



# SIX BRIDGES TRAIL EXTENSION FEASIBILITY STUDY

MARYLAND AVENUE TO STONELEIGH ELEMENTARY SCHOOL

February 3, 2023





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## EXECUTIVE SUMMARY

Baltimore County enlisted Johnson, Mirmiran, and Thompson Inc. (JMT) to conduct a feasibility study to evaluate options for a pedestrian and bicycle trail between Stoneleigh Elementary School and Maryland Avenue in Towson, MD. The proposed alignments primarily utilize property that is already owned by the County through a series of parks, transportation corridors, and school districts.

The proposed trail is approximately one mile long and crosses an unnamed tributary (UNT) of Herring Run at several locations. There are a series of existing vehicular and pedestrian bridges within the project area, and part of JMT's task was to identify how both pedestrians and bicyclists could utilize these bridges, and whether any or all the existing bridges should be replaced. After completing this analysis, JMT determined that none of the existing pedestrian bridges meet the current guidelines for a shared-use path due to the width of each bridge. Additionally, several of the bridges are in poor condition and JMT is recommending replacing them as part of this project.

During the initial phase of the project, JMT completed a desktop analysis, submitted trilogy letters to regulatory agencies, and submitted record requests to utility companies to determine the potential impacts of the project. These analyses and requests generally identified no major concerns within the project area. There are no known wetlands, rare or endangered species, or FEMA floodplains within the project area. The UNT is classified as a Use IV Stream, indicating that no construction activities will be allowed to be conducted within the stream between March 1<sup>st</sup> and May 31<sup>st</sup> of any given year. The results of the utilities records request indicated that there are Baltimore County DPW and Verizon utilities within the project area, however the project team believes these utilities are unlikely to be impacted by this project.

After the existing conditions coordination and analyses discussed above were completed, the project was moved into feasibility-level design. As part of this design, JMT identified design criteria and created typical sections for on-road and off-road pedestrian and bicycle facilities. Next, JMT developed three trail alignment options based on the results of the analysis that had been completed so far to help the County identify a preferred alignment option to be moved into the conceptual design phase of the project. Option 1 and Option 2 are broadly similar, with the primary differences being that Option 1 seeks to upgrade all bridges and facilities to meet AASHTO Guidelines of a minimum 10-foot width for a shared-use trail, and Option 2 has a more significant impact on existing street parking. Option 3, however, proposes to bypass two of the existing bridges by utilizing a different alignment along the east side of the Towson High School track.

*Table 1: Feasibility Level Cost Estimates*

After developing these alignment options, a feasibility level stormwater management (SWM) design was completed to identify potential SWM facilities for the project. Based on the results of the SWM design, the project team developed a feasibility-level Impacts Analysis comparison of the three options based on a 25-foot offset of all proposed construction improvements. Finally, the project team created feasibility-level cost estimates for each of the three proposed options, as shown in **Table 1**.

Design Option	Cost Range
Option 1	\$5.5 Million - \$7.5 Million
Option 2	\$3.0 Million - \$4.5 Million
Option 3	\$3.0 Million - \$4.5 Million



## INTRODUCTION

Baltimore County enlisted Johnson, Mirmiran, and Thompson Inc. (JMT) to conduct a feasibility study to evaluate options to construct and/or reconstruct a pedestrian and bicycle trail between Stoneleigh Elementary School and Maryland Avenue in Towson, MD. The study evaluated the proposed trail alignment by the County and identifies potential constructability/community concerns along the alignment.

The trail is approximately one mile long and crosses a UNT of Herring Run at several locations. There are a series of existing vehicular and pedestrian bridges within the project area, and part of JMT's task was to identify how both pedestrians and bicyclists could utilize these bridges, and whether any or all the existing bridges should be replaced.

Additionally, this feasibility report will include a general summary of the anticipated stormwater management requirements, an evaluation of existing utilities, and will develop cost estimates for each of the proposed options.

## EXISTING CONDITIONS

### Natural Resources

JMT performed a desktop analysis and submitted trilogy letters to regulatory agencies to identify potential natural resources located within the Six Bridges project area. These analyses identified no major concerns for the project area, however future design phases should include more detailed field analysis and further coordination with regulatory agencies to confirm these results and to identify potential tree impacts.

### DESKTOP ANALYSIS

As part of a desktop analysis, JMT reviewed existing GIS Mapping to identify any known wetlands, floodplains, or streams within the project area. The desktop analysis found no known wetlands and no existing floodplain mapping within the project area. There is one MDE Stream, a UNT to Herring Run, located within the project area. The results of the GIS Mapping can be found in **Appendix A**.

### AGENCY COORDINATION

JMT submitted coordination letters to the Maryland Department of Natural Resources Environmental Review Program (MDNR ERP), the Maryland Department of Natural Resources Wildlife and Heritage Service (MDNR WHS), the Maryland Historical Trust (MHT), and the United States Fish and Wildlife Service (USFWS). In general, the agencies identified no major concerns for the project area, and a summarized response from each agency can be found below. The full responses from each of these agencies can be found in **Appendix B**.

#### MDNR ERP

MDNR ERP stated that the only resource of State concern within the project area is the UNT to Herring Run. This UNT is classified as a Use IV stream, meaning that it may support adult trout. Any impacts to this stream, including all construction work done for stream crossings, will be prohibited from March 1<sup>st</sup> to May 31<sup>st</sup> of any given year.

#### MDNR WHS

MDNR WHS stated that there are no known State or Federal listed, candidate, proposed, or rare plant or animal species within the current project limits and stated that they have no specific concerns regarding potential impacts to plant or animal species at this time.

*MHT*

MHT has determined that this project will have no adverse effects on any historic properties.

*USFWS*

The USFWS stated that no federally listed endangered or threatened species are known to exist within the project area.

## Subsurface Utilities

JMT submitted records requests for subsurface utilities within the project area to the following utility services and received records from Baltimore County DPW and Verizon.

### BALTIMORE COUNTY DPW

JMT received engineered drawings of an existing sewer interceptor that runs through the project site. The interceptor dates to the 1940's, and roughly runs along the unnamed stream UNT to Herring Run within the project area. Drawings show that the interceptor is generally 5-10' below grade and is not anticipated to be impacted as part of this project. However, during future design phases, the interceptor should be mapped and located to ensure that it is not impacted by the project, especially in locations where a new bridge structure is being proposed.

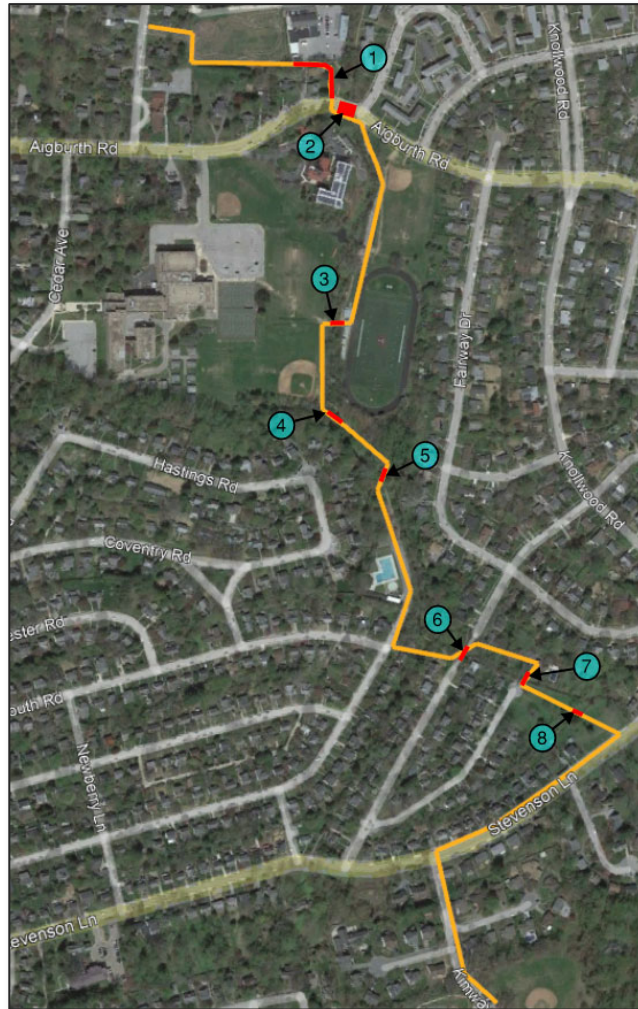
### VERIZON

JMT received GIS-level mapping of Verizon underground, buried, or aerial lines within the project area. There is an existing overhead line running parallel to Fairway Drive between Aigburth Road and Weatherbee Road adjacent to the approximate trail location. There are also existing aerial lines running along Weatherbee Road, Aigburth Road, and Stevenson Lane. None of these lines are likely to be impacted by this project, beyond potentially needing to relocate some existing poles. There is also an existing buried line running along Kimway and along the south side of Stevenson Lane between Sonachan Court and the proposed trail crossing of Stevenson Lane.



## Existing Structures

JMT conducted a field visit on November 9, 2022, to identify the existing structures within the project area and to evaluate the condition and usability of each of the structures. A diagram with the approximate location of each of the eight existing structures is shown in **Figure \_**.





### BRIDGE 1: RADEBAUGH PARK BOARDWALK

The Radebaugh Park Boardwalk is an approximately 400-foot-long wooden boardwalk structure connecting Aigburth Road with Radebaugh Park. The boardwalk structure is five-feet-wide with 4"x4" timber rails and is in good condition.

According to the 2012 *AASHTO Guide for the Development of Bicycle Facilities* (AASHTO Bike Book), a two-directional shared-use path for pedestrians and bicycles should be 10-14 feet wide and can be reduced eight-feet-wide in constrained areas. Additionally, the AASHTO Bike Book recommends that a 42" safety railing should be installed at locations where there is a vertical drop of 12 inches or more.



*Photograph 1: Bridge 1: Radebaugh Park Boardwalk*

### BRIDGE 2: AIGBURTH ROAD

The second bridge is an existing pedestrian and vehicular bridge on Aigburth Road. The bridge is approximately 50-feet-wide by 50-feet-long and includes sidewalk on both sides of the road, two travel lanes, and two parking lanes. The currently proposed design would remove one of the parking lanes and convert it to a two-way cycle track for approximately 80 feet until the intersection with Donnybrook Lane.

### BRIDGE 3: TOWSON HIGH SCHOOL NORTH BRIDGE

The third bridge is a concrete bridge located adjacent to the Towson High School track and is approximately six-feet-wide by 15-feet-long. As noted above, the Bike Book recommends a minimum width of 10-14 feet for shared-use pedestrian and bicycle paths, meaning this structure is not wide enough to accommodate pedestrian and bicycle use. Additionally, the outer wing walls on the west side of the bridge are leaning into the streambed and the County might find it preferable to replace the bridge as part of this project to prevent further deterioration.



*Photograph 2: Bridge 3: Towson High School North*



*Photograph 3: Bridge 3: Northwest Wing Wall*

### BRIDGE 4: TOWSON HIGH SCHOOL SOUTH BRIDGE

The fourth bridge is a metal bridge and is located behind the baseball field in the southeast corner of the Towson High School campus. This bridge is approximately four-feet-wide by 30-feet-long, indicating that this bridge is also too narrow to accommodate both pedestrians and bicycles. Otherwise, the bridge appears to be in generally fair condition.



*Photograph 4: Bridge 4: Towson High School South Bridge*



### BRIDGE 5: GREENWOOD PARK BRIDGE

The fifth bridge is a metal footbridge adjacent to Greenwood Park near the Wiltondale Swimming Center. This bridge is approximately four-feet-wide by 40-feet-long and is in poor condition. JMT field crews observed section loss and bent structural members. Additionally, the handrail is rusted through in some locations. The bridge is too narrow for a shared-use pedestrian and bicycle trail.



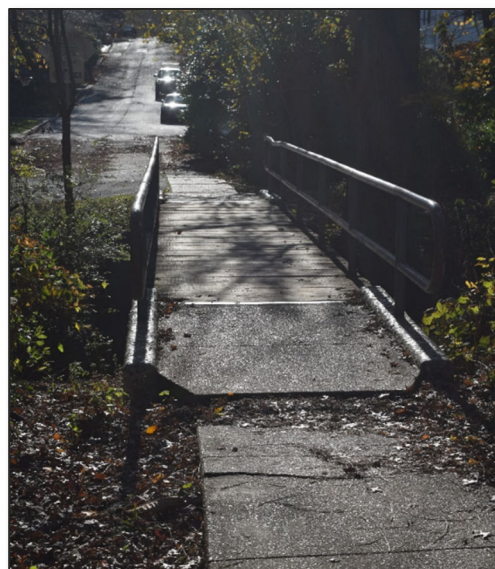
*Photograph 5: Bridge 5: Greenwood Park Bridge*



*Photograph 6: Bridge 5: Rusted Handrail*

### BRIDGE 6: WEATHERBEE ROAD

The sixth bridge is a concrete footbridge linking the east and west portions of Weatherbee Road, both of which become cul-de-sacs on either side of the bridge. The bridge is approximately six-feet-wide by 45-feet-long. However, there are vertical and horizontal discontinuities between the bridge deck and the bridge approach that will not meet current ADA guidelines. Additionally, the existing bridge is too narrow to accommodate a shared-use pedestrian and bicycle trail. This bridge is on the Baltimore County DPWT inspection and maintenance inventory (Bridge B-0082) and is inspected every 24 months. The County stated that the steel beams beneath the bridge are corroded, and wood blocking supports were installed for precautionary measures several years ago.



*Photograph 7 Bridge 6: Weatherbee Road*

### BRIDGE 7: WORTHINGTON ROAD

The seventh bridge is a former driveway bridge located at the end of Worthington Road, providing vehicular access to two former residences located on the east side of the stream. The bridge is approximately 10-feet-wide by 30-feet-long and is in poor condition. The bridge was recently closed by the County to all traffic, including for pedestrians and bicyclists. The bridge deck is in poor condition, the girders appear to be corroded, and the western abutment is leaning and has sheared.



*Photograph 8: Bridge 7: Worthington Road*



*Photograph 9: Bridge 7: Cracked Abutment*

### BRIDGE 8: FOOTBRIDGE NEAR STEVENSON LANE

The eighth bridge in the project area is a small wooden footbridge located between Stevenson Lane and Worthington Road. The existing bridge is approximately three-feet-wide by 20-feet-long. The bridge is too narrow to be used as a shared-use pedestrian and bicycle bridge, and additionally, the bridge approaches on both sides are steep and may not meet ADA guidelines.



*Photograph 10: Bridge 8: Footbridge near Stevenson Lane*



## TRAIL CONCEPT DEVELOPMENT

As part of the existing conditions report, the project team developed design criteria, proposed typical sections, and three trail alignment options.

### Design Criteria

The project team developed Design Criteria for the proposed Six Bridges Trail Feasibility Study. The purpose of these criteria is to identify design elements for the project such as trail widths, offsets, and other constraining factors. These criteria are developed based on guidance provided by international, national, state, and city literature. When conflicting information is present in these guidance documents, the strictest criteria will be used for design.

The Design Criteria for the proposed trail facilities were created using the 2012 AASHTO Guide for the Development of Bicycle Facilities, 4<sup>th</sup> Edition (AASHTO Bike Book), the 2018 AASHTO Policy on Geometric Design of Highways and Streets the Maryland State Highway Administrations (2018 Green Book), the 2015 Bicycle Policy and Design Guidelines (MSHA Bike Policy) and the NACTO Urban Bikeway Design Guide (NACTO UBDG). While a fifth edition of the AASHTO Bike Book is currently under review it has not yet been released for use. As this project is anticipated to use federal funding, these criteria will follow the Public Rights-of-Way Accessibility Guidelines (PROWAG) to ensure accessibility for all users.

#### FACILITY TYPE: EXISTING ROADS

Criteria	Existing Design	Reference
<b>Maryland Avenue</b>		
Roadway Classification	Local Road	MDOT SHA Roadway Functional Classification (MDOT SHA)
Posted Speed Limit	N/A, assumed 25 mph	
Typical Section	22' curb-to-curb width, two directional, street parking on east side of roadway. 4' sidewalk on east side with grass buffer.	
Ownership	Baltimore County	
<b>Aigburth Road</b>		
Roadway Classification	Minor Collector	MDOT SHA
Posted Speed Limit	25 mph	
Typical Section	40' curb-to-curb, 12' travel lanes, 8' parking lane on each side of the road. 5' sidewalk on each side of the road.	
Ownership	Baltimore County	
<b>Hastings Road</b>		
Roadway Classification	Local Road	MDOT SHA
Posted Speed Limit	N/A, assumed 25 mph	
Typical Section	24' curb-to-curb width, 4' sidewalk on each side with a grass buffer.	
Ownership	Baltimore County	
<b>Fairway Drive</b>		
Roadway Classification	Local Road	MDOT SHA
Posted Speed Limit	25 mph	
Typical Section	30' curb-to-curb width, street parking on both sides of roadway. 4' sidewalk on west side with grass buffer	



Criteria	Existing Design	Reference
Ownership	Baltimore County	
<b>Stevenson Lane</b>		
Roadway Classification	Minor Arterial	MDOT SHA
Posted Speed Limit	25 mph	
Typical Section	36' curb-to-curb width, two travel lanes with street parking along south side. 4' sidewalk on north side with no buffer	
Ownership	Baltimore County	
<b>Kimway Road</b>		
Roadway Classification	Local Road	MDOT SHA
Posted Speed Limit	N/A, assumed 25 mph	
Typical Section	15' curb-to-curb width, 4' sidewalk on west side of roadway	
Ownership	Baltimore County	

**FACILITY TYPE: PROPOSED SHARED-USE PATH**

Criteria	Guidance	Reference
Bicycle Design Speed	20 MPH max 12 MPH max for urban areas	MSHA Bike Policy (pg. 7.3, 7.5)
Min. Curve Radius	74 ft	AASHTO Bike Book (pg. 5-14)
Stopping Sight Distance	200 ft	AASHTO Bike Book (pg. 5-17)
Maximum Grade (within Street or Highway ROW)	Not to exceed roadway grade	PROWAG Supplemental Notice R302.5.1
Maximum Grade (outside Street or Highway ROW)	5% max, with allowances for: 5% < X < 8.33% for 200' max 8.33% < X < 10% for 30' max 10% < X < 12% for 10' max	Forest Service Trail Accessibility Guidelines (FSTAG) (pg. 10)
Cross Slope	2% max.	PROWAG Supplemental Notice R302.6
Superelevation	Not Needed	AASHTO Bike Book (pg. 5-16)
Vertical Clearance above Path	10 ft preferred	AASHTO Bike Book (pg. 5-26)
Vertical Clearance above Roadway	15 ft	2018 Green Book (pg. 6-20)
Horizontal Sightline Offset (HSO)	58 ft	AASHTO Bike Book (pg. 5-23)
Shared-Use Path (SUP) Width	10 ft preferred 8 ft min for short segments of constrained areas*	AASHTO Bike Book (pg. 5-3)
Pedestrian Access Route (PAR)	Full Width of SUP	PROWAG Supplemental Notice R302.3.1
Shoulder Clearance Width (Clear area on either side of SUP)	2 ft min. (6:1 slope) Grass shoulders	AASHTO Bike Book (pg. 5-5)
Safety Grading	Barrier / Fence required if buffer <5' or: 3:1 for 6' vertical drop 2:1 for 4' vertical drop 1:1 for 1' vertical drop	AASHTO Bike Book (pg. 5-6)



Buffer Width (With and without Curbs)	5' min, greater than 5' preferred for high-speed roadways from outside edge of shoulder If the buffer < 5', a vertical barrier should be installed for separation from vehicle lanes	AASHTO Bike Book (pg. 5-11)
Pavement Design	Pervious or impervious depending on soil characteristics. 3" Hot Mix Asphalt (HMA) for Surface, 4" Graded Aggregate Subbase (GASB)	

**FACILITY TYPE: ON-ROAD BIKE LANE**

Criteria	Guidance	Reference
Bicycle Lane Width	5 ft min	AASHTO Bike Book (pg. 4-14, 4-28)
Road Speed Limit	50 mph Recommended that higher speeds have wider bike lanes	MSHA Bicycle Policy (pg. 3.1) AASHTO Bike Book (pg.4-7)
Roadway Surface Requirements	Must meet requirements for motor vehicle use	AASHTO Bike Book (pg. 4-28)
Shoulder Width	Not needed Can be absorbed in retrofit	AASHTO Bike Book (pg. 4-7, 4-29)

**FACILITY TYPE: CYCLE TRACK**

Criteria	Guidance	Reference
Bicycle Lane Width	5 ft – 7ft min 12 ft min if two ways	NACTO UBDG One-way Protected Cycle Lane Guide and Two-way Protected Cycle Lane Guide
Roadway Surface Requirements	Must meet requirements for motor vehicle use	AASHTO Bike Book (pg. 4-28)
Shoulder Width	Not needed Can be absorbed in retrofit	AASHTO Bike Book (pg. 4-7, 4-29)
Buffer Width	2 ft min	MSHA Bicycle Policy (pg. 10.3)



## Typical Sections

### PROPOSED BRIDGE – AS NECESSARY

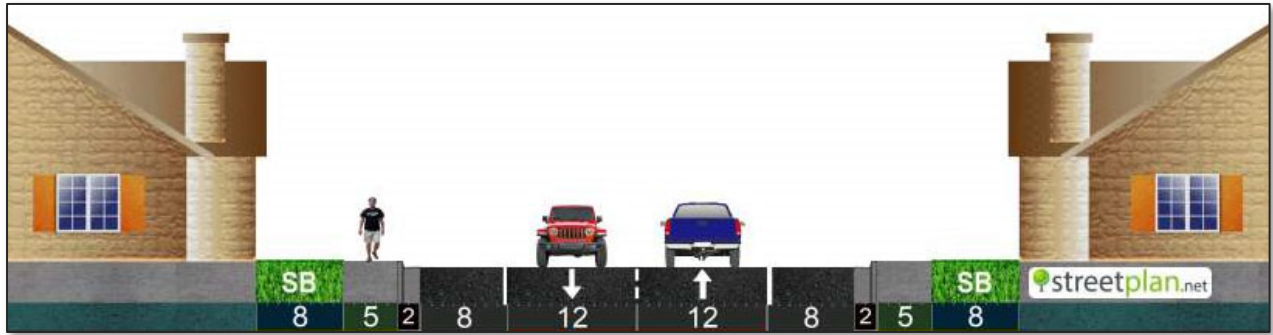


### PROPOSED TRAIL - GENERAL

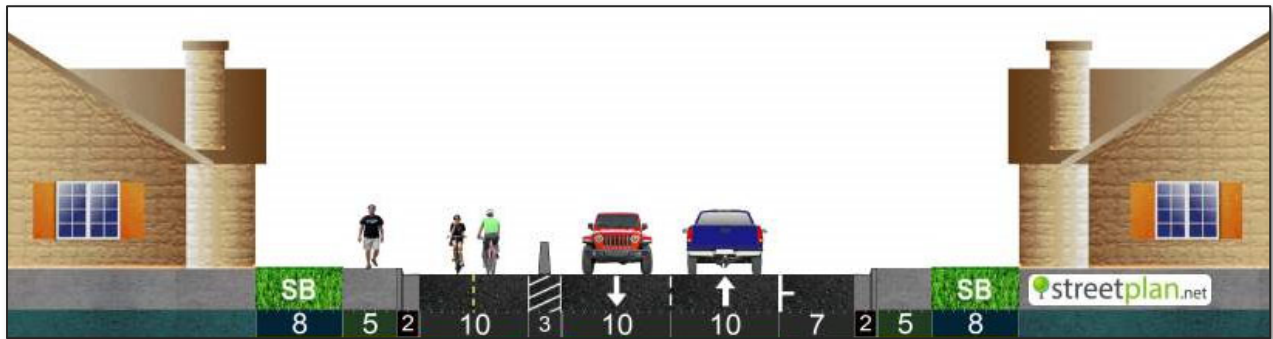


AIGBURTH ROAD

Existing Conditions (looking east)



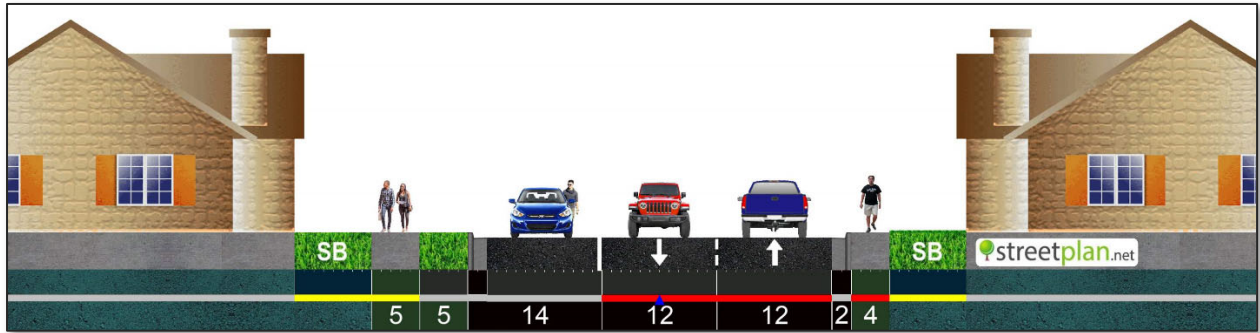
Proposed Cycle Track



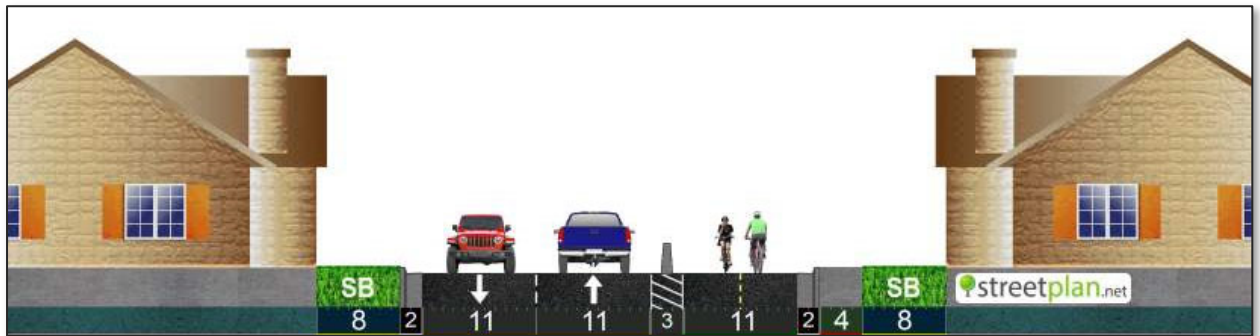


## STEVENSON LANE

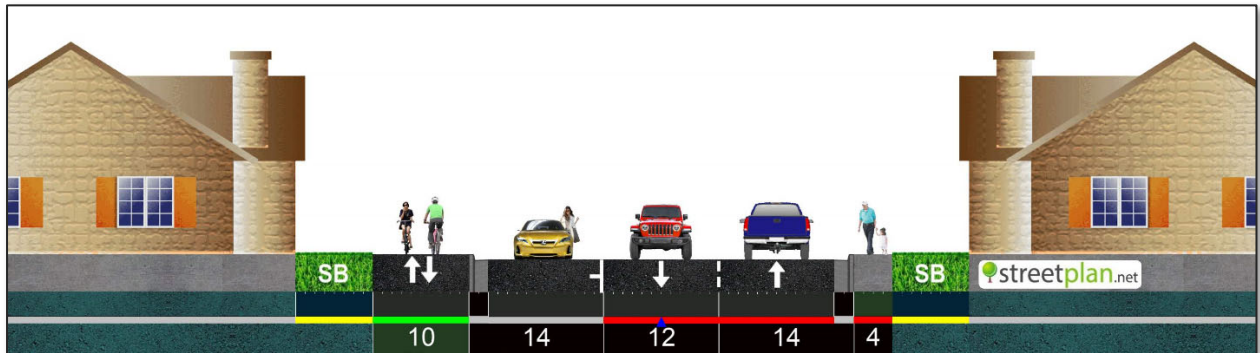
Existing Conditions (looking west)



Alternative 1: Cycle Track (looking west)



Alternative 2: Shared-Use Path (looking west)

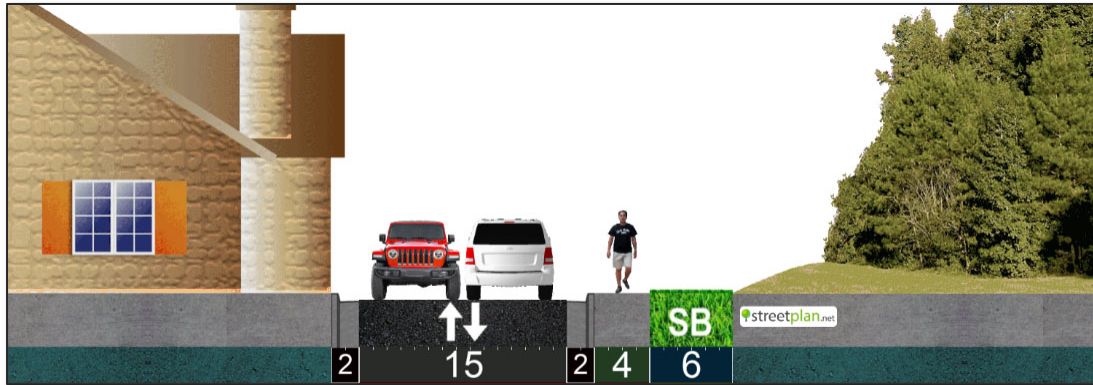




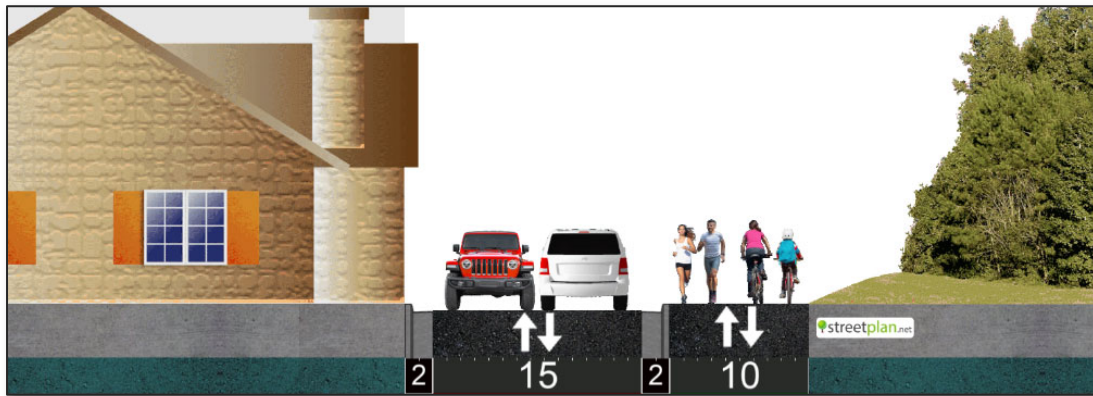


**KIMWAY ROAD**

*Existing Conditions (looking south)*



*Proposed Shared-Use Path (looking south)*





## Proposed Trail Alignment Options

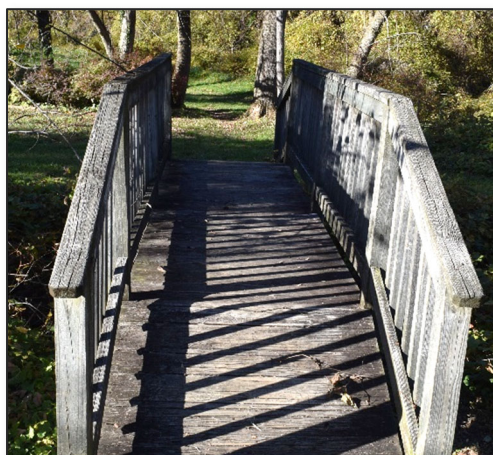
Based on the existing conditions and design criteria analyses, JMT created three feasibility level options for the proposed trail. Option 1 identifies the ideal trail conditions that meet all trail guidelines. Option 2 is a “realistic” design that seeks to create a formal trail and replace structures that are in poor or unsafe conditions but maintains other existing structures. Option 3 proposed a “realistic” design on a separate horizontal alignment on the other side of the Towson High School track, which will bypass two of the existing pedestrian bridges.

### OPTION 1

Beginning at the Stoneleigh Elementary School at the south end of the project area, the proposed trail will utilize Kimway as a connection between Stoneleigh Elementary School and Stevenson Lane. Kimway is a low-speed, narrow, and low-volume roadway. The existing five-foot-wide sidewalk will be widened to the west to ten feet. There is an existing berm and trees along the sidewalk that will need to be removed and replaced with new screening trees for the houses along the west side of Kimway. There is an existing pinch point approximately 150’ south of the intersection with Stevenson Lane caused by a utility pole that will be relocated.

At the intersection with Stevenson Lane, the proposed trail will cross Kimway and continue along the south side of Stevenson Lane. The existing five-foot-wide sidewalk will be widened to ten feet, with the existing parking lane functioning as the buffer for the shared-use path. The project team is proposing bump-outs at each driveway, where the grade difference between the roadway and the proposed trail will be tied-in without requiring large driveway reconstructions. The trail resumes along the south side of Stevenson Lane, crossing eight driveways and Sonachan Court, until approximately 175 feet east of Sonachan Court, where there will be a proposed mid-block crossing. The project team is proposing bump-outs at the crossing to reduce the crossing width and help slow down traffic speeds. Additional traffic controls such as advanced signage, a raised pedestrian crossing and / or a high visibility crossing should also be considered during future design phases.

After crossing Stevenson Lane, the trail will make its way north through an unnamed park towards Worthington Road. There is a small, approximately three-foot-wide by 15-feet-long, existing wooden footbridge approximately 150’ north of Stevenson Lane over a small creek tributary. This bridge is proposed to be replaced by a new 14-foot-wide bridge that is more amenable to pedestrian and bicycle traffic. Since this bridge is relatively small, the County may consider reaching out to the local high school or boy scout groups to see if there is any interest for the new bridge to be constructed as part of an eagle scout or senior class project.



*Photograph 11: Bridge 8: Footbridge near Stevenson Lane*

As the new trail approaches Worthington Road, the proposed trail will turn towards the northeast to cross the existing stream south of the existing bridge over the stream. The existing bridge is in poor condition and is currently closed to the public. By relocating the bridge further south, there will be enough space to create and maintain a higher design speed for bicycles in this area. The new trail will also include a connection to Worthington Road that splits from the main trail in this area.



After crossing the stream, the trail will again turn northward, into an existing easement and existing grass trail owned by the County, for approximately 200 feet until reaching Weatherbee Road. The existing grass trail will be upgraded to a paved shared-use path. At Weatherbee Road, the proposed trail will turn northwest to cross the UNT again. The existing pedestrian bridge at Weatherbee Road is too narrow for bicycle traffic, and will be replaced with a new, 14-foot-wide bridge on a new alignment. The new alignment will cross the stream on a diagonal, which will make for a longer bridge, but will allow for higher bicycle design speeds.

After crossing the stream again, the trail will turn north through an existing easement and partially paved / partially gravel trail owned by the County towards Sussex Road. The existing trail will be replaced with a fully paved trail for the full length of the stretch between Weatherbee Road and Sussex Road. Once the trail reaches Sussex Road, the trail will cross Sussex Road and a new shared-use path will be built along the north side of Sussex Road heading into the Wiltondale Swimming Pool parking lot. The new shared-use path will continue along the north side of the pool parking lot until reaching Greenwood Park. There is an existing paved trail through Greenwood Park that will be widened from six-feet to 10-feet.



*Photograph 12: Existing trail within Greenwood Park*

At the northern end of Greenwood Park, the proposed trail will once again cross the stream, at the existing Greenwood Park pedestrian bridge. The existing bridge is in poor condition and is too narrow for pedestrian and bicycle use, therefore the project team recommends demolishing and reconstructing this bridge on a slightly different alignment to maintain bicycle design speeds through this area.

After crossing the stream, the proposed trail will turn northwest towards Towson High School on an existing dirt trail, which will be widened and paved, for approximately 250 feet before reaching another existing, approximately five-

foot-wide pedestrian bridge. This option recommends replacing this bridge due to the narrow width and reconstructing the bridge on a different alignment to maintain bicycle design speeds.

After crossing the UNT with the new bridge, the trail will carry on to the west side of the UNT for approximately 280 feet until reaching another existing pedestrian bridge. As discussed in the existing structures section above, the northwest wing wall is leaning towards the stream, and the bridge is too narrow for a shared-use path, so the project team recommends removing and replacing this bridge with a new bridge on the same alignment.

After crossing the stream on the new Towson High School North bridge, the trail will turn north to follow parallel to the stream for approximately 300 feet before merging into an existing access road for the Towson High School track and athletic fields. The existing access road will be milled and overlaid and used as the connection between the track and athletic fields and Aigburth Road.

On Aigburth Road, pedestrians will travel along the existing sidewalk, while the roadway will be restriped to remove approximately 150 feet of parking lanes to add a two-way cycle track. A new mid-block crossing will be installed approximately 100 feet west of Donnybrook Lane at the existing entrance to Radebaugh Park.

The trail will head into Radebaugh Park, where the existing boardwalk structure will be widened from six feet to ten feet for the full length of the structure. The trail will then make its way northwest through Radebaugh Park, utilizing the existing paved pathway that will be widened ten feet, until reaching Maryland Avenue.

## OPTION 2

Beginning at the Stoneleigh Elementary School at the south end of the project area, the proposed trail will utilize Kimway as a connection between Stoneleigh Elementary School and Stevenson Lane. Kimway is a low-speed, narrow, and low-volume roadway. The existing five-foot-wide sidewalk will be widened to the west to ten feet. There is an existing berm and trees along the sidewalk that will need to be removed and replaced with new screening trees for the houses along the west side of Kimway. There is an existing pinch point approximately 150' south of the intersection with Stevenson Lane caused by a utility pole that will be relocated.

After reaching Stevenson Lane, pedestrian and bicycle traffic will split, with pedestrians using the existing sidewalk along either side of Stevenson Lane, and bicycles using a new, two-way cycle track along the south side of Stevenson Lane. The new cycle track will be located within the existing parking lane and all street parking along Stevenson Lane in this section will be removed. The proposed cycle track will carry on from Kimway to approximately 175 feet east of Sonachan Court, where a new mid-boc crossing will be installed.



*Photograph 13: Kimway*

After crossing Stevenson Lane, the trail will head north through an unnamed park towards Worthington Road. There is a small, approximately three-foot-wide by 15-foot-long, existing wooden footbridge approximately 150' north of Stevenson Lane over a small creek tributary. This bridge is proposed to be replaced by a new 14-foot-wide bridge that is more amenable to pedestrian and bicycle traffic. Since this

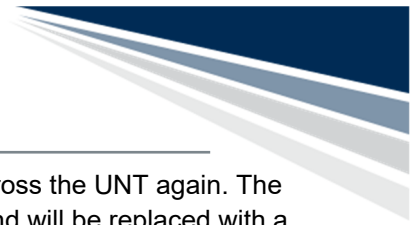


*Photograph 14: Existing grass trail*

bridge is relatively small, the County may consider reaching out to the local high school or boy scout groups to see if there is any interest for the new bridge to be constructed as part of an eagle scout or senior class project.

As the new trail approaches Worthington Road, the proposed trail will turn towards the northeast to cross the existing stream south of the existing bridge over the stream. The existing bridge is in poor condition and is currently closed to the public. By relocating the bridge further south, there will be enough space to create and maintain a higher design speed for bicycles in this area. The new trail will also include a connection to Worthington Road that splits off of the main trail in this area.

After crossing the stream, the trail will again turn northward, into an existing easement and existing grass trail owned by the County, for approximately 200 feet until reaching Weatherbee Road. The existing grass trail will be upgraded to a paved



shared-use path. At Weatherbee Road, the proposed trail will turn northwest to cross the UNT again. The existing pedestrian bridge at Weatherbee Road is too narrow for bicycle traffic, and will be replaced with a new 14-foot-wide bridge on a new alignment. The new alignment will cross the stream on a diagonal, which will make for a longer bridge, but will allow for higher bicycle design speeds.

After crossing the stream, the trail will again turn north using an existing easement towards Sussex Road and the Wiltondale Swimming Pool. Once reaching Sussex Road, bicyclists will use the roadway and the parking lot, with bicycle-specific markings, to continue northwest towards Greenwood Park. Meanwhile, a new sidewalk will be installed along the north side of the swimming pool parking lot for pedestrian use. There is an existing paved trail through Greenwood Park that will be widened from six-feet to 10-feet.

At the northern end of Greenwood Park, the proposed trail will once again cross the stream, where there is an existing Greenwood Park pedestrian bridge. The existing bridge is in poor condition and is too narrow for pedestrian and bicycle use, therefore the project team recommends demolishing and reconstructing this bridge on a slightly different alignment to maintain bicycle design speeds through this area.

After crossing the stream, the proposed trail will turn northwest towards Towson High School on an existing dirt trail, that will be widened and paved, for approximately 250 feet before reaching another existing, approximately five-foot-wide, pedestrian bridge. This option recommends maintaining the existing bridge and installing “Walk Bike Across Bridge” signage on both sides of the structure. After crossing the bridge, the trail will persist toward the west side of the UNT for approximately 280 feet until reaching another existing pedestrian bridge. As discussed in the existing structures section above, the northwest wing wall is currently leaning towards the stream, and the bridge is too narrow for a shared-use path, so the project team recommends removing and replacing this bridge with a new bridge on the same alignment.

After crossing the stream on the new Towson High School North bridge, the trail will turn north to follow parallel to the stream for approximately 300 feet before merging into an existing access road for the Towson High School track and athletic fields. The existing access road will be milled and overlaid and used as the connection between the track and athletic fields and Aigburth Road.

On Aigburth Road, pedestrians will commute using the existing sidewalk, while the roadway will be restriped to remove approximately 150 feet of parking lanes to add a two-way cycle track. A new mid-block crossing will be installed approximately 100 feet west of Donnybrook Lane at the existing entrance to Radebaugh Park.

The trail will resume into Radebaugh Park, utilizing the existing boardwalk structure through the park, and new “Walk Bike Across Bridge” signage will be installed. After crossing the boardwalk, the trail will then make its way northwest through Radebaugh Park, utilizing the existing paved pathway, until reaching Maryland Avenue. Option 2 does **not** propose widening either the boardwalk or the existing paved pathways within the park to 10 feet.



*Photograph 15: Radebaugh Park existing trail*



### OPTION 3

Beginning at the Stoneleigh Elementary School at the south end of the project area, the proposed trail will utilize Kimway as a connection between Stoneleigh Elementary School and Stevenson Lane. Kimway is a low-speed, narrow, and low-volume roadway. The existing five-foot-wide sidewalk will be widened to the west to ten feet. There is an existing berm and trees along the sidewalk that will need to be removed and replaced with new screening trees for the houses along the west side of Kimway. There is an existing pinch point approximately 150' south of the intersection with Stevenson Lane caused by a utility pole that will be relocated.



*Photograph 16: Stevenson Lane*

At the intersection with Stevenson Lane, the proposed trail will cross Kimway and move along the south side of Stevenson Lane. The existing five-foot-wide sidewalk will be widened to ten feet, with the existing parking lane functioning as the buffer for the shared-use path. The project team is proposing bump-outs at each driveway, where the grade difference between the roadway and the proposed trail will be tied-in without requiring large driveway reconstructions. The trail will proceed along the south side of Stevenson Lane, crossing eight driveways and Sonachan Court, until approximately 175 feet east of

Sonachan Court, where there will be a proposed mid-block crossing. The project team is proposing bump-outs at the crossing to reduce the crossing width and help slow down traffic speeds. Additional traffic controls such as advanced signage, a raised pedestrian crossing and / or a high visibility crossing should also be considered during future design phases.

After crossing Stevenson Lane, the trail will extend north through an unnamed park towards Worthington Road. There is a small, approximately three-foot-wide by 15-foot-long, existing wooden footbridge approximately 150' north of Stevenson Lane over a small creek tributary. This bridge is proposed to be replaced by a new 14-foot-wide bridge that is more amenable to pedestrian and bicycle traffic. Since this bridge is relatively small, the County may consider reaching out to the local high school or boy scout groups to see if there is any interest for the new bridge to be constructed as part of an eagle scout or senior class project.

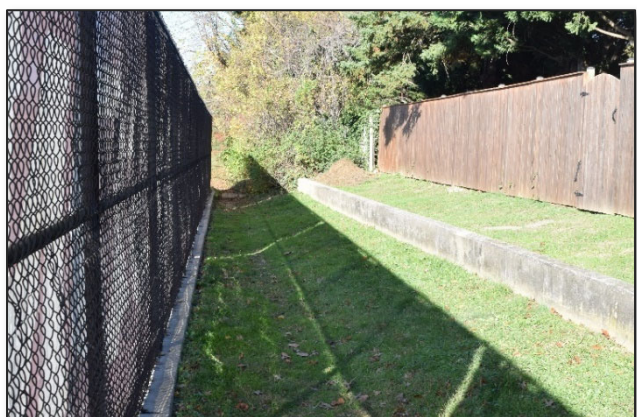
As the new trail approaches Worthington Road, the proposed trail will turn towards the northeast to cross the existing stream south of the existing bridge over the stream. The existing bridge is in poor condition and is currently closed to the public. By relocating the bridge further south, there will be enough space to create and maintain a higher design speed for bicycles in this area. The new trail will also include a connection to Worthington Road that splits off of the main trail in this area.

After crossing the stream, the trail will again turn northward, into an existing easement and existing grass trail owned by the County, for approximately 200 feet until reaching Weatherbee Road. The existing grass trail will be upgraded to a paved shared-use path. At Weatherbee Road, the proposed trail will turn northwest to cross the UNT again. The existing pedestrian bridge at Weatherbee Road is too narrow for bicycle traffic, and will be replaced with a new, 14-foot-wide bridge on a new alignment. The new alignment will cross the stream on a diagonal, which will make for a longer bridge, but will allow for higher bicycle design speeds.



After crossing the stream again, the trail will turn north through an existing easement and partially paved / partially gravel travel owned by the County towards Sussex Road. The existing trail will be replaced with a fully paved trail for the full length of the stretch between Weatherbee Road and Sussex Road. Once the trail reaches Sussex Road, the trail will cross Sussex Road and a new shared-use path will be built along the north side of Sussex Road heading into the Wiltondale Swimming Pool parking lot. The new shared-use path will run along the north side of the pool parking lot until reaching Greenwood Park. There is an existing paved trail through Greenwood Park that will be widened from six-feet to 10-feet.

At the northern end of Greenwood Park, the proposed trail will once again cross the stream, at the existing Greenwood Park pedestrian bridge. The existing bridge is in poor condition and is too narrow for pedestrian and bicycle use, therefore the project team recommends demolishing and reconstructing this bridge on a slightly different alignment to maintain bicycle design speeds through this area.



*Photograph 17: East side of High School Track*

Unlike Option 1 and Option 2, after the trail leaves Greenwood Park in Option 3, it will carry on north instead of veering northwest on the existing dirt path and will stay on the east side of the Towson High School track and athletic fields. There is a chain link fence along the west edge of the track with a clear space behind the fence. This clear space is County-owned and is wide enough to fit a shared-use path without impacting the properties along Fairway Drive. The trail will extend along the chain link fence, turning to the west at the northern limits of the track, until eventually tying in with the existing athletic fields access road. The access road will

be milled and overlaid and will serve as the pedestrian and bicycle connection between Aigburth Road and the trail near the track and athletic fields.

On Aigburth Road, pedestrians will continue on the existing sidewalk, while the roadway will be restriped to remove approximately 150 feet of parking lanes to add a two-way cycle track. A new mid-block crossing will be installed approximately 100 feet west of Donnybrook Lane at the existing entrance to Radebaugh Park.

The trail will continue into Radebaugh Park, utilizing the existing boardwalk structure through the park, and new “Walk Bike Across Bridge” signage will be installed. After crossing the boardwalk, the trail will then continue northwest through Radebaugh Park, utilizing the existing paved pathway, until reaching Maryland Avenue. Option 3 does **not** propose widening either the boardwalk or the existing paved pathways within the park to 10 feet.



## Feasibility Level Stormwater Management Design

### METHODOLOGY

Stormwater Management (SWM) is required in accordance with the Baltimore County Code, which was revised to incorporate State-mandated changes resulting from the passing of the Storm Water Management Act of 2007. Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP) must be addressed for all projects, including redevelopment.

Designers analyzed the project corridor for potential SWM facilities to address water quality and quantity control requirements for each trail option. As part of this process, the project team completed a desktop review of the available existing site conditions information (e.g., floodplain mapping, NRCS Soil Mapping, GIS contours, wetland mapping, etc.), followed by a field visit. The team evaluated the project site to identify potential locations along the trail alignment where ESD facilities are potentially feasible to provide stormwater water quality treatment in accordance with the Maryland Department of the Environment (MDE) Stormwater Design Manual. The team also evaluated potential locations for stormwater detention facilities to provide quantity control (i.e., mitigating potential increases in peak discharge rates resulting from the proposed impervious area). Finally, the team considered potential ESD facilities to treat the proposed impervious area from the trail as well as ESD facilities to treat existing untreated impervious areas in the project area.

The proposed trail consists of a combination of new impervious area and existing, reconstructed impervious area. The team evaluated the percentage of existing, reconstructed impervious area to determine if the project could potentially be classified as a redevelopment project, which reduces the water quality treatment requirement. After quantifying the proposed impervious area (both new and existing, reconstructed), the team compared potential treatment provided by proposed ESD facilities. The drainage area to each potential SWM facility was estimated using GIS topographic contours, which quantifies the approximate impervious area draining to the potential SWM facility.

### SITE INFORMATION

The project area is entirely within the Patapsco River Watershed (MD 6-Digit Watershed 021309). Runoff from the proposed trail drains to an unnamed tributary (UNT) of Herring Run. The trail is not located within a Federal Emergency Management Administration (FEMA) Floodplain. The applicable FEMA Flood Insurance Rate Map (FIRM) covering the project area is Map Number 2400100265F. The FEMA Floodplain begins downstream from the southern project limits at Stevenson Lane; however, there is a known history of flooding along the section of the stream north of the culvert under Stevenson Lane.





## STORMWATER MANAGEMENT – WATER QUALITY

### *Water Quality Requirements*

While portions of the trail along Kimway and Stevenson Lane involve reconstructing existing impervious area, most of the proposed path is new impervious area. Since less than 40% of the project area is impervious in existing conditions, the project will be classified as new development, and no reduction in water quality requirements for redevelopment will apply.

The impervious area for each trail option is provided in the table below.

*Table 2: Proposed Impervious Area Summary*

OPTION	TOTAL IMPERVIOUS (AC)	NEW IMPERVIOUS (AC)	RECONSTRUCTED (AC)	IMPERVIOUS REMOVAL (AC)
1	1.091	0.841	0.250	0.016
2	0.785	0.708	0.077	0
3	0.923	0.793	0.130	0.016

Option 1 adds the most impervious area, which is primarily due to the widening of the existing path through Radebaugh Park, which is excluded from Options 2 and 3. There are not feasible locations for ESD treatment of the additional impervious area in Radebaugh Park, so widening the path would require offsetting SWM treatment elsewhere.

Option 2 adds the least impervious area, and consequently has the least SWM requirements, which is largely due to the conversion of the existing travel lane on Stevenson Avenue to a cycle track, which does not require mitigating SWM.

### *Water Quality Treatment*

The potential SWM facility locations identified did not vary significantly between the three (3) trail options considered (i.e., one additional, potential SWM facility was identified for Option 3 north of the track at Towson High School). The potential facility locations are illustrated in the Figure 1. The table below identifies which trail option each potential SWM facility applies to, as well as the new and existing impervious area draining to each SWM location.

*Table 3: Potential SWM Facilities*

POTENTIAL FACILITY	APPLICABLE OPTION	NEW IMPERVIOUS TREATED (AC)	EXISTING IMPERVIOUS TREATED (AC)
SWM-1	1, 2, 3	0	0.308
SWM-2	1, 2, 3	0.034	0
SWM-3	1, 2, 3	0.040	0
SWM-4	1, 2, 3	0.023	0.200
SWM-5	1, 2, 3	0.005	0.086
SWM-6	3	0.030	0
<b>TOTAL</b>	<b>1, 2</b>	<b>0.102</b>	<b>0.594</b>
	<b>3</b>	<b>0.132</b>	<b>0.594</b>

Either a microbio retention (MBR) or submerged gravel wetland (SGW) could be proposed at the SWM-1 location—the open space between Bridge 8 and Stevenson Lane, east of the proposed trail. Runoff from the existing, untreated impervious area on the north side of Stevenson Lane (i.e., one lane plus the

sidewalk) currently travels as gutter flow to an existing inlet adjacent to the culvert conveying stream flow. This runoff can be redirected to a proposed ESD facility through a curb-on-grade (COG) opening. Excess runoff during more severe storm events can bypass the ESD facility—continuing to flow along the curb and gutter to the existing inlet, as it flows under existing conditions. The elevation of the groundwater table at the SWM-1 location will determine whether an MBR or SGW is feasible (i.e., if shallow groundwater is present, an MBR is infeasible, so an SGW would be the selected alternative).

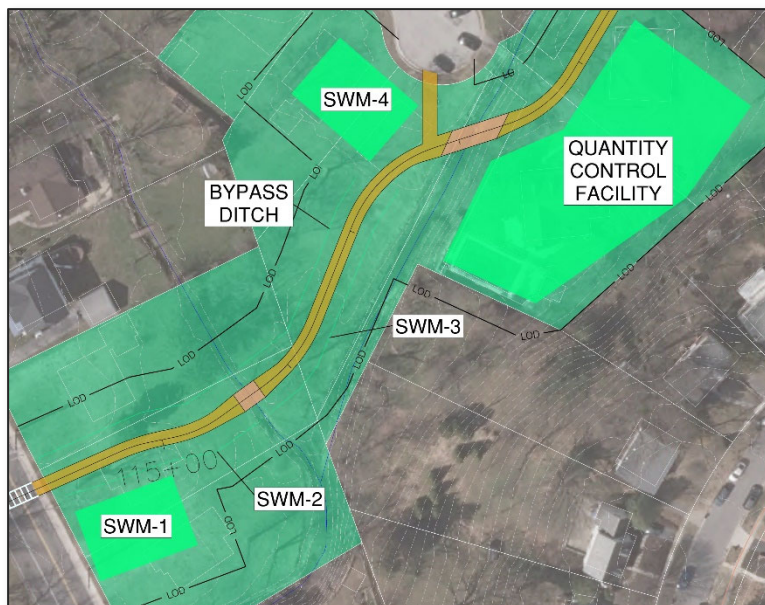


Figure 1: Proposed SWM Facilities SWM-1, SWM-2, SWM-3, SWM-4, and Proposed Quantity Control Facility

Runoff from a portion of Worthington Road, which currently discharges directly to the stream, can be captured and directed to an ESD facility located in this open space, thus providing water quality treatment prior to discharging to the stream. As with SWM-1, an MBR or SGW could be located at SWM-4 location depending on the depth to the groundwater table.

At SWM-5, a swale is feasible along the existing, impervious access road to the Towson High School track, which would provide water quality treatment for the adjacent impervious area. There is also the potential to remove some existing pavement along the east side of the access road. The easternmost six (6) feet of the pavement are located outside of the gate opening, and therefore does not provide any increased functionality. The removal of unused impervious area will help to offset the addition of impervious area in locations where providing ESD treatment is infeasible.

A swale (i.e., grass swale, bioswale, or wet swale) is feasible at both the SWM-2 and SWM-3 locations, which would treat the proposed impervious area from the trail. To improve the water quality treatment efficiency, a bypass ditch would be required on the west side of the path to divert runoff from the pervious area upslope. The type of swale selected will depend on the elevation of the groundwater table.

A large, open space is available within County ROW west of the proposed trail, at the southeast corner of the cul-de-sac on Worthington Road. Runoff from a portion of Worthington Road, which currently discharges directly to the

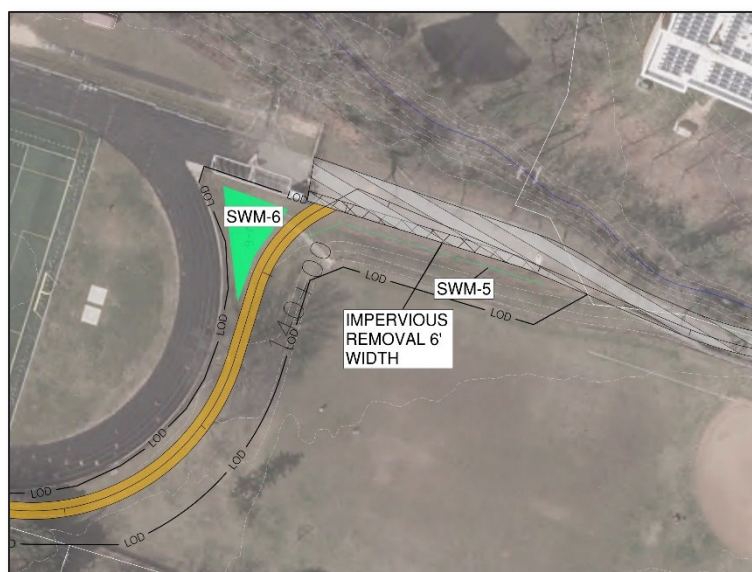


Figure 2: Proposed SWM Facilities SWM-5 and Proposed Impervious Removal. Facility SWM-6 is for Option 3 ONLY.



The potential ESD facility at SWM-6 is only applicable to Option 3, as it would treat proposed impervious area from the trail along the north side of the track. The area around the existing yard inlet could be regraded to facilitate the construction of a microbioretention facility at this location. The groundwater table would have to be confirmed at a deep enough elevation for an MBR to be feasible in this location. Furthermore, the invert elevation of the existing outlet pipe would need to be lower than the underdrain elevation for the MBR if the infiltration rates at that location necessitate the installation of an underdrain.

There may be possibilities to claim ESD credit for non-structural practices such as the Disconnection of Non-Rooftop Runoff (NRDC). ESD credit can be claimed in certain areas where sheet flow from the proposed impervious area travels across a sufficient distance of vegetated area at a shallow slope, thus promoting infiltration. Once surveyed topography is obtained, the proposed trail can be evaluated to determine if any sections meet the criteria for NRDC credit.

Finally, existing structures located on parcels purchased by the County between Stevenson Lane and Sussex Road can be demolished and replaced with pervious area, thus eliminating existing impervious area to offset a portion of the newly added impervious area for the trail.

#### *Limiting Factors*

Much of the trail runs through wooded areas, which limits the potential for ESD treatment—the removal of woods to install an ESD facility is discouraged. In areas with suitable infiltration rates (i.e., which would need to be confirmed by in situ infiltration tests), permeable pavement could be utilized; however, the potential for clogging of the permeable pavement increases in areas where leaves and dirt are easily tracked or washed onto the trail. Consequently, permeable pavement is not recommended in the wooded areas, and offsetting water quality treatment should be sought elsewhere (e.g., SWM-1 which treats existing, untreated impervious area).

### **STORMWATER MANAGEMENT – QUANTITY CONTROL**

The addition of impervious area has the potential to increase stormwater runoff. The Baltimore County Storm Drainage Design Manual calls for the management of the 100-year storm for culverts. Most of the site drains to the UNT that flows through an existing culvert under Stevenson Lane; therefore, management of peak discharge rates up to the 100-year storm will likely be required.

While the new impervious area proposed is small relative to the overall drainage area to the UNT, it has the potential to cause a quantifiable increase in peak discharges from the site. Along much of the proposed trail alignments, there is insufficient space to provide quantity control facilities (e.g., detention ponds). The proposed design should seek to maintain sheet flow where possible and to avoid concentrating runoff, which reduces travel times and can further increase peak discharges. Furthermore, the elimination of existing impervious areas to offset new impervious trail areas should be sought wherever possible.

The location north of Bridge 7 is owned by the County. If the existing buildings are demolished, not only could the impervious area be reduced, but a detention pond could be provided at this location. The location is at an elevation allowing runoff from upslope areas to be directed to it, thus reducing peak discharges from this area and offsetting minor increases in peak discharges elsewhere along the proposed trail. Due to the large areas of pervious ground cover within the drainage area, providing ESD is impractical at this location. This space would be better utilized by eliminating existing impervious area and providing a quantity control facility.

## PERMITTING REQUIREMENTS

Several permits / approvals will be required due to the LOD and proposed impervious area associated with this project. SWM approval must be obtained from the Baltimore County Department of Environmental Protection and Sustainability (DEPS). This will involve three (3) sequential plan submissions and reviews: Concept SWM Plan; Development SWM Plan; and Final SWM Plan.

Engineered erosion and sediment control (ESC) plans will be required for all areas within the limit of disturbance (LOD). Review and approval of the ESC Plans will be performed by the Baltimore County Soil Conservation District (BCSCD). The LOD is anticipated to be greater than one (1) acre; therefore, a Notice of Intent (NOI) for coverage under the General Permit No. 20-CP for Discharges from Stormwater Associated with Construction Activity will be required.

A grading permit will be required due to the disturbance of more than 5,000 square feet. The grading permit will be issued by DEPS following final approval of the SWM and ESC plans by the DEPS and BCSCD, respectfully.

If disturbances within the Waters of the United States (WUS) are proposed, the project will be subject to additional permitting requirements, including a Joint Federal / State Application (JPA) for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland.



## Proposed Structures

Each of the three options includes the removal and reconstruction of existing pedestrian bridges along the proposed trail. The approximate size, cost, and reason for reconstruction for each of the proposed bridges are shown in the following tables.

### OPTION 1

*Table 4: Proposed Structures for Option 1*

BRIDGE	SIZE	COST	NOTES
Bridge 1: Radebaugh Park Boardwalk	400' x 10'	~ \$550,000	Boardwalk width < 10 feet. Widen existing ~ 400' x 5' boardwalk.
Bridge 3: Towson High School North	28' x 14'	~ \$125,000	Leaning northwest wing wall. Bridge width < 10 feet.
Bridge 4: Towson High School South	35' x 14'	~ \$155,000	Bridge width < 10 feet.
Bridge 5: Greenwood Park Bridge	30' x 14'	~\$135,000	Corroding railings. Bridge width < 10 feet.
Bridge 6: Weatherbee Road Bridge	38' x 14'	~ \$165,000	Corroded steel beams. Bridge width < 10 feet.
Bridge 7: Worthington Road Bridge	40' x 14'	~ \$180,000	Leaning and sheared abutment. Potentially corroded girders.
Bridge 8: Footbridge	18' x 14'	~ \$75,000	Bridge width < 10 feet.

### OPTION 2

*Table 5: Proposed Structures for Option 2*

BRIDGE	SIZE	COST	NOTES
Bridge 3: Towson High School North	28' x 14'	~ \$125,000	Leaning northwest wing wall. Bridge width < 10 feet.
Bridge 5: Greenwood Park Bridge	30' x 14'	~\$135,000	Corroding railings. Bridge width < 10 feet.
Bridge 6: Weatherbee Road Bridge	38' x 14'	~ \$165,000	Corroded steel beams. Bridge width < 10 feet.
Bridge 7: Worthington Road Bridge	40' x 14'	~ \$180,000	Leaning and sheared abutment. Potentially corroded girders.
Bridge 8: Footbridge	18' x 14'	~ \$75,000	Bridge width < 10 feet.



### OPTION 3

Table 6: Proposed Structures for Option 3

BRIDGE*	SIZE	COST	NOTES
Bridge 5: Greenwood Park Bridge	30' x 14'	~\$135,000	Corroding railings. Bridge width < 10 feet.
Bridge 6: Weatherbee Road Bridge	38' x 14'	~ \$165,000	Corroded steel beams. Bridge width < 10 feet.
Bridge 7: Worthington Road Bridge	40' x 14'	~ \$180,000	Leaning and sheared abutment. Potentially corroded girders.
Bridge 8: Footbridge	18' x 14'	~ \$75,000	Bridge width < 10 feet.

\*Note: Due to the bridge age, usage, and the direct path they provide to and from Towson High School, it may be preferable for the County to replace Bridges 3 and 4 as part of this project even if they are not included as part of the proposed alignment.

## Impacts Analysis

JMT developed a planning level Limit of Disturbance (LOD) using a 25-foot offset from the edge of proposed construction, including both the proposed trail and proposed SWM facilities. The 25-foot offset was reduced in locations where significant impacts could be avoided (i.e. the High School track, residential buildings, the swimming pool). The offset reduction assumed that construction activities impacting these buildings and / or facilities would significantly reduce the likelihood of the project continuing to move forward and that future design phases would be able avoid these impacts with more precision. Based on this LOD, JMT completed an impacts analysis for each of the three options. The impacts analysis was based on Baltimore County GIS Mapping.

Table 7: Impacts Analysis

ITEM	OPTION 1	OPTION 2	OPTION 3
Right-of-Way	20 parcels 0.52 acres	14 parcels 0.46 acres	17 parcels 0.50 acres
Forests	2.30 acres	2.08 acres	1.50 acres
Stream Impacts	1,010 LF	960 LF	630 LF
Potential Wetlands	No impacts	No impacts	No impacts
Utility / Light Poles	1 pole	1 pole	1 pole
Driveways / Entrances	7 driveways 1 parking lot entrance 1 access road entrance	7 driveways 1 parking lot entrance 1 access road entrance	7 driveways 1 parking lot entrance 1 access road entrance
Fire Hydrants	1 hydrant	1 hydrant	1 hydrant
Business Signage	1 sign – Radebaugh Park Entrance Sign	No impacts	No impacts
Traffic Signal Upgrades	N/A	N/A	N/A
Number of New / Reconstructed Structures	6 new bridges 1 bridge widening	5 new bridges	4 new bridges



## Cost Estimates

Cost estimates were developed using the MDOT SHA Cost Estimating Guideline for each of the three options described above. The estimates were primarily developed on a Cost Per Mile (CPM) basis, with items such as structures, sidewalks, and utility pole relocations added to the initial CPM estimate. The estimates also include items such as preliminary construction work, drainage, landscaping, and utilities as contingency costs on the initial CPM estimate. Finally, to account for uncertainty at this early stage of design, a 40% design contingency was added to the project cost. These estimates **do not** include the cost of additional right-of-way, however, the majority of the project will be constructed on county-owned land and any right-of-way costs are anticipated to be minimal. Detailed estimates for each of the three options can be found in **Appendix C**.

*Table 8: Cost Estimates*

Design Option	Cost Range
Option 1	\$5.5 Million - \$7.5 Million
Option 2	\$3.0 Million - \$4.5 Million
Option 3	\$3.0 Million - \$4.5 Million

## Constructability

The project team also analyzed the constructability of each of these three options. As discussed in the Natural Resources section above the UNT to Herring Run that the proposed trail crosses is a Use IV Stream. This means that any in-stream construction work will be prohibited from March 1<sup>st</sup> to May 31<sup>st</sup> of any given year.

Additionally, all options will include a loss of on-street parking. For Option 1 and Option 3, there will be limited parking loss on Stevenson Lane at the proposed driveway bump-outs, and limited parking loss on Aigburth Road for the approximately 120 linear feet of new two-way cycle track that links Radebaugh Park with the High School access road. For Option 2, all on-street parking between Kimway and the proposed mid-block crossing of Stevenson Lane, a distance of approximately 800 linear feet, will be lost for the proposed two-way cycle track. Public outreach will be essential to keep the public aware of the potential for lost on-street parking and to receive positive or negative feedback on the proposed improvements.

## Next Steps

This study will be completed at the feasibility level of the project. These Next Steps are items that should be addressed during the next phase of the project.

### FULL SURVEYS AND DESIGN REFINEMENT

The proposed alignment should be field surveyed prior to additional design work. These surveys should include environmental surveys to confirm the results of the desktop analysis and to identify significant trees within the project area. The surveys will provide a higher level of accuracy than the GIS-based mapping data that has been used for the feasibility stage of the project. Additionally, this phase of design should include subsurface utilities designation to confirm the initial subsurface utilities records requests.

Once these surveys are completed, the proposed design should be reevaluated based on more accurate data, and three-dimensional design should be initiated to further refine the proposed Limit of Disturbance for the project.

### AGENCY COORDINATION

Although regulatory agencies have not identified any significant concerns for the project at this time, coordination with agencies should continue into future design phases to ensure that there are no changes or surprises as the project continues to move forward. An easement or agreement will need to be executed with Wiltondale Swimming Pool and Improvement Association.

### STRUCTURAL COORDINATION

The next phase of the project should include coordination with Baltimore County Public Schools and Baltimore County Department of Recreation and Parks to determine ownership and the proposed maintenance and / or replacement schedule of bridges 3, 4, 5, 7, and 8 discussed above.

### CONCEPT STORMWATER MANAGEMENT PLAN

As part of the next phase of design, the design team will take the informal SWM design proposed in this report and utilize soil borings and detailed surveys to create a more formal Concept SWM Plan that will be submitted to DEPS for their review and approval.





# APPENDIX A



# APPENDIX B



# APPENDIX C



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**Submitted to:**

