9	-	-	D	29.5	A	3.0
Nabbs Creek Rd	AM	A	0	A	1.3	-	-	C	18.2	A	4.6
	PM	A	0	A	1.9	-	-	C	24.7	A	3.8
Chestnut Springs Ln	AM	A	0	A	0	A	0	-	-	A	0
	PM	A	0	A	0	A	0	-	-	A	0
Solley ES – Parking Lot	AM	A	1.7	A	0	C	22.8	-	-	A	7.0
	PM	A	0.8	A	0	C	22.9	-	-	A	4.5
Solley ES – Bus Loop	AM	A	0.4	A	0	B	13.6	-	-	A	0.9
	PM	A	0.3	A	0	C	16.0	-	-	A	0.9
Energy Pkwy/ Tanyard Springs Ln	AM	A	0.2	A	1.8	C	18.7	C	21.9	A	4.1
	PM	A	0.7	A	0.6	D	33.9	D	34.5	A	9.3
MD 173	AM	D	46.2	B	14.9	B	11.6	C	22.9	C	22.6
	PM	D	42.3	C	24.1	F	108	C	23.1	E	71.8

Table 8: Year 2040 No-Build Conditions Operational Analysis with Optimized Signal Timing

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MD 177	AM	**F**	**103**	E	65.2	C	21.4	E	72.4	E	67.8
	PM	**F**	**115**	**F**	**95.2**	**F**	**82.5**	**F**	**88.2**	**F**	**91.9**
MD 173	PM	E	62.3	C	25.6	D	42.6	C	21.4	D	38.8

Future Conditions – Year 2040 Mitigation Alternative at Solley Road and MD 177: The intersection of Solley Road and MD 177 would operate at LOS F in Year 2040 during the AM and PM peak hours, under the current signal timings with existing geometry. As shown earlier in this report, the intersection would operate at LOS E with optimized signal timing during the AM peak hour, but would continue to operate at LOS F during the PM peak hour. Therefore, two (2) mitigation alternatives for improvement at the intersection were analyzed. The alternatives are:

- Option 1: Addition of a northbound right-turn lane on Waterford Road
- Option 2: Addition of a northbound right-turn lane and concurrent north/south left-turn phasing on Waterford Road

The results of the two mitigation alternative analyses at the intersection are summarized in **Table 9**. The table also includes the result of the No-Build with optimized existing timings alternative. The findings indicate that, under Option 1, the intersection would continue to operate at LOS E overall during the AM peak hour, but would improve from LOS F to LOS E during the PM peak hour. The overall delay would reduce by approximately 3 sec/veh, and 36 sec/veh during the AM and PM peak hours, respectively, under Option 1, compared to the No-Build with optimized existing timings alternative. Also, under Option 2, the intersection would continue to operate at LOS E during the AM peak hour, however the overall delay would reduce by 13 sec/veh, compared to the No-Build with optimized existing timings alternative. The intersection would operate at LOS D overall during the PM peak under Option 2. Per **Table 9**, the intersection of Solley Road and MD 177 would operate better under Option 2.

Table 9: Mitigation Alternative Analysis Result at Solley Road and MD 17

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
No Build Optimized	AM	**F**	**102.6**	E	65.2	C	21.4	E	72.4	E	67.8
	PM	**F**	**115.2**	**F**	**95.2**	**F**	**82.5**	**F**	**88.2**	**F**	**91.9**
Option 1	AM	**F**	**87.3**	E	65.2	C	21.4	E	72.4	E	65.0
	PM	E	73.6	E	74.5	D	45.4	D	50.1	E	56.4
Option 2	AM	**F**	**80.2**	E	62.9	B	17.8	E	56.1	E	55.1
	PM	D	51.1	E	62.3	D	39.6	D	39.8	D	45.4

Future Conditions – Year 2040 Mitigation Alternative at Solley Road and Freetown Road: Analysis was performed to determine if the Year 2040 eastbound approach and overall intersection operation at Solley Road and Freetown Road could be improved by either installing a traffic signal at the intersection or constructing a roundabout to replace the existing stop-controlled T-intersection (which has a stop sign on the Freetown Road approach). A signal warrant analysis was conducted at the intersection in accordance with the 2011 Maryland Manual on Uniform Traffic Control Devices (MUTCD). A traffic signal may be justified if one or more of the traffic signal warrants in the 2011 Maryland MUTCD is met, or based on engineering judgment. Based on the available count data, only Warrant 2 (Four Hour Vehicle Volume) and Warrant 3 (Peak Hour) were analyzed. The result of the warrant analysis showed that Warrant 2 was not satisfied. Warrant 3 is satisfied for the 1 hour minimum MUTCD requirement; however this location does not satisfy the "unusual case" requirement. The "unusual cases" are locations with schools, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

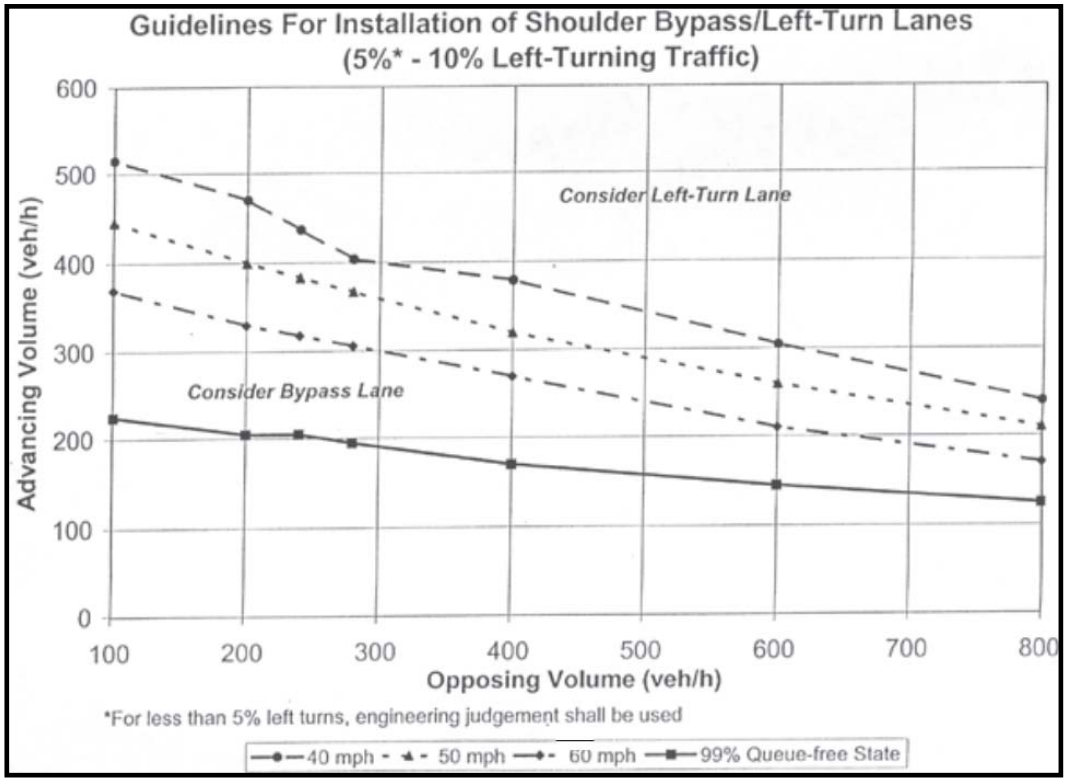
The roundabout analysis was conducted using Sidra Intersection software and the HCM Roundabout Capacity Model. The proposed roundabout was assumed to have a single circulating lane, with single lane entry and single lane exit on each of the three legs of the intersection. The results of the roundabout analysis indicate this intersection and all approaches would operate at LOS A during both the AM and PM peak hours in Year 2040.

Future Conditions – Year 2040 Left-Turn Lane Alternative: Left-turn lanes are being considered for implementation at various intersections along Solley Road to improve safety at the intersections. Maryland SHA provides graphical guidelines for installation of shoulder bypass/left-turn lanes. These guidelines base the need for a separate left turn lane on the Advancing Volume (i.e., the combined same direction through and left-turn volume) corresponding the left-turn percentage (i.e., the ratio of the left-turn volume to the total advancing volume), the volume of opposite direction traffic, and the measured prevailing travel speed. Using these guidelines, left-turn lanes are justified along Solley Road at each of the intersections considered that would have 5% or more left-turning traffic. This is due to the projected Year 2040 advancing volumes at these locations being greater than the Maryland SHA advancing volume thresholds corresponding to a 40-mph operating speed and the projected left-turn volume percentages. **Table 10** presents the projected left-turn percentages, Year 2040 opposing and advancing volumes for the intersections. **Figures 5 and 6** present the guideline charts for 5% - 10% left-turning traffic chart, and 10% - 20% left-turning traffic chart, respectively.

Table 10: Left-Turn Lane Warrant Volumes

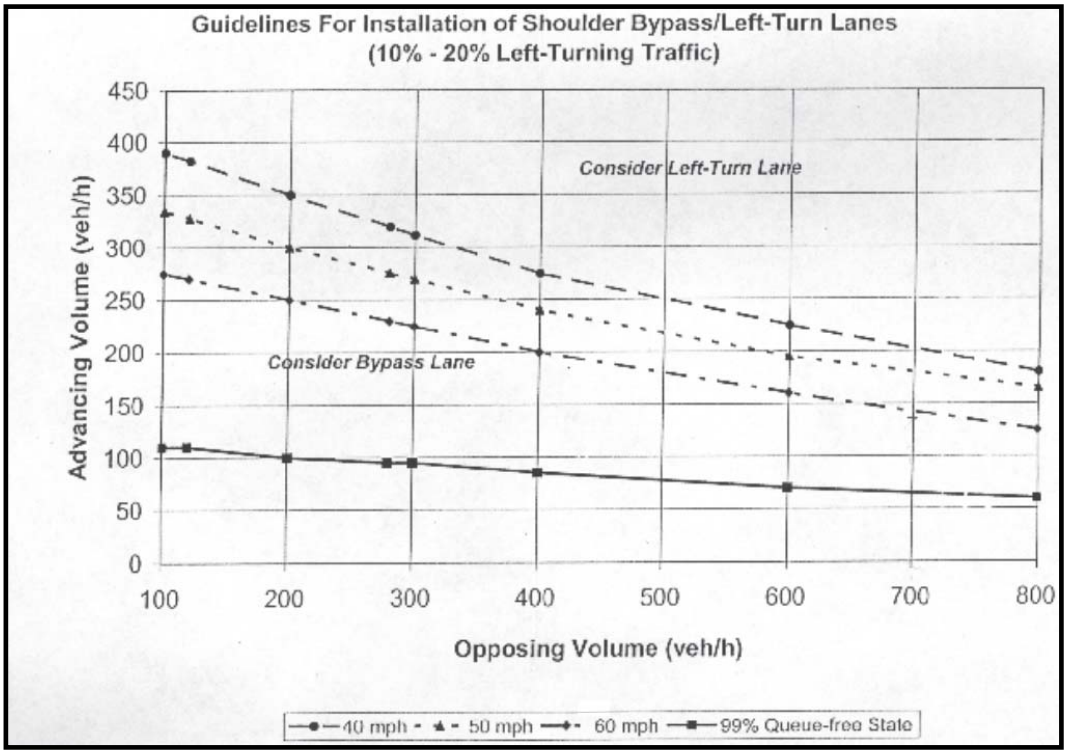
Intersection Approach	Projected Left-Turn Percentages	Year 2040 Opposing Volume (veh/hr)	Year 2040 Advancing Volume (veh/hr)	SHA Left Turn Criteria Met?
NB Solley Road and Pine Ridge Road	9%	445	480	✔
SB Solley Road and Powhatan Road	5%	430	455	✔
NB Solley Road and Freetown Road	15%	450	440	✔
SB Solley Road and Half Court Circle North	8%	510	460	✔
NB Solley Road and Lincoln Drive/Willow Tree Drive	6%	480	525	✔
SB Solley Road and North Shore Road	10%	470	470	✔
SB Solley Road and Nabbs Creek Road	20%	360	525	✔

Figure 5: SHA Guidelines for Installing Shoulder Bypass/Left-Turn Lanes (5% - 10% Left-Turning Traffic)



Source: Maryland State Highway Administration, *Maryland State Highway Access Manual*.

Figure 6: SHA Guidelines for Installing Shoulder Bypass/Left-Turn Lanes (10% - 20% Left-Turning Traffic)



Source: Maryland State Highway Administration, *Maryland State Highway Access Manual*.

Potential Roundabouts: Vehicles traveling at speeds exceeding the posted speed limit are common along Solley Road. Roundabouts may be employed as a potential traffic-calming measure to reduce traffic speeds along Solley Road. Potential locations for roundabouts along Solley Road are:

- Freetown Road (would also improve projected Year 2040 traffic operations)
- Lincoln Drive/Willow Tree Drive
- Nabbs Creek Road
- North Shore Road
- Energy Parkway

Aside from the Freetown Road location, each of these potential roundabout locations would serve as traffic calming devices only, and would not be required to mitigate any adverse capacity impacts of the projected traffic growth along the corridor (i.e., each location would operate at LOS D or better in Year 2040). Therefore, no operational analyses were performed at these locations. However, each of these locations represents a major unsignalized intersection along the study corridor.

TRAFFIC SUMMARY

Key findings from the traffic analysis are presented below:

1. The posted speed limit on Solley Road is 40 MPH and the 85th-percentile speeds range from 45-52 mph.
2. There were 131 reported crashes along Solley Road during the 6-year period between January 1, 2011 and December 31, 2016; 51 crashes (39%) occurred at intersections.
3. The crash data shows a prevalence of fixed object crashes, which comprise 44% of the total crashes within the study corridor. Fixed-object crashes were mostly associated with trees/shrubbery, and poles (utility poles, sign poles and other poles).
4. Each of the intersections along Solley Road currently operate at LOS D or better during both the AM and PM peak hours
5. Using existing signal timings in Year 2040, the intersection of Solley Road and MD 177 would operate at LOS F during the AM and PM peak hours
    a. Westbound approach along MD 177 would operate at LOS F during the AM peak hour
    b. Northbound approach (Waterford Road) would operate at LOS F during the AM and PM peak hours
    c. Eastbound approach along MD 177 would operate at LOS F during the PM peak hour
6. Using signal timings optimized for the projected Year 2040 volumes, the LOS at Solley Road and MD 177 would improve to LOS E during the AM peak hour; however, the LOS during the PM peak hour would remain at LOS F
    a. All the approaches would operate at LOS F during the PM peak hour
7. Two mitigation options were analyzed to improve operations at Solley Road and MD 177 in Year 2040
    a. These options were developed to be implementable without making significant changes to MD 177, focusing primarily on Solley Road.
    b. Option 2 provides a separate northbound right-turn lane with concurrent left-turn phasing and would significantly reduce overall delay during both peak periods. The overall LOS would improve to LOS E during AM peak period, and LOS D during the PM peak hour
8. Using existing signal timings in Year 2040, the intersection of Solley Road and MD 173 would operate at LOS E during the PM peak hour
    a. Eastbound approach along MD 173 would operate at LOS F during the PM peak hour
9. Using signal timings optimized for the projected Year 2040 volumes, the LOS at Solley Road and MD 173 would improve to LOS D during the PM peak hour.
10. Eastbound approach at the intersection of Solley Road and Freetown Road would operate at a LOS F during the PM Peak hour in Year 2040
    a. Signal is not warranted at this location based on applicable MUTCD criteria
    b. Constructing a roundabout at this location would improve Year 2040 operations to LOS A
11. Using Maryland SHA's guidelines, left-turn lanes are warranted along Solley Road at intersections with 5% or more left-turning traffic volume based on Year 2040 volumes.

IV. PROPOSED IMPROVEMENTS

Posted and Design Speeds

Solley Road is currently posted for 40 mph along the entire 3.9 mile corridor except for the segment adjacent to the Solley Elementary School located south of Energy Parkway. The proposed design speed is 40 mph to encourage lower travel speeds along the roadway and to make the roadway safer for multimodal travel including autos, bicyclists and pedestrians. Since the speed studies indicate that the 85th-percentile speeds range from 45-52 mph, substandard geometry should be improved where feasible to meet the 40 mph design speed, and the roadway improvements should be developed to encourage travel speeds at the posted speed limits.

High travel speeds are not desirable because of the large volumes of turning movements from local driveways, entrances and side streets and the increased volume of bicyclists and pedestrians anticipated with the planned residential and industrial development. Lower design speeds will make the roadways safer for multimodal travel and will also reduce clear zone requirements, typical section width, right-of-way requirements and impacts on neighboring communities, environmental features and utilities. A higher design speed would require the reconstruction of a larger quantity of the existing roadway along Solley Road, necessitate the potential relocation of the existing pumping station south of Freetown Road and create a significant increase in construction costs.

Criteria utilized for the proposed roadway design include the following:

- Maximum superelevation: 0.04 ft:/ft. (AASHTO & AA County)
- Minimum radius: 533’ (AASHTO) & 637’ (AA County)
- Maximum vertical grade: 8.0% (AA County)
- Minimum vertical grade: 1.0% (AA County)

Typical Section

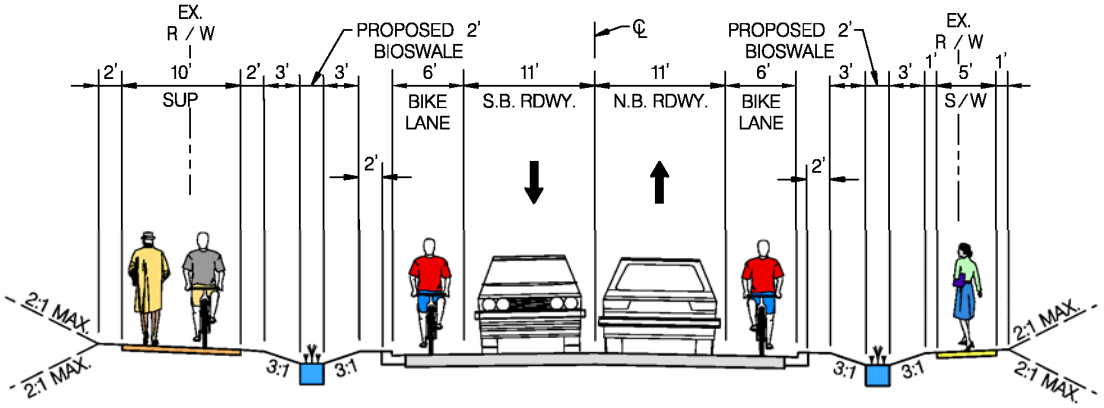
The existing segment of Solley Road between Mountain Road and Chestnut Springs Lane (approximately 3 miles) is currently a sub-standard two-lane open section roadway comprised of 2-10’ lanes with minimal paved shoulders and no sidewalks. The northern ¾ mile segment between Chestnut Springs Lane and Fort Smallwood Road (MD 173) consists of a combination of open and closed three lane section consisting of one lane per direction, plus a continuous two-way left turn lane. Since the results of the traffic analysis determined that most of the intersections are not in need of additional capacity, the primary goal of the proposed improvements is to increase safety for auto, bicycle and pedestrian travel by widening clear zones and adding paved shoulders, shared-use path and sidewalks along the corridor. Left turn lanes are recommended at several intersections to provide storage for left turning vehicles and reduce the opportunity for rear-end collisions. Bio-swales are also proposed along the roadway to accommodate conveyance of stormwater runoff from the roadway and provide stormwater treatment to remove sediments and pollutants prior to discharge into local waterways.

Between Mountain Road (MD 177) and North Shore Drive (approximately 1.6 miles), a closed section roadway with curb and gutter is proposed to narrow the proposed typical section and help control travel speeds while also reducing impacts to adjacent properties and resources. Between North Shore Drive and Chestnut Springs Lane (approximately 1.5 miles), an open section roadway is proposed to reduce costs, expand the clear zones and enhance stormwater treatment. A closed three lane section is proposed between Chestnut Springs Lane and Fort Smallwood Road (MD 173) to match the existing roadway section and continue accommodating left turning traffic movements into the adjacent residents, businesses and community facilities.

The typical sections for the corridor each include a 10-foot shared use path along the southbound roadway, a 5-foot sidewalk along the northbound roadway and 6-foot bike lanes along both sides of the roadway to improve bicycle and pedestrian travel. Proposed 11-foot northbound and southbound travel lanes, 10-foot left turn lanes, and reduced shoulder widths are shown to minimize impacts and reduce travel speeds. Proposed 1.5 foot deep bio-swales will be provided along the roadway to address stormwater runoff and comply with county stormwater management regulations. In the closed section segments, the proposed bio-swales will generally consist of a 2-foot bottom with 3:1 side slopes (8' total). In the open section segments, the proposed swales will consist of a 4-foot bottom with 4:1 slopes (16' total). Bioswale design locations and sizes will be further refined during final design.

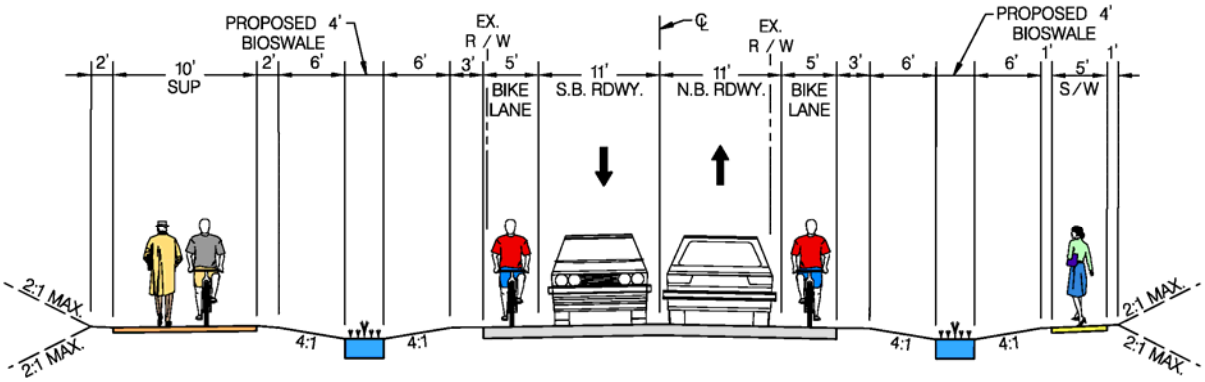
The proposed typical sections for the Solley Road Improvements are presented below.

Two-Lane Closed Section: From MD 177 (Station 10+00) to North Shore Drive (Station 99+50) the proposed improvements consist of a two-lane closed section roadway with bio-swales, bike lanes, sidewalk and shared use path within a proposed right-of-way of approximately 75 feet.



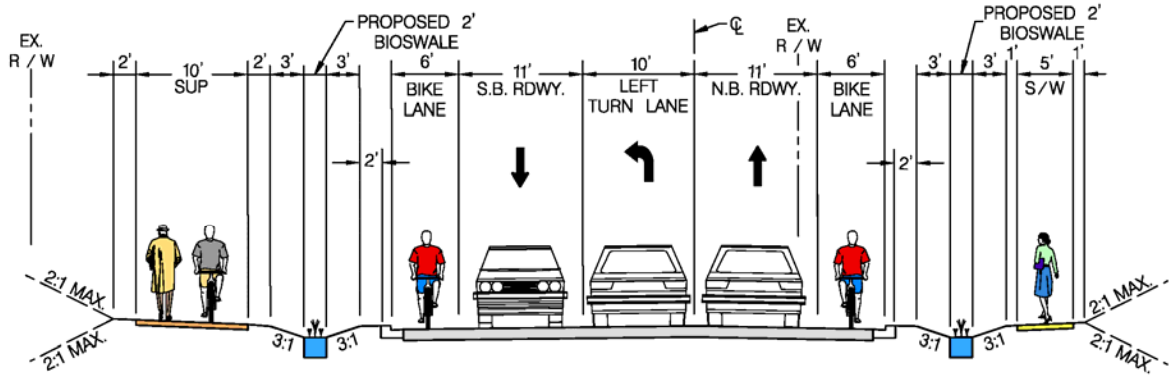
PROPOSED 2 LANE CLOSED TYPICAL SECTION
MOUNTAIN ROAD (MD 177) TO STA. 99+50

Two-Lane Open Section: From North Shore Drive (Station 99+50) to Chestnut Springs Lane (Station 170+00), the roadway will consist of a two-lane open section roadway with bike lanes, bio-swales, sidewalk and shared use path within a proposed right-of-way of approximately 90 feet.



PROPOSED 2 LANE OPEN TYPICAL SECTION
STA. 99+50 TO STA. 170+00

Three-Lane Closed Section: From Chestnut Springs Lane (Station 170+00) to Fort Smallwood Road (Station 215+00), the proposed roadway will consist of a three-lane closed section with a continuous two-way center left turn lane, bike lanes, bio-swales, sidewalk and shared use path within a proposed right-of-way of approximately 85 feet.



PROPOSED 3 LANE CLOSED TYPICAL SECTION
STA. 170+00 TO FORT SMALLWOOD ROAD (MD 173)

Left turn lanes are proposed at the following locations:

1. Northbound at Pine Ridge Road (300' left turn length)
2. Southbound at Powhatten Beach Road (250' left turn length)
3. Northbound at Freetown Road (335' left turn length)
4. Continuous Left from Opel Road to Lincoln Drive (650' left turn length)
5. Southbound at Lincoln (250' left turn length)
6. Southbound at North Shore Drive (310' left turn length)
7. Southbound at Nabbs Creek Road (385' left turn length)

Stormwater Management

The proposed typical sections noted above consist of bio-swales along both sides of the roadway to treat the majority of the new impervious areas added by the proposed improvements. Additional methods of treatment could include pervious pavement for the sidewalk and/or shared use path. Additional bio-retention facilities may be incorporated into available open space locations such as the grass buffer area between northbound Solley Road and Half Circle at Opel Road.

Horizontal and Vertical Alignment

A review of the existing horizontal and vertical geometry along the Solley Road corridor indicates that the roadway has insufficient horizontal and vertical sight distance in a few locations along the roadway and that approximately 10% of the horizontal curves and 20% of the vertical curves do not meet applicable AASHTO and Anne Arundel County Department of Public Works 40 mph design criteria. Also, due to the numerous utility poles that are located within 6 to 10 feet of the existing pavement edge, the existing clear zones do not meet AASHTO's recommended 16-foot width for a 40 MPH roadway.

All of the proposed improvements – horizontal alignment, lane configurations, shoulders, bike lanes, sidewalk and asphalt shared use path – are shown on 100 scale plans included in Appendix B. The improvements include:

- A substandard sag vertical curve immediately south of Freetown Road must be improved between station 49+00 and station 56+00 requiring complete reconstruction of the roadway to raise the profile above the existing grades. A proposed profile and cross sections were prepared to determine the limits of grading shown on the enclosed plans.

- Removal of Half Circle in the vicinity of Opel Road (Station 75) is proposed to eliminate the skewed intersection alignments of Half Circle with Solley Road and consolidate all turning movements at Opel Road. Driveway access for two properties will be extended directly to Solley Road. The modifications will also improve stormwater design by removing excess pavement and providing space for stormwater management facilities.

- In the vicinity of North Shore Drive, the roadway horizontal alignment is proposed to be modified between stations 87+00 and 100+75 to provide the minimum horizontal radius (R=533').
- The centerline will be shifted east between station 106+30 and station 110+75 to provide the minimum horizontal radius (R=533').

- The centerline of the roadway will be shifted east from station 122+00 to station 187+00 to reduce property impacts on the west side of the roadway and to focus improvements to the east that can be incorporated into the Brandon Woods Business Park development.
- Existing sidewalk along the northbound roadway from station 191+00 to station 206+00 will be maintained. However, portions of the 4-foot sidewalk may need to be widened to provide 5-foot wide passing areas every 200 feet per ADA guidelines.

Intersection Sight Distance

Intersection sight distances were evaluated at each of the 21 intersecting roadways along the corridor to determine if adequate visibility is provided for motorists to see approaching vehicles and make safe stopping and turning movements. The evaluation identified 7 intersections with substandard intersection sight distances. Potential mitigation measures include removal of obstructions such as trees and utility poles. The locations that contained substandard intersection sight distance are provided in the table below along with recommended mitigation measures.

Intersection	NB/SB Direction	Approximate Existing Sight Distance (feet)	Required Sight Distance (feet)	Potential Mitigation
Pine Ridge Road	SB	Varies	445'	Restrict Parking
Shady Brook Drive	NB	300'	385'	Clear Vegetation

Intersection	NB/SB Direction	Approximate Existing Sight Distance (feet)	Required Sight Distance (feet)	Potential Mitigation
Thelma Road	SB	300’	445’	Clear Vegetation & Relocate Utility Pole
Freetown Road	SB	300’	445’	Clear Vegetation & Relocate Utility Pole
North Shore Drive	NB	380	445’	Clear Vegetation
Nabbs Creek Road	NB	300’	445’	Clear Vegetation & Relocate Utility Pole
Chestnut Springs Road	SB	350’	445’	Clear Vegetation & Relocate Utility Pole

Roundabouts

As noted previously, speed studies indicate that the 85th-percentile speeds in both the northbound and southbound directions are approaching 50 mph and design measures that reduce travel speeds are desirable to improve the safety of multimodal travel. One potential measure to help control travel speeds would be the installation of roundabouts at some of the higher volume intersections along the corridor. Roundabouts have been routinely employed to calm travel speeds along both rural and urban roadways. Furthermore, numerous studies have shown significant safety improvements at intersections converted from conventional stop-control and signalization to roundabouts. The physical shape of roundabouts eliminates crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the most severe of those conflict points. Recent studies of converted intersections have reported overall reductions of 35 percent in total crashes and 76 percent in injury crashes. Severe, incapacitating injuries and fatalities are rare, with one study reporting 89-percent reduction in these types of crashes and another reporting 100-percent reduction in fatalities. Additional potential benefits of roundabouts include:

- Roundabouts typically have lower overall delay than signalized and stop-controlled intersections.
- Roundabouts would enhance pedestrian crossings of Solley Road at intersections by reducing speeds on Solley Road and providing refuge islands for pedestrians.

The five intersections listed below were identified as potential locations for the installation of roundabouts:

I. Freetown Road (would significantly reduce delay and improve 2040 traffic operations) – Station 60+00
II. Lincoln Drive/Willow Tree Drive - Station 81+25
III. North Shore Road – Station 95+50
IV. Nabbs Creek Road – Station 134+25
V. Energy Parkway / Tanyard Springs Lane – Station 198+00

V. IMPACT ASSESSMENT

Property Impacts

The existing right-of-way and property boundaries shown on the enclosed plans is based on County supplied GIS data. The existing roadway generally lies within a right-of-way ranging from 30 to 95 feet. Consequently, the proposed 75-90 foot right-of-way associated with the proposed typical sections will require fee simple right-of-way and easement acquisition from adjacent property owners. The proposed improvements are estimated to require approximately 20 acres of proposed fee simple right-of-way acquisition from approximately 207 properties. There are two properties located at approximately station 42+50 left and station 163+30 right that could require potential displacement with the proposed improvements. The property at Station 42+50 appears to be operating as an automotive service station (All Good Stuff) and snowball stand. The property at Station 163+30 appears to be an unoccupied residence. These two locations will need to be further studies in final design to determine if displacement can be avoided.

Utilities

Utilities were inventoried based on GIS data, available record plans provided by the utility owners and from field reconnaissance. Potential utility impacts are estimated to include relocation and/or adjustments to both overhead and underground utilities including utility poles, water mains, storm drains, sewers, fire hydrants, gas mains and service lines to adjacent properties. Impacts to other utilities for which records were not available, such as underground cable and electric, are also anticipated and will need to be explored further in final design.

Wetland and Stream Impacts

A desktop investigation of mapped wetlands, waterways, and floodplains was conducted prior to the preliminary field investigation. Several published reference maps were reviewed to determine the likelihood of federal or state jurisdictional wetlands or waters within the project study area, including the *U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI)*, *Maryland Department of Natural Resources (DNR) Wetland Inventory*, *Anne Arundel County Streams Mapping, U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Web Soil Survey*, *Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM)*, and the *U.S. Geological Survey (USGS) Topographic Survey*. NWI identified one forested wetland; DNR identified three forested wetlands, one emergent wetland, and one stream; and Anne Arundel County identified two perennial streams, one ephemeral stream, and one intermittent stream. A 100-Year FEMA floodplain crosses the study area just north of Shady Brook Lane (Station 52+). One partially hydric and one predominantly hydric soils were identified within the study area.

A preliminary wetlands and waters field investigation was conducted on April 10 and April 18, 2017 to approximate the limits of Waters of the U.S. and wetlands within the project study area. Five Waters of the U.S. and 14 wetlands were identified within the project study area during the preliminary field investigation. Details on each feature are provided in **Tables 11 and 12**.

Table 11: Observed Waters

Feature ID	Station	Hydrologic Class	Channel Shape/ Bank Stability	Substrate	Bank Cover Type
A	52+50	Perennial RPW	Natural/Stable	Silts Cobbles Sands Gravel	Right bank: Forest Left bank: Forest
D	65+80	Intermittent RPW	Natural/Stable	Silts Sands	Right bank: Forest Left bank: Forest
J	98+75	Ephemeral Non-RPW	Natural/Stable	Silts Sands	Right bank: Forest Left bank: Forest
N	129+30	Intermittent RPW	Natural/Stable	Silts Sands	Right bank: Forest Left bank: Forest
P	113+30	Ephemeral Non-RPW	Natural/Stable	Silts Sands	Right bank: Forest Left bank: Forest

One perennial relatively permanent waters (RPW) (Feature A), two intermittent RPWs (Features D and N), and two ephemeral non-RPWs (Features J and P) were observed during the field investigation. Features A, D, and N originate outside of the project study area and flow west to east through culverts under Solley Road. Feature A has been identified by the Maryland Department of Natural Resources Wildlife and Heritage Section as a Nontidal Wetland of Special State Concern (WOSSC). Features J and P originate from a culvert under Solley Road with Feature J receiving hydrology from wetland Feature Q. The waters features observed have natural channel shapes, stable banks, forested riparian bank cover types, and a substrate composed of silts and sands. Feature A substrate also includes cobbles and gravel. Features D and N abut forested wetland Feature E and Feature O, respectively.

Table 12: Observed Wetlands

Feature ID	Station	Wetland Classification	
B	59+50, Left	PFO	Palustrine Forested
C	60+50, Left	PEM	Palustrine Emergent
E	65+80, Left	PFO	Palustrine Forested
F	79+75, Left	PFO	Palustrine Forested
G	80+50, Left	PFO	Palustrine Forested
H	89+95, Right	PEM	Palustrine Emergent
I	89+00, Right	PEM	Palustrine Emergent
K	126+50, Left	PFO	Palustrine Forested
L	129+00, Left	PEM/PFO	Palustrine Emergent/Palustrine Forested
M	137+50, Left	PFO	Palustrine Forested
O	129+10, Right	PFO	Palustrine Forested
Q	99+00, Right	PFO	Palustrine Forested
R	144+50, Left	PEM	Palustrine Emergent
S	150+00, Left	PFO	Palustrine Forested

Fourteen wetlands were identified east and west of Solley Road **(Table 12)**: four palustrine emergent (PEM) wetlands (Features C, H, I, and R), nine palustrine forested (PFO) wetlands (Features B, E, F, G, K, M, O, Q, and S), and one PEM/PFO wetland (Feature L). The wetland features observed have hydrologic indicators including standing water, saturation, water stained leaves, and high water table. Hydric soils contained distinct redoximorphic features. Common hydric vegetation observed include sedge (*Carex* sp.), sweetgum (*Liquidambar styraciflua*), soft rush (*Juncus effusus*), Japanese stiltgrass (*Microstegium vimineum*), broadleaf cattail (*Typha latifolia*), and narrow leaf cattail (*Typha angustifolia*).

The proposed roadway improvements will impact approximately 360 linear feet of waters and 0.3 acres of non-tidal wetlands. A Joint Permit Application will need to be completed and permit authorizations will need to be secured from the U.S. Army Corps of Engineers and the Maryland Department of the Environment for impacts to the wetland and waters resources.

Forest & Roadside Tree Impacts

A preliminary walkthrough forest stand analysis was conducted on April 10 and April 18, 2017 to characterize and approximate the limits of forest stands and hedgerows within the project study area. One hedgerow and 10 forest stands were identified within the project study area. One mid-successional hedgerow (H1) was identified west of Solley Road with a dominant canopy size class of 12-20” diameter at breast height (DBH). H1 is a volunteer hedgerow dominated by white oak (*Quercus alba*) and tulip poplar (*Liriodendron tulipifera*) in the canopy; American holly (*Ilex opaca*) and red cedar (*Juniperus virginiana*) in the understory; and English ivy (*Hedera helix*), Japanese honeysuckle (*Lonicera japonica*), greenbrier (*Smilax rotundifolia*), grapevine (*Vitis* sp.), and red raspberry (*Rubus idaeus*) in the herbaceous layer. H1 is in fair condition with moderate levels of downed woody debris and invasive species cover.

Nine early to mid-successional forest stands (FS1, FS2, FS4, FS5, FS6, FS7, FS8, FS9, and FS10) were identified east and west of Solley Road, with dominant canopy size classes ranging from 6 to 11 inches DBH and 12 to 20 inches DBH. Dominant canopy species within these stands include white oak, northern red oak (*Quercus rubra*), southern red oak (*Quercus falcata*), red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), pitch pine (*Pinus rigida*), Virginia pine (*Pinus virginiana*), American sycamore (*Platanus occidentalis*), and sweetgum. Dominant understory species within these forest stands include American holly, sweetgum, and red cedar. Common herbaceous species include English ivy, Japanese honeysuckle, multiflora rose (*Rosa multiflora*), and poison ivy (*Toxicodendron radicans*). FS1, FS2, FS5, FS8, and FS9 are in fair condition, generally due to medium to high invasive species cover and/or edge disturbances caused by fragmentation from transmission lines and development. FS4, FS6, FS7, and FS10 are in good condition.

One early successional forest stand (FS3) was identified west of Solley Road, with a dominant canopy size class of 2 to 6 inches DBH. Dominant canopy species include American sycamore and sweetgum, with American holly, multiflora rose, and bush honeysuckle (*Lonicera* spp.) common in the understory. Herbaceous layer species include Japanese honeysuckle and grape species. FS3 is in fair condition, generally due to medium to high invasive species cover and/or edge disturbances.

The proposed improvements are estimated to impact approximately 11.5 acres of forest. Forest Conservation Plans will need to be prepared in accordance with the Anne Arundel County Forest Conservation Program.

Rare, Threatened, and Endangered Species

Letters requesting database review for rare, threatened, and endangered (RTE) species and fisheries resources were submitted to the following agencies:

- Maryland Department of Natural Resources Wildlife and Heritage Section (MDNR-WH)
- Maryland Department of Natural Resources Project Review Division (MDNR-PRD)
- U.S. Fish and Wildlife Service (USFWS)

Requests for information on the presence of RTE species and fisheries resources were sent to MDNR-WH and MDNR-PRD on March 22, 2017, and to USFWS on June 20, 2017. MDNR-WH responded on April 7, 2017 indicating the occurrence of the state-listed endangered dwarf iris (*Iris verna*), as well as the presence of a Nontidal Wetland of Special State Concern with a regulated 100-foot upland buffer (Wetland Feature A) and Forest Interior Dwelling Bird habitat. Final design will take these areas into consideration to minimize and avoid impacts.

MDNR-PRD responded on May 4, 2017 indicating that the project crosses several Use-I streams. No in-stream work is permitted in Use-I streams between March 1 and June 15 of any given year to protect spawning fish habitat. A USFWS official species list was obtained via the IPaC tool on May 8, 2017 indicating the presence of swamp pink (*Helonias bullata*) within the vicinity of the project area. A letter requesting further information on the swamp pink was sent to USFWS on June 20, 2017. USFWS responded on August 2, 2017 indicating that swamp pink has been documented to occur in the area and that all wetlands to be filled or otherwise

affected by the project must be surveyed for the presence of swamp pink by a professional botanist. Further coordination with USFWS regarding swamp pink survey will be pursued during the final design stages.

VI. ESTIMATED COSTS

A major quantities project cost estimate was completed for the proposed improvements using SHA Project Planning methodologies. Construction quantities for major items of work including earthwork, paving and shoulder improvements were computed based on the concept plans and cross sections. Other items of work including Preliminary/MOT, Drainage, Landscaping, Traffic and Utilities were estimated using percentages established by SHA based on historical project data. The estimate also includes proposed right-of-way acquisition, engineering, construction administration and a 35% contingency. The estimated construction cost for the long-term improvements is approximately $45,000,000 and the estimated project cost is $75,000,000. Detailed estimates are included in Appendix C.

VII. RECOMMENDATIONS

Corridor Needs

The results of the existing conditions assessment and traffic analysis indicate the following:

1. The study corridor currently has adequate capacity and all intersections operate at an adequate level of service (LOS D or better).
2. The intersections at MD 177, Freetown Road, and MD 173 will fail in year 2040 with estimated traffic growth.
    - The traffic capacity needs at MD 173 in year 2040 can be mitigated by optimizing the traffic signalization.
    - The traffic capacity needs at MD 177 in year 2040 can be mitigated by constructing a northbound right turn lane with concurrent left turn phasing
    - The traffic capacity needs at Freetown Road can be mitigated by constructing a roundabout.
3. There were 131 reported crashes along Solley Road during the 6-year period between January 1, 2011 and December 31, 2016; 51 crashes (39%) occurred at intersections. The crash data shows a prevalence of fixed object crashes, which comprise 44% of the total crashes within the study corridor. Fixed-object crashes were mostly associated with trees/shrubbery, and poles (utility poles, sign poles and other poles).
4. The study corridor currently provides virtually no shoulders, sidewalks, bike lanes or pathways for bicycle and pedestrian travel.
5. The study corridor possesses substandard horizontal and vertical geometry, intersection sight distances, and roadway section and clear zones that do not meet current County and AASHTO recommendations for the 40mph posted speed.
6. The ongoing residential and industrial development will result in continued demand for auto, bicycle and pedestrian travel.

Long-Term Improvements

1. The proposed improvements include:
    a. Typical section improvements to include new shoulders/bike lanes, sidewalks, shared use path, bio-swales and wider clear zones
    b. Horizontal and vertical alignment improvements
    c. Left turn lanes at various intersections
    d. Roundabouts at various intersections
2. The proposed improvements will help calm traffic speeds, provide wider clear zones, improve stormwater conveyance and treatment, and provide enhanced facilities for auto, bicycle and pedestrian travel.

3. A separate right-turn lane along northbound Waterford Road at Mountain Road and replacement of the existing north-south signal split-phasing with exclusive-permissive left-turn phasing.

Short-Term Improvements

The study also identified potential short-term safety and operational improvements with lower capital and right-of-way needs that may be implemented in the near future while additional funding is being pursued and/or planning and engineering is being completed for the complete long-term improvements.

Hot Spots: Several of the short-term improvements focus on reducing or eliminating the number of fixed-object crashes as well as rear-end, angle, and left-turn crashes. Examination of the fixed-object crashes along Solley Road showed there are four clusters, or "hot spots", of this crash type, located as follows:

1. Hot Spot #1: Mile 0.55 to 0.72 (roughly from Powhatan Beach Road to Nature Walk Lane)
2. Hot Spot #2: Mile 1.53 to 1.64 (a 525 foot segment south of North Shore Drive)
3. Hot Spot #3: Mile 2.29 to 2.63 (from Nabbs Creek Road to 800' north of the power line crossing)
4. Hot Spot #4: Mile 2.96 to 3.23 (a 1500 foot segment south of Solley Elementary School)

The following is a description of the specific roadway and roadside characteristics identified within each of these hot spots which could be potential contributors to the fixed-object crash occurrences in these areas. The fixed-object crash details within these segments are also described in greater detail.

Hot Spot # 1: Powhatan Beach Road to Nature Walk Lane (Station 39 – 45)

In this segment of Solley Road, there were seven (7) northbound fixed-object crashes and two (2) southbound crashes reported. Five of the seven (71%) northbound crashes involved a vehicle striking some type of roadside pole, and the remaining two crashes involved a vehicle striking an object not identified in the crash reports. In the southbound direction, one crash involved a pole and the other crash involved a vehicle striking a building.

This hot spot is characterized by numerous utility poles in proximity to the traveled way, some located within 3 feet of the edge of pavement. There are few trees located near the edge of the road. There are no shoulders except for accel and decel lanes along the southbound roadway at Nature Walk Lane. The roadway is relatively straight and flat through this segment. There is continuous overhead lighting along the entire segment, on both sides of Solley Road. Images of the segment are provided below for reference.

Figure 7: Hot Spot #1, looking north along Solley Road at Powhatan Beach Road

Figure 8: Hot Spot #1, looking north along Solley Road north of Powhatan Beach Road

Figure 9: Hot Spot #1, looking south along Solley Road at Nature Walk Lane

Based on the crash patterns and characteristics identified within Hot Spot Segment #1, the following short-term safety improvements are suggested:

1. Remove existing trees within close proximity of the roadway
2. Relocate utility poles and mailboxes further back from the roadway where feasible; GIS mapping indicates that right-of-way may be available along the southbound roadway.
3. Install Type 2 or Type 3 Object Markers at each utility pole within the County-owned right of way. A Type 3 object marker is recommended for the utility pole located on the SE corner of the Powhatan Beach Road intersection (see **Figure 7**)
4. Install double-width white edge line pavement markings along northbound and southbound Solley Road, and extend the markings around the SE and NE corner radii at the Powhatan Beach Rd intersection
5. Install a rolled asphalt curb around the SE corner radius at the Powhatan Beach Road intersection
6. Add additional lighting to the existing utility poles along the corridor.

Hot Spot #2: 525 Feet South of North Shore Drive (Station 90-95)

In this segment along Solley Road, there were five (5) northbound fixed-object crashes reported, and two (2) southbound crashes. Five of the seven total crashes occurred at night, but only two of the seven occurred on wet pavement. All five northbound crashes occurred at the North Shore Drive intersection. Both southbound crashes occurred near the curve approximately 525 feet south of that intersection. Three of the five (60%) northbound crashes were collisions with a tree or shrubbery, and the remaining two crashes were collisions with a utility pole. Both southbound crashes were collisions with a tree or shrubbery.

This hot spot location is characterized by a lack of shoulders (with one exception), but with relatively few utility poles located in proximity to the edge of pavement (poles are mostly located along the southbound lane where there were fewer crashes reported). The exception: There is a paved shoulder along the NE corner radius at the North Shore Drive intersection. Trees were the most common fixed object struck, and the only spots within the segment where trees are present near the edge of pavement are at the specific locations where the reported crashes occurred. On the NE corner of the North Shore Drive intersection, there is a wooded area, and along the southbound lane approximately 500 feet south of that intersection, there are several large trees near the roadway along the curve. There are existing W1-8L Chevron Alignment signs located along southbound Solley Road at this curve. There is a slight upgrade along Solley Road approaching North Shore Drive, but aside from the curve at the southern end of the segment, the roadway is generally straight. There is continuous overhead lighting along the entire segment, on the southbound side of Solley Road. Images of the segment are provided below for reference.

Figure 10: Hot Spot #2, looking north on Solley Road at North Shore Drive

Figure 11: Hot Spot #2, looking south on Solley Road south of North Shore Drive

Based on the crash patterns and characteristics identified within Hot Spot Segment #2, the following short-term safety improvements are suggested:

1. Remove the trees along southbound Solley Road located within the County right-of-way
2. Remove any trees within the County right-of-way on the NE corner of the North Shore Drive intersection
3. Refresh all white edge line pavement markings along this entire segment, including new markings to delineate the raised concrete channelization island on the NE corner of the North Shore Drive intersection
4. Fill in any noticeable ruts along the existing edge of pavement.
5. Relocate southbound 'Trucks Entering Highway' sign from approximately station 97+00 to station 101+00.
6. Install an advance warning intersection sign, W2-2 L & R with a W16-8P sign, in the southbound and northbound directions respectively, approaching North Shore Drive along Solley Road. The MUTCD recommends a distance of 250 to 325 feet for this type of sign under the prevailing speed conditions.
7. Relocate utility poles further back from the roadway where feasible; GIS mapping indicates that right-of-way may be available along the southbound roadway.
8. Reconstruct the roadway between Millhouse Drive (Station 85) and North Shore Drive (Station 95) to improve the substandard horizontal curve. The realignment will improve the design speed of the roadway to 40 mph and expand the clear zones along the roadway.

Hot Spot #3: Nabbs Creek Road to 800' North of the Power Lines (Station 134-152)

In this segment of Solley Road, there were six (6) reported northbound fixed-object crashes, and ten (10) reported southbound fixed-object crashes. Of the northbound crashes, four involved a collision with a pole, one involved a tree, and one is erroneously reported as striking a curb (there is no curb present at that location). In the southbound direction, five of the crashes occurred at the Nabbs Creek Rd intersection. Southbound vehicles struck a variety of fixed objects including trees, poles, and embankment (and several other fixed object types that were not reported). About half of the 16 total reported crashes for both directions combined occurred at night, and 5 of the 16 total reported crashes occurred under wet or icy pavement conditions.

This hot spot segment is characterized by a lack of shoulders, wooded areas in close proximity to the edge of pavement on both sides of the road, and numerous utility poles near the pavement edges on both sides of the road. Near the Nabbs Creek Road intersection, the utility poles along the southbound side of the road are located in front of (i.e., on the road-facing side) of the guardrail. There is a winding road segment at the northern end of the hot spot segment, which coincides with a subtle hill crest in that same area. A W1-5 Winding Road warning sign is present in advance of these curves for northbound and southbound traffic (the north end of the winding road along with the southbound-facing warning sign is located in the segment designated as Hot Spot #4). There is continuous overhead lighting along the entire segment on the southbound side of Solley Road. Images of the segment are provided below for reference.

Figure 12: Hot Spot #3, looking north on Solley Road north of Nabbs Creek Road

Figure 13: Hot Spot #3, looking north on Solley Road north of the power line crossing

Figure 14: Hot Spot #3, looking south on Solley Road north of the power line crossing

Figure 15: Hot Spot #3, looking south on Solley Road at the power line crossing

Figure 16: Hot Spot #3, looking south on Solley Road at Nabbs Creek Road

Based on the crash patterns and characteristics identified within Hot Spot Segment #3, the following short-term safety improvements are suggested:

1. Refresh all white edge line pavement markings along this entire segment, and consider installing double-width white edge lines within the winding road segment
2. Install Type 2 Object Markers at each utility pole within the County-owned right of way
3. Remove trees located within 20 feet of northbound and southbound Solley Road located within the County right-of-way; GIS mapping indicates that significant right-of-way is available for clearing
4. Relocated southbound blue destination signs from approximately station 136+00 to station 138+00.
5. Relocate utility poles further back from the roadway where feasible; GIS mapping indicates that right-of-way is available along the northbound and southbound roadways.
6. Construct a shoulder and drainage swale along southbound Solley Road at Nabbs Creek Road; relocate the guardrail to the edge of the new shoulder; relocate utility poles behind the guardrail and beyond the guardrail deflection zone
7. Reconstruct the roadway with the new proposed typical roadway section to improve the horizontal and vertical geometry and widen the shoulders and clear zones.

Hot Spot #4: 2300 Foot Segment South of Solley Elementary School (Station 162-185)

In this segment of Solley Road, there were six (6) fixed-object crashes reported in the northbound direction, and six (6) fixed-object crashes reported in the southbound direction. One of the northbound crashes resulted in a fatality. This fatal crash occurred at night in the vicinity of Chestnut Springs Lane, with wet pavement conditions, and the driver was under the influence of alcohol. **Figure 18** is a photo of the location of this crash. The remaining 5 northbound crashes involved fixed objects such as poles and trees. Two of these crashes occurred on the same day in 2015 under snowy pavement conditions near the location of the fatal crash of the prior year. In the southbound direction, trees and poles were the most common fixed objects struck by vehicles. Overall, 50 percent of the total reported crashes for both directions combined occurred during inclement weather (2 on wet pavement, 3 in snow, and 1 on icy pavement). Five of the twelve total crashes occurred at night.

This hot spot segment is characterized by a lack of shoulders, wooded areas in close proximity to the edge of pavement on both sides of the road, and numerous utility poles near the pavement edges on both sides of the road. It also includes a winding road segment for approximately ¾-mile located immediately south of the Chestnut Springs Lane intersection which includes the spot where the fatal crash occurred in 2014. North of Chestnut Springs Lane, recent roadway improvements have been made by a developer, including widening Solley Road to a three-lane cross-section with a center two-way left-turn lane with curb and gutter and bike lane along the northbound side of the road.

Traveling southbound on Solley Road, there is a W2-2 Side Road intersection warning sign in advance of Chestnut Springs Lane, followed by a W1-5 Winding Road warning sign. There is a recently-installed radar speed sign along southbound Solley Road in advance of the winding road segment, along with several W1-8 Chevrons located on the left side of the road at the first

curve to the right. There is a hill crest at this curve, which coincides with the location of the fatal crash (DPW is currently completing final design of improvements for this segment of roadway under a separate project). The pavement in this segment has also been recently resurfaced. Continuing southbound, there is another crest vertical curve on a horizontal curve near a house with a red metal roof at the south end (Station 163) of this hot spot segment. Traveling northbound from this point, there is an S3-1 School Bus Stop Ahead warning sign, followed by a W2-2 Side Road intersection warning sign in advance of Chestnut Springs Lane, and lastly, several W1-8 Chevrons located at the curve and hill crest just south of Chestnut Springs Lane. There is continuous overhead lighting along the entire segment, on the southbound side of Solley Road. Images of the segment are provided below for reference.

Based on the crash patterns and characteristics identified within Hot Spot Segment #4, the following short-term safety improvements are suggested:

1. Refresh all white edge line pavement markings along this entire segment, and consider installing double-width white edge lines within the winding road segment.
2. Install Type 2 Object Markers at each utility pole within the County-owned right of way.
3. Remove the large trees along northbound and southbound Solley Road located within the County right-of-way; GIS mapping indicates right-of-way is available for additional clearing
4. Relocate utility poles further back from the roadway where feasible; GIS mapping indicates that right-of-way is available along the northbound and southbound roadways.
5. Reconstruct the roadway between Station 162+ and Station 175+ (beginning of existing 3-lane section) to improve the horizontal and vertical geometry, widen shoulders and clear zones and provide improved pedestrian and bicycle facilities.

Figure 17: Hot Spot #4, looking north on Solley Road

Figure 18: Hot Spot #4, looking north on Solley Road toward the 2014 fatal crash site

Figure 19: Hot Spot #4, looking south toward Chestnut Springs Lane

Figure 20: Hot Spot #4, looking south on Solley Road at the 2014 fatal crash site

Figure 21: Hot Spot #4, looking south on Solley Road

Signing and Pavement Marking Improvements

In addition to the 4 key hot spot improvements identified above, the following signing and pavement marking improvements may be applied along the corridor to further enhance safety and operations:

- Trim vegetation obstructing signs along the corridor in both directions
- Install object markers on utility poles within the clear zone
- Add advisory speed limit signs to the four (4) Winding Curve signs (W1-5) located on the corridor in both directions. Advisory speed limit of 30 MPH is recommended. Curveware test shows that driving at the curves failed at the 40 mph posted speed limit
- Install additional speed limit signs along the northern section of Solley Road.
- Relocate southbound side chevron sign closest to the North Shore intersection to the curve, approximately 400 feet south of North Shore Drive
- Relocate the Freetown Road advance warning intersection sign (W2-2L) in the northbound direction along Solley Road to be closer to the intersection. It is currently approximately 1,000 feet away from the intersection, but the MUTCD recommends a distance of 250 to 325 feet for this type of sign under the prevailing speed conditions.
- Remove the 3 construction signs that were left over from a developer project near Freetown Road.
- Install a stop sign at the hidden roadway on the west side of Solley Road, 750 feet North of North Shore Drive, and install a W2-2R sign with “Hidden Roadway” plaque in the southbound direction prior to the roadway.
- Install an object marker on the existing stop sign post on the island at North Shore Drive intersection, facing the northbound vehicles.

- Reinstall the raised pavement markers along the corridor to increase nighttime visibility.
- Consider installing edgeline reflectors and/or rumble strips where there are no houses.
- Reinstall pavement markings along the entire corridor. The pavement markings appear to be recently-installed along the corridor but lack reflectivity at night. Install double-width white edge lines along the entire length of Solley Road to enhance visibility of the road edge and to make the road appear narrower to drivers to reduce speeds.
- Install (or re-install) pavement markings along the intersection corner radii at Powhatan Beach Rd, Freetown Rd, North Shore Dr (including the channelization island), and Nabbs Creek Rd.
- Consider extending the taper length along the northbound roadway at the Millhouse Drive intersection; the current taper length is 130 feet, whereas the standard taper length should be 300 feet for the prevailing speed conditions.
- Relocate stop sign on Powhaten Beach Road closer to intersection and add stop bar as you approach Solley Road.
- Repair three (3) overhead street lights that were observed as non-functioning during recent nighttime field visits:
    - SW corner of MD 173 at Solley Rd
    - West side of Solley Rd between Shore Forest Dr and North Shore Dr
    - NW corner of Lincoln Dr at Solley Rd

Left Turn Lanes: In addition to the four hot spots, there are seven (7) intersections along Solley Road that meet SHA's traffic volume criteria for providing a separate left turn lane as stated in the SHA Access Manual. These locations are as follows:

1. Northbound left turn onto Pine Ridge Road
2. Southbound left turn onto Powhatan Beach Road
3. Northbound left turn onto Freetown Road
4. Southbound left turn onto northern intersection of Half Circle (Old County Road)
5. Northbound left turn onto Willow Tree Drive and Southbound left turn onto Lincoln Drive
6. Southbound left turn onto North Shore Drive
7. Southbound left turn onto Nabbs Creek Road

The crash history at these locations was evaluated to determine if a significant number of potentially left-turn related crashes have occurred at each location. Left-turn related crashes are assumed to be those identified in the SHA-provided data as "Left Turn", "Angle", or "Rear-End". Rear-End crashes are included because there are no existing left turn lanes along Solley Road at these intersections, which requires vehicles traveling straight to decelerate to a stop behind vehicles waiting to make a left turn, potentially resulting in rear-end collisions. **Table 13** lists the number of left-turn related crashes reported at each of these intersections during the 2011 to 2016 analysis period.

Table 13: Left-Turn Related Crashes at Key Intersections

Intersections Meeting SHA Left-Turn Lane Criteria	Number of Left-Turn Related Crashes
Northbound left turn onto **Pine Ridge Road**	4
Southbound left turn onto **Powhatan Beach Road**	1
Northbound left turn onto **Freetown Road**	4
Southbound left turn onto northern intersection of **Half Circle** (Old County Road)	None
Northbound left turn onto **Willow Tree Drive** & Southbound left turn onto **Lincoln Drive**	2
Southbound left turn onto **North Shore Drive**	4
Southbound left turn onto **Nabbs Creek Road**	2

Based on this tally of crashes, the construction of separate left turn lanes as short-term safety improvements should be given priority at Pine Ridge Road, Freetown Road, and North Shore Drive.

Bicycle and Pedestrian Improvements: The study corridor serves residential communities along the entire corridor with relatively dense development south of North Shore Drive and north of the power lines (Station 144) with the ongoing development of Tanyard Springs. In addition, there is continued planned growth in the northern segment of the corridor with the planned expansion of the Brandon Woods Business Park. To serve the development of the corridor, the County should consider improvements to Solley Road that will improve bicycle and pedestrian access between communities, businesses, schools, parks and other community facilities. Potential short term improvements included the following:

1. **Bicycle and Pedestrian Improvements from 300 feet South of Chestnut Springs Lane to MD 173 (Station 170 to Station 215):** The County could construct new bike lanes, shared use path and sidewalk improvements along this 4500 foot segment of the corridor to provide improved access and connectivity for pedestrians and bicyclists. The existing roadway in this section is a three lane section and would be widened as needed to accommodate bike lanes, sidewalk along the northbound roadway and shared use path along the southbound roadway. The improvements would provide connectivity between the expanding residential and industrial development, Solley Elementary School, Solley Park and Orchard Beach Volunteer Fire Station. Improved recreational opportunities would be provided by completing loops between Solley Road, Coulbourn Corner, Tanyard Springs Drive, Energy Parkway and MD 173.

2. **Bicycle and Pedestrian Improvements from MD 177 to Willow Tree Drive / Lincoln Drive (Station 10 to Station 81):** The County could construct new bike lanes, shared use path and/or sidewalk improvements along this 7100 foot segment of the corridor to provide improved access and connectivity for pedestrians and bicyclists between the

multiple residential communities located along Solley Road (many with existing sidewalk facilities) and the commercial areas located along Mountain Road. The existing roadway in this section of Solley Road is predominantly a two-lane open section roadway and the proposed improvements could include a portion or all of the proposed bike lane, sidewalk and shared use path facilities identified for the long-term improvements.

Roundabouts: As noted previously, roundabouts could be installed along the corridor to help control travel speeds and improve intersection operations and safety. Roundabouts would:

- Eliminate crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the potential severity of the conflict points.
- Lower delay (for side street traffic).
- Enhance pedestrian crossings of Solley Road by reducing speeds on Solley Road and providing refuge islands for pedestrians.

The five intersections listed below were identified as potential locations for the installation of roundabouts:

1. Freetown Road (would significantly reduce delay and improve 2040 traffic operations) – Station 60+00
2. Lincoln Drive/Willow Tree Drive - Station 81+25
3. North Shore Road – Station 95+50
4. Nabbs Creek Road – Station 134+25
5. Energy Parkway / Tanyard Springs Lane – Station 198+00

Geometric Improvements: As noted previously, there is 1 vertical curve and 2 horizontal curves that need to be improved to address insufficient horizontal and vertical sight distance. Each of those locations could be improved in the short-term as a separate project as funding becomes available. The roadway realignment could be completed in the short-term even if the ultimate typical section isn't constructed until a later date. The three locations include:

Description of Substandard Roadway Feature	Station Limits
Substandard vertical curve immediately south of Freetown Road	49+00 to 56+00
Substandard horizontal curve near North shore Drive	87+00 to 100+75
Substandard horizontal curve near waste facility	106+30 to 110+75

Minor Roadway Improvements: There are several improvements noted below which could be implemented in the near future to improve multimodal travel operations and safety within the corridor.

- **Complete Sidewalk to Solley Park:** Construct missing 75 foot segment of existing sidewalk along northbound Solley Road just south of the park entrance;
- **Upgrade Existing Sidewalk along Northbound Roadway North of Chestnut Springs Lane to conform with ADA guidelines:** Upgrade existing sidewalk as needed to meet ADA requirements between Solley Elementary School and Solley Park along northbound roadway; improvements may include providing passing zones at 200 foot intervals and verify proper grades and cross slopes
- **Extend Sidewalk or Shared Use Path (SUP) along Southbound Roadway from Solley Elementary School To Tanyard Springs Lane:** Perform ultimate roadway widening between station 184+00 to Tanyard Springs Lane (Station 198+00) to provide pedestrian connectivity along the southbound roadway; sidewalk/SUP will provide connections to new residential communities, school, Solley United Methodist Church and Solley Park; provide controlled roadway crossing at Tanyard Springs Lane intersection (signal or roundabout).
- **Remove Paved Two Way Left Turn Lane and Construct Raised Landscaped Median between Solley United Methodist Church and Tanyard Springs Lane** to calm traffic and improve water quality.
- **Provide Bike Lanes and/or Shared Use Path along Solley Road between Tanyard Springs Lane and MD 173:** Construct full width widening for approximately 300 feet north of Tanyard Springs Lane and replace striped medians with raised landscaped medians between Tanyard Springs Lane and Fort Smallwood Road; restripe roadway between Tanyard Springs Lane and Fort Smallwood Road to provide an 11-foot travel lane and 6-foot bike lane in each direction.
- **Remove Half Circle and provide "T" connection between Opel Road and Solley Road** to simplify intersection operations and provide improved sight lines from intersection
- **Relocate Utility Poles to Back of Existing Right-of-Way:** Several utility poles are located in close proximity (less than 5 feet) from the edge of roadway and should be relocated out of the clear zone (16 feet) where feasible; GIS mapping indicates that additional right-of-way is available in many locations to relocate the poles further from the roadway. The potential pole relocations are listed in the table below:

Table 14: Potential Utility Pole Relocations

Northbound		Southbound		
Sta. 24+60	Sta. 143+40	Sta. 39+00	Sta. 103+70	Sta. 165+00
Sta. 33+30	Sta. 151+75	Sta. 40+00	Sta. 129+60	Sta. 167+60
Sta. 37+40	Sta. 153+90	Sta. 41+40	Sta. 132+40	Sta. 171+60
Sta. 38+50	Sta. 156+75	Sta. 43+75	Sta. 134+80	Sta. 173+70
Sta. 40+00	Sta. 157+60	Sta. 47+30	Sta. 136+90	Sta. 175+30
Sta. 41+60	Sta. 158+00	Sta. 56+20	Sta. 139+00	Sta. 177+10
Sta. 43+70	Sta. 158+90	Sta. 57+00	Sta. 140+80	Sta. 178+40
Sta. 134+75	Sta. 161+30	Sta. 58+60	Sta. 141+50	Sta. 180+25
Sta. 137+60	Sta. 162+75	Sta. 79+10	Sta. 143+00	Sta. 181+30
Sta. 139+20	Sta. 170+50	Sta. 84+10	Sta. 145+50	Sta. 195+20
Sta. 140+50	Sta. 172+00	Sta. 86+70	Sta. 147+50	Sta. 196+40
Sta. 142+10		Sta. 88+30	Sta. 150+20	Sta. 199+00
		Sta. 90+60	Sta. 157+50	

- **Clear Vegetation at Intersections to Improve Sight Distance:** Vegetation should be cleared at several intersections to improve sight lines as follows:

  Southbound:
  - South of Chestnut Springs Lane.
  - South of Freetown Road
  - South of Thelma Road
  - North of Shady Brook Drive

  Northbound:
  - North of Nabbs Creek Road
  - North of North Shore Drive

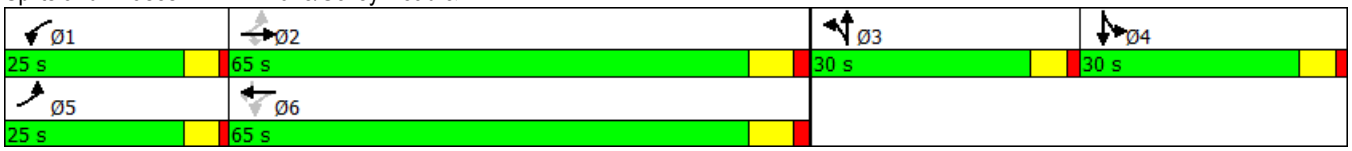
APPENDIX A

TRAFFIC DATA

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	167	57	73	600	65	150	76	45	65	111	147
Future Volume (vph)	28	167	57	73	600	65	150	76	45	65	111	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1746	0	1687	1674	0	1687	1863	1509
Flt Permitted	0.162			0.585			0.950			0.950		
Satd. Flow (perm)	288	1776	1583	1090	1746	0	1687	1674	0	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95		5			17				163
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	38	209	77	95	758	0	197	151	0	76	134	163
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA		Split	NA	custom
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6								6
Total Split (s)	25.0	65.0	65.0	25.0	65.0		30.0	30.0		30.0	30.0	65.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5		5.5	5.5	7.0
Act Effct Green (s)	66.7	58.4	58.4	71.2	62.5		18.7	18.7		13.8	13.8	62.5
Actuated g/C Ratio	0.55	0.48	0.48	0.58	0.51		0.15	0.15		0.11	0.11	0.51
v/c Ratio	0.17	0.25	0.10	0.14	0.85		0.76	0.56		0.40	0.64	0.19
Control Delay	14.0	21.8	3.0	12.4	38.8		69.7	51.3		58.0	67.1	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	14.0	21.8	3.0	12.4	38.8		69.7	51.3		58.0	67.1	3.7
LOS	B	C	A	B	D		E	D		E	E	A
Approach Delay		16.4			35.8			61.7			37.5	
Approach LOS		B			D			E			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 122.1			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 37.6		Intersection LOS: D	
Intersection Capacity Utilization 80.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177



Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	48	12	158	276	14
Future Vol, veh/h	20	48	12	158	276	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	22	52	13	172	300	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	506	308	315	0	-	0
Stage 1	308	-	-	-	-	-
Stage 2	198	-	-	-	-	-
Critical Hdwy	7.12	6.22	4.12	-	-	-
Critical Hdwy Stg 1	6.12	-	-	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	477	732	1245	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	804	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	473	732	1245	-	-	-
Mov Cap-2 Maneuver	473	-	-	-	-	-
Stage 1	694	-	-	-	-	-
Stage 2	794	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1245	-	630	-	-
HCM Lane V/C Ratio	0.01	-	0.117	-	-
HCM Control Delay (s)	7.9	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	15	171	7	8	267
Future Vol, veh/h	23	15	171	7	8	267
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	25	16	186	8	9	290

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	498	190	0	0	193	0
Stage 1	190	-	-	-	-	-
Stage 2	308	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	532	852	-	-	1380	-
Stage 1	842	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	528	852	-	-	1380	-
Mov Cap-2 Maneuver	528	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	739	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	621	1380	-
HCM Lane V/C Ratio	-	-	0.067	0.006	-
HCM Control Delay (s)	-	-	11.2	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	8	3	183	267	2
Future Vol, veh/h	5	8	3	183	267	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	5	9	3	199	290	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	496	291	292	0	-	0
Stage 1	291	-	-	-	-	-
Stage 2	205	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	533	748	1270	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	531	748	1270	-	-	-
Mov Cap-2 Maneuver	531	-	-	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	827	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1270	-	646	-	-
HCM Lane V/C Ratio	0.003	-	0.022	-	-
HCM Control Delay (s)	7.8	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	21	25	162	247	98
Future Vol, veh/h	23	21	25	162	247	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	66	78	85	97	83
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	37	32	32	191	255	118

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	569	314	373	0	-	0
Stage 1	314	-	-	-	-	-
Stage 2	255	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	475	715	1159	-	-	-
Stage 1	729	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	460	715	1159	-	-	-
Mov Cap-2 Maneuver	460	-	-	-	-	-
Stage 1	729	-	-	-	-	-
Stage 2	752	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.5	1.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1159	-	551	-	-
HCM Lane V/C Ratio	0.028	-	0.125	-	-
HCM Control Delay (s)	8.2	0	12.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	4	184	2	3	338
Future Vol, veh/h	8	4	184	2	3	338
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	9	4	200	2	3	367

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	575	201	0	0	202	0
Stage 1	201	-	-	-	-	-
Stage 2	374	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	480	840	-	-	1370	-
Stage 1	833	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	479	840	-	-	1370	-
Mov Cap-2 Maneuver	479	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	694	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.6	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	559	1370	-
HCM Lane V/C Ratio	-	-	0.023	0.002	-
HCM Control Delay (s)	-	-	11.6	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	0	181	7	0	313
Future Vol, veh/h	28	0	181	7	0	313
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	30	0	197	8	0	340

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	541	-	0	0	-	-
Stage 1	201	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	502	0	-	-	0	-
Stage 1	833	0	-	-	0	-
Stage 2	721	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	502	-	-	-	-	-
Mov Cap-2 Maneuver	502	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	721	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	502	-
HCM Lane V/C Ratio	-	-	0.061	-
HCM Control Delay (s)	-	-	12.6	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	181	0	8	313
Future Vol, veh/h	0	15	181	0	8	313
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	0	16	197	0	9	340

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	197	0	-	197	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	844	-	0	1376	-
Stage 1	0	-	-	0	-	-
Stage 2	0	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	844	-	-	1376	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	0.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	WBLn1	SBL	SBT
Capacity (veh/h)	-	844	1376	-
HCM Lane V/C Ratio	-	0.019	0.006	-
HCM Control Delay (s)	-	9.3	7.6	0
HCM Lane LOS	-	A	A	A
HCM 95th %tile Q(veh)	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	1	23	26	18	5	16	178	2	0	272	38
Future Vol, veh/h	16	1	23	26	18	5	16	178	2	0	272	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	25	64	81	56	50	50	75	25	25	87	71
Heavy Vehicles, %	2	7	2	2	7	2	7	7	7	7	7	7
Mvmt Flow	23	4	36	32	32	10	32	237	8	0	313	54

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	665	648	339	646	671	241	366	0	0	245	0	0
Stage 1	339	339	-	305	305	-	-	-	-	-	-	-
Stage 2	326	309	-	341	366	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.57	6.22	7.12	6.57	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.063	3.318	3.518	4.063	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	374	383	703	385	371	798	1165	-	-	1292	-	-
Stage 1	676	631	-	705	653	-	-	-	-	-	-	-
Stage 2	687	651	-	674	614	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	336	371	703	353	359	798	1165	-	-	1292	-	-
Mov Cap-2 Maneuver	336	371	-	353	359	-	-	-	-	-	-	-
Stage 1	654	631	-	682	632	-	-	-	-	-	-	-
Stage 2	623	630	-	635	614	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.9	16.6	0.9	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1165	-	-	341	703	385	1292	-	-
HCM Lane V/C Ratio	0.027	-	-	0.078	0.051	0.193	-	-	-
HCM Control Delay (s)	8.2	0	-	16.4	10.4	16.6	0	-	-
HCM Lane LOS	A	A	-	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.2	0.7	0	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	19	3	196	291	4
Future Vol, veh/h	11	19	3	196	291	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	12	21	3	213	316	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	538	318	321	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	220	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	504	723	1239	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	502	723	1239	-	-	-
Mov Cap-2 Maneuver	502	-	-	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	815	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1239	-	623	-	-
HCM Lane V/C Ratio	0.003	-	0.052	-	-
HCM Control Delay (s)	7.9	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	29	188	19	12	215
Future Vol, veh/h	80	29	188	19	12	215
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	77	55	86	68	46	93
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	104	53	219	28	26	231

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	516	-	0	0	247	0
Stage 1	233	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	2.218	-
Pot Cap-1 Maneuver	519	0	-	-	1319	-
Stage 1	806	0	-	-	-	-
Stage 2	765	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	507	-	-	-	1319	-
Mov Cap-2 Maneuver	507	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	747	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	507	1319	-
HCM Lane V/C Ratio	-	-	0.205	0.02	-
HCM Control Delay (s)	-	-	13.9	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.1	-

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	74	45	192	25	19	153
Future Vol, veh/h	74	45	192	25	19	153
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	85	94	63	47	79
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	84	53	204	40	40	194

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	499	224	0	0	244	0
Stage 1	224	-	-	-	-	-
Stage 2	275	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	531	815	-	-	1322	-
Stage 1	813	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	513	815	-	-	1322	-
Mov Cap-2 Maneuver	513	-	-	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	745	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	599	1322	-
HCM Lane V/C Ratio	-	-	0.229	0.031	-
HCM Control Delay (s)	-	-	12.8	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.9	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	2	2	235	170	0
Future Vol, veh/h	2	2	2	235	170	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	2	2	2	255	185	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	445	185	185	0	-	0
Stage 1	185	-	-	-	-	-
Stage 2	260	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	571	857	1390	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	783	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	570	857	1390	-	-	-
Mov Cap-2 Maneuver	570	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1390	-	685	-	-
HCM Lane V/C Ratio	0.002	-	0.006	-	-
HCM Control Delay (s)	7.6	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	93	55	46	191	115	88
Future Vol, veh/h	93	55	46	191	115	88
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	225	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	54	47	52	92	73	74
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	172	117	88	208	158	119

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	602	217	276	0	-	0
Stage 1	217	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	463	823	1287	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	431	823	1287	-	-	-
Mov Cap-2 Maneuver	518	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	641	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	2.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1287	-	609	-	-
HCM Lane V/C Ratio	0.069	-	0.475	-	-
HCM Control Delay (s)	8	-	16.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2.6	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	9	8	276	194	12
Future Vol, veh/h	13	9	8	276	194	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	46	56	33	71	92	33
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	28	16	24	389	211	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	666	229	247	0	-	0
Stage 1	229	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	417	798	1290	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	409	798	1290	-	-	-
Mov Cap-2 Maneuver	501	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	629	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.7	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1290	-	579	-	-
HCM Lane V/C Ratio	0.019	-	0.077	-	-
HCM Control Delay (s)	7.8	-	11.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↱			↱			↱	
Traffic Vol, veh/h	10	5	21	15	1	21	2	256	31	48	170	5
Future Vol, veh/h	10	5	21	15	1	21	2	256	31	48	170	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	200	-	-	250	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	31	58	42	25	75	50	80	65	86	83	42
Heavy Vehicles, %	2	2	2	2	2	2	7	7	7	7	7	7
Mvmt Flow	16	16	36	36	4	28	4	320	48	56	205	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	691	699	211	701	681	344	217	0	0	368	0	0
Stage 1	323	323	-	352	352	-	-	-	-	-	-	-
Stage 2	368	376	-	349	329	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	359	364	829	353	373	699	1324	-	-	1163	-	-
Stage 1	689	650	-	665	632	-	-	-	-	-	-	-
Stage 2	652	616	-	667	646	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	328	345	829	313	354	699	1324	-	-	1163	-	-
Mov Cap-2 Maneuver	328	345	-	313	354	-	-	-	-	-	-	-
Stage 1	687	619	-	663	630	-	-	-	-	-	-	-
Stage 2	620	614	-	591	615	-	-	-	-	-	-	-

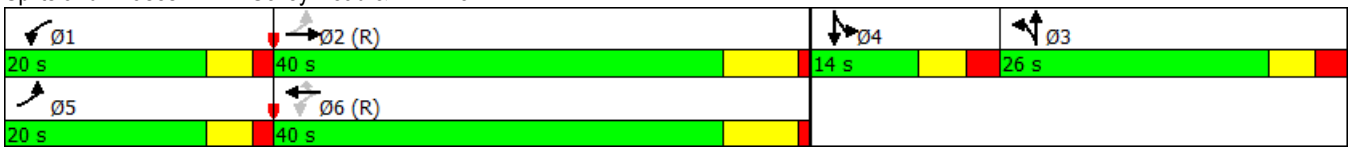
Approach	EB	WB	NB	SB
HCM Control Delay, s	13.5	14.7	0.1	1.7
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1324	-	-	490	313	623	1163	-	-
HCM Lane V/C Ratio	0.003	-	-	0.14	0.114	0.051	0.048	-	-
HCM Control Delay (s)	7.7	-	-	13.5	18	11.1	8.3	-	-
HCM Lane LOS	A	-	-	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.4	0.2	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	407	147	73	1238	1	248	1	37	0	2	6
Future Volume (vph)	13	407	147	73	1238	1	248	1	37	0	2	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	250		250	350		350	200		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3374	1509	1687	3374	1583	1603	1612	1509	0	1863	1583
Flt Permitted	0.145			0.421			0.950	0.954				
Satd. Flow (perm)	270	3374	1509	748	3374	1583	1603	1612	1509	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			224			153			224			224
Link Speed (mph)		50			50			40			30	
Link Distance (ft)		1445			2089			1794			491	
Travel Time (s)		19.7			28.5			30.6			11.2	
Lane Group Flow (vph)	16	515	199	95	1331	4	139	138	51	0	5	16
Turn Type	pm+pt	NA	Free	pm+pt	NA	Perm	Split	NA	Free		NA	Free
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		Free	6		6			Free		4	Free
Total Split (s)	20.0	40.0		20.0	40.0	40.0	26.0	26.0		14.0	14.0	
Total Lost Time (s)	5.0	6.5		5.0	6.5	6.5	6.0	6.0			6.0	
Act Effct Green (s)	66.9	60.6	100.0	71.5	66.4	66.4	13.9	13.9	100.0		7.5	100.0
Actuated g/C Ratio	0.67	0.61	1.00	0.72	0.66	0.66	0.14	0.14	1.00		0.08	1.00
v/c Ratio	0.06	0.25	0.13	0.16	0.59	0.00	0.63	0.62	0.03		0.04	0.01
Control Delay	7.4	12.2	0.2	6.6	14.3	0.0	52.3	51.7	0.1		43.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	7.4	12.2	0.2	6.6	14.3	0.0	52.3	51.7	0.1		43.5	0.0
LOS	A	B	A	A	B	A	D	D	A		D	A
Approach Delay		8.8			13.7			43.9			10.4	
Approach LOS		A			B			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 8 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 16.2		Intersection LOS: B	
Intersection Capacity Utilization 66.5%		ICU Level of Service C	
Analysis Period (min) 15			

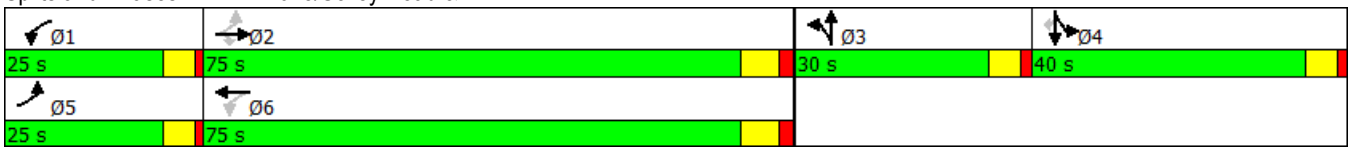
Splits and Phases: 17: Solley Road & MD 173



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	605	148	68	373	98	120	126	113	109	134	67
Future Volume (vph)	122	605	148	68	373	98	120	126	113	109	134	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1722	0	1687	1646	0	1687	1863	1509
Flt Permitted	0.270			0.210			0.950			0.950		
Satd. Flow (perm)	479	1776	1583	391	1722	0	1687	1646	0	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83		9			24				97
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	139	665	156	77	543	0	122	305	0	127	179	97
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6								4
Total Split (s)	25.0	75.0	75.0	25.0	75.0		30.0	30.0		40.0	40.0	40.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5		5.5	5.5	5.5
Act Effct Green (s)	84.2	71.3	71.3	78.0	68.2		24.6	24.6		18.9	18.9	18.9
Actuated g/C Ratio	0.58	0.49	0.49	0.54	0.47		0.17	0.17		0.13	0.13	0.13
v/c Ratio	0.38	0.77	0.19	0.27	0.67		0.43	1.03		0.58	0.74	0.35
Control Delay	17.1	38.6	11.2	16.4	35.9		61.4	112.9		70.7	79.6	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	17.1	38.6	11.2	16.4	35.9		61.4	112.9		70.7	79.6	13.4
LOS	B	D	B	B	D		E	F		E	E	B
Approach Delay		31.0			33.5			98.2			60.9	
Approach LOS		C			C			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 170			
Actuated Cycle Length: 145.7			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.03			
Intersection Signal Delay: 48.6		Intersection LOS: D	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177



Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	26	47	300	285	38
Future Vol, veh/h	21	26	47	300	285	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	23	28	51	326	310	41

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	758	330	351	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	428	-	-	-	-	-
Critical Hdwy	7.12	6.22	4.12	-	-	-
Critical Hdwy Stg 1	6.12	-	-	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	324	712	1208	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	311	712	1208	-	-	-
Mov Cap-2 Maneuver	311	-	-	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	574	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1208	-	452	-	-
HCM Lane V/C Ratio	0.042	-	0.113	-	-
HCM Control Delay (s)	8.1	0	14	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	13	294	27	23	309
Future Vol, veh/h	14	13	294	27	23	309
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	15	14	320	29	25	336

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	720	334	0	0	349	0
Stage 1	334	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	395	708	-	-	1210	-
Stage 1	725	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	385	708	-	-	1210	-
Mov Cap-2 Maneuver	385	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	670	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	493	1210	-
HCM Lane V/C Ratio	-	-	0.06	0.021	-
HCM Control Delay (s)	-	-	12.8	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	6	8	299	326	7
Future Vol, veh/h	3	6	8	299	326	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	3	7	9	325	354	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	700	358	362	0	-	0
Stage 1	358	-	-	-	-	-
Stage 2	342	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	405	686	1197	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	719	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	401	686	1197	-	-	-
Mov Cap-2 Maneuver	401	-	-	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	713	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1197	-	555	-	-
HCM Lane V/C Ratio	0.007	-	0.018	-	-
HCM Control Delay (s)	8	0	11.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	114	76	45	256	257	75
Future Vol, veh/h	114	76	45	256	257	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	69	85	89	85	83
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	120	110	53	288	302	90

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	742	348	393	0	-	0
Stage 1	348	-	-	-	-	-
Stage 2	394	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	376	684	1139	-	-	-
Stage 1	704	-	-	-	-	-
Stage 2	671	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	355	684	1139	-	-	-
Mov Cap-2 Maneuver	355	-	-	-	-	-
Stage 1	704	-	-	-	-	-
Stage 2	634	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.3	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1139	-	461	-	-
HCM Lane V/C Ratio	0.046	-	0.499	-	-
HCM Control Delay (s)	8.3	0	20.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	2.7	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	4	363	8	7	328
Future Vol, veh/h	4	4	363	8	7	328
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	4	4	395	9	8	357

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	771	399	0	0	403	0
Stage 1	399	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	368	651	-	-	1156	-
Stage 1	678	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	365	651	-	-	1156	-
Mov Cap-2 Maneuver	365	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	691	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	468	1156	-
HCM Lane V/C Ratio	-	-	0.019	0.007	-
HCM Control Delay (s)	-	-	12.8	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	0	339	28	0	320
Future Vol, veh/h	15	0	339	28	0	320
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	16	0	368	30	0	348

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	732	-	0	0	-	-
Stage 1	384	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	388	0	-	-	0	-
Stage 1	688	0	-	-	0	-
Stage 2	715	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	388	-	-	-	-	-
Mov Cap-2 Maneuver	388	-	-	-	-	-
Stage 1	688	-	-	-	-	-
Stage 2	715	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	388	-
HCM Lane V/C Ratio	-	-	0.042	-
HCM Control Delay (s)	-	-	14.7	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	14	339	0	23	320
Future Vol, veh/h	0	14	339	0	23	320
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	0	15	368	0	25	348

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	368	0	-	368	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	677	-	0	1191	-
Stage 1	0	-	-	0	-	-
Stage 2	0	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	677	-	-	1191	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	SBL	SBT
Capacity (veh/h)	-	677	1191	-
HCM Lane V/C Ratio	-	0.022	0.021	-
HCM Control Delay (s)	-	10.4	8.1	0
HCM Lane LOS	-	B	A	A
HCM 95th %tile Q(veh)	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	11	15	17	5	1	21	298	34	7	311	27
Future Vol, veh/h	38	11	15	17	5	1	21	298	34	7	311	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	69	63	71	63	50	75	88	85	50	86	78
Heavy Vehicles, %	2	7	2	2	7	2	7	7	7	7	7	7
Mvmt Flow	48	16	24	24	8	2	28	339	40	14	362	35

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	827	842	379	830	839	359	396	0	0	379	0	0
Stage 1	407	407	-	415	415	-	-	-	-	-	-	-
Stage 2	420	435	-	415	424	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.57	6.22	7.12	6.57	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.063	3.318	3.518	4.063	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	291	295	668	289	296	685	1136	-	-	1153	-	-
Stage 1	621	589	-	615	584	-	-	-	-	-	-	-
Stage 2	611	572	-	615	579	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	274	281	668	257	282	685	1136	-	-	1153	-	-
Mov Cap-2 Maneuver	274	281	-	257	282	-	-	-	-	-	-	-
Stage 1	602	580	-	596	566	-	-	-	-	-	-	-
Stage 2	582	554	-	568	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.8	20	0.6	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1136	-	-	276	668	273	1153	-	-
HCM Lane V/C Ratio	0.025	-	-	0.23	0.036	0.124	0.012	-	-
HCM Control Delay (s)	8.2	0	-	21.9	10.6	20	8.2	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	0.1	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	9	18	319	336	15
Future Vol, veh/h	6	9	18	319	336	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	7	10	20	347	365	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	759	373	382	0	-	0
Stage 1	373	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	374	673	1176	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	366	673	1176	-	-	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1176	-	504	-	-
HCM Lane V/C Ratio	0.017	-	0.032	-	-
HCM Control Delay (s)	8.1	0	12.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	10	237	88	31	308
Future Vol, veh/h	43	10	237	88	31	308
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	65	92	92	81	91
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	72	15	258	96	38	338

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	720	-	0	0	353	0
Stage 1	305	-	-	-	-	-
Stage 2	415	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	2.218	-
Pot Cap-1 Maneuver	395	0	-	-	1206	-
Stage 1	748	0	-	-	-	-
Stage 2	666	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	380	-	-	-	1206	-
Mov Cap-2 Maneuver	380	-	-	-	-	-
Stage 1	748	-	-	-	-	-
Stage 2	640	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.7	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	380	1206	-
HCM Lane V/C Ratio	-	-	0.189	0.032	-
HCM Control Delay (s)	-	-	16.7	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	33	178	69	75	303
Future Vol, veh/h	36	33	178	69	75	303
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	69	82	89	91	84	94
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	52	40	200	76	89	322

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	739	238	0	0	276	0
Stage 1	238	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	385	801	-	-	1287	-
Stage 1	802	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	353	801	-	-	1287	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	558	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.6	0	1.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	467	1287	-
HCM Lane V/C Ratio	-	-	0.198	0.069	-
HCM Control Delay (s)	-	-	14.6	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.2	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	2	2	209	376	5
Future Vol, veh/h	1	2	2	209	376	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	1	2	2	227	409	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	643	411	414	0	-	0
Stage 1	411	-	-	-	-	-
Stage 2	232	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	438	641	1145	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	807	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	437	641	1145	-	-	-
Mov Cap-2 Maneuver	437	-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	805	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.5	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1145	-	555	-	-
HCM Lane V/C Ratio	0.002	-	0.006	-	-
HCM Control Delay (s)	8.2	0	11.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	67	47	13	197	334	31
Future Vol, veh/h	67	47	13	197	334	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	225	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	45	65	41	81	90	47
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	149	72	32	243	371	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	711	404	437	0	-	0
Stage 1	404	-	-	-	-	-
Stage 2	307	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	400	647	1123	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	746	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	389	647	1123	-	-	-
Mov Cap-2 Maneuver	496	-	-	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	725	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.3	1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1123	-	537	-	-
HCM Lane V/C Ratio	0.028	-	0.412	-	-
HCM Control Delay (s)	8.3	-	16.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	2	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	12	10	254	353	17
Future Vol, veh/h	13	12	10	254	353	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	50	63	83	80	94
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	34	24	16	306	441	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	788	450	459	0	-	0
Stage 1	450	-	-	-	-	-
Stage 2	338	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	353	599	1076	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	711	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	348	599	1076	-	-	-
Mov Cap-2 Maneuver	461	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1076	-	509	-	-
HCM Lane V/C Ratio	0.015	-	0.114	-	-
HCM Control Delay (s)	8.4	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑			↑			↑	
Traffic Vol, veh/h	4	5	11	53	13	96	15	197	55	25	306	9
Future Vol, veh/h	4	5	11	53	13	96	15	197	55	25	306	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	200	-	-	250	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	33	63	55	78	54	67	47	69	81	89	82	75
Heavy Vehicles, %	2	2	2	2	2	2	7	7	7	7	7	7
Mvmt Flow	12	8	20	68	24	143	32	286	68	28	373	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	903	853	379	833	825	320	385	0	0	354	0	0
Stage 1	435	435	-	384	384	-	-	-	-	-	-	-
Stage 2	468	418	-	449	441	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	258	296	668	288	308	721	1147	-	-	1178	-	-
Stage 1	600	580	-	639	611	-	-	-	-	-	-	-
Stage 2	575	591	-	589	577	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	186	281	668	263	292	721	1147	-	-	1178	-	-
Mov Cap-2 Maneuver	186	281	-	263	292	-	-	-	-	-	-	-
Stage 1	583	566	-	621	594	-	-	-	-	-	-	-
Stage 2	430	574	-	550	563	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.6	16.3	0.7	0.6
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1147	-	-	325	263	595	1178	-	-
HCM Lane V/C Ratio	0.028	-	-	0.123	0.258	0.281	0.024	-	-
HCM Control Delay (s)	8.2	-	-	17.6	23.4	13.4	8.1	-	-
HCM Lane LOS	A	-	-	C	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1	1.1	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1140	256	80	650	0	209	1	85	4	3	13
Future Volume (vph)	5	1140	256	80	650	0	209	1	85	4	3	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	250		250	350		350	200		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3374	1509	1687	3374	1863	1603	1611	1509	0	1825	1583
Flt Permitted	0.352			0.096			0.950	0.954			0.980	
Satd. Flow (perm)	656	3374	1509	170	3374	1863	1603	1611	1509	0	1825	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245						245			245
Link Speed (mph)		50			50			40			30	
Link Distance (ft)		1445			2089			1794			491	
Travel Time (s)		19.7			28.5			30.6			11.2	
Lane Group Flow (vph)	12	1253	264	98	739	0	152	151	96	0	20	28
Turn Type	pm+pt	NA	Free	pm+pt	NA	Perm	Split	NA	Free	Split	NA	Free
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		Free	6		6			Free		4	Free
Total Split (s)	22.0	52.0		22.0	52.0	52.0	22.0	22.0		24.0	24.0	
Total Lost Time (s)	5.0	6.5		5.0	6.5	6.5	12.5	12.5			6.0	
Act Effct Green (s)	67.8	60.5	120.0	75.5	69.7		21.1	21.1	120.0		6.9	120.0
Actuated g/C Ratio	0.56	0.50	1.00	0.63	0.58		0.18	0.18	1.00		0.06	1.00
v/c Ratio	0.03	0.74	0.17	0.45	0.38		0.54	0.53	0.06		0.19	0.02
Control Delay	10.6	28.3	0.3	16.4	16.0		53.8	53.5	0.1		57.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	10.6	28.3	0.3	16.4	16.0		53.8	53.5	0.1		57.6	0.0
LOS	B	C	A	B	B		D	D	A		E	A
Approach Delay		23.3			16.0			40.8			24.0	
Approach LOS		C			B			D			C	

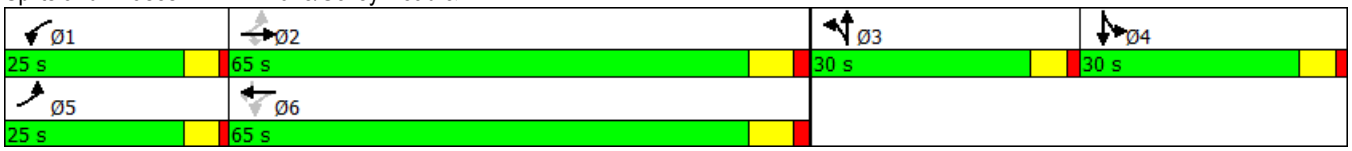
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 23.6		Intersection LOS: C	
Intersection Capacity Utilization 68.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 17: Solley Road & MD 173

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Future Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1744	0	1687	1678	0	1687	1863	1509
Flt Permitted	0.068			0.479			0.950			0.950		
Satd. Flow (perm)	121	1776	1583	892	1744	0	1687	1678	0	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95		5			17				206
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	62	294	108	130	1074	0	276	224	0	99	169	206
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA		Split	NA	custom
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6								6
Total Split (s)	25.0	65.0	65.0	25.0	65.0		30.0	30.0		30.0	30.0	65.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5		5.5	5.5	7.0
Act Effct Green (s)	67.5	58.1	58.1	73.0	62.7		24.6	24.6		16.8	16.8	62.7
Actuated g/C Ratio	0.51	0.44	0.44	0.55	0.47		0.19	0.19		0.13	0.13	0.47
v/c Ratio	0.42	0.38	0.14	0.23	1.30		0.88	0.69		0.46	0.72	0.25
Control Delay	24.6	27.8	6.7	15.3	172.7		81.6	59.5		60.9	72.8	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	24.6	27.8	6.7	15.3	172.7		81.6	59.5		60.9	72.8	3.8
LOS	C	C	A	B	F		F	E		E	E	A
Approach Delay		22.5			155.7			71.7			40.3	
Approach LOS		C			F			E			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 132.2			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.30			
Intersection Signal Delay: 95.7		Intersection LOS: F	
Intersection Capacity Utilization 99.0%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177



Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	50	10	250	360	15
Future Vol, veh/h	20	50	10	250	360	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	22	54	11	272	391	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	692	399	408	0	-	0
Stage 1	399	-	-	-	-	-
Stage 2	293	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	410	651	1151	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	405	651	1151	-	-	-
Mov Cap-2 Maneuver	405	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	749	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.5	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1151	-	555	-	-
HCM Lane V/C Ratio	0.009	-	0.137	-	-
HCM Control Delay (s)	8.2	0	12.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	15	265	5	10	350
Future Vol, veh/h	25	15	265	5	10	350
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	27	16	288	5	11	380

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	693	291	0	0	293	0
Stage 1	291	-	-	-	-	-
Stage 2	402	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	409	748	-	-	1269	-
Stage 1	759	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	405	748	-	-	1269	-
Mov Cap-2 Maneuver	405	-	-	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	669	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	489	1269	-
HCM Lane V/C Ratio	-	-	0.089	0.009	-
HCM Control Delay (s)	-	-	13.1	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	5	275	350	0
Future Vol, veh/h	5	10	5	275	350	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	5	11	5	299	380	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	690	380	380	0	-	0
Stage 1	380	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	411	667	1178	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	744	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	409	667	1178	-	-	-
Mov Cap-2 Maneuver	409	-	-	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	740	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1178	-	551	-	-
HCM Lane V/C Ratio	0.005	-	0.03	-	-
HCM Control Delay (s)	8.1	0	11.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	30	35	245	320	130
Future Vol, veh/h	40	30	35	245	320	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	62	66	78	85	97	83
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	65	45	45	288	330	157

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	786	408	487	0	-	0
Stage 1	408	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	354	633	1051	-	-	-
Stage 1	661	-	-	-	-	-
Stage 2	682	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	336	633	1051	-	-	-
Mov Cap-2 Maneuver	336	-	-	-	-	-
Stage 1	661	-	-	-	-	-
Stage 2	647	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.7	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1051	-	417	-	-
HCM Lane V/C Ratio	0.043	-	0.264	-	-
HCM Control Delay (s)	8.6	0	16.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	5	285	0	5	440
Future Vol, veh/h	10	5	285	0	5	440
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	11	5	310	0	5	478

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	799	310	0	0	310	0
Stage 1	310	-	-	-	-	-
Stage 2	489	-	-	-	-	-
Critical Hdwy	7.12	6.22	-	-	4.12	-
Critical Hdwy Stg 1	6.12	-	-	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	304	730	-	-	1250	-
Stage 1	700	-	-	-	-	-
Stage 2	561	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	303	730	-	-	1250	-
Mov Cap-2 Maneuver	303	-	-	-	-	-
Stage 1	700	-	-	-	-	-
Stage 2	558	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	376	1250	-
HCM Lane V/C Ratio	-	-	0.043	0.004	-
HCM Control Delay (s)	-	-	15	7.9	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	0	285	5	0	415
Future Vol, veh/h	30	0	285	5	0	415
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	33	0	310	5	0	451

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	764	-	0	0	-	-
Stage 1	313	-	-	-	-	-
Stage 2	451	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	372	0	-	-	0	-
Stage 1	741	0	-	-	0	-
Stage 2	642	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	372	-	-	-	-	-
Mov Cap-2 Maneuver	372	-	-	-	-	-
Stage 1	741	-	-	-	-	-
Stage 2	642	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	372	-
HCM Lane V/C Ratio	-	-	0.088	-
HCM Control Delay (s)	-	-	15.6	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	285	0	10	415
Future Vol, veh/h	0	15	285	0	10	415
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	0	16	310	0	11	451

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	310	0	-	310	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	730	-	0	1250	-
Stage 1	0	-	-	0	-	-
Stage 2	0	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	730	-	-	1250	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	SBL	SBT
Capacity (veh/h)	-	730	1250	-
HCM Lane V/C Ratio	-	0.022	0.009	-
HCM Control Delay (s)	-	10	7.9	0
HCM Lane LOS	-	B	A	A
HCM 95th %tile Q(veh)	-	0.1	0	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	25	25	20	5	20	275	5	0	375	55
Future Vol, veh/h	15	0	25	25	20	5	20	275	5	0	375	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	25	64	81	56	50	50	75	25	25	87	71
Heavy Vehicles, %	2	7	2	2	7	2	7	7	7	7	7	7
Mvmt Flow	21	0	39	31	36	10	40	367	20	0	431	77

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	950	937	470	927	965	377	508	0	0	387	0	0
Stage 1	470	470	-	457	457	-	-	-	-	-	-	-
Stage 2	480	467	-	470	508	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.57	6.22	7.12	6.57	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.063	3.318	3.518	4.063	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	240	260	594	249	250	670	1032	-	-	1145	-	-
Stage 1	574	552	-	583	559	-	-	-	-	-	-	-
Stage 2	567	553	-	574	530	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	201	247	594	224	238	670	1032	-	-	1145	-	-
Mov Cap-2 Maneuver	201	247	-	224	238	-	-	-	-	-	-	-
Stage 1	545	552	-	554	531	-	-	-	-	-	-	-
Stage 2	495	525	-	536	530	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.2	25.3	0.8	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1032	-	-	201	594	253	1145	-	-
HCM Lane V/C Ratio	0.039	-	-	0.105	0.066	0.303	-	-	-
HCM Control Delay (s)	8.6	0	-	25	11.5	25.3	0	-	-
HCM Lane LOS	A	A	-	D	B	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0.2	1.2	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	20	5	290	410	5
Future Vol, veh/h	10	20	5	290	410	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	11	22	5	315	446	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	774	448	451	0	-	0
Stage 1	448	-	-	-	-	-
Stage 2	326	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	367	611	1109	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	365	611	1109	-	-	-
Mov Cap-2 Maneuver	365	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	727	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1109	-	499	-	-
HCM Lane V/C Ratio	0.005	-	0.065	-	-
HCM Control Delay (s)	8.3	0	12.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	110	40	275	25	15	305
Future Vol, veh/h	110	40	275	25	15	305
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	77	55	86	68	46	93
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	143	73	320	37	33	328

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	731	-	0	0	357	0
Stage 1	338	-	-	-	-	-
Stage 2	393	-	-	-	-	-
Critical Hdwy	7.12	-	-	-	4.12	-
Critical Hdwy Stg 1	6.12	-	-	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	2.218	-
Pot Cap-1 Maneuver	337	0	-	-	1202	-
Stage 1	676	0	-	-	-	-
Stage 2	632	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	328	-	-	-	1202	-
Mov Cap-2 Maneuver	328	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	611	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.2	0	0.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	328	1202	-
HCM Lane V/C Ratio	-	-	0.436	0.027	-
HCM Control Delay (s)	-	-	24.2	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.1	0.1	-

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	105	65	280	35	25	215
Future Vol, veh/h	105	65	280	35	25	215
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	85	94	63	47	79
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	119	76	298	56	53	272

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	705	326	0	0	353	0
Stage 1	326	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	403	715	-	-	1206	-
Stage 1	731	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	382	715	-	-	1206	-
Mov Cap-2 Maneuver	382	-	-	-	-	-
Stage 1	731	-	-	-	-	-
Stage 2	656	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.2	0	1.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	467	1206	-
HCM Lane V/C Ratio	-	-	0.419	0.044	-
HCM Control Delay (s)	-	-	18.2	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	345	240	0
Future Vol, veh/h	0	0	0	345	240	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	0	0	0	375	261	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	636	261	261	0	-	0
Stage 1	261	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	442	778	1303	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	695	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	442	778	1303	-	-	-
Mov Cap-2 Maneuver	442	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	695	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1303	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	55	45	300	185	105
Future Vol, veh/h	105	55	45	300	185	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	225	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	54	47	52	92	73	74
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	194	117	87	326	253	142

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	823	324	395	0	-	0
Stage 1	324	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	343	717	1164	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	610	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	317	717	1164	-	-	-
Mov Cap-2 Maneuver	431	-	-	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	564	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.8	1.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1164	-	507	-	-
HCM Lane V/C Ratio	0.074	-	0.614	-	-
HCM Control Delay (s)	8.3	-	22.8	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	4.1	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	10	10	395	280	10
Future Vol, veh/h	15	10	10	395	280	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	46	56	33	71	92	33
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	33	18	30	556	304	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	936	319	335	0	-	0
Stage 1	319	-	-	-	-	-
Stage 2	617	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	288	710	1197	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	529	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	281	710	1197	-	-	-
Mov Cap-2 Maneuver	397	-	-	-	-	-
Stage 1	726	-	-	-	-	-
Stage 2	516	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1197	-	470	-	-
HCM Lane V/C Ratio	0.025	-	0.107	-	-
HCM Control Delay (s)	8.1	-	13.6	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↑			↑			↑	
Traffic Vol, veh/h	15	5	30	20	0	30	5	360	45	65	240	5
Future Vol, veh/h	15	5	30	20	0	30	5	360	45	65	240	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	200	-	-	250	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	31	58	42	25	75	50	80	65	86	83	42
Heavy Vehicles, %	2	2	2	2	2	2	7	7	7	7	7	7
Mvmt Flow	24	16	52	48	0	40	10	450	69	76	289	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	972	986	295	986	958	485	301	0	0	519	0	0
Stage 1	447	447	-	505	505	-	-	-	-	-	-	-
Stage 2	525	539	-	481	453	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	232	248	744	227	257	582	1232	-	-	1022	-	-
Stage 1	591	573	-	549	540	-	-	-	-	-	-	-
Stage 2	536	522	-	566	570	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	203	228	744	188	236	582	1232	-	-	1022	-	-
Mov Cap-2 Maneuver	203	228	-	188	236	-	-	-	-	-	-	-
Stage 1	586	531	-	545	536	-	-	-	-	-	-	-
Stage 2	495	518	-	473	528	-	-	-	-	-	-	-

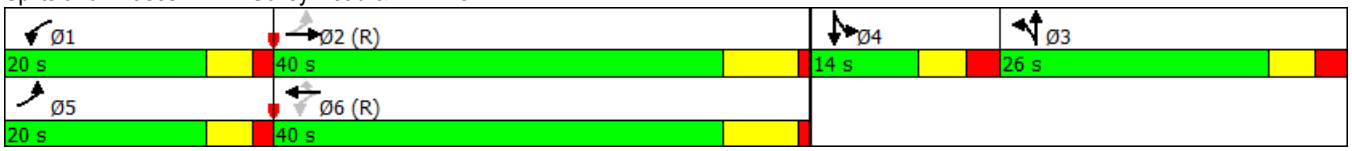
Approach	EB	WB	NB	SB
HCM Control Delay, s	18.7	21.9	0.2	1.8
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1232	-	-	355	188	582	1022	-	-
HCM Lane V/C Ratio	0.008	-	-	0.259	0.253	0.069	0.074	-	-
HCM Control Delay (s)	7.9	-	-	18.7	30.5	11.6	8.8	-	-
HCM Lane LOS	A	-	-	C	D	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1	1	0.2	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	570	200	105	1735	0	350	0	55	0	5	10
Future Volume (vph)	20	570	200	105	1735	0	350	0	55	0	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	250		250	350		350	200		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3374	1509	1687	3374	1863	1603	1603	1509	0	1863	1583
Flt Permitted	0.080			0.296			0.950	0.950				
Satd. Flow (perm)	149	3374	1509	526	3374	1863	1603	1603	1509	0	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270						224			224
Link Speed (mph)		50			50			40			30	
Link Distance (ft)		1445			2089			1794			491	
Travel Time (s)		19.7			28.5			30.6			11.2	
Lane Group Flow (vph)	25	722	270	136	1866	0	192	193	75	0	13	26
Turn Type	pm+pt	NA	Free	pm+pt	NA	Perm	Split	NA	Free		NA	Free
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		Free	6		6			Free		4	Free
Total Split (s)	20.0	40.0		20.0	40.0	40.0	26.0	26.0		14.0	14.0	
Total Lost Time (s)	5.0	6.5		5.0	6.5	6.5	6.0	6.0			6.0	
Act Effct Green (s)	62.3	54.8	100.0	69.3	63.6		16.5	16.5	100.0		7.5	100.0
Actuated g/C Ratio	0.62	0.55	1.00	0.69	0.64		0.16	0.16	1.00		0.08	1.00
v/c Ratio	0.13	0.39	0.18	0.29	0.87		0.73	0.73	0.05		0.09	0.02
Control Delay	9.2	16.0	0.3	8.4	23.9		55.1	55.4	0.1		44.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	9.2	16.0	0.3	8.4	23.9		55.1	55.4	0.1		44.8	0.0
LOS	A	B	A	A	C		E	E	A		D	A
Approach Delay		11.6			22.9			46.2			14.9	
Approach LOS		B			C			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 8 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 22.6		Intersection LOS: C	
Intersection Capacity Utilization 83.1%		ICU Level of Service E	
Analysis Period (min) 15			

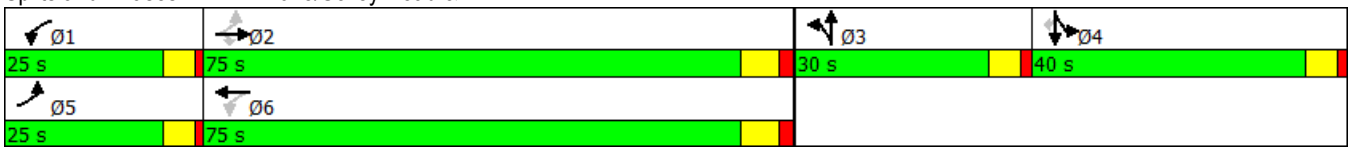
Splits and Phases: 17: Solley Road & MD 173



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Future Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1721	0	1687	1643	0	1687	1863	1509
Flt Permitted	0.055			0.059			0.950			0.950		
Satd. Flow (perm)	98	1776	1583	110	1721	0	1687	1643	0	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83		9			25				104
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	193	929	216	108	766	0	173	421	0	174	247	138
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6								4
Total Split (s)	25.0	75.0	75.0	25.0	75.0		30.0	30.0		40.0	40.0	40.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5		5.5	5.5	5.5
Act Effct Green (s)	91.9	74.7	74.7	81.0	68.3		24.6	24.6		25.7	25.7	25.7
Actuated g/C Ratio	0.58	0.47	0.47	0.51	0.43		0.15	0.15		0.16	0.16	0.16
v/c Ratio	0.85	1.11	0.27	0.65	1.03		0.66	1.53		0.64	0.82	0.42
Control Delay	73.8	106.0	17.7	49.1	84.2		78.2	295.5		73.3	86.0	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	73.8	106.0	17.7	49.1	84.2		78.2	295.5		73.3	86.0	21.2
LOS	E	F	B	D	F		E	F		E	F	C
Approach Delay		87.1			79.9			232.2			66.0	
Approach LOS		F			E			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 170			
Actuated Cycle Length: 158.8			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.53			
Intersection Signal Delay: 107.3		Intersection LOS: F	
Intersection Capacity Utilization 95.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177



Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	25	45	435	405	40
Future Vol, veh/h	20	25	45	435	405	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	22	27	49	473	440	43

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1033	462	484	0	-	0
Stage 1	462	-	-	-	-	-
Stage 2	571	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	258	600	1079	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	242	600	1079	-	-	-
Mov Cap-2 Maneuver	242	-	-	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	530	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1079	-	362	-	-
HCM Lane V/C Ratio	0.045	-	0.135	-	-
HCM Control Delay (s)	8.5	0	16.5	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	15	430	25	25	430
Future Vol, veh/h	15	15	430	25	25	430
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	16	16	467	27	27	467

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1003	481	0	0	495	0
Stage 1	481	-	-	-	-	-
Stage 2	522	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	268	585	-	-	1069	-
Stage 1	622	-	-	-	-	-
Stage 2	595	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	259	585	-	-	1069	-
Mov Cap-2 Maneuver	259	-	-	-	-	-
Stage 1	622	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	359	1069	-
HCM Lane V/C Ratio	-	-	0.091	0.025	-
HCM Control Delay (s)	-	-	16	8.5	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	5	10	435	450	5
Future Vol, veh/h	5	5	10	435	450	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	5	5	11	473	489	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	987	492	495	0	-	0
Stage 1	492	-	-	-	-	-
Stage 2	495	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	274	577	1069	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	613	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	270	577	1069	-	-	-
Mov Cap-2 Maneuver	270	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	604	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.1	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1069	-	368	-	-
HCM Lane V/C Ratio	0.01	-	0.03	-	-
HCM Control Delay (s)	8.4	0	15.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	26.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	170	105	65	375	350	100
Future Vol, veh/h	170	105	65	375	350	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	69	85	89	85	83
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	179	152	76	421	412	120

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1046	472	532	0	-	0
Stage 1	472	-	-	-	-	-
Stage 2	574	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	248	582	1011	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	224	582	1011	-	-	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	500	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	105.8	1.4	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1011	-	312	-	-
HCM Lane V/C Ratio	0.076	-	1.061	-	-
HCM Control Delay (s)	8.9	0	105.8	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	12.4	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	535	10	5	445
Future Vol, veh/h	5	5	535	10	5	445
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	5	5	582	11	5	484

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1082	587	0	0	592	0
Stage 1	587	-	-	-	-	-
Stage 2	495	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	241	510	-	-	984	-
Stage 1	556	-	-	-	-	-
Stage 2	613	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	239	510	-	-	984	-
Mov Cap-2 Maneuver	239	-	-	-	-	-
Stage 1	556	-	-	-	-	-
Stage 2	609	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	325	984	-
HCM Lane V/C Ratio	-	-	0.033	0.006	-
HCM Control Delay (s)	-	-	16.5	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	0	510	30	0	435
Future Vol, veh/h	15	0	510	30	0	435
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	16	0	554	33	0	473

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1044	-	0	0	-	-
Stage 1	571	-	-	-	-	-
Stage 2	473	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	-
Pot Cap-1 Maneuver	254	0	-	-	0	-
Stage 1	565	0	-	-	0	-
Stage 2	627	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	254	-	-	-	-	-
Mov Cap-2 Maneuver	254	-	-	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	627	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	254	-
HCM Lane V/C Ratio	-	-	0.064	-
HCM Control Delay (s)	-	-	20.1	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	510	0	25	435
Future Vol, veh/h	0	15	510	0	25	435
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	0	16	554	0	27	473

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	554	0	-	554	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	532	-	0	1016	-
Stage 1	0	-	-	0	-	-
Stage 2	0	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	532	-	-	1016	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	SBL	SBT
Capacity (veh/h)	-	532	1016	-
HCM Lane V/C Ratio	-	0.031	0.027	-
HCM Control Delay (s)	-	12	8.6	0
HCM Lane LOS	-	B	A	A
HCM 95th %tile Q(veh)	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	10	15	15	5	0	30	445	50	10	430	40
Future Vol, veh/h	40	10	15	15	5	0	30	445	50	10	430	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	69	63	71	63	50	75	88	85	50	86	78
Heavy Vehicles, %	2	7	2	2	7	2	7	7	7	7	7	7
Mvmt Flow	50	14	24	21	8	0	40	506	59	20	500	51

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1185	1211	526	1188	1206	535	551	0	0	565	0	0
Stage 1	566	566	-	615	615	-	-	-	-	-	-	-
Stage 2	619	645	-	573	591	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.57	6.22	7.12	6.57	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.57	-	6.12	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.063	3.318	3.518	4.063	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	166	178	552	165	180	545	994	-	-	982	-	-
Stage 1	509	499	-	479	475	-	-	-	-	-	-	-
Stage 2	476	460	-	505	487	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	149	162	552	137	164	545	994	-	-	982	-	-
Mov Cap-2 Maneuver	149	162	-	137	164	-	-	-	-	-	-	-
Stage 1	479	484	-	451	447	-	-	-	-	-	-	-
Stage 2	440	433	-	455	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	36.1	36.5	0.6	0.3
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	994	-	-	152	552	143	982	-	-
HCM Lane V/C Ratio	0.04	-	-	0.424	0.043	0.203	0.02	-	-
HCM Control Delay (s)	8.8	0	-	45.1	11.8	36.5	8.7	0	-
HCM Lane LOS	A	A	-	E	B	E	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.9	0.1	0.7	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	20	465	470	15
Future Vol, veh/h	5	10	20	465	470	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	5	11	22	505	511	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1068	519	527	0	-	0
Stage 1	519	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	245	557	1040	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	238	557	1040	-	-	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	562	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.8	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1040	-	385	-	-
HCM Lane V/C Ratio	0.021	-	0.042	-	-
HCM Control Delay (s)	8.5	0	14.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	60	15	345	125	45	425
Future Vol, veh/h	60	15	345	125	45	425
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	65	92	92	81	92
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	100	23	375	136	56	462

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1016	-	0	0	511	0
Stage 1	443	-	-	-	-	-
Stage 2	573	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	2.218	-
Pot Cap-1 Maneuver	264	0	-	-	1054	-
Stage 1	647	0	-	-	-	-
Stage 2	564	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	245	-	-	-	1054	-
Mov Cap-2 Maneuver	245	-	-	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	524	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.5	0	0.9
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	245	1054	-
HCM Lane V/C Ratio	-	-	0.408	0.053	-
HCM Control Delay (s)	-	-	29.5	8.6	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	1.9	0.2	-

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	45	265	95	105	420
Future Vol, veh/h	50	45	265	95	105	420
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	69	82	89	91	84	94
Heavy Vehicles, %	2	2	7	2	2	7
Mvmt Flow	72	55	298	104	125	447

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1047	350	0	0	402	0
Stage 1	350	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	253	693	-	-	1157	-
Stage 1	713	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	217	693	-	-	1157	-
Mov Cap-2 Maneuver	217	-	-	-	-	-
Stage 1	713	-	-	-	-	-
Stage 2	423	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.7	0	1.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	1157	-
HCM Lane V/C Ratio	-	-	0.413	0.108	-
HCM Control Delay (s)	-	-	24.7	8.5	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.9	0.4	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	310	525	5
Future Vol, veh/h	0	0	0	310	525	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	0	0	0	337	571	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	910	573	576	0	-	0
Stage 1	573	-	-	-	-	-
Stage 2	337	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	305	519	997	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	723	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	305	519	997	-	-	-
Mov Cap-2 Maneuver	305	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	997	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	70	45	15	295	485	30
Future Vol, veh/h	70	45	15	295	485	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	225	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	45	65	41	81	90	47
Heavy Vehicles, %	2	2	2	7	7	2
Mvmt Flow	156	69	37	364	539	64

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1008	571	603	0	-	0
Stage 1	571	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	267	520	975	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	257	520	975	-	-	-
Mov Cap-2 Maneuver	388	-	-	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	626	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.9	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	975	-	421	-	-
HCM Lane V/C Ratio	0.038	-	0.534	-	-
HCM Control Delay (s)	8.8	-	22.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	3.1	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	10	10	355	505	15
Future Vol, veh/h	15	10	10	355	505	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	50	63	83	80	94
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	39	20	16	428	631	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1098	639	647	0	-	0
Stage 1	639	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.17	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.263	-	-	-
Pot Cap-1 Maneuver	230	467	915	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	226	467	915	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	615	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	915	-	388	-	-
HCM Lane V/C Ratio	0.017	-	0.153	-	-
HCM Control Delay (s)	9	-	16	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	9.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	5	15	75	20	135	20	275	75	35	430	15
Future Vol, veh/h	5	5	15	75	20	135	20	275	75	35	430	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	200	-	-	250	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	33	63	55	78	54	67	47	69	81	89	82	75
Heavy Vehicles, %	2	2	2	2	2	2	7	7	7	7	7	7
Mvmt Flow	15	8	27	96	37	201	43	399	93	39	524	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1263	1190	534	1162	1154	446	544	0	0	492	0	0
Stage 1	612	612	-	532	532	-	-	-	-	-	-	-
Stage 2	651	578	-	630	622	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	147	188	546	172	197	612	1000	-	-	1046	-	-
Stage 1	480	484	-	531	526	-	-	-	-	-	-	-
Stage 2	457	501	-	470	479	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	78	173	546	148	182	612	1000	-	-	1046	-	-
Mov Cap-2 Maneuver	78	173	-	148	182	-	-	-	-	-	-	-
Stage 1	459	466	-	508	503	-	-	-	-	-	-	-
Stage 2	272	479	-	423	461	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.9	34.5	0.7	0.6
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1000	-	-	174	148	448	1046	-	-
HCM Lane V/C Ratio	0.043	-	-	0.289	0.65	0.532	0.038	-	-
HCM Control Delay (s)	8.8	-	-	33.9	65.9	21.8	8.6	-	-
HCM Lane LOS	A	-	-	D	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.1	3.6	3.1	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1595	365	110	910	0	295	0	120	5	5	20
Future Volume (vph)	5	1595	365	110	910	0	295	0	120	5	5	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	250		250	350		350	200		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3374	1509	1687	3374	1863	1603	1603	1509	0	1833	1583
Flt Permitted	0.210			0.074			0.950	0.950			0.984	
Satd. Flow (perm)	391	3374	1509	131	3374	1863	1603	1603	1509	0	1833	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245						245			245
Link Speed (mph)		50			50			40			30	
Link Distance (ft)		1445			2089			1794			491	
Travel Time (s)		19.7			28.5			30.6			11.2	
Lane Group Flow (vph)	12	1753	376	134	1034	0	210	211	135	0	30	43
Turn Type	pm+pt	NA	Free	pm+pt	NA	Perm	Split	NA	Free	Split	NA	Free
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		Free	6		6			Free		4	Free
Total Split (s)	22.0	52.0		22.0	52.0	52.0	22.0	22.0		24.0	24.0	
Total Lost Time (s)	5.0	6.5		5.0	6.5	6.5	12.5	12.5			6.0	
Act Effct Green (s)	59.1	51.7	120.0	69.2	63.2		24.6	24.6	120.0		7.5	120.0
Actuated g/C Ratio	0.49	0.43	1.00	0.58	0.53		0.20	0.20	1.00		0.06	1.00
v/c Ratio	0.05	1.21	0.25	0.62	0.58		0.64	0.64	0.09		0.26	0.03
Control Delay	12.0	131.4	0.4	31.5	22.0		55.8	56.0	0.1		58.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	12.0	131.4	0.4	31.5	22.0		55.8	56.0	0.1		58.6	0.1
LOS	B	F	A	C	C		E	E	A		E	A
Approach Delay		107.7			23.1			42.3			24.1	
Approach LOS		F			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.21			
Intersection Signal Delay: 71.8		Intersection LOS: E	
Intersection Capacity Utilization 85.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 17: Solley Road & MD 173

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Future Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1744	0	1687	1678	0	1687	1863	1509
Flt Permitted	0.048			0.519			0.950			0.950		
Satd. Flow (perm)	85	1776	1583	967	1744	0	1687	1678	0	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			108		8			16				206
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	62	294	108	130	1074	0	276	224	0	99	169	206
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA		Split	NA	custom
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6								6
Total Split (s)	8.0	90.2	90.2	11.0	93.2		29.4	29.4		19.4	19.4	93.2
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5		5.5	5.5	7.0
Act Effct Green (s)	88.2	83.2	83.2	94.2	86.2		23.9	23.9		13.9	13.9	86.2
Actuated g/C Ratio	0.59	0.55	0.55	0.63	0.57		0.16	0.16		0.09	0.09	0.57
v/c Ratio	0.76	0.30	0.12	0.20	1.07		1.03	0.80		0.63	0.98	0.22
Control Delay	65.5	18.9	2.9	11.3	79.8		123.0	77.4		84.3	130.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	65.5	18.9	2.9	11.3	79.8		123.0	77.4		84.3	130.6	2.3
LOS	E	B	A	B	E		F	E		F	F	A
Approach Delay		21.4			72.4			102.6			65.2	
Approach LOS		C			E			F			E	

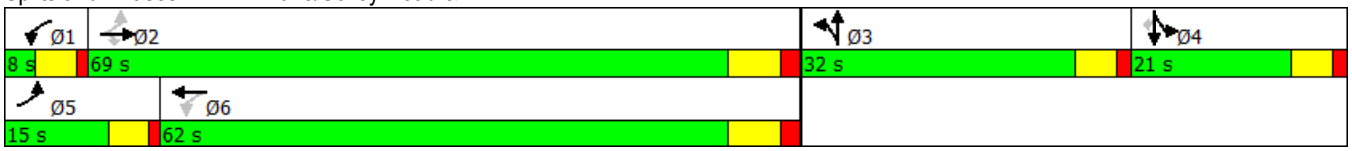
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 67.8		Intersection LOS: E	
Intersection Capacity Utilization 99.0%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Future Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1721	0	1687	1643	0	1687	1863	1509
Flt Permitted	0.067			0.073			0.950			0.950		
Satd. Flow (perm)	119	1776	1583	136	1721	0	1687	1643	0	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		12			35				164
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	193	929	216	108	766	0	173	421	0	174	247	138
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6								4
Total Split (s)	15.0	69.0	69.0	8.0	62.0		32.0	32.0		21.0	21.0	21.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5		5.5	5.5	5.5
Act Effct Green (s)	72.0	62.0	62.0	60.0	55.0		26.5	26.5		15.5	15.5	15.5
Actuated g/C Ratio	0.55	0.48	0.48	0.46	0.42		0.20	0.20		0.12	0.12	0.12
v/c Ratio	1.04	1.10	0.27	1.08	1.04		0.50	1.16		0.87	1.11	0.43
Control Delay	108.0	94.0	10.6	138.7	81.1		51.8	141.2		92.6	145.4	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	108.0	94.0	10.6	138.7	81.1		51.8	141.2		92.6	145.4	8.5
LOS	F	F	B	F	F		D	F		F	F	A
Approach Delay		82.5			88.2			115.2			95.2	
Approach LOS		F			F			F			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 91.9		Intersection LOS: F	
Intersection Capacity Utilization 95.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1595	365	110	910	0	295	0	120	5	5	20
Future Volume (vph)	5	1595	365	110	910	0	295	0	120	5	5	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	250		250	350		350	200		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3374	1509	1687	3374	1863	1603	1603	1509	0	1833	1583
Flt Permitted	0.223			0.062			0.950	0.950			0.984	
Satd. Flow (perm)	415	3374	1509	110	3374	1863	1603	1603	1509	0	1833	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245						245			245
Link Speed (mph)		50			50			40			30	
Link Distance (ft)		1445			2089			1794			491	
Travel Time (s)		19.7			28.5			30.6			11.2	
Lane Group Flow (vph)	12	1753	376	134	1034	0	210	211	135	0	30	43
Turn Type	pm+pt	NA	Free	pm+pt	NA	Perm	Split	NA	Free	Split	NA	Free
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		Free	6		6			Free		4	Free
Total Split (s)	10.5	67.3		11.2	68.0	68.0	28.5	28.5		13.0	13.0	
Total Lost Time (s)	5.0	6.5		5.0	6.5	6.5	12.5	12.5			6.0	
Act Effct Green (s)	69.2	62.2	120.0	74.7	70.7		18.3	18.3	120.0		6.6	120.0
Actuated g/C Ratio	0.58	0.52	1.00	0.62	0.59		0.15	0.15	1.00		0.06	1.00
v/c Ratio	0.04	1.00	0.25	0.79	0.52		0.86	0.87	0.09		0.30	0.03
Control Delay	9.4	51.8	0.4	54.1	17.1		82.0	82.6	0.1		62.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	9.4	51.8	0.4	54.1	17.1		82.0	82.6	0.1		62.3	0.1
LOS	A	D	A	D	B		F	F	A		E	A
Approach Delay		42.6			21.4			62.3			25.6	
Approach LOS		D			C			E			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 8 (7%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 38.8		Intersection LOS: D	
Intersection Capacity Utilization 85.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 17: Solley Road & MD 173

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Future Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		100	150		150
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1744	0	1687	1776	1509	1687	1863	1509
Flt Permitted	0.048			0.519			0.950			0.950		
Satd. Flow (perm)	85	1776	1583	967	1744	0	1687	1776	1509	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			108		8				105			206
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	62	294	108	130	1074	0	276	142	82	99	169	206
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	custom
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6					3			6
Total Split (s)	8.0	90.2	90.2	11.0	93.2		29.4	29.4	29.4	19.4	19.4	93.2
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5	5.5	5.5	5.5	7.0
Act Effct Green (s)	88.2	83.2	83.2	94.2	86.2		23.9	23.9	23.9	13.9	13.9	86.2
Actuated g/C Ratio	0.59	0.55	0.55	0.63	0.57		0.16	0.16	0.16	0.09	0.09	0.57
v/c Ratio	0.76	0.30	0.12	0.20	1.07		1.03	0.50	0.25	0.63	0.98	0.22
Control Delay	65.5	18.9	2.9	11.3	79.8		123.0	64.6	6.3	84.3	130.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	18.9	2.9	11.3	79.8		123.0	64.6	6.3	84.3	130.6	2.3
LOS	E	B	A	B	E		F	E	A	F	F	A
Approach Delay		21.4			72.4			87.3			65.2	
Approach LOS		C			E			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 65.0		Intersection LOS: E	
Intersection Capacity Utilization 99.0%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Future Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		100	150		150
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1721	0	1687	1776	1509	1687	1863	1509
Flt Permitted	0.123			0.062			0.950			0.950		
Satd. Flow (perm)	218	1776	1583	115	1721	0	1687	1776	1509	1687	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		14				159			125
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	193	929	216	108	766	0	173	210	211	174	247	138
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2		2	6					3			4
Total Split (s)	14.0	76.4	76.4	9.0	71.4		21.4	21.4	21.4	23.2	23.2	23.2
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5	5.5	5.5	5.5	5.5
Act Effct Green (s)	80.4	69.4	69.4	70.4	64.4		15.9	15.9	15.9	17.7	17.7	17.7
Actuated g/C Ratio	0.62	0.53	0.53	0.54	0.50		0.12	0.12	0.12	0.14	0.14	0.14
v/c Ratio	0.82	0.98	0.24	0.96	0.89		0.84	0.97	0.65	0.76	0.98	0.44
Control Delay	41.0	54.9	8.4	96.9	43.4		87.9	109.9	25.6	75.5	106.6	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	54.9	8.4	96.9	43.4		87.9	109.9	25.6	75.5	106.6	15.6
LOS	D	D	A	F	D		F	F	C	E	F	B
Approach Delay		45.4			50.1			73.6			74.5	
Approach LOS		D			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 56.4		Intersection LOS: E	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Future Volume (vph)	45	235	80	100	840	100	210	115	65	85	140	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		100	150		150
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1744	0	1687	1776	1509	1687	1863	1509
Flt Permitted	0.049			0.530			0.207			0.666		
Satd. Flow (perm)	87	1776	1583	987	1744	0	368	1776	1509	1183	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			144		9				113			158
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	62	294	108	130	1074	0	276	142	82	99	169	206
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Total Split (s)	8.0	87.5	87.5	10.0	89.5		23.2	27.5	27.5	15.0	19.3	19.3
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5	5.5	5.5	5.5	5.5
Act Effct Green (s)	85.5	80.5	80.5	90.1	84.1		37.0	22.5	22.5	22.8	13.8	13.8
Actuated g/C Ratio	0.61	0.58	0.58	0.64	0.60		0.26	0.16	0.16	0.16	0.10	0.10
v/c Ratio	0.71	0.29	0.11	0.20	1.02		1.05	0.50	0.24	0.44	0.92	0.71
Control Delay	55.3	16.1	1.0	9.6	61.7		112.5	60.6	5.2	48.2	111.0	30.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	16.1	1.0	9.6	61.7		112.5	60.6	5.2	48.2	111.0	30.6
LOS	E	B	A	A	E		F	E	A	D	F	C
Approach Delay		17.8			56.1			80.2			62.9	
Approach LOS		B			E			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.05			
Intersection Signal Delay: 55.1		Intersection LOS: E	
Intersection Capacity Utilization 91.8%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Future Volume (vph)	170	845	205	95	525	140	170	170	160	150	185	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		135	190		0	150		100	150		150
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1687	1776	1583	1770	1721	0	1687	1776	1509	1687	1863	1509
Flt Permitted	0.133			0.081			0.255			0.460		
Satd. Flow (perm)	236	1776	1583	151	1721	0	453	1776	1509	817	1863	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			131		18				168			147
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		425			583			442			2109	
Travel Time (s)		7.2			9.9			7.5			35.9	
Lane Group Flow (vph)	193	929	216	108	766	0	173	210	211	174	247	138
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Total Split (s)	12.0	60.4	60.4	8.0	56.4		12.4	21.2	21.2	10.4	19.2	19.2
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0		5.5	5.5	5.5	4.5	5.5	5.5
Act Effct Green (s)	62.4	53.4	53.4	54.4	49.4		22.6	15.7	15.7	20.6	13.7	13.7
Actuated g/C Ratio	0.62	0.53	0.53	0.54	0.49		0.23	0.16	0.16	0.21	0.14	0.14
v/c Ratio	0.78	0.98	0.24	0.83	0.89		0.93	0.76	0.56	0.79	0.97	0.41
Control Delay	32.5	48.9	5.7	59.2	37.1		84.1	58.7	16.4	59.5	93.5	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	48.9	5.7	59.2	37.1		84.1	58.7	16.4	59.5	93.5	10.0
LOS	C	D	A	E	D		F	E	B	E	F	A
Approach Delay		39.6			39.8			51.1			62.3	
Approach LOS		D			D			D			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 45.4		Intersection LOS: D	
Intersection Capacity Utilization 88.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: MD 648/Solley Road & MD 177

MOVEMENT SUMMARY

Site: 101 [Solley Rd at Freetown Rd AM]

2040 AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Solley Rd											
3	L2	38	7.0	0.247	5.1	LOS A	1.2	32.7	0.18	0.07	34.7
8	T1	266	7.0	0.247	5.1	LOS A	1.2	32.7	0.18	0.07	34.7
Approach		304	7.0	0.247	5.1	LOS A	1.2	32.7	0.18	0.07	34.7
North: Solley Rd											
4	T1	348	7.0	0.395	6.8	LOS A	2.4	63.0	0.20	0.08	34.2
14	R2	141	7.0	0.395	6.8	LOS A	2.4	63.0	0.20	0.08	33.2
Approach		489	7.0	0.395	6.8	LOS A	2.4	63.0	0.20	0.08	33.9
West: Freetown Rd											
5	L2	43	7.0	0.086	4.9	LOS A	0.3	8.9	0.46	0.35	27.8
12	R2	33	7.0	0.086	4.9	LOS A	0.3	8.9	0.46	0.35	26.8
Approach		76	7.0	0.086	4.9	LOS A	0.3	8.9	0.46	0.35	27.4
All Vehicles		870	7.0	0.395	6.0	LOS A	2.4	63.0	0.22	0.10	33.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Solley Rd at Freetown Rd PM]

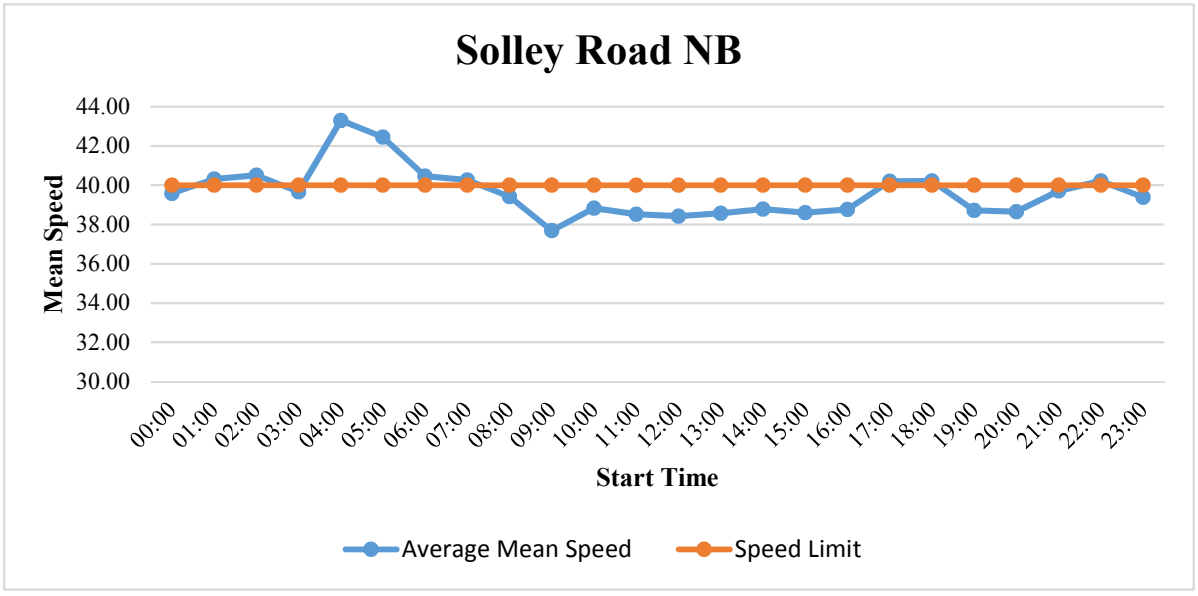
2040 PM
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Solley Rd											
3	L2	71	7.0	0.454	8.5	LOS A	2.6	69.8	0.49	0.35	33.0
8	T1	408	7.0	0.454	8.5	LOS A	2.6	69.8	0.49	0.35	33.0
Approach		478	7.0	0.454	8.5	LOS A	2.6	69.8	0.49	0.35	33.0
North: Solley Rd											
4	T1	380	7.0	0.410	7.1	LOS A	2.5	65.0	0.29	0.14	34.0
14	R2	109	7.0	0.410	7.1	LOS A	2.5	65.0	0.29	0.14	33.0
Approach		489	7.0	0.410	7.1	LOS A	2.5	65.0	0.29	0.14	33.8
West: Freetown Rd											
5	L2	185	7.0	0.351	8.3	LOS A	1.7	43.6	0.58	0.52	26.7
12	R2	114	7.0	0.351	8.3	LOS A	1.7	43.6	0.58	0.52	25.7
Approach		299	7.0	0.351	8.3	LOS A	1.7	43.6	0.58	0.52	26.3
All Vehicles		1266	7.0	0.454	7.9	LOS A	2.6	69.8	0.43	0.31	31.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

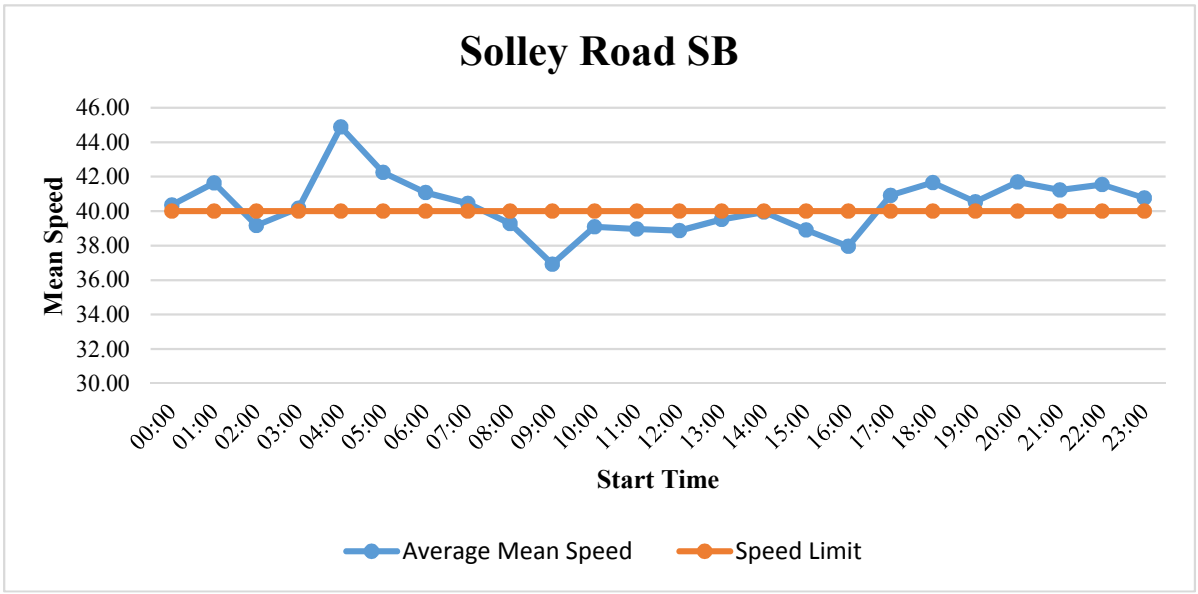
Station Name:Solley Rd NB - Between Energy Pkwy & Solley Rd Elem School
Description:Solley Rd between Energy Pkwy & Solley Elem School
City:Glen Burnie
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	39.59	40
01:00	40.32	40
02:00	40.52	40
03:00	39.67	40
04:00	43.31	40
05:00	42.45	40
06:00	40.46	40
07:00	40.27	40
08:00	39.41	40
09:00	37.69	40
10:00	38.84	40
11:00	38.52	40
12:00	38.42	40
13:00	38.57	40
14:00	38.79	40
15:00	38.61	40
16:00	38.77	40
17:00	40.20	40
18:00	40.22	40
19:00	38.71	40
20:00	38.66	40
21:00	39.72	40
22:00	40.22	40
23:00	39.39	40



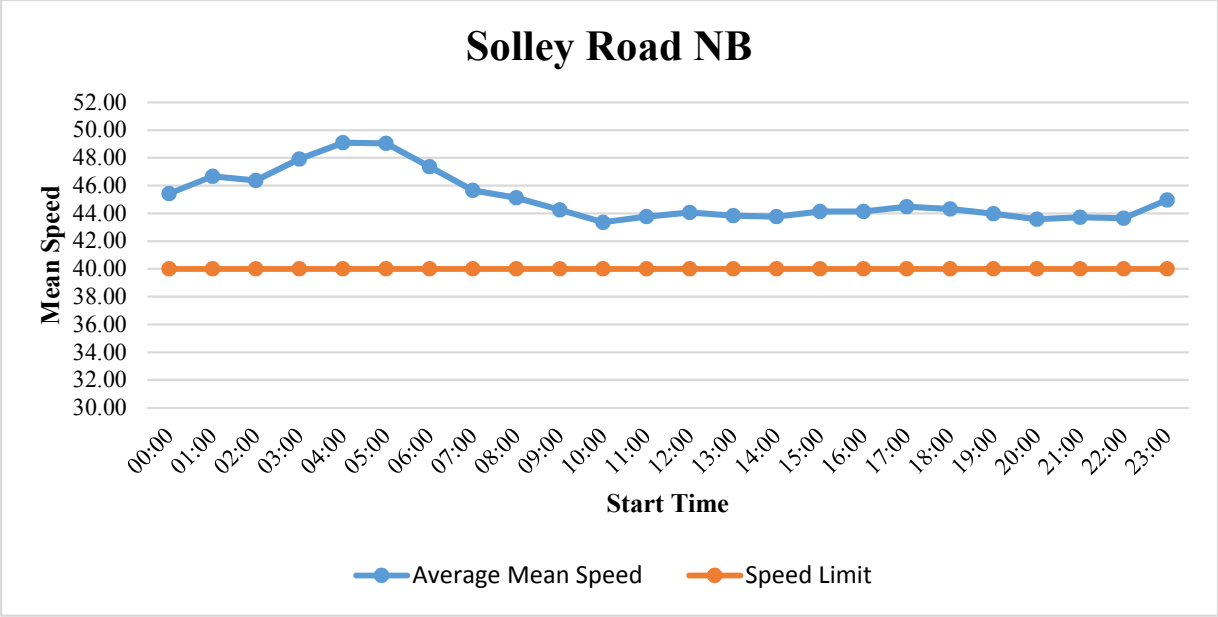
Station Name:Solley Rd SB - Between Energy Pkwy & Solley Rd Elem School
Description:Solley Rd between Energy Pkwy & Solley Elem School
City:Glen Burnie
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	40.36	40
01:00	41.63	40
02:00	39.17	40
03:00	40.17	40
04:00	44.89	40
05:00	42.26	40
06:00	41.08	40
07:00	40.45	40
08:00	39.29	40
09:00	36.93	40
10:00	39.10	40
11:00	38.97	40
12:00	38.87	40
13:00	39.51	40
14:00	39.94	40
15:00	38.92	40
16:00	37.96	40
17:00	40.91	40
18:00	41.66	40
19:00	40.55	40
20:00	41.70	40
21:00	41.22	40
22:00	41.55	40
23:00	40.77	40



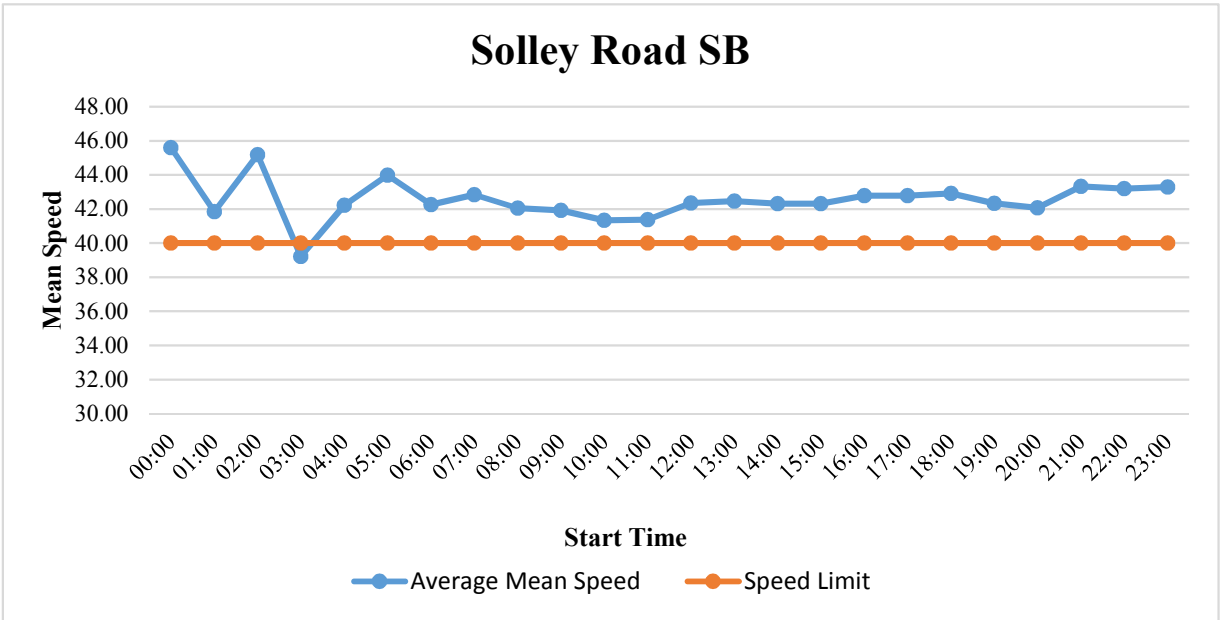
Station Name:Solley Rd NB south of Nabbs Creek Rd
Description:Solley Rd south of Nabbs Creek Rd
City:Glen Burnie
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	45.42	40
01:00	46.67	40
02:00	46.38	40
03:00	47.92	40
04:00	49.09	40
05:00	49.05	40
06:00	47.37	40
07:00	45.66	40
08:00	45.13	40
09:00	44.25	40
10:00	43.36	40
11:00	43.77	40
12:00	44.07	40
13:00	43.85	40
14:00	43.76	40
15:00	44.14	40
16:00	44.13	40
17:00	44.48	40
18:00	44.33	40
19:00	43.97	40
20:00	43.60	40
21:00	43.72	40
22:00	43.66	40
23:00	44.97	40



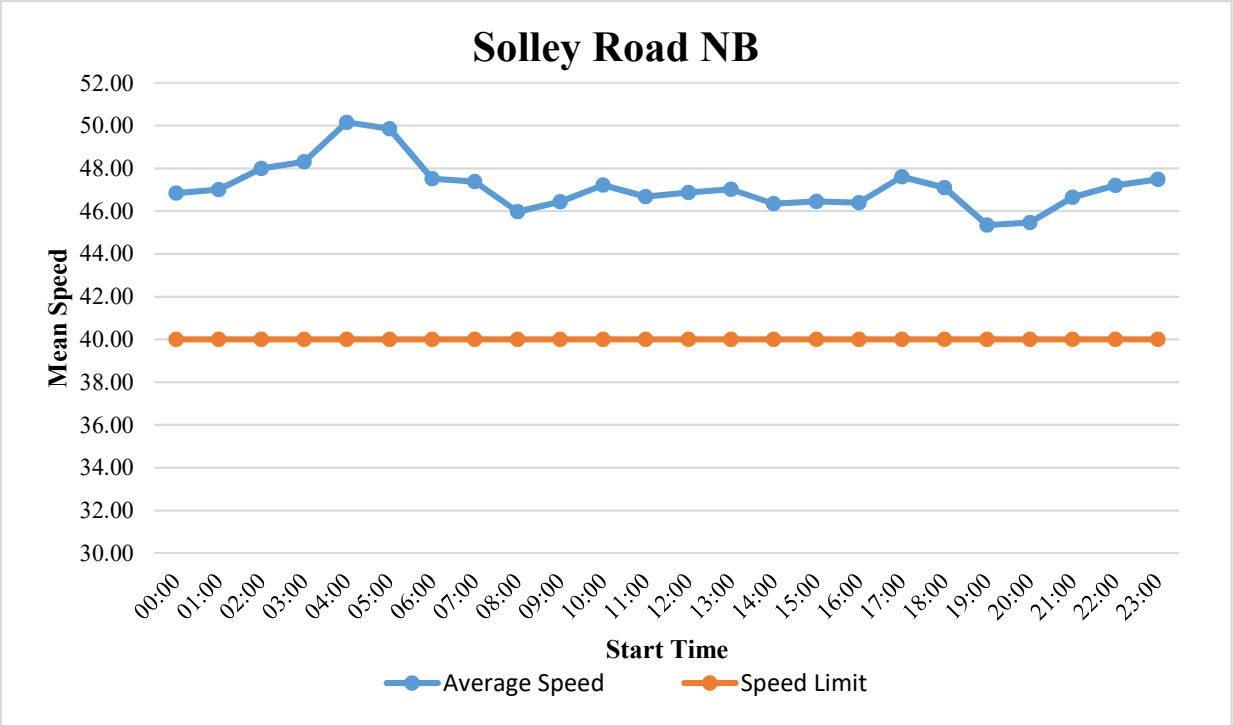
Station Name:Solley Rd SB south of Nabbs Creek Rd
Description:Solley Rd south of Nabbs Creek Rd
City:Glen Burnie
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	45.61	40
01:00	41.85	40
02:00	45.19	40
03:00	39.22	40
04:00	42.22	40
05:00	43.98	40
06:00	42.26	40
07:00	42.84	40
08:00	42.05	40
09:00	41.91	40
10:00	41.34	40
11:00	41.37	40
12:00	42.36	40
13:00	42.46	40
14:00	42.31	40
15:00	42.32	40
16:00	42.79	40
17:00	42.78	40
18:00	42.91	40
19:00	42.33	40
20:00	42.08	40
21:00	43.34	40
22:00	43.20	40
23:00	43.29	40



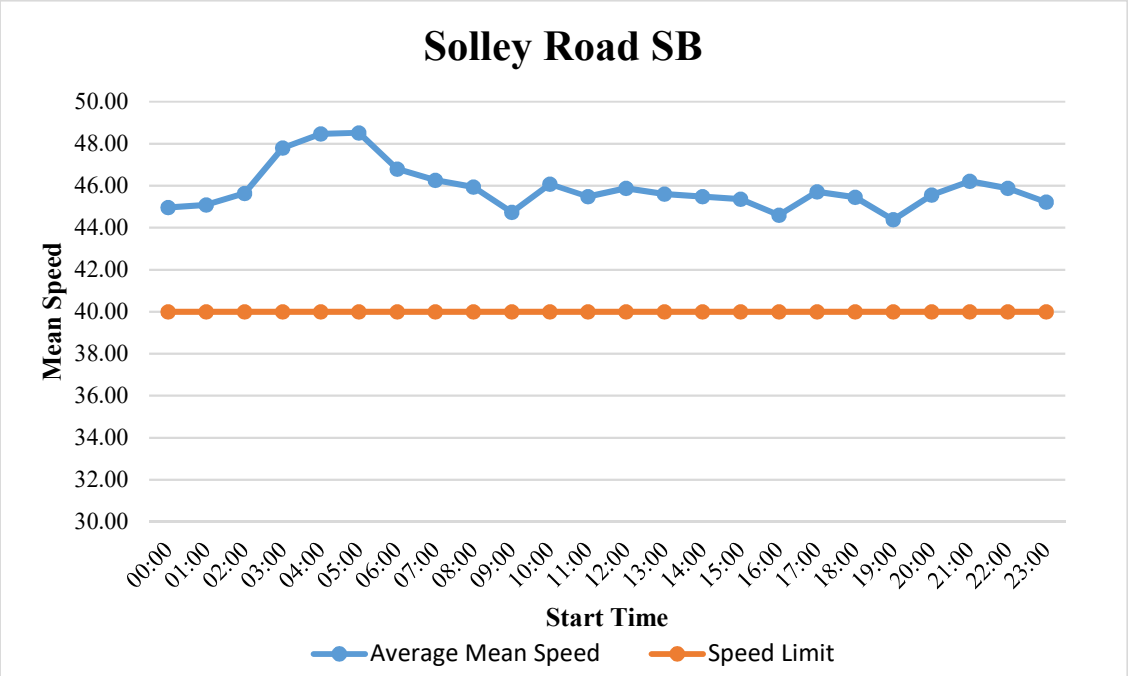
Station Name:Solley Rd NB - Between Freetown Rd & Shady Brook Ln
Description:Solley Rd between Freetown Rd & Shady Brook Ln
City:Glen Burnie
County:Anne Arundel

Start Time	Average Speed	Speed Limit
00:00	46.84	40
01:00	47.01	40
02:00	48.00	40
03:00	48.31	40
04:00	50.16	40
05:00	49.85	40
06:00	47.52	40
07:00	47.38	40
08:00	45.97	40
09:00	46.43	40
10:00	47.21	40
11:00	46.67	40
12:00	46.87	40
13:00	47.02	40
14:00	46.35	40
15:00	46.45	40
16:00	46.40	40
17:00	47.61	40
18:00	47.10	40
19:00	45.35	40
20:00	45.46	40
21:00	46.65	40
22:00	47.21	40
23:00	47.49	40



Station Name:Solley Rd SB - Between Freetown Rd & Shady Brook Ln
Description:Solley Rd between Freetown Rd & Shady Brook Ln
City:Glen Burnie
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	44.96	40
01:00	45.08	40
02:00	45.63	40
03:00	47.81	40
04:00	48.47	40
05:00	48.52	40
06:00	46.80	40
07:00	46.27	40
08:00	45.94	40
09:00	44.74	40
10:00	46.07	40
11:00	45.49	40
12:00	45.88	40
13:00	45.60	40
14:00	45.48	40
15:00	45.36	40
16:00	44.61	40
17:00	45.72	40
18:00	45.45	40
19:00	44.38	40
20:00	45.56	40
21:00	46.22	40
22:00	45.88	40
23:00	45.22	40



Supplemental Traffic Signal Evaluation Form

RK&K

Location	Solley Road at Freetown Road	Date	May 19, 2017
County	Anne Arundel	Analyst	**OAD**

Summary Sheet

The following Signal Warrant Evaluation is based on the criteria presented in the **2009 Edition** of the Manual on Uniform Traffic Control Devices, Part 4 (Highway Traffic Signals), Chapter C

NOTE: The 70% criteria applies for these analyses
NOTE: the 56% criteria do not apply for these analyses
NOTE: Right turns from the Minor street ARE included in these analyses

	MUTCD Min. Requirement	Current Conditions	Criteria Met?	Warrant Met?
Warrant 1 - 8 Hour Volumes				
A. Minimum Volume	8 hours	2 hour(s)	**No**	**NO**
B. Continuous Traffic	8 hours	3 hour(s)	**No**	
C. 80% of A and B	8 hours	2 hour(s)	**No**	
NOTE: Warrant 1 is met if any of criteria A, B or C are met				
Warrant 2 - Four Hour Vehicular Volume				
A. Four Hour Volume	4 hours	2 hour(s)	**No**	**NO**
Warrant 3 - Peak Hour				
"Unusual" Case Clause	"Unusual" Case?		**No**	**NO**
A. Peak Hour Delay	14,400 seconds	N/A seconds	**No**	
	100 vehicles	N/A vehicles		
	800 vehicles	0 vehicles		
B. Peak Hour Volume	1 hour	2 hour(s)	**Yes**	
NOTE: Warrant 3 is met if either criteria A or B is met AND it is an "Unusual" Case				
Warrant 4 - Pedestrian Volume				
Is there a signalized or stop-controlled intersection which controls the street that pedestrians desire cross within 300 feet?			**No**	**Warrant Applies**
Would the traffic signal restrict progressive movement of traffic?			**Yes**	
A. Four Hour Volume	4 hours	0 hour(s)	**No**	**NO**
B. Peak Hour Volume	1 hour	0 hour(s)	**No**	
NOTE: Warrant 4 is met if either criteria A or B is met AND there are no signals or stop-controlled intersections controlling the major pedestrian movements, unless the proposed signal does not restrict progressive movement of traffic				
Warrant 5 - School Crossing				
A. Student Crossing Volume	20 peds./hr.	0 peds./hr.	**No**	**NO**
B. Acceptable gaps (calculated based on pedestrian volume)			**N/A**	
Tried other remedial measures			**Yes**	
Nearby signal < 300 feet away?			**No**	
Would the traffic signal restrict progressive movement of traffic?			**Yes**	
NOTE: Warrant 5 is met if both criteria A and B are met AND no signals are within 300' and progressive flow is not restricted or other remedial measures have been tried				
Warrant 6 - Coordinated Signal System				
A. One-Way Street: existing signals widely spaced (inadequate platooning)?			**No**	**NO**
B. Two-Way Street: existing signals widely spaced (inadequate platooning)?			**Yes**	
If a signal were installed, would resulting signal spacing > 1,000 feet?			**No**	
NOTE: Warrant 6 is met if either criteria A or B is met AND the resulting signal spacing > 1000 feet				
Warrant 7 - Crash Experience				
A. Have other remedial measures been tried?			**No**	**NO**
B. Accident Experience	5 acc./yr.	2 acc./yr.	**No**	
C. 8 hour volume @ 80%	8 hours	2 hours	**No**	
NOTE: Warrant 7 is met if ALL three of these criteria are satisfied				
Warrant 8 - Roadway Network				
A. Total Entering Volume	1 Hour	0 hour(s)	**No**	**NO**
B. Projected Volumes	1 Hour	N/A hour(s)	**No**	
Is this the junction of two or more MAJOR routes?			**No**	
NOTE: Warrant 8 is met if either criteria A or B is met AND the intersection is the junction of major roads				
Warrant 9 - Intersection Near a Grade Crossing				
A. Grade crossing exists within 140 ft of stop line on minor approach			**No**	**N/A**
B. Adjusted highest minor street approach volume exceeds threshold			**No**	
NOTE: Warrant 9 is met if both criteria A and B are met				

Supplemental Traffic Signal Evaluation Form

RK&K

Location	Solley Road at Freetown Road	Date	May 19, 2017
County	Anne Arundel	Analyst	**OAD**

Warrant 1 - 8 Hour Volumes

MUTCD Requirements:

Number of Lanes for moving traffic on each approach		Condition A - Minimum Vehicular Volume							
		Vehicles per hour on major street				Vehicles per hour on higher-volume minor street (one direction)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Number of Lanes for moving traffic on each approach		Condition B - Interruption of Continuous Traffic							
		Vehicles per hour on major street				Vehicles per hour on higher-volume minor street (one direction)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Field Data

Hour Ending	Combined Major Approach	Highest Minor Approach	Condition A met?	Condition B met?	A & B Condition met?
7 AM	0	0	No	No	No
8 AM	0	0	No	No	No
9 AM	602	55	No	Yes	No
10 AM	488	73	No	No	No
11 AM	0	0	No	No	No
12 PM	0	0	No	No	No
1 PM	0	0	No	No	No
2 PM	0	0	No	No	No
3 PM	0	0	No	No	No
4 PM	0	0	No	No	No
5 PM	685	195	Yes	Yes	Yes
6 PM	632	195	Yes	Yes	Yes

Warrant 1 Summary	Hours Met	Warrant Met?	
Condition A:	**2**	**No**	(70 percent criteria applies)
Condition B:	**3**	**No**	(70 percent criteria applies)
A & B Combination:	**2**	**No**	(56 percent criteria does not apply)

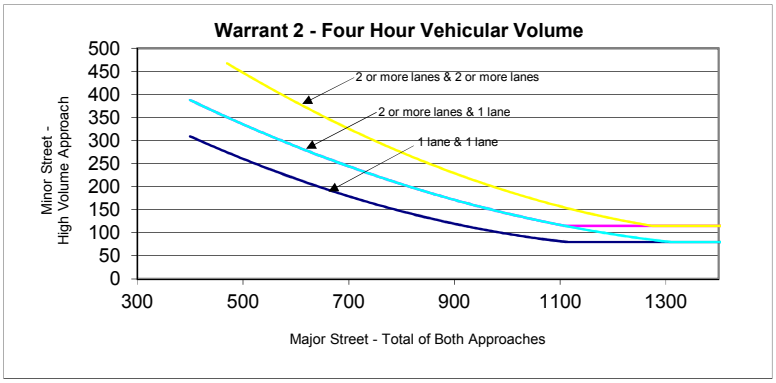
Is Warrant 1 Satisfied?	**NO**

Supplemental Traffic Signal Evaluation Form

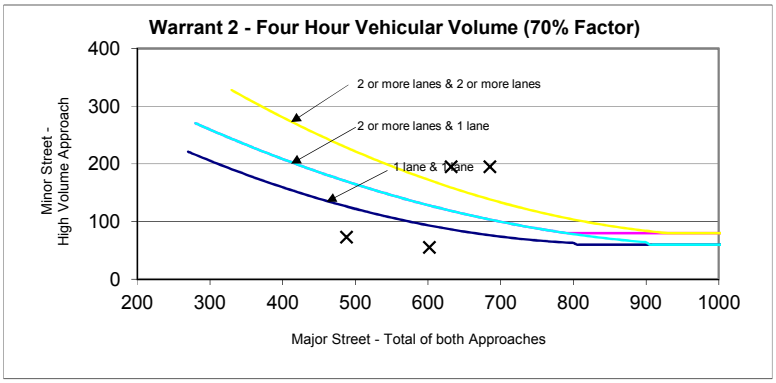
RK&K

Location Solley Road at Freetown Road Date May 19, 2017

Warrant 2 - Four Hour Vehicular Volume



NOTE: This chart not used (70% Criteria applies)



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Field Data

Hour Ending	Combined Major Approach	Highest Minor Approach	Minimum Required	Warrant met?
7 AM	0	0	397	No
8 AM	0	0	397	No
9 AM	602	55	93	No
10 AM	488	73	126	No
11 AM	0	0	397	No
12 PM	0	0	397	No
1 PM	0	0	397	No
2 PM	0	0	397	No
3 PM	0	0	397	No
4 PM	0	0	397	No
5 PM	685	195	76	Yes
6 PM	632	195	86	Yes

	Hours Met	Warrant Met?
Total Hours Met:	**2**	**No**

(70 percent criteria applies)

Is Warrant 2 Satisfied?	**NO**

Supplemental Traffic Signal Evaluation Form

RK&K

Location Solley Road at Freetown Road Date May 19, 2017

Warrant 3 - Peak Hour

NOTE: Warrant 3 is not applicable because this area IS NOT considered an 'unusual' case

An "unusual" case refers to locations such as an office complex, a manufacturing plant, an industrial plant, or a facility that discharges/attracts a large volume of traffic over a short time

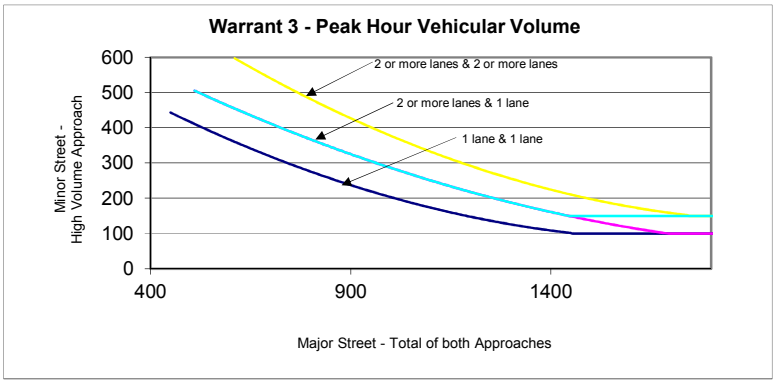
Criteria A: Peak Hour Delay

NOTE: A formal Delay Study was not conducted because a delay study was not included in the scope of this study

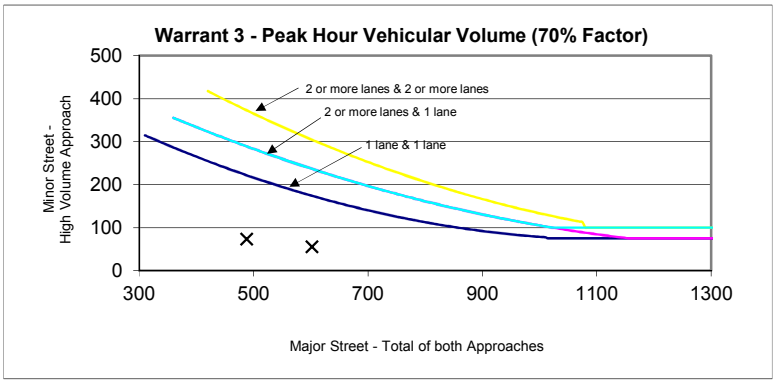
			Minimum Required
1. Total Stopped Delay	N/A	vehicle-seconds	14,400
2. Volume on Minor Street Approach during same hour	N/A	vehicles	100
3. Total entering traffic during hour more than 800 vehicles?	N/A		800

Is the Peak Hour Delay Criteria Met?	**No**

Criteria B: Peak Hour Volume



NOTE: This chart not used (70% Criteria applies)



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- Warrant 3 Worksheet Continued on Next Page -

Location Solley Road at Freetown Road Date May 19, 2017

Warrant 3 - Peak Hour (Continued)

Field Data

Hour Ending	Combined Major Approach	Highest Minor Approach	Minimum Required	Warrant met?
7 AM	0	0	529	No
8 AM	0	0	529	No
9 AM	602	55	174	No
10 AM	488	73	222	No
11 AM	0	0	529	No
12 PM	0	0	529	No
1 PM	0	0	529	No
2 PM	0	0	529	No
3 PM	0	0	529	No
4 PM	0	0	529	No
5 PM	685	195	145	Yes
6 PM	632	195	163	Yes

	Hours Met	Warrant Met?	
Is the Peak Hour Volume Criteria Met?	**2**	**Yes**	(70 percent criteria applies)

Warrant 3 Summary:	Warrant Met?	
Warrant 3.A - Peak Hour Delay:	**No**	
Warrant 3.B - Peak Hour Volume:	**Yes**	(70 percent criteria applies)

Is Warrant 3 Satisfied? NO

(NOTE: Criteria B - Peak Hour Volume is not recognized by Maryland SHA)

Warrant 4 - Pedestrian Volume

The need for a traffic control signal at an intersection or midblock crossing shall be considered if either of the following criteria is met:

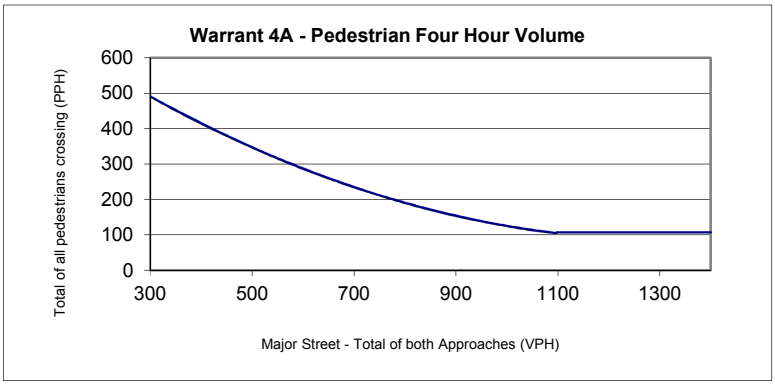
A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5.

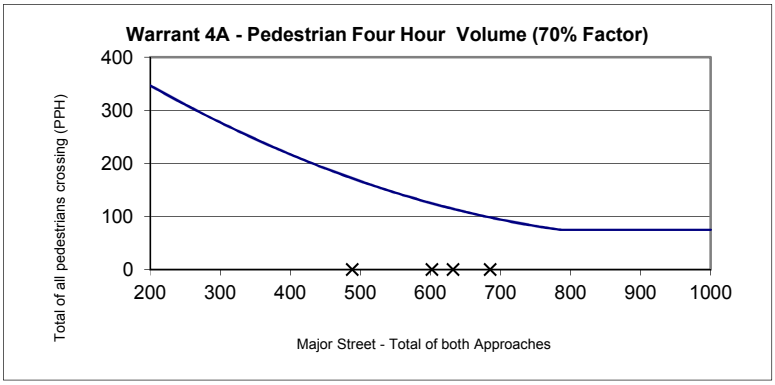
B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve in Figure 4C-7.

The pedestrian warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic

Distance to nearest signalized or stop-controlled intersection 900 feet
Would a new signal restrict progressive movement? Yes

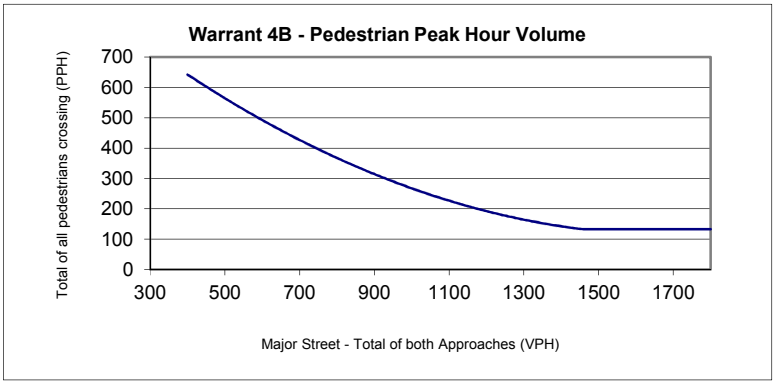
Warrant 4 - Pedestrian Volume (Continued)

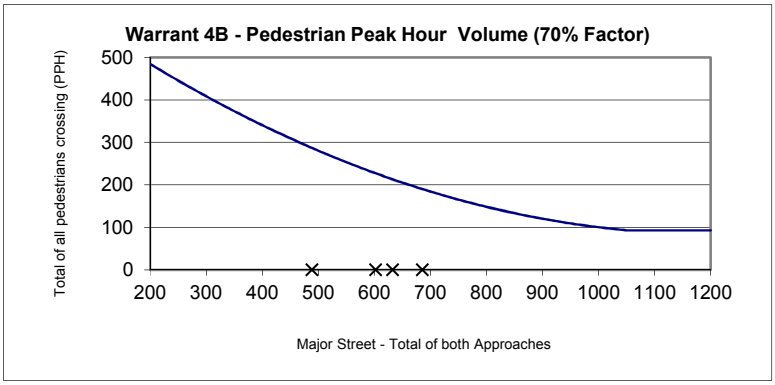




Hour Ending	Combined Major Approach	Pedestrian Total Crossing	Minimum Required	Warrant met?
7 AM	0	0	515	No
8 AM	0	0	515	No
9 AM	602	0	125	No
10 AM	488	0	172	No
11 AM	0	0	515	No
12 PM	0	0	515	No
1 PM	0	0	515	No
2 PM	0	0	515	No
3 PM	0	0	515	No
4 PM	0	0	515	No
5 PM	685	0	98	No
6 PM	632	0	115	No

Warrant 4 - Pedestrian Volume (Continued)





Hour Ending	Combined Major Approach	Pedestrian Total Crossing	Minimum Required	Warrant met?
7 AM	0	0	661	No
8 AM	0	0	661	No
9 AM	602	0	227	No
10 AM	488	0	287	No
11 AM	0	0	661	No
12 PM	0	0	661	No
1 PM	0	0	661	No
2 PM	0	0	661	No
3 PM	0	0	661	No
4 PM	0	0	661	No
5 PM	685	0	190	No
6 PM	632	0	213	No

Warrant 4 Summary	**Hours Met**	**Warrant Met?**	
Condition A:	**0**	**No**	(70 percent criteria applies)
Condition B:	**0**	**No**	(70 percent criteria applies)

Is Warrant 4 Satisfied?	**NO**

Supplemental Traffic Signal Evaluation Form

RK&K

Location: Solley Road at Freetown Road Date: May 19, 2017

Warrant 5 - School Crossing

1. Are there 20 or more students during the highest crossing hour?	No
2. Are there an adequate number of gaps?	N/A
NOTE: A formal Gap Study was not conducted because A gap study was not included in the scope of this study.	
3. Have other remedial measures been tried? (items can include warning signs, flashers, crossing guards, etc.)	Yes
4. Is there another nearby signal located < 300 feet from the intersection?	No
5. Would a new signal restrict progressive movement?	Yes

Is Warrant 5 Satisfied? NO

Warrant 6 - Coordinated Signal System

The need for a signal based on Warrant 6 shall be considered if either of the following criteria is met AND if the resultant spacing of traffic control signals would be > 1,000 feet:

A.	On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning	**Not Met**
B.	On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will provide collectively progressive operation	**Met**

If a signal were installed, would the resulting signal spacing be > 1,000 feet? **No**

Is Warrant 6 Satisfied? NO

Warrant 7 - Crash Experience

A.	Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency.	**Not Met**
B.	Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage, apparently exceeding the applicable requirements for a reportable crash	**Not Met**
C.	For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1, or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major street and on the higher volume minor street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.	**Not Met**

Is Warrant 7 Satisfied? NO

Supplemental Traffic Signal Evaluation Form

RK&K

Location Solley Road at Freetown Road Date May 19, 2017

Warrant 8 - Roadway Network

The need for a signal based on Warrant 8 shall be considered if either of the following criteria is met AND if the intersection is a junction of two or more MAJOR roads:

NOTE: Portions of the criteria for Warrant 8 are based on projected traffic volumes and weekend traffic volumes. However, projected and weekend volumes were not available during the preparation of this study, so Warrant 8 was only evaluated based on current weekday traffic conditions.

A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has a 5-year projected traffic volume, based on an engineering study, that meets one or more of Warrants 1,2 and 3 during an average weekday — **Not Met**

B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of and 5 hours of a non-normal business day (Saturday or Sunday). — **N/A**

Is this the junction of two or more MAJOR routes? — **No**

Is Warrant 8 Satisfied? NO

Warrant 9 - Intersection Near a Grade Crossing

The need for a signal based on Warrant 9 shall be considered if both of the following criteria are met:

A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of th track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and — **N/A**

B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13. — **N/A**

Distance to railroad 0 ft

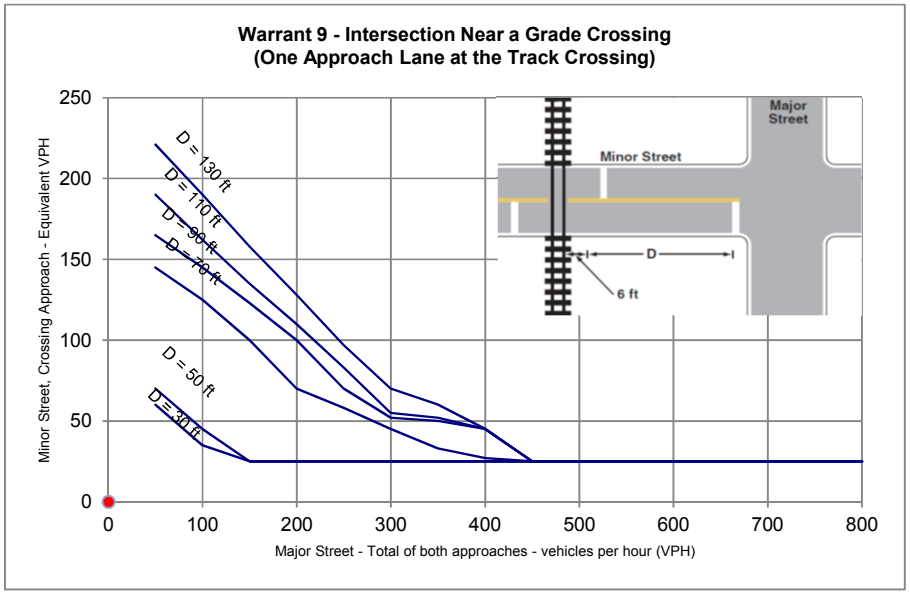
	Number	Adj. Factor	
Daily frequency of rail traffic	4	1.00	Table 4C-2
Percentage of high-occupancy buses	1	1.00	Table 4C-3
Percentage of tractor-trailer trucks	8	1.00	Table 4C-4

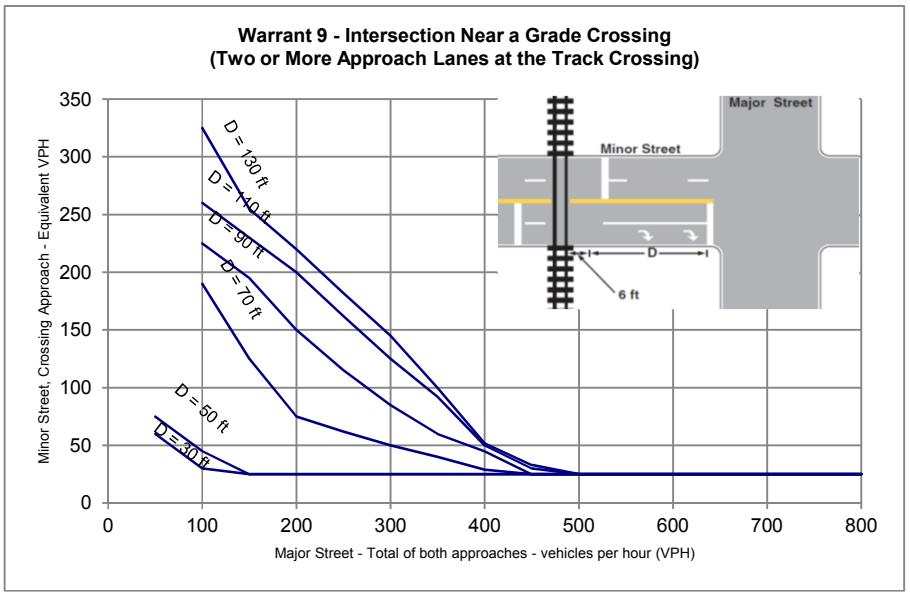
Total Adjustment 1.00

Highest Rail Traffic Hour	Combined Major Approach	Minor Approach	Combined Adjusted Approach	Minimum Required	Warrant met?
11 - 12 PM	0	0	0	#N/A	#N/A

Is Warrant 9 Satisfied? N/A

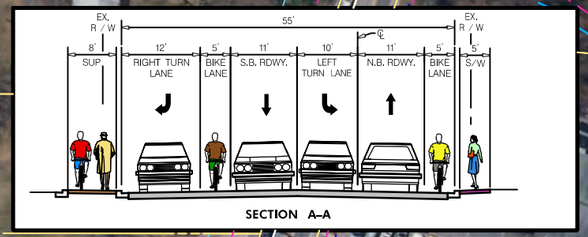
Warrant 9 - Intersection Near a Grade Crossing (Continued)



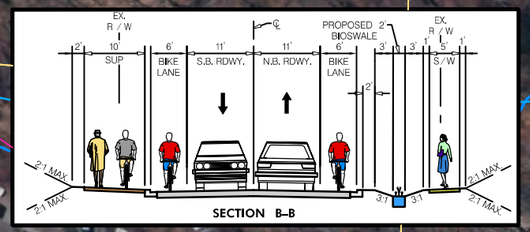


APPENDIX B

CONCEPT PLANS



SECTION A–A



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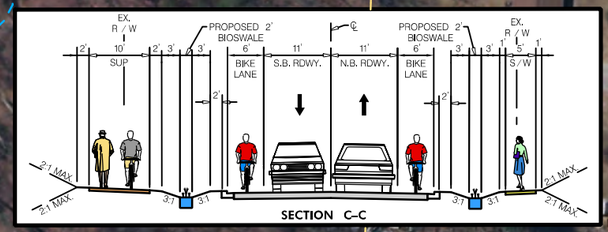

SECTION C–C

EZ QUICK FOOD MARKET

ANNE ARUNDEL SEAFOOD

ELVATON AUTO & TRUCK

SOLLEY ROAD

SANGRIA CT.

MATCH LINE – SEE DWG. NO. PS-02

BP

SHELL

S & S AUTO

MOUNTAIN ROAD

MD 177

ARMIGER FIRE STATION

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C — LIMITS OF CUT / FILL
- F — LIMITS OF CUT / FILL

PS–01

$DATE$
$FILE$

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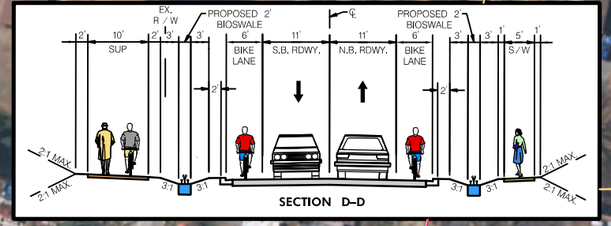
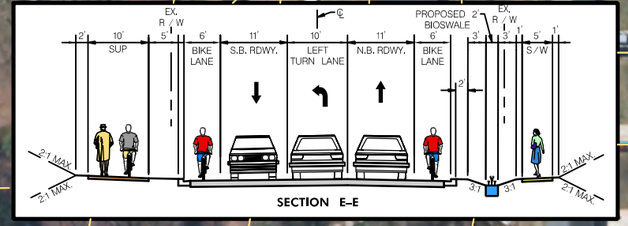
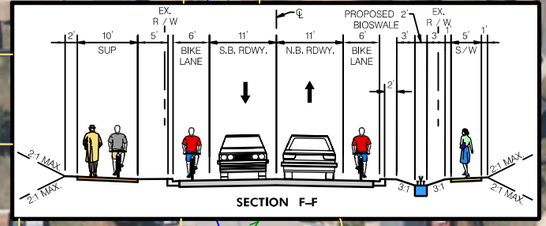
CHIEF ENGINEER	PROJECT MANAGER	DRAWN BY: TTS	
APPROVED DATE	APPROVED DATE	CHECKED BY: TMB	SOLLEY ROAD IMPROVEMENTS STUDY
ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY	SHEET NO. 1 OF 15	
		PROJECT NO: H545900	PREPARED JULY 2017
		PROPOSAL NO: H545905	







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APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	DRAWN BY: TTS CHECKED BY: TMB SHEET NO. 2 OF 15 PROJECT NO: H545900 PROPOSAL NO: H545905	SOLLEY ROAD IMPROVEMENTS STUDY PREPARED JULY 2017

Wednesday, July 12, 2017 AT 11:32 AM
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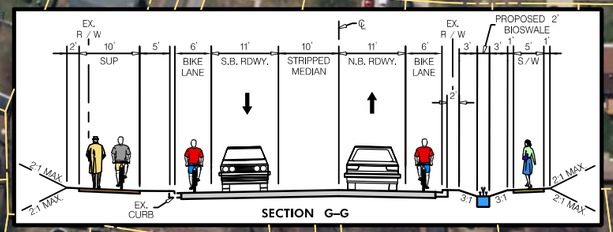
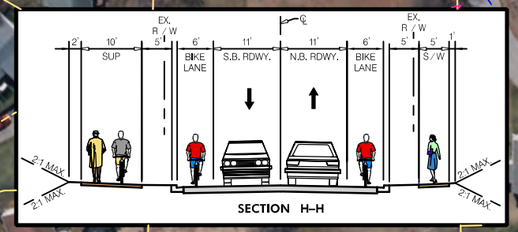


SECTION G–G



SECTION H–H

EXISTING SIDEWALK TO BE REMOVED

POTENTIAL DISPLACEMENT

SOLLEY ROAD

NATURE WALK DRIVE

POWHATAN BEACH RD.

MATCH LINE – SEE DWG NO. PS-02

MATCH LINE – SEE DWG NO. PS-04

G

H

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C / F LIMITS OF CUT / FILL

$DATE$
$FILE$

PS–03

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APPROVED DATE
PROJECT MANAGER

APPROVED DATE
ASSISTANT CHIEF ENGINEER

APPROVED DATE
CHIEF RIGHT-OF-WAY

SCALE: 1" = 100'
DRAWN BY: TTS
CHECKED BY: TMB
SHEET NO. 3 OF 15
PROJECT NO: H545900
PROPOSAL NO: H545905

SITE PLAN

SOLLEY ROAD
IMPROVEMENTS STUDY
PREPARED JULY 2017

MATCH LINE – SEE DWG NO. PS–03

LAURNICK DRIVE

EXISTING PUMPING STATION

SOLLEY ROAD

FREETOWN RD

WETLAND

POTENTIAL ROUNDABOUT (115' DIAMETER)

MATCH LINE – SEE DWG NO. PS–05

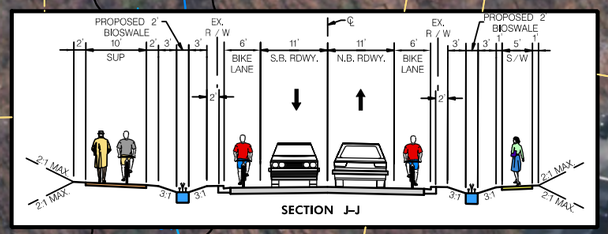
J

J

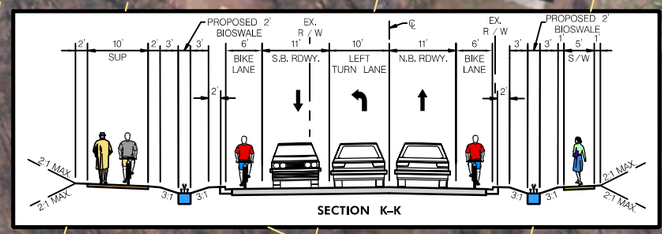
K

K

N



SECTION J–J



SECTION K–K

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C — LIMITS OF CUT / FILL
- F — LIMITS OF CUT / FILL

WETLAND

PS–04

Wednesday, July 12, 2017 AT 11:43 AM
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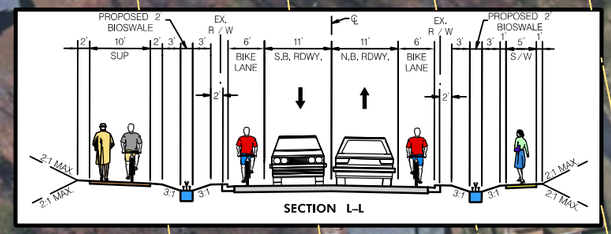
APPROVED DATE CHIEF ENGINEER	APPROVED DATE PROJECT MANAGER	SCALE: 1" = 100'	SITE PLAN
APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	DRAWN BY: TTS CHECKED BY: TMB SHEET NO. 4 OF 15 PROJECT NO: H545900 PROPOSAL NO: H545905	SOLLEY ROAD IMPROVEMENTS STUDY PREPARED JULY 2017



SOLLEY ROAD

MATCH LINE – SEE DWG NO. PS–04

MATCH LINE – SEE DWG NO. PS–06

CARL AVE.

OPEL RD.

HALF CIRCLE

L

L

N

PS–05

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- EXISTING PAVEMENT REMOVAL
- C / F LIMITS OF CUT / FILL

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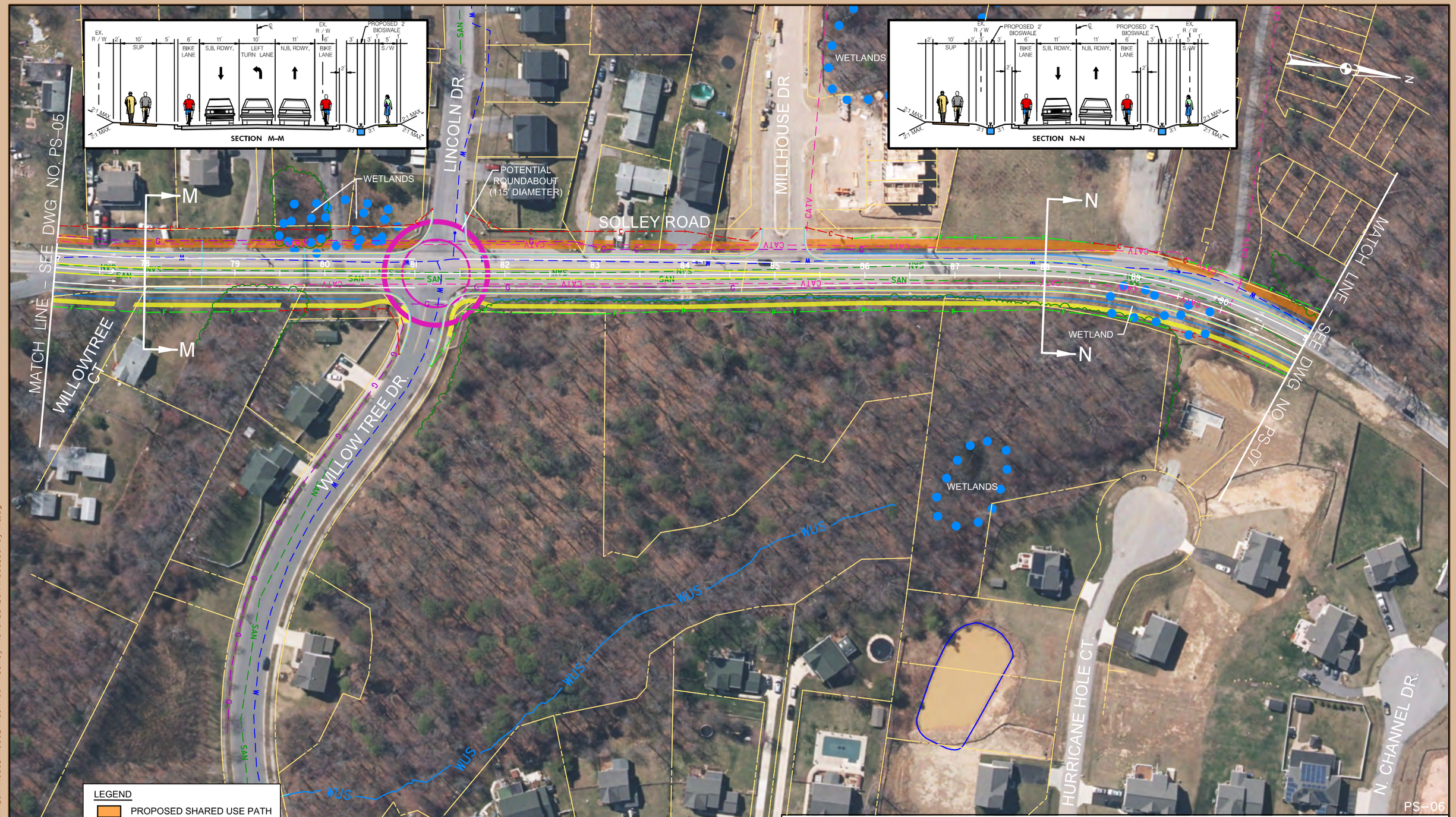
CHIEF ENGINEER	PROJECT MANAGER	DRAWN BY: TTS	
APPROVED DATE	APPROVED DATE	CHECKED BY: TMB	SOLLEY ROAD IMPROVEMENTS STUDY
ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY	SHEET NO. 5 OF 15	
		PROJECT NO: H545900	PREPARED JULY 2017
		PROPOSAL NO: H545905	



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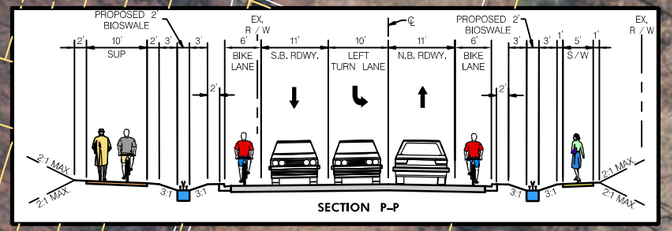
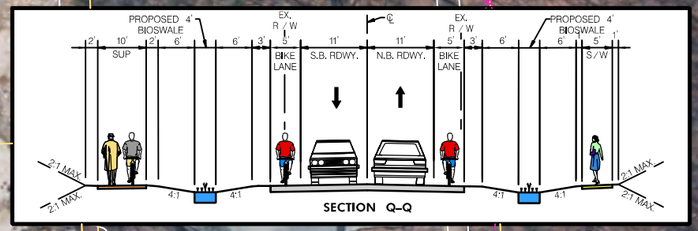
CHIEF ENGINEER		PROJECT MANAGER	
APPROVED	DATE	APPROVED	DATE
ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	

SCALE: 1" = 100'	SITE PLAN
DRAWN BY: TTS	
CHECKED BY: TMB	SOLLEY ROAD IMPROVEMENTS STUDY
SHEET NO. 6 OF 15	
PROJECT NO: H545900	PREPARED JULY 2017
PROPOSAL NO: H545905	





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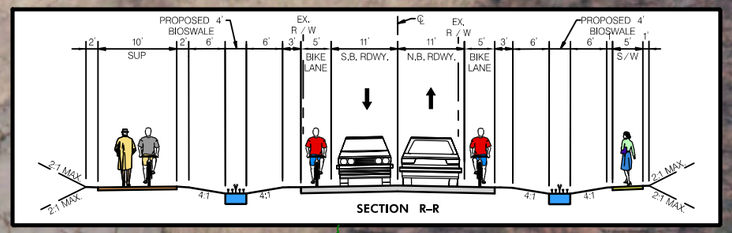
APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	DRAWN BY: TTS CHECKED BY: TMB SHEET NO. 7 OF 15 PROJECT NO: H545900 PROPOSAL NO: H545905	SOLLEY ROAD IMPROVEMENTS STUDY PREPARED JULY 2017



SECTION R–R

SOLLEY ROAD

R

R

N

MATCH LINE – SEE DWG. NO. PS-07

MATCH LINE – SEE DWG. NO. PS-09

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C / F LIMITS OF CUT / FILL

PS–08

Wednesday, July 12, 2017 AT 12:17 PM
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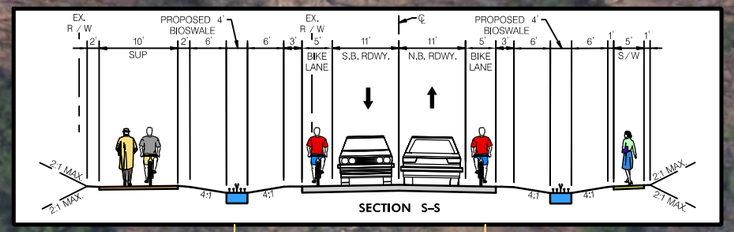
		DRAWN BY: TTS	
		CHECKED BY: TMB	
APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	SHEET NO. 8 OF 15	SOLLEY ROAD IMPROVEMENTS STUDY
		PROJECT NO: H545900	
		PROPOSAL NO: H545905	PREPARED JULY 2017



PS–09

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REVISED NO.	DESCRIPTION	DATE	BY

APPROVED DATE — CHIEF ENGINEER
APPROVED DATE — PROJECT MANAGER
APPROVED DATE — ASSISTANT CHIEF ENGINEER
APPROVED DATE — CHIEF RIGHT-OF-WAY

SCALE: 1" = 100'
DRAWN BY: TTS
CHECKED BY: TMB
SHEET NO. 9 OF 15
PROJECT NO: H545900
PROPOSAL NO: H545905

SITE PLAN

SOLLEY ROAD IMPROVEMENTS STUDY
PREPARED JULY 2017

Wednesday, July 12, 2017 AT 12:28 PM
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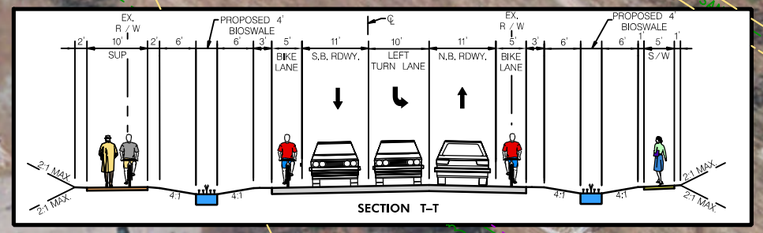

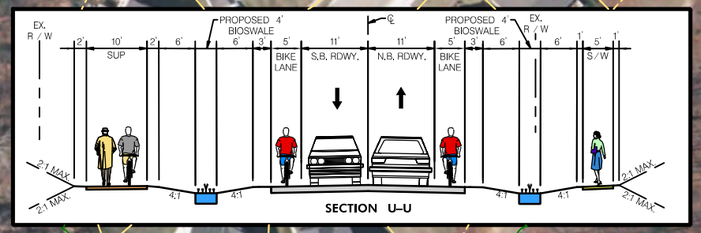

SOLLEY ROAD

WETLAND

POTENTIAL ROUNDABOUT (115' DIAMETER)

MATCH LINE – SEE DWG NO. PS–09

MATCH LINE – SEE DWG NO. PS–11

SAN

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C — LIMITS OF CUT / FILL
- F

PS–10

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APPROVED DATE — CHIEF ENGINEER	APPROVED DATE — PROJECT MANAGER
APPROVED DATE — ASSISTANT CHIEF ENGINEER	APPROVED DATE — CHIEF RIGHT-OF-WAY

SCALE: 1" = 100'
DRAWN BY: TTS
CHECKED BY: TMB
SHEET NO. 10 OF 15
PROJECT NO: H545900
PROPOSAL NO: H545905

SITE PLAN

SOLLEY ROAD IMPROVEMENTS STUDY

PREPARED JULY 2017

Wednesday, July 12, 2017 AT 01:14 PM
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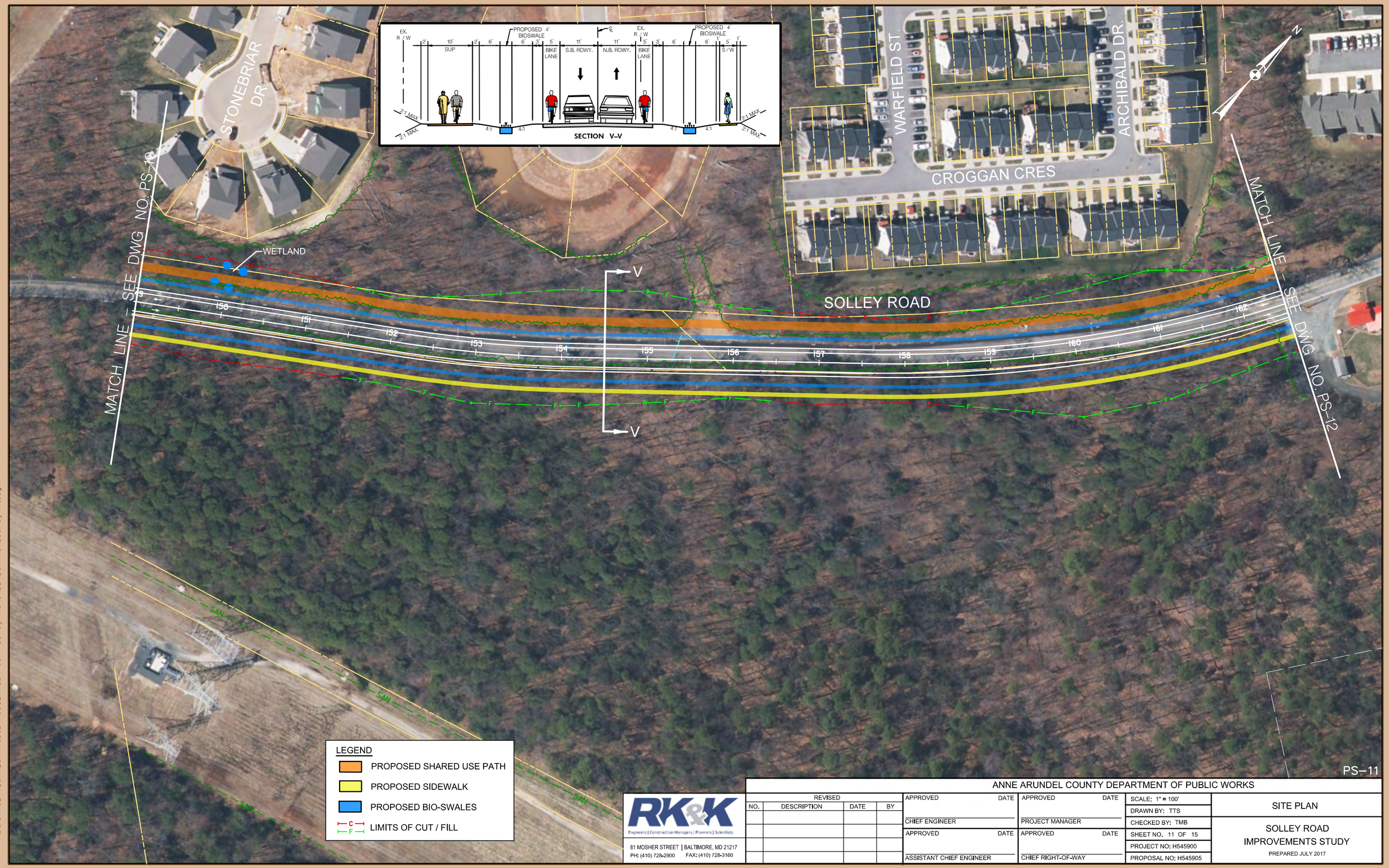

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NO.	DESCRIPTION	DATE	BY

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APPROVED DATE CHIEF ENGINEER	APPROVED DATE PROJECT MANAGER	SCALE: 1" = 100'	SITE PLAN
APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	DRAWN BY: TTS CHECKED BY: TMB SHEET NO. 11 OF 15 PROJECT NO: H545900 PROPOSAL NO: H545905	SOLLEY ROAD IMPROVEMENTS STUDY PREPARED JULY 2017

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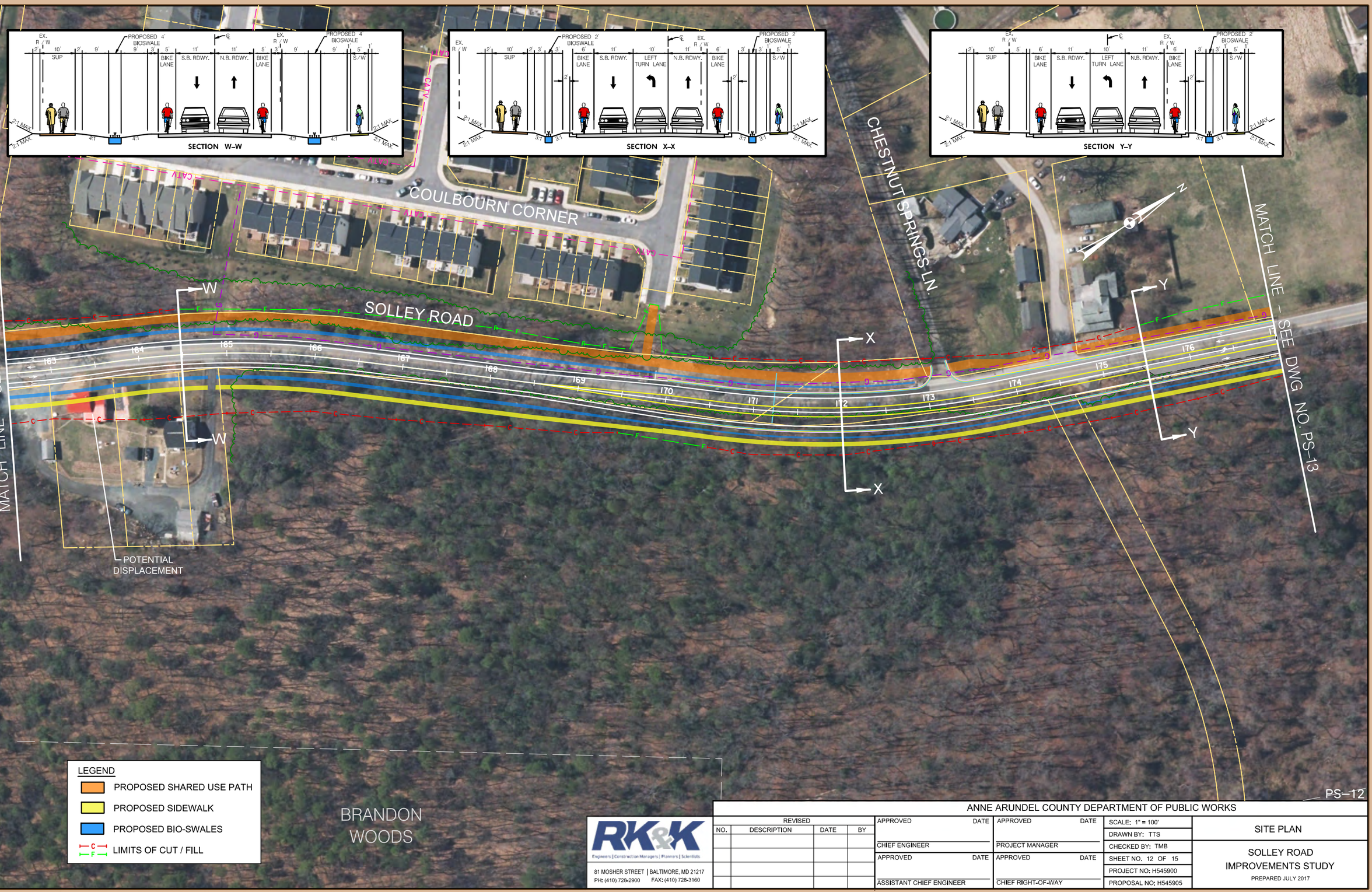

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NO.	DESCRIPTION	DATE	BY

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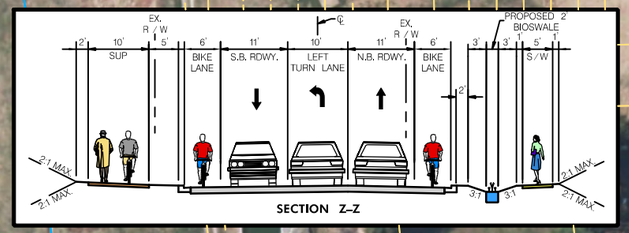
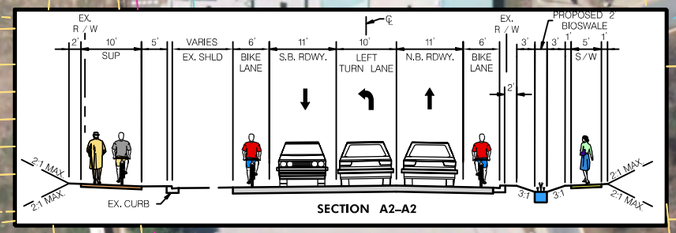
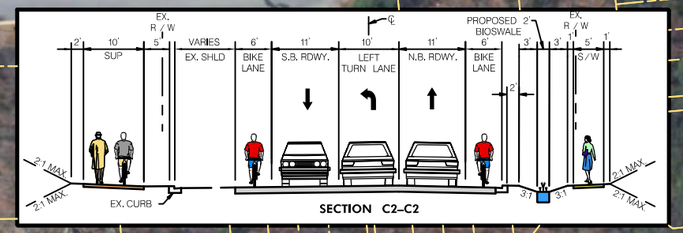
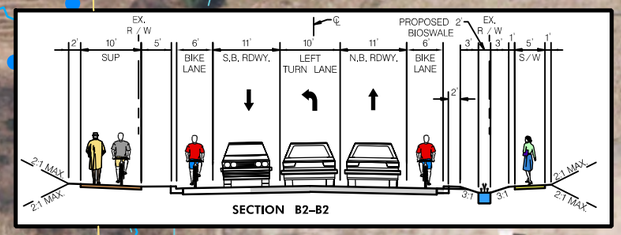
APPROVED DATE CHIEF ENGINEER	APPROVED DATE PROJECT MANAGER	SCALE: 1" = 100'	SITE PLAN
APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	DRAWN BY: TTS CHECKED BY: TMB SHEET NO. 12 OF 15 PROJECT NO: H545900 PROPOSAL NO: H545905	SOLLEY ROAD IMPROVEMENTS STUDY PREPARED JULY 2017









MATCH LINE – SEE DWG NO. PS–12

MATCH LINE – SEE DWG NO. PS–14

WARBLERS PERCH WAY

SOLLEY ROAD

SOLLEY ELEMENTARY SCHOOL

SOLLEY UNITED METHODIST CHURCH

WETLAND

BRANDON WOODS

Z

A2

B2

C2

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C / F LIMITS OF CUT / FILL

PS–13

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APPROVED DATE CHIEF ENGINEER	APPROVED DATE PROJECT MANAGER	SCALE: 1" = 100'	SITE PLAN
		DRAWN BY: TTS	
		CHECKED BY: TMB	
APPROVED DATE ASSISTANT CHIEF ENGINEER	APPROVED DATE CHIEF RIGHT-OF-WAY	SHEET NO. 13 OF 15	SOLLEY ROAD IMPROVEMENTS STUDY
		PROJECT NO: H545900	
		PROPOSAL NO: H545905	PREPARED JULY 2017

Thursday, July 13, 2017 AT 08:21 AM
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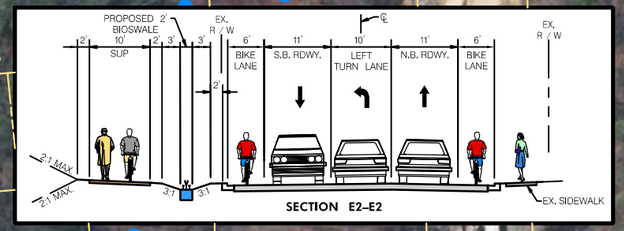
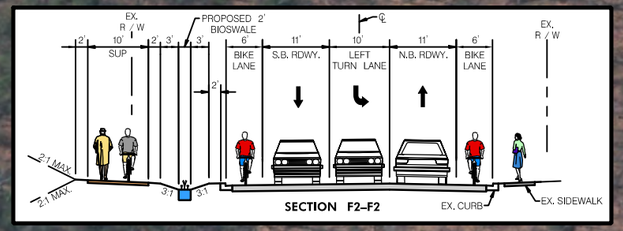


SECTION E2–E2



SECTION F2–F2

MATCH LINE – SEE DWG. NO. PS–13

MATCH LINE – SEE DWG. NO. PS–15

TANYARD SPRINGS LANE

SOLLEY ROAD

ENERGY PKWY.

WETLAND

POTENTIAL ROUNDABOUT (115' DIAMETER)

E2

E2

F2

F2

ADRIAN STEEL OF MARYLAND

ORCHARD BEACH VOLUNTEER FIRE STATION

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C / F LIMITS OF CUT / FILL

PS–14

Wednesday, July 12, 2017 AT 02:07 PM
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REVISED			
NO.	DESCRIPTION	DATE	BY

APPROVED DATE
CHIEF ENGINEER

APPROVED DATE
PROJECT MANAGER

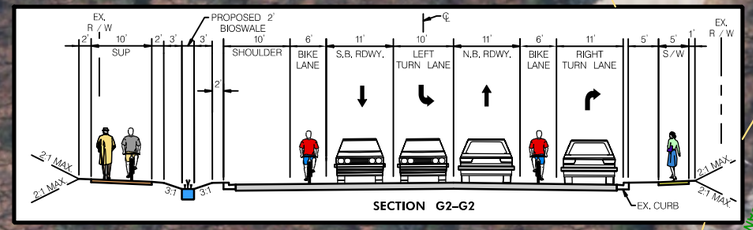
APPROVED DATE
ASSISTANT CHIEF ENGINEER

APPROVED DATE
CHIEF RIGHT-OF-WAY

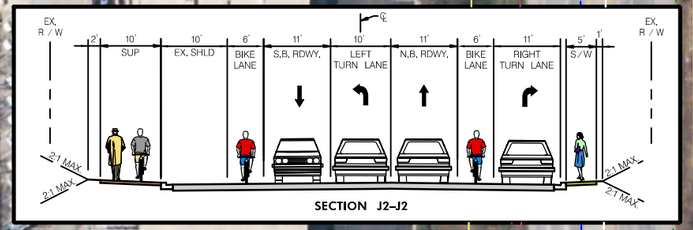
SCALE: 1" = 100'
DRAWN BY: TTS
CHECKED BY: TMB
SHEET NO. 14 OF 15
PROJECT NO: H545900
PROPOSAL NO: H545905

SITE PLAN

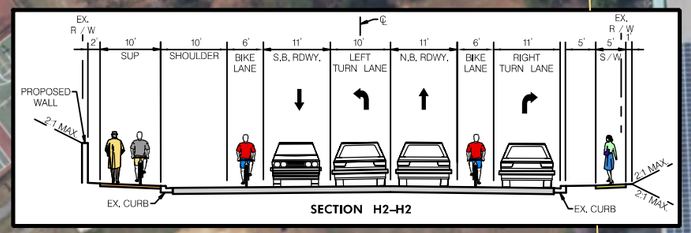
SOLLEY ROAD
IMPROVEMENTS STUDY
PREPARED JULY 2017



SECTION G2–G2



SECTION J2–J2



SECTION H2–H2

WETLAND

PROPOSED RETAINING WALL

STEEL RIDGE DR.

GABLE

SOLLEY ROAD

G2

H2

J2

EXTRA SPACE STORAGE

MD 173

FORT SMALLWOOD ROAD

ORCHARD BEACH VOLUNTEER FIRE STATION

BRANDON SHORES POWER PLANT

PS–15

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK
- PROPOSED BIO-SWALES
- C / F LIMITS OF CUT / FILL

Wednesday, July 12, 2017 AT 02:12 PM
\\balsrv02\v2011\2011\1036.AAC00\Task 69 - Solley Rd\CADD\DGN\PSI5_Solley-Rd.dgn

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REVISED			
NO.	DESCRIPTION	DATE	BY

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED DATE	APPROVED DATE	SCALE: 1" = 100'	SITE PLAN
CHIEF ENGINEER	PROJECT MANAGER	DRAWN BY: TTS	
APPROVED DATE	APPROVED DATE	CHECKED BY: TMB	
ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY	SHEET NO. 15 OF 15	SOLLEY ROAD IMPROVEMENTS STUDY
		PROJECT NO: H545900	
		PROPOSAL NO: H545905	PREPARED JULY 2017

APPENDIX C

COST ESTIMATE

Solley Road - Concept Design Cost Estimate				
	Quantity	**Unit**	**Unit Price**	**Cost**
CATEGORY 1 - PRELIMINARY / MOT				
25% of Category 2, 4, 5 & 6				**$3,611,853**
CATEGORY 2 - EARTHWORK				
Removal of Existing Pavement	290	CY	$35	$10,150
Common Borrow	57,090	CY	$80	$4,567,200
Class 2 Excavation	42,530	CY	$60	$2,551,800
Sub-total				**$7,129,150**
CATEGORY 3 - DRAINAGE				
35% of Category 2, 4, 5 & 6				**$5,056,594**
CATEGORY 4 - STRUCTURES				
Retaining Wall	1	LS	$48,000	$48,000
Sub-total				**$48,000**
CATEGORY 5 - PAVING				
2 Inch HMA 9.5mm for Surface	6,830	TONS	$150	$1,024,500
3 Inch HMA 19.0mm for Base (Full Depth)	12,040	TONS	$150	$1,806,000
4 Inch HMA 19.0mm for Base (SUP)	4,860	TONS	$150	$729,000
6 Inch Graded Aggregate Base Course	111,660	SY	$20	$2,233,200
Sub-total				**$5,792,700**
CATEGORY 6 - SHOULDERS				
Concrete Curb and Gutter	24,900	LF	$30	$747,000
5 Inch Concrete Sidewalk	87,370	SF	$8	$698,960
Detectable Warning Surface for Curb Ramps	790	SF	$40	$31,600
Sub-total				**$1,477,560**
CATEGORY 7 - LANDSCAPING				
5% of Category 2, 4, 5 & 6				**$722,371**
CATEGORY 8 - SIGNING / MARKING / UTILITIES				
Utility Relocation				
	1	LS	$6,800,000	$6,800,000
Sub-total				**$6,800,000**
NEAT SUB-TOTAL				**$30,638,227**
35% Contingency				**$10,723,379**
Construction Overhead				**$3,768,502**
TOTAL CONSTRUCTION COST				**$45,130,108**
Property Acquisition Cost	763,620	SF	$30	**$22,908,600**
Planning and Preliminary Engineering				**$6,769,516**
TOTAL				**$74,808,224**

Solley Road - Roundabout Cost Estimate @ Tanyard/Solley intersection				
	Quantity	**Unit**	**Unit Price**	**Cost**
CATEGORY 1 - PRELIMINARY / MOT				
25% of Category 2, 5 & 6				**$106,950**
CATEGORY 2 - EARTHWORK				
Removal of Existing Pavement	700	CY	$35	$24,500
Common Borrow	50	CY	$80	$4,000
Class 2 Excavation	300	CY	$60	$18,000
Sub-total				**$46,500**
CATEGORY 3 - DRAINAGE				
35% of Category 2, 5 & 6				**$149,730**
CATEGORY 5 - PAVING				
2 Inch HMA 9.5mm for Surface	290	TONS	$150	$43,500
3 Inch HMA 19.0mm for Base (Full Depth)	440	TONS	$150	$66,000
4 Inch HMA 19.0mm for Base (SUP)	85	TONS	$150	$12,750
6 Inch Graded Aggregate Base Course	3,750	SY	$18	$67,500
9 Inch PCC for Truck Apron & Splitter Islands	1,050	SY	$100	$105,000
Sub-total				**$294,750**
CATEGORY 6 - SHOULDERS				
Concrete Curb and Gutter	1,100	LF	$30	$33,000
Mountable Concrete Curb and Gutter	1,050	LF	$35	$36,750
5 Inch Concrete Sidewalk	1,500	SF	$8	$12,000
Detectable Warning Surface for Curb Ramps	120	SF	$40	$4,800
Sub-total				**$86,550**
CATEGORY 7 - LANDSCAPING				
5% of Category 2, 5 & 6				**$21,390**
CATEGORY 8 - SIGNING / MARKING / UTILITIES				
Utility Relocation	1	LS	$50,000	$50,000
Sub-total				**$50,000**
NEAT SUB-TOTAL				**$755,870**
35% Contingency				**$264,555**
TOTAL CONSTRUCTION COST				**$1,020,425**
Property Acquisition Cost	1,200	SF	$30	**$36,000**
Planning and Preliminary Engineering				**$153,064**
Construction Overhead				**$92,972**
TOTAL				**$1,209,488**