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ODENTON AREA SIDEWALKS

Draft Schematic Design Report

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Submitted to:
Anne Arundel County Department of Public Works

Table of Contents

INTRODUCTION

The Odenton Area sidewalks study area consists of seven individual roadway segments. Sidewalk concept designs have been developed for each of the seven segments. The various segments are located southwest of the Odenton Town Center circle located on MD 175 (Annapolis Road). For this study, each roadway segment has been evaluated as a separate project. Therefore, separate construction cost estimates will be provided for each roadway segment. Initial conceptual stormwater management considerations will be made for the concept design of each roadway segment. The seven roadway segments include:

I. Hillcrest Road – From Maple Ridge Lane to Higgins Drive (~610 LF)
II. Higgins Drive – From Existing sidewalk south of Hammond Lane to Cul-De-Sac (~2,050 LF)
III. Winer Road – From Maple Ridge Lane to Higgins Drive (~575 LF)
IV. Monie Road – From Maple Ridge Lane to Higgins Drive (~600 LF)
V. Hammond Lane – From Maple Ridge Lane to Higgins Drive (~1,000 LF)
VI. Greenwood Street – From Odenton Road to Maple Ridge Lane (~800 LF)
VII. Holiday Street – From Odenton Road to Greenwood Street (~500 LF)

Concept design layouts have been developed for each roadway segment. The sidewalk layout for each segment was developed based on considerations including general constructability, ADA compliance, roadside grading, property impacts, anticipated utility impacts, anticipated stormwater management options, and storm drainage modifications.

SCHEMATIC DESIGN APPROACH

HILLCREST ROAD

EXISTING CONDITIONS

The Hillcrest Road study segment is for the portion of Hillcrest Road between Higgins Drive and Maple Ridge Lane. The portion of Hillcrest Road in the study area is curbed throughout with a concrete mountable curb. The roadside grading for the south side of the road is relatively flat. There are some steeper slopes approaching 3:1 near the tie-in with existing sidewalk at 1197 Hillcrest Road. The south side of the road contains a densely-vegetated area between 1191 and 1193 Hillcrest Road. The vegetation will need to be removed along with some trees that must be trimmed at a minimum, possibly removed. The roadside grading on the north side of the road is steep in some locations with upward slopes measured between 10% and 19%. The steepest roadside grading is closest to Higgins Drive at 1190 and 1192 Hillcrest Road. A few larger mature trees may be impacted as sidewalk is constructed and portions of the roadside slope are either cut back or a small retaining wall is constructed. The project can make a connection with two existing runs of sidewalk at the intersection of Hillcrest Road and Maple Ridge Lane. (*See Figures 1, 2, & 3)*

Figure 1 - Existing Pedestrian Ramp West Side of Hillcrest Road at Maple Ridge Lane

Figure 2 - Existing Sidewalk West Side of Hillcrest Road

Figure 3 - Existing Pedestrian Ramp East Side of Hillcrest Road at Maple Ridge Lane

Visible utility features in the study area include water meters, fire hydrants, overhead utility poles. The sanitary line runs within the westbound lane of Hillcrest Road, while the water line runs within the eastbound lane. A fire hydrant sits roadside on the south side of the intersection at Higgins Drive. The overhead utility lines run along the north side of the roadway. Existing mailboxes vary in their offset from the curb. Some will need to be reset or relocated.

Hillcrest road drains to two points of interest, POI 1 and POI 2. The roadway is crowned in the middle and runoff drains to either side of the road. Hillcrest Road has a low point at the intersection of Higgins Drive. The north side of Hillcrest Road drains north on Higgins Drive to an existing inlet and then outfalls east to POI 2, an existing ditch. The south side of Hillcrest Road drains south on Higgins Drive toward the cul-de-sac and outfalls through an existing inlet to POI 1.

PROPOSED LAYOUT & RECOMMENDATIONS

For the south side of Hillcrest, the proposed sidewalk will begin at the existing sidewalk termination on the west side of Hillcrest Road (1197 Hillcrest Road). At this western end, a retaining wall (20’ L, 1.5’ avg. height) is proposed at the start of the sidewalk to avoid additional property impacts at the tie-in point. The current sidewalk layout implements a 2’ grass buffer from back of curb to the sidewalk for most of the length of Hillcrest Road. A five-foot wide sidewalk is provided and a 3:1 max tie-in slope is used. As the sidewalk runs east, there will be the need to clear vegetation and remove and/or prune some trees. The sidewalk will need to taper to avoid the existing fire hydrant at the Higgins intersection. For Hillcrest Road, Filterra devices have been proposed as a stormwater management treatment option. Given the typical tree grate sizing, the sidewalk will need to taper away from the road to allow for placement of the tree grates. This is shown within the conceptual layout, but the actual location of the Filterra devices may change as design proceeds. The sidewalk does narrow to 4’ when tapering behind the Filterra devices. An ADA ramp will need to be installed at the southwestern corner of the Hillcrest Road/Higgins Drive intersection.

The current sidewalk design for the north side of Hillcrest Road has a 2’ buffer for the entire length. Due to the steep slopes beginning at the Higgins Drive intersection, two retaining walls totaling approximately 225’ long with a 3’ average height are proposed. (*See Figures 4 & 5)* Each run of retaining wall is to end at the walkway to 1190 Hillcrest Road. There are at least two larger mature trees that sit atop the roadside slope. The proposed

Figures 4 & 5 - Hillcrest Road at Higgins Drive and just west of Higgins Drive - Steep Slopes, Retaining Walls Proposed

retaining walls may result in removal of these trees. Elimination of the grass buffer for these locations areas may need to be considered as design proceeds. An ADA ramp is proposed at the northwestern corner of the Hillcrest Road and Higgins Drive intersection.

Given the length of the proposed sidewalks and required roadside work, the overall work area will not remain under 5,000 total square feet of earthen disturbance. Therefore, stormwater management will be required. With the right-of-way constraints, it may be difficult to locate and acquire adequate space for typical stormwater management treatment options. As stated above, Filterra devices are the recommended option. The use of Filterra device is limited to the south side of Hillcrest Road. Filterras were not deemed feasible for the north side of the road due to large drainage areas. The usage of Filterra devices is anticipated to result in modifications to the existing storm drainage system. Tie-ins to the existing system are anticipated to result in pavement removal/patching along portions of Hillcrest Road. Additional work is necessary along Higgins Drive to tie into the existing storm drainage system. A conceptual layout is provided, but more analysis is needed to develop a full design.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

HIGGINS DRIVE

EXISTING CONDITIONS

Figure 6 - Higgins Drive - Existing Sidewalk North of church (Looking South)

The Higgins Drive segment is from Hammond Lane south to the residential cul-de-sac. There are existing sidewalk sections at the church between Winer Road and Monie Road (*See Figures 6 & 7)* and from Hammond Lane south to Hammond Park. The intersection of Higgins Drive and Hammond lane does not currently have compliant ADA ramps for each leg. The northwest and southwest corners of the Higgins Drive and Hammond Lane intersection have no sidewalks or ramps. The northeast and southeast corners of Higgins Drive and Hammond Lane have existing sidewalks without ADA-compliant ramps. Moving south along the east side of Higgins Drive, the existing sidewalk currently terminates as it reaches Hammond Park. The roadway curb terminates at the same location. Towsers Branch crosses Higgins Drive via culvert (*See Figure 8)* and runs through Hammond Park. Towsers Branch has a more clearly defined channel within Hammond Park, as compared to the west side of Higgins Drive. The roadway is curbed again just south of the Towsers Branch culvert. The FEMA 100-year floodplain boundary has not been delineated in this area.

Figure 7 - Higgins Drive - Existing Sidewalk at Church – South End (Looking South)

Figure 8 - Existing Culvert at Towsers Branch - East Side of Higgins

Continuing south on Higgins Drive, the roadside grading is relatively flat until 525 Higgins Drive. This is where a 60-foot section in front of an existing utility pole has an upward slope, field measured at 20%. The roadside grading flattens back out beyond this point until the existing storm drainage outfall point at 531 Higgins Drive. The pipe outfalls approximately 3’ behind the back of curb. Roadside slopes are gradual again after the outfall point until 535 Higgins drive. There are steeper upward slopes (up to 24%) from 535 Higgins Drive to 541

Higgins Drive. The roadside grading flattens again for approximately 235' until 545 Higgins Drive. Upward 15% slopes were measured until the start of the cul-de-sac.

The roadside grading within the cul-de-sac is generally level. The roadside grades do steepen on the west side of Higgins Drive just outside of the cul-de-sac. The slopes range between 10% and 14% until Hillcrest Road. Roadside grading between Hillcrest and Winer Road ranges from 10:1 and 1:1. From Winer Road to the existing sidewalk at 528 Higgins Drive, the roadside grading is generally flat. The existing sidewalk extends north and terminates at the driveway at 522 Higgins Drive.

Figure 9 - Ex. Culvert at Towsers Branch - West Side

Continuing north, the roadside grading remains relatively flat from Monie Road to Towsers Branch. The curb ends approximately 50' prior to the culvert. Towsers Branch is not as channelized on the west side of Higgins Drive (*See Figure 9)*. The vegetation in and around the stream is denser as well. From the culvert, up to Hammond Lane, there is a 3' wide asphalt drainage ditch that no longer provides a smooth pathway for water due to brush growth and pavement damage.

There are bushes and trees that will need to be trimmed or removed throughout the study area. The trees of most concern are within Hammond Park and along Higgins Drive - south of Hillcrest Road and around the cul-de-sac. Impacts to trees in this area will be difficult to avoid as the design progresses. Further evaluation by an environmental scientist is warranted as the design proceeds to determine final design layout.

Visible utilities in the study area include water meters, fire hydrants, storm drain inlets, storm drain outfalls, and overhead utility poles. Many of the overhead utility poles and fire hydrants along Higgins Drive will be within the sidewalk if the typical 2' grass buffer is considered. Additionally, at the southernmost portion of the cul-de-sac, a hydrant and utility pole are close to each other (*See Figure 10)*, creating difficulty maintaining the grass buffer and standard sidewalk width. Also, mailbox offsets vary throughout this roadway segment. Some will need to be relocated closer to the curb during construction.

Figure 10 - Hydrant and Utility Pole in cul-de-sac

Higgins Drive drains to several POIs, POI 1, 2, 3, 4, 5, and 6. The roadway is crowned in the middle and runoff drains to either side of the road. Higgins Drive has low points between the intersections of Winer Road and Monie Road, between the intersections of Hillcrest Road and Winer Road, and at the residential cul-de-sac at the end of the road. An inlet is located along either side of the road at each low point and one at the bottom of the cul-de-sac. Runoff flows along existing curb to the inlets and outfalls south of Higgins drive to either POI 1, 2, or 3. POI 1 is located approximately 200' downstream from the existing inlet at the cul-de-sac and drains towards Towsers Branch Stream. POI 2 is located approximately 260' downstream from the existing eastern inlet between Hillcrest Road and Winer Road and drains towards Towsers Branch Stream. POI 3 is located at a concrete ditch directly behind the eastern inlet between Winer Road and Monie Road (*See Figure 11)*.

Figure 11 - Concrete Ditch at POI 3

There is a low point at the intersection of Higgins Road and Monie Road that collects runoff from Higgins Road as well. Runoff outfalls through the inlet approximately 140' to POI 4, an outfall channel east of Higgins Road. The outfall channel drains to Towsers Branch Stream.

There is also a low point in the roadway at the Towsers Branch culvert. Runoff flows towards the culvert and outfalls on either side of the road directly into the stream at POIs 5 and 6.

Figure 12 - Towsers Branch and Park at Proposed Pedestrian Bridge Location (Looking South)

Figure 13 - Towsers Branch and Park at Proposed Pedestrian Bridge Location (Looking North)

PROPOSED LAYOUT & RECOMMENDATIONS

The current design layout implements a 2' grass buffer from back of curb to the sidewalk for most of the length of Higgins Drive. A five-foot wide sidewalk is provided and a tie-in slope of 3:1 max is typically used to meet the existing ground. For all proposed sidewalk locations, mountable curb and gutter is proposed. ADA ramp upgrades are needed for at least three corners of the Higgins Drive and Hammond Lane intersection. The southwest corner may also be considered if the Hammond Lane sidewalk construction is projected to be undertaken. Proposed sidewalk will meet the existing sidewalk on the east side of Higgins road at the north end of Hammond Park. Heading south, the sidewalk will offset further from the roadway to a proposed pedestrian bridge over Towsers Branch. The pedestrian bridge is set back 20' from the edge of the roadway and will have an 8' wide sidewalk (*See Figures 12 & 13)*. Details of the bridge will be refined as design progresses for this project. Analysis of Towsers Branch and an evaluation of the overhead utilities in the area will be necessary to confirm location and elevation of the pedestrian bridge. A full floodplain evaluation is likely required. Work in this area is also contained within a park (*See Figures 14 & 15)*, so overall project impacts may need to be analyzed in greater detail as the design progresses.

Figure 14 - Existing path into Park

Figure 15 - Existing Park Features (Pavilion, Picnic Tables, & Bench)

Figure 16 - Retaining Wall at 525 Higgins Drive (Utility Pole)

The sidewalk transitions back to the roadway and narrows to 5' after crossing over the pedestrian bridge. An ADA ramp is needed at 523 Higgins Drive to allow pedestrians to cross to the west side of Higgins Drive at Monie Road. A retaining wall (60' L, 2.5' avg. height) is needed for the steep slope at 525 Higgins Drive (*See Figure 16)*. The grass buffer is removed and the sidewalk narrows to 4'. There is also an existing utility pole just behind the proposed retaining wall. Ideally, the pole can be maintained in location during construction of the retaining wall, but further design analysis is necessary to confirm whether the pole can remain.

Continuing south, the sidewalk can redevelop a grass buffer and full width. The sidewalk will need to taper around proposed Filterra devices (concept locations shown on plans). There is also the existing outfall pipe to contend with at 531 Higgins Drive. The outfall will need to be extended to allow for the sidewalk construction. The current narrow section of ground is only approximately 3' wide above the outfall pipe.

An ADA ramp is needed to allow for a crossing at the Winer Road intersection. Moving south, the sidewalk will taper to avoid a fire hydrant and accommodate Filterra devices. There are some steep roadside slopes in the area between Winer Road and Hillcrest Road. Retaining walls (100' L, 3' avg. height and 190' L, 1.5' avg. height) are anticipated, especially due to the location of two existing overhead utility poles. ADA ramps are needed for both the north and south legs of the Higgins Drive and Hillcrest Road intersection.

As the sidewalk approaches the cul-de-sac, a retaining wall (130'L, 2' avg. height) will be needed at 545 Higgins Drive (*See Figure 17)*. This is to minimize right-of-way impacts due to roadside grading. The retaining wall ends at the beginning of the cul-de-sac. The grass buffer is removed within the cul-de-sac due to the location of mature trees. The sidewalk does need to shift and narrow to run between a fire hydrant and an existing overhead utility pole. As the sidewalk exits the cul-de-sac, the LOD is expanded in general because it takes longer to tie-in given the moderately steep roadside grading. ADA ramps are anticipated for both the southwest and northwest corners of the Higgins Drive and Hillcrest Road intersection.

Figure 17 - Proposed Retaining Wall due to Roadside Grading

Sidewalk for the west side of Higgins Drive is not recommended from Hillcrest Road to Winer Road. There are 1:1 existing slopes in the area and it is difficult to provide sidewalk around the southwest corner of the Higgins Drive and Winer Road intersection. An ADA ramp will be constructed at the northwest corner of Winer Road and Higgins Drive with the sidewalk extended to meet the existing sidewalk at 528 Higgins Drive.

Proposed sidewalk construction will begin again at 522 Higgins Drive. ADA ramps will be provided for both the southwest and northwest corners for the Monie Road and Higgins Drive intersection. These pedestrian connections are proposed for the Monie Road intersection; however, sidewalk construction is not proposed between Monie Road and Hammond Lane. Given the proximity of Towsers Branch, it is not recommended to provide sidewalk for both the east and west sides of Higgins Drive. The pedestrian bridge proposed within the Hammond Park area will act as the only crossing for Towsers Branch. It is recommended that the existing paved drainage ditch located between Towsers Branch and Hammond Lane is cleaned, patched, and/or replaced to achieve better functionality (*See Figure 18)*.

Figure 18 - Existing paved drainage ditch north of Towsers Branch

Work for this roadway segment will result in greater than 5,000 square feet of earthen disturbance. Like the Hillcrest Road segment, it may be difficult to locate and acquire adequate space for typical stormwater management treatment options. For Higgins Drive, Filterra devices are a recommended option. The usage of Filterra devices will result in modifications to the existing storm drainage system. New storm drainage elements will need to be tied to the existing system. These tie-ins result in pavement removal/patching along portions of Higgins Drive for the work to be completed. A conceptual layout is provided, but more analysis is needed to develop a full design.

One additional option shown is to install a stormwater management facility in Hammond Park (*See Figures 14 & 15)*. This facility would occupy a significant portion of the open space in the park as shown in the drawings. This is the only area on the project where a stormwater management facility can be installed without significant right of way acquisitions or tree removal. A new inlet would be needed along the roadway to capture runoff and direct it to the facility. The facility would outfall above the Towsers Branch stream. Plantings can be selected to make the facility

aesthetically pleasing to users of the park. Since no floodplain information is available, a floodplain analysis would need to be conducted for this area.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

WINER ROAD

EXISTING CONDITIONS

The Winer Road study area is for the portion of Winer Road between Higgins Drive and Maple Ridge Lane. Winer Road has curb on both the north and south sides of the street. The south side has steep roadside grades, while the north side of the street is relatively level in grade (*See Figures 19 & 20)*. Overhead utility poles run along the south side of the street. The water line runs just behind the south side roadway curb. Heading west, the sanitary line runs just behind the north side roadway curb until it tapers into the roadway at 1192 Winer Road. Both sides of the street have shrubs, small planter beds, and roadside trees located close to the roadway. There is existing sidewalk at the west end of Winer Road for both the north and south side of the roadway. The pedestrian ramps on the southwest and northwest corners of the Winer Road and Maple Ridge Lane intersection appear to have been redone recently.

Figure 19 - South Side of Winer Road - Steep Slope (Typ.)

Figure 20 - North Side of Winer Road - Flat Roadside Grading (Typ.) / Possible Tree Removal

Winer Road drains to one point of interest, POI 3. The roadway is crowned in the middle and runoff drains to either side of the road. Winer Road has a low point at the intersection of Higgins Drive where runoff flows north to enter an existing inlet and then outfalls east to an existing concrete ditch.

PROPOSED LAYOUT & RECOMMENDATIONS

Given the steep roadside grades and overhead utility constraints along the south side of Winer Road, sidewalk is only proposed for the north side of the roadway. The current design layout implements a 2' grass buffer from back of curb to the sidewalk for the length of Winer Road. A five-foot wide sidewalk is provided from Higgins Drive to Maple Ridge Lane.

In general, there are limited constraints for the north side sidewalk construction. There are some shrubs that will need to be removed or relocated. There is one tree that will need to be removed unless the sidewalk is tapered to the back of curb and/or narrowed. The proposed sidewalk will tie into the existing sidewalk that currently terminates at the driveway for 1196 Winer Road *(See Figure 21)*. Existing mailbox offsets vary and some may need to be reset or relocated during construction.

Figure 21 - Existing Pedestrian Ramp - NE Corner Winer Road and Maple Ridge Lane

No stormwater management opportunities were deemed feasible for this section of proposed sidewalk. The drainage areas are too large for the use of Filterras and there is not enough space for stormwater management facilities within the easement.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

MONIE ROAD

EXISTING CONDITIONS

The Monie Road study area is for the portion of Monie Road between Higgins Drive and Maple Ridge Lane. Monie Road has curb on both the north and south sides of the street. The north side of the street has relatively level roadside grades. The south side has roadside grades that are considerably steeper. The roadside grading at 1199 Monie Road has a grade change of 6' to 7' between the curb and the parking pad area over a short distance *(See Figure 22)*. Both sides of the street have shrubs and small planter beds located close to the roadway. The roadside trees are offset further from the roadway curb line.

Figure 22 - Steep Grading at 1199 Monie Road

Figure 23 - Utilities at SW Corner of Higgins Drive Intersection

Visible utility features in the Monie Road study area include water meters, overhead utility poles, sanitary manholes, storm drainage inlets, and a hydrant. The sanitary line runs within the westbound lane. The water line runs within the roadway just offset from the curb on the south side of the roadway. There is an overhead utility pole on the southwest corner of the Monie Road and Higgins Drive intersection. The lines cross immediately over to the north side of the roadway and then run on the north side. At a point, approximately 100' east of the Monie Road and Maple Ridge Lane intersection, the lines cross back over and run south. At the southwest corner of Monie Road and Higgins Drive, there is a fire hydrant, storm drainage inlet, storm drain manhole, and a guy wire from an overhead utility pole *(See Figure 23)*.

Monie Road drains to two points of interest, POI 4 and POI 5. The roadway is crowned in the middle and runoff drains to either side of the road. Monie Road has a low point at the intersection of Higgins Drive. The south side of Monie Road drains to an existing inlet at the intersection of Higgins Drive which then outfalls to POI 4, an existing outfall channel. The north side of Monie Road drains north on Higgins Drive to outfall into the stream at POI 5.

PROPOSED LAYOUT & RECOMMENDATIONS

Given the steep grades and utility based constraints along the south side of Monie Road, sidewalk is proposed for the north side of the roadway. The current design layout implements a 2' grass buffer from back of curb to the sidewalk for the length of Monie Road. A five-foot wide sidewalk is provided from Higgins Drive to Maple Ridge Lane.

In general, the impacts for the north side sidewalk construction are minimal *(See Figure 25)*. There are some shrubs that will need to be removed and at least one tree that needs to be removed or relocated for sidewalk construction. One is located at the northeast corner of the Maple Ridge Lane and Monie Road intersection *(See Figure 24)*. Others are located between properties. There is one driveway at 1194 Monie Road that ramps up and has concrete curb exposed on the east side. Modifications will be needed to smoothly cross the driveway with proposed sidewalk *(See Figure 26)*. Based on the current layout, overhead utility poles can be avoided entirely. There are at least two large shrubs that may need to be removed for the sidewalk construction *(See Figure 27)*.

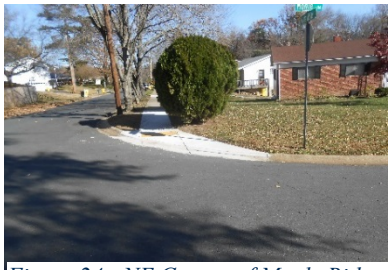

Figure 24 - NE Corner of Maple Ridge Lane Intersection - Existing Pedestrian Ramp / Shrub to be removed

Figure 25 - North Side of Monie Road Looking South - Level Roadside Grading (Typ.)

Figure 26 - Existing 1194 Monie Road Driveway Retaining Wall/Curb - Needs to be Reconstructed

Figure 27 - North Side of Monie Road Looking South - Level Roadside Grading (Typ.) / Shrub Removal

While an extended run of sidewalk is not proposed for the south side of Monie Road, an ADA ramp is recommended to allow for pedestrians to cross Monie Road and make a connection with existing sidewalk at 528 Higgins Drive. A directional ramp is chosen as a good fit here, but this corner is difficult given the existing storm drain and overhead utility guy wire layout. A narrowed ramp and/or backing curb at the storm drain manhole may be necessary to avoid impacts to the storm drainage system. Topographical survey and detailed design is required if design were to proceed.

No stormwater management opportunities were deemed feasible for this section of proposed sidewalk. There is no existing storm drain system for Filterra devices to tie into and there is not enough space for stormwater management facilities within the right-of-way.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

HAMMOND LANE

EXISTING CONDITIONS

The Hammond Lane study segment runs from Greenwood Street to Higgins Drive. At the southeast corner of Hammond Lane and Greenwood Street, there is an existing pedestrian ramp and approximately 230' of existing sidewalk that terminates at a wooded area *(See Figure 28)*. The wooded area is approximately 125' long. Continuing east, the ground remains relatively level until the driveway at 1187 Hammond Lane. Roadside slopes extend upward at rates of approximately 30% to 40% until the southwest corner of the Hammond Lane and Higgins Drive intersection *(See Figures 29 and 30)*.

Figure 28 - Existing Sidewalk on South Side of Hammond Lane - Terminates at Wooded Area

Figure 29 - South Side of Hammond Lane Looking South - Steep Roadside Grading (Typ.)

Figure 30 - South Side of Hammond Lane Looking South - Steep Roadside Grading / Landscape Removal

For the north side of Hammond Lane, the ground is relatively level for approximately 90'. From that point to the driveway of 1190 Hammond Lane, upward roadside slopes range from approximately 30% to 35%. The roadside slopes flatten out from the driveway of 1190 Hammond Lane to the northeast corner of Hammond Lane and Greenwood Street. A small section of wooden, decorative fence appears to sit within the County right-of-way between the driveways at 1194 Hammond Lane *(See Figure 31)*. A fence also exists approximately 10' offset from the road edge at 495 Greenwood Street.

Figure 31 - Existing Fence in ROW

Figure 32 - Mature Tree b/w Road and Fence

Figure 33 - Mature Tree at 495 Greenwood

There are mature trees that will need to be trimmed/removed/avoided throughout this segment. Also, some small bushes or trees will need to be relocated or removed. Trees of known concern include everything within the wooded area in the floodplain area west of 1191 Hammond and the two large trees at 495 Greenwood Street *(See Figures 32 and 33)*. One sits between the fence and roadway and the other sits closer to the northeast corner of the Hammond

Lane and Greenwood Street intersection. As design for this project progresses, further evaluation by an environmental scientist is needed to confirm species, conditions, and feasibility of avoiding adverse impacts.

Visible utilities in the study area include manhole covers, storm drain inlets and overhead utility poles. The largest constraint along Hammond Lane is the utility poles. As with the other segments, mailbox location varies. Some may need to be reset or relocated closer to the roadway edge during construction.

Hammond Lane drains to two points of interest, POI 5 and POI 7. The roadway is crowned in the middle and runoff drains to either side of the road. There is a high point in the road approximately 130' from the intersection with Higgins Drive and a low point approximately 210' starting at Greenwood Street. Runoff east of the highpoint drains towards Higgins Drive and flows south down Higgins Drive. There is no existing curb or gutter and runoff concentrates at the east corner of the Hammond Lane and Higgins Drive intersection. The runoff then flows down a paved ditch along Higgins Drive to outfall into the stream at POI 5. During field investigations, the paved ditch was observed to be in poor condition.

The rest of Hammond Land drains towards the low point located 210' from Greenwood Street. Majority of the roadway is open section, without curb and gutter where runoff sheet flows along the road. There is existing curb and gutter along the west side of Hammond Lane, for about 210' from Greenwood Street. Runoff flows to two existing inlets, located on both sides of the road at the low point, to outfall to POI 7.

PROPOSED LAYOUT & RECOMMENDATIONS

Figure 34 - Existing Ped Ramp to Remain - SW Corner Hammond Lane and Greenwood Street

The current design layout implements a 2' grass buffer from back of curb to the sidewalk for most of the length of Hammond Lane. A five-foot wide sidewalk is typically provided with a tie-in slope of 3:1 max used to meet existing ground. The proposed sidewalk along the south side of Hammond Lane will begin at the existing sidewalk termination approximately 230' east of the southeast corner of Hammond Lane and Greenwood Street. The sidewalk remains relatively typical until 1187 Hammond Lane. Given the steep slope in this area, retaining walls will be used to minimize right-of-way impacts. The use of retaining walls (95' L, 2.5' avg. height; 75' L, 3' avg. height; and 50' L, 2.5' avg. height) continues to the southwest corner of the Hammond Lane and Higgins Drive intersection. Each wall will need to start and/or stop at the driveway locations. A new ADA ramp will be installed at this corner to allow pedestrians to cross both Hammond Lane and Higgins Drive. Depending on the location of the recommended Filterra devices along the south side, additional tapers and narrowing will be likely for the sidewalk along the south side of Higgins Drive. The wooded area will require clearing. There is generally some low vegetation and brush, but multiple trees are anticipated for removal as well.

A new ADA ramp will be installed at the northwest corner of Hammond Lane and Higgins Drive. The layout is offset from the curb line further in this area to allow for the sidewalk design to clear the existing overhead utility pole. Like the south side, a retaining wall (260' L, 2' avg. height) is anticipated for the first two properties along the north side *(See Figure 35)*. The sidewalk will taper towards the roadway to avoid impacts to multiple overhead utility poles on the north side of Hammond Lane. Additional tapers will be necessary if Filterra devices are installed as the stormwater management treatment option. The large tree just off the fence line at 495 Greenwood Street needs to be examined in more detail. The sidewalk does shift towards the curb line, but additional narrowing may be necessary to save the tree.

Figure 35 - Hammond Lane North Side Looking West - Steep Roadside Grading - Retaining Wall Needed

As noted above, Filterra devices are the anticipated stormwater management treatment option. The usage of Filterra devices may result in modifications to the existing storm drainage system. The new storm drainage elements will need to be tied to the existing system. These tie-ins result in pavement removal/patching along portions of Hammond Lane for the work to be completed. A conceptual layout is provided, but more analysis is needed to develop a full design. In addition to the recommended option of Filterra devices, the wooded property was analyzed for a possible treatment option. Given the proximity to Towsers Branch and the need for extensive clearing, this option was ruled out during early analysis.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

GREENWOOD STREET

EXISTING CONDITIONS

The segment evaluated for Greenwood Street extended from the start of Greenwood Street at Odenton Road to the intersection of Hammond Lane. Greenwood Street has no existing curbs within the study area. At the southwest corner of Greenwood Street and Odenton Road, there is an existing pedestrian ramp with approximately 20' of existing sidewalk heading south *(See Figure 36)*. The existing roadside slopes are generally flat. The side slopes do increase up to 23% closer to the Holiday Street intersection. There are existing property fences along this entire stretch of

Figure 36 - Existing Pedestrian Ramp - SW Corner of Odenton Road Intersection

Figure 37 - West Side of Greenwood Street Looking South

Figure 38 - Open Grassy Area with Large Tree at Holiday Street Intersection

Greenwood Street ranging from a 6' to a 10' offset from the road edge *(See Figure 37)*. At the north side of the Holiday Street and Greenwood Street intersection, there is an open grassy area with storm drain and a mature tree *(See*

Figure 38). Due to the severe angle of this intersection, a large paved area exists to promote all turning movements *(See Figure 39)*. The southwest corner of the Holiday Street and Greenwood Street intersection has a raised yard inlet in a drainage ditch that is approximately 1' deep. The ditch runs for about 50 feet and then the ground levels out until the existing sidewalk termination on the west side of Greenwood Street *(See Figure 40)*. Existing curb ends at the same location as the sidewalk. 490 Greenwood Street has a fence installed that sits approximately 10' off the road edge.

Figure 39 - Holiday and Greenwood Intersection

Figure 40 - West Side of Greenwood Street - Tie-in to Existing Sidewalk

Figure 41 - 495 Greenwood Street - Drainage Ditch

At the northeast corner of the Greenwood Street and Hammond Lane intersection, there is a drainage ditch ranging from approximately 1' to 2' deep heading north until the driveway at 489 Greenwood Street *(See Figure 41)*. The ground on the far side of the drainage ditch from the road edge sits generally lower than the road edge. Storm drainage pipes cross under all the driveways and at the northeast corner of the Greenwood Street and Hammond Lane intersection to convey water. There are some steep slopes ranging up to 15% beginning north of 489 Greenwood Street's driveway to just south of 487 Greenwood Street's driveway. Continuing north, the ground remains relatively level until the existing sidewalk termination at the southeast corner of Greenwood Street and Odenton Road. There is an existing pedestrian ramp at the southeast corner of Greenwood Street and Odenton Road. Impacts to trees are not anticipated for this sidewalk segment construction. There are a few small bushes that may need to be removed or relocated for this segment of sidewalk.

Visible utilities in the study area include manhole covers, storm drain outfalls and overhead utility poles. Storm drain and the overhead utility poles are the biggest constraints for the Greenwood Street sidewalk layout. Existing mailbox offsets vary and some may need to be reset or relocated during construction.

Greenwood Street drains to two points of interest, POI 7 and POI 8. The roadway is crowned in the middle and runoff drains to either side of the road. There is a high point in the road approximately 210' from the intersection with Odenton Road. Runoff north of the highpoint drains towards Odenton Road. There is no existing curb or gutter along Greenwood Street and runoff concentrates at the southeast corner of the intersection. Runoff flows through an existing curb cut to POI 8, a roadside grass ditch along Odenton Road.

Runoff south of the highpoint drains toward Hammond Lane. The roadway is open section, without curb and gutter where runoff sheet flows along the road and then concentrates at roadside grass ditches. Runoff on the east side of the roadway drains into a culvert at the intersection of Holiday Street and Greenwood Street. Runoff on the west side of the roadway drains to roadside grass ditches. Driveway culverts convey the runoff into the storm drain system at the intersection of Greenwood Street and Hammond Lane. The storm drain system eventually outfalls to POI 7.

PROPOSED LAYOUT & RECOMMENDATIONS

The current design layout implements a 2' grass buffer from back of curb to the sidewalk for most of the length of Holiday Street. A five-foot wide sidewalk is typically provided using a tie-in slope of 3:1 max is used to meet existing ground. Proposed sidewalk will begin at the existing sidewalk termination on the southeast corner of Greenwood Street and Odenton Road *(See Figure 42)*. Heading south along the east side of Greenwood Street, a typical sidewalk section can be maintained for nearly 300' with just a short taper to avoid a utility pole. Then, a retaining wall (140' L, 1.5' avg. height) is proposed to minimize right-of-way impacts *(See Figure 43)*.

Figure 42 - Existing Sidewalk and Pedestrian Ramp - SE Corner of Odenton Road Intersection

Figure 43 - East Side of Greenwood Looking North - Steep Slope - Retaining Wall Needed

Filterra devices are proposed just offset from both the 487 Greenwood Street and 489 Greenwood Street driveways. The sidewalk and retaining wall will taper away from the roadway to accommodate the Filterras. A typical sidewalk section can be used from south of the driveway at 489 Greenwood Street to the northeast corner of the intersection at Greenwood Street and Hammond Lane with tapers and narrowing to 4' wide at each recommended Filterra device.

The sidewalk from 491 Greenwood Street to 495 Greenwood Street is proposed in the location of an existing drainage ditch. To continue to maintain positive drainage after the existing ditch is filled in, a proposed drainage ditch is recommended east of the sidewalk with new crossing storm drainage pipes for the driveways. The water is proposed to flow to a new yard inlet at the northeast corner of Greenwood Street and Hammond Lane. This inlet will then connect to the existing storm drain system. Easements need to be considered for these work areas considering that grading modifications could reach 40' from the road edge.

ADA ramps will be installed on both the east and west sides of Greenwood Street. Just south of the proposed ADA ramp on the west side of Greenwood, a small piece of sidewalk will connect to the existing sidewalk. Continuing north, a typical sidewalk section can be used until Holiday Street.

A grassy or planted island is proposed within the large paved area at the Holiday Street and Greenwood Street intersection to provide some pavement removal. This will alleviate a portion of the stormwater management treatment requirements. This option would be completed in conjunction with the installation of Filterra devices. The island shown was laid out using an SU-30 for the design vehicle, but it is assumed to have mountable curb on all sides to accommodate larger vehicles and emergency equipment. Further development of this turning island should be considered as the project develops further.

Based on previous coordination with the County, sidewalk is not proposed for the west side of Greenwood Street because it would only serve two properties. At the southwest corner of the Greenwood Street and Odenton Road intersection, the existing sidewalk and pedestrian ramp are to remain.

The usage of Filterra devices may result in modifications to the existing storm drainage system. Downstream bypass inlets might be needed beyond each Filterra device and the new storm drainage elements will need to be tied to the

existing system. These tie-ins result in pavement removal/patching along portions of Greenwood Street for the work to be completed. A conceptual layout is provided, but more analysis is needed to develop a full design.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

HOLIDAY STREET

EXISTING CONDITIONS

The Holiday Street study area is for the entire length, from Odenton Road to Greenwood Street. Holiday Street has no existing curb. At the southeast corner of the Holiday Street and Odenton Road intersection, there are two existing pedestrian ramps. One is right at the intersection corner with the other approximately 20' south of the intersection *(See Figures 44 and 45)*. Neither of the ramps are ADA compliant based on field measurements. The ramps are connected by a section of 4' wide sidewalk. Continuing south to Greenwood Street, the roadside grading is generally flat with fences for most the roadway length. The offset to the fence lines varies from 7' to 10' with respect to the road edge. At the northeast corner of Holiday Street and Greenwood Street there is a grass area. A large mature tree sits just outside of the right-of-way. A small storm drain culvert collects water that reaches this area and conveys it to the existing raised yard inlet at the southwest side of Holiday Street. With the skew of the intersection, a large paved area exists to accommodate all turning movements. The raised yard inlet on the southwest corner sits within a drainage ditch that is approximately 1' deep. Heading north along Holiday Street, the drainage ditch continues until 486 Holiday Street.

Figure 44 - Existing Pedestrian Ramp just south of SE Corner of Odenton Road Intersection

Figure 45 - Existing Pedestrian Ramp - SE Corner of Odenton Road Intersection

Figure 47 - Existing Pedestrian Ramps - SW Corner of Odenton Road Intersection

From the driveway at 486 Holiday Street to the driveway at 484 Holiday street, the roadside grading is relatively level. For approximately 100' north of the 484 Holiday Street driveway, the roadside grade steepens to an upward slope of 25%. The roadside grading flattens for the last 50' before the Odenton Road intersection. There is an existing pedestrian ramp approximately 20' south of Odenton Road *(See Figure 46)*. This ramp is not ADA compliant. An existing 4' wide sidewalk connects to another pedestrian ramp at the corner of the intersection *(See Figure 47)*. This ramp is not ADA compliant. Roadside shrubs and trees were not present within the study area for Holiday Street.

Figure 46 - Existing Pedestrian Ramp just south of SW Corner of Odenton Road Intersection

Visible utilities in the study area include manhole covers, storm drain inlets, storm drain end sections and overhead utility poles. The existing yard inlet at the southwest corner of the Holiday Street and Greenwood Street is anticipated to be impacted with proposed sidewalk construction. The overhead utilities run on the west side of Holiday Street. The utility poles sit close to the roadway edge. The existing water line runs on the east side of the roadway. The sanitary line runs on the west side of Holiday Street. Existing mailbox offsets vary and some may need to be reset or relocated during construction.

Holiday Street drains to one point of interest, POI 7. The roadway is crowned in the middle and runoff drains to either side of the road. There is a low point at the intersection with Greenwood Street. The west side of the road drains to a culvert and yard inlet west of the roadway. The east side of the road drains to a culvert located at the intersection of Holiday Street and Greenwood Street. The storm drain system eventually outfalls to POI 7.

PROPOSED LAYOUT & RECOMMENDATIONS

Sidewalk is proposed for the west side of Holiday Street. Earlier coordination with the County ruled out the need for sidewalk along the east side of Holiday Street because only one home fronts the side of Holiday Street. The current design layout implements a 2' grass buffer from back of curb to the sidewalk for most of the length of Holiday Street. Starting at the north end of Holiday Street, a new ADA compliant ramp will replace the existing pedestrian ramp at the corner of the Odenton Road intersection. The second ramp to the south will be removed. The existing 4' wide sidewalk will be replaced with the proposed 5' wide sidewalk.

Heading south from the new ADA ramp, the typical sidewalk section can be used for approximately 50' until the steep slope area is reached. The following 100' of sidewalk utilizes a retaining wall (100' L, 1' avg. height) to minimize right of way impacts *(See Figure 48)*. A proposed Filterra device is shown just north of the 484 Holiday Street driveway. The sidewalk and retaining wall will need to taper away from the road with the sidewalk narrowed to 4' wide. A typical sidewalk section can be used from south of this driveway to the southwest corner of the intersection at Holiday Street and Greenwood Street.

Figure 48 - Steep Roadside Slope - West Side of Holiday Street Looking South

At 486 and 488 Holiday Street, the LOD is extended to allow for positive drainage and appropriate tie-in slopes to extend beyond the existing ditch *(See Figure 49)*. The ditch will be filled, as curb is installed to convey water to proposed inlets. The yard inlet at 488 Holiday Street is proposed to be replaced with a new combination inlet/manhole with a yard inlet installed just south of this point *(See Figure 50)*. A small section of pavement is to be removed to allow for a continuous curb line. It is assumed that the Holiday Street sidewalk will tie in with the small section of sidewalk along the west side of Greenwood Street.

Figure 49 - Existing Ditch West side of Holiday Street - Looking South

Figure 50 - Existing Yard Inlet - 488 Holiday Street

A grass island is proposed within the large paved area at the Holiday Street and Greenwood Street intersection. The island acts to provide some pavement removal when calculating the overall impervious surfaces added by this project. The island was sized and located using an SU-30 as the design vehicle. It is shown to have mountable curb on all sides to allow larger vehicles, and particularly emergency equipment to safely traverse the grass island if needed. Further development of the island can be made as design progresses for this project.

Sidewalk is not currently proposed on the east side of Holiday Street because it would only serve two properties, only one of which has frontage to Holiday Street *(See Figure 51)*. At the northeast corner of the Holiday Street and Odenton Road intersection, the existing southernmost pedestrian ramp is to be removed and the northern ramp is to be replaced with an ADA compliant ramp.

Figure 51 - East Side of Holiday Street Looking North

For Holiday Street, Filterra devices in combination with the pavement removal at the island are the recommended options. The usage of Filterra devices will result in modifications to the existing storm drainage system. Downstream bypass inlets may be needed beyond each Filterra device and the new storm drainage elements will need to be tied to the existing system. A conceptual layout is provided, but more analysis is needed to develop a full design.

For conceptual right-of-way impacts, a construction cost estimate, and a general description of stormwater management alternatives considered, reference Appendices.

ADDITIONAL FIELD EXPLORATION AND DESIGN ITEMS

The following field exploration and design items are anticipated for the project to progress further into final design and construction (Please note that this is not necessarily a comprehensive list, but many of the expected items):

- Full Topographical and Boundary Survey – Need to confirm exact locations of existing site features and establish boundaries for potential easement agreements and/or future plat work
- Subsurface Utility Engineering (SUE) – Needed at key locations (SWM, Storm Drainage, & Retaining Wall locations – Checking for conflicts)
- Environmental Walkthrough Site Assessment – Needed for Towsers Branch work areas and consideration for Roadside Tree Permits per segment
- Floodplain Analysis – For SWM and Structural Design
- Structural Design of Pedestrian Bridge
- Structural Design and Detailing of Retaining Walls
- Erosion Sediment Control Design
- Geotechnical borings – potentially required for stormwater management design
- ROW – Easement Agreements and Plat Work
- Utility Design – Possible Hydrant Relocations
- Utility Coordination – All Utilities (including overhead utility lines)
- Construction Phasing – The phasing of construction needs to be coordinated to ensure appropriate sidewalk and storm drain system connections. Suggested phasing includes the grouping of Holiday Street, Greenwood Street, and Hammond Lane. The remaining roadways Monie Road, Winer Road, Hillcrest Road, and Higgins Road can be grouped together as well.

Appendix A

Anticipated Right-of-Way Impacts

Schematic Design Layout Anticipated ROW Impacts

Hillcrest Road	
Property Address	**Acreage of Impacts**
1190 Hillcrest Road	0.0113
1191 Hillcrest Road	0.0011
1192 Hillcrest Road	0.0055
1193 Hillcrest Road	0.0008
1194 Hillcrest Road	0.0004
1195 Hillcrest Road	0.0012
1196 Hillcrest Road	0.0004
1197 Hillcrest Road	0.0028
Higgins Drive	
Property Address	**Acreage of Impacts**
544 Higgins Drive	0.006
547 Higgins Drive	0.0037
542 Higgins Drive	0.0053
545 Higgins Drive	0.0068
541 Higgins Drive	0.0043
539 Higgins Drive	0.0087
537 Higgins Drive	0.0068
535 Higgins Drive	0.0004
533 Higgins Drive	0.0008
531 Higgins Drive	0.0136
530 Higgins Drive	0.0088
528 Higgins Drive	0.0022
1191 Hillcrest Road	0.0069
Hammond Park (East)	0.1562
Sanitary Easement	0.0064
Hammond Park (West)	0.0363
Winer Road	
Property Address	**Acreage of Impacts**
530 Higgins Drive	0.0042

Monie Road	
Property Address	**Acreage of Impacts**
522 Higgins Drive	0.0075
Hammond Lane	
Property Address	**Acreage of Impacts**
1185 Hammond Lane	0.0147
1187 Hammond Lane	0.0067
1188 Hammond Lane	0.0112
1189 Hammond Lane	0.0012
1190 Hammond Lane	0.0128
Ridgewood Floodplain Area 1	0.0048
Ridgewood Floodplain Area 2	0.0006
Greenwood Street	
Property Address	**Acreage of Impacts**
490 Greenwood Street	0.0003
495 Greenwood Street	0.0766
493 Greenwood Street	0.0764
491 Greenwood Street	0.0771
489 Greenwood Street	0.0149
487 Greenwood Street	0.0148
485 Greenwood Street	0.0077
483 Greenwood Street	0.0113
Holiday Street	
Property Address	**Acreage of Impacts**
488 Holiday Street	0.0148
486 Holiday Street	0.0226
484 Holiday Street	0.0005
Odenton Road	
Property Address	**Acreage of Impacts**
1123 Odenton Road	0.016

Appendix B

Preliminary Design Concept Construction Cost Estimates

Schematic Design Layout Construction Cost Estimate: Hillcrest Road Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$12,000.00	$12,000.00
Maintenance of Traffic	LS	1	$10,000.00	$10,000.00
Construction Stakeout	LS	1	$6,000.00	$6,000.00
Excavation	CY	110	$32.00	$3,520.00
Storm Drainage Structures	EA	3	$7,500.00	$22,500.00
15" RCP for Storm Drainage	LF	221	$90.00	$19,890.00
18" RCP for Storm Drainage	LF	55	$105.00	$5,775.00
Filterra Device	EA	2	$15,000.00	$30,000.00
Sediment Control Measures	LS	1	$8,000.00	$8,000.00
Retaining Wall(s)	SF	705	$30.00	$21,150.00
Graded Aggregate Base (8" Depth)	SY	200	$34.00	$6,800.00
Asphalt Base Course (5.5" Depth)	TON	65	$100.00	$6,500.00
Asphalt Surface Course (1.5" Depth)	TON	20	$125.00	$2,500.00
Standard Type A Concrete Curb and Gutter	LF	980	$35.00	$34,300.00
4" Concrete Sidewalk	SF	4790	$8.00	$38,320.00
Detectable Warning Surface	EA	1	$30.00	$30.00
Landscaping	LS	1	$4,500.00	$4,500.00
Sub-Total				**$231,785.00**
Planning Level / Conceptual Contingency (20%)				**$46,357.00**
Total (Rounded)				**$278,000.00**

Note: Right-of-way and unknown utility costs are not included. **Additional work is needed on Higgins to fully connect storm drain.**

Schematic Design Layout Construction Cost Estimate: Higgins Drive Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$40,000.00	$40,000.00
Maintenance of Traffic	LS	1	$25,000.00	$25,000.00
Construction Stakeout	LS	1	$12,000.00	$12,000.00
Excavation (Includes anticipated excavation for Bridge)	CY	245	$32.00	$7,840.00
Storm Drainage Structures	EA	8	$7,500.00	$60,000.00
15" RCP for Storm Drainage	LF	210	$90.00	$18,900.00
18" RCP for Storm Drainage	LF	230	$105.00	$24,150.00
24" RCP for Storm Drainage	LF	164	$150.00	$24,600.00
Filterra Device	EA	6	$15,000.00	$90,000.00
Potential SWM Treatment Option (Bioswale / Bioretention / Other Infiltration Practice)	LS	1	$45,000.00	$45,000.00
Sediment Control Measures	LS	1	$20,000.00	$20,000.00
Retaining Wall(s)	SF	995	$30.00	$29,850.00
Pedestrian Bridge	LS	1	$135,000.00	$135,000.00
Graded Aggregate Base (8" Depth)	SY	230	$34.00	$7,820.00
Asphalt Base Course (5.5" Depth)	TON	75	$100.00	$7,500.00
Asphalt Surface Course (1.5" Depth)	TON	25	$125.00	$3,125.00
Standard Type A Concrete Curb and Gutter	LF	2780	$35.00	$97,300.00
4" Concrete Sidewalk	SF	13600	$8.00	$108,800.00
Detectable Warning Surface	EA	9	$30.00	$270.00
Landscaping	LS	1	$12,000.00	$12,000.00
Sub-Total				**$769,155.00**
Planning Level / Conceptual Contingency (20%)				**$153,831.00**
Total (Rounded)				**$923,000.00**

Note: Right-of-way and unknown utility costs are not included.

Schematic Design Layout Construction Cost Estimate: Winer Road Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$2,500.00	$2,500.00
Maintenance of Traffic	LS	1	$2,000.00	$2,000.00
Construction Stakeout	LS	1	$2,000.00	$2,000.00
Excavation	CY	50	$32.00	$1,600.00
Sediment Control Measures	LS	1	$2,000.00	$2,000.00
Standard Type A Concrete Curb and Gutter	LF	510	$35.00	$17,850.00
4" Concrete Sidewalk	SF	2550	$8.00	$20,400.00
Landscaping	LS	1	$2,500.00	$2,500.00
Sub-Total				**$50,850.00**
Planning Level / Conceptual Contingency (20%)				**$10,170.00**
Total (Rounded)				**$61,000.00**

Note: Right-of-way and unknown utility costs are not included.

Schematic Design Layout Construction Cost Estimate: Monie Road Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$2,500.00	$2,500.00
Maintenance of Traffic	LS	1	$3,500.00	$3,500.00
Construction Stakeout	LS	1	$3,000.00	$3,000.00
Excavation	CY	50	$32.00	$1,600.00
Sediment Control Measures	LS	1	$2,500.00	$2,500.00
Standard Type A Concrete Curb and Gutter	LF	800	$35.00	$28,000.00
4" Concrete Sidewalk	SF	3630	$8.00	$29,040.00
Detectable Warning Surface	EA	4	$30.00	$120.00
Landscaping	LS	1	$4,000.00	$4,000.00
Sub-Total				**$74,260.00**
Planning Level / Conceptual Contingency (20%)				**$14,852.00**
Total (Rounded)				**$89,000.00**

Note: Right-of-way and unknown utility costs are not included.

Schematic Design Layout Construction Cost Estimate: Hammond Lane Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$15,000.00	$15,000.00
Maintenance of Traffic	LS	1	$15,000.00	$15,000.00
Construction Stakeout	LS	1	$8,000.00	$8,000.00
Excavation	CY	130	$32.00	$4,160.00
Storm Drainage Structures	EA	7	$7,500.00	$52,500.00
15" RCP for Storm Drainage	LF	260	$90.00	$23,400.00
18" RCP for Storm Drainage	LF	280	$105.00	$29,400.00
24" RCP for Storm Drainage	LF	115	$150.00	$17,250.00
Filterra Device	EA	8	$15,000.00	$120,000.00
Sediment Control Measures	LS	1	$8,000.00	$8,000.00
Retaining Wall(s)	SF	1110	$30.00	$33,300.00
Graded Aggregate Base (8" Depth)	SY	400	$34.00	$13,600.00
Asphalt Base Course (5.5" Depth)	TON	130	$100.00	$13,000.00
Asphalt Surface Course (1.5" Depth)	TON	40	$125.00	$5,000.00
Standard Type A Concrete Curb and Gutter	LF	1780	$35.00	$62,300.00
4" Concrete Sidewalk	SF	8650	$8.00	$69,200.00
Detectable Warning Surface	EA	2	$30.00	$60.00
Landscaping (Including Tree Removal)	LS	1	$5,500.00	$5,500.00
Sub-Total				**$494,670.00**
Planning Level / Conceptual Contingency (20%)				**$98,934.00**
Total (Rounded)				**$594,000.00**

Note: Right-of-way and unknown utility costs are not included.

Schematic Design Layout Construction Cost Estimate: Greenwood Street Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$12,000.00	$12,000.00
Maintenance of Traffic	LS	1	$10,000.00	$10,000.00
Construction Stakeout	LS	1	$5,000.00	$5,000.00
Common Borrow	CY	140	$40.00	$5,600.00
Storm Drainage Structures	EA	6	$7,500.00	$45,000.00
15" RCP for Storm Drainage	LF	85	$90.00	$7,650.00
18" RCP for Storm Drainage	LF	235	$105.00	$24,675.00
24" RCP for Storm Drainage	LF	150	$150.00	$22,500.00
Filterra Device	EA	4	$15,000.00	$60,000.00
Sediment Control Measures	LS	1	$8,000.00	$8,000.00
Retaining Wall(s)	SF	210	$30.00	$6,300.00
Graded Aggregate Base (8" Depth)	SY	250	$34.00	$8,500.00
Asphalt Base Course (5.5" Depth)	TON	81	$100.00	$8,100.00
Asphalt Surface Course (1.5" Depth)	TON	25	$125.00	$3,125.00
Standard Type A Concrete Curb and Gutter	LF	1040	$35.00	$36,400.00
4" Concrete Sidewalk	SF	4600	$8.00	$36,800.00
Detectable Warning Surface	EA	2	$30.00	$60.00
Landscaping	LS	1	$4,000.00	$4,000.00
Sub-Total				**$303,710.00**
Planning Level / Conceptual Contingency (20%)				**$60,742.00**
Total (Rounded)				**$364,000.00**

Note: Right-of-way and unknown utility costs are not included.

Schematic Design Layout Construction Cost Estimate: Holiday Street Sidewalks

Item	Unit	Quantity	Unit Cost	Item Cost
Mobilization	LS	1	$10,000.00	$10,000.00
Maintenance of Traffic	LS	1	$10,000.00	$10,000.00
Construction Stakeout	LS	1	$3,500.00	$3,500.00
General Site Grading (Borrow/Excavation)	LS	1	$2,500.00	$2,500.00
Storm Drainage Structures	EA	3	$7,500.00	$22,500.00
15" RCP for Storm Drainage	LF	95	$90.00	$8,550.00
18" RCP for Storm Drainage	LF	240	$105.00	$25,200.00
Filterra Device	EA	1	$15,000.00	$15,000.00
Sediment Control Measures	LS	1	$6,500.00	$6,500.00
Retaining Wall(s)	SF	100	$30.00	$3,000.00
Standard Type A Concrete Curb and Gutter	LF	550	$35.00	$19,250.00
4" Concrete Sidewalk	SF	2600	$8.00	$20,800.00
Detectable Warning Surface	EA	2	$30.00	$60.00
Landscaping	LS	1	$4,500.00	$4,500.00
Sub-Total				**$151,360.00**
Planning Level / Conceptual Contingency (20%)				**$30,272.00**
Total (Rounded)				**$182,000.00**

Note: Right-of-way and unknown utility costs are not included.

Appendix C

Stormwater Management Alternatives

STORMWATER MANAGEMENT ALTERNATIVES

A total of three (3) stormwater management alternatives have been proposed. The various alternatives include pavement removal, micro-bioretentions, and Filterra devices. Not only do these options help meet project stormwater management requirements, but they can also improve upon the aesthetics of the site. A description of each alternative can be found in the following paragraphs.

Pavement Removal

Pavement Removal – Removal of pavement may count as treatment credit to offset the addition of the proposed sidewalks. Removal of pavement at the intersection of Holiday Street and Greenwood Street is recommended to maximize impervious removal and keep roadway travel lanes the required width. Additional strips of existing sidewalk may be considered for removal as the design progresses.

Bioretentions

The bioretention subsurface is made up of 3" of mulch, 18" of soil media, and a 6" perforated PVC pipe in a 12" gravel jacket of AASHTO #57 stone. Runoff would enter an inlet along the street and be directed into the bioretention. Water would leave the facility through a proposed pipe and outfall towards the existing stream. The location identified would need to be verified for underground utilities in case of any conflicts. The existing 100-Year floodplain has not been delineated in this area and a floodplain analysis would need to be conducted.

The county would be responsible for maintaining the facility. Maintenance should be frequently performed to ensure long-term performance of the bioretention practices. Maintenance includes, but is not limited to, replacing the top few inches of the filter media when water ponds for more than 48 hours, removal of silts and sediment when accumulation exceeds one inch, and pruning and replacement of dead vegetation. Currently, a bioretention is only proposed for the Hammond Park area.

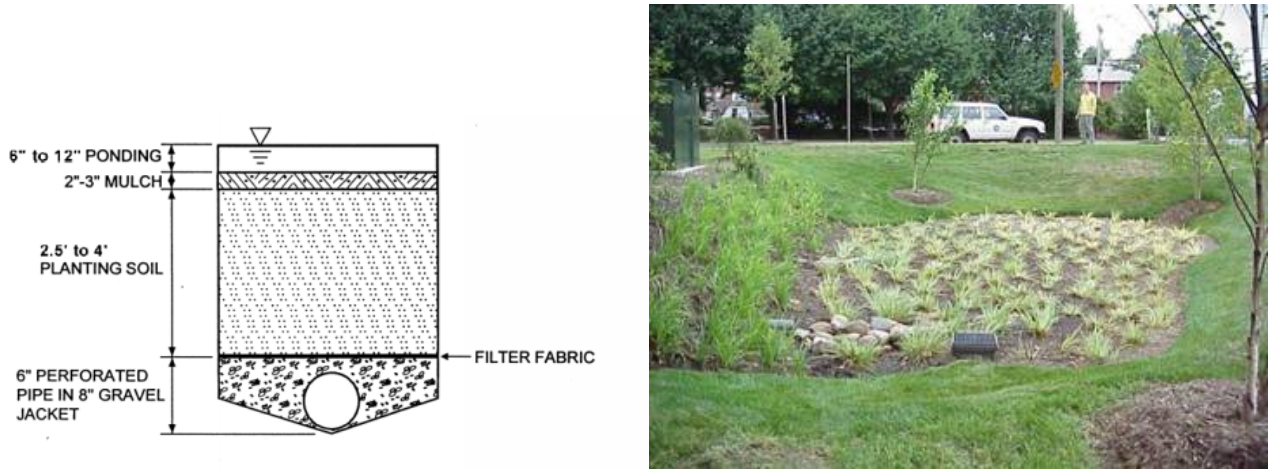

Photo 1: Examples of bioretentions. *[Photo taken from Maryland Stormwater Design Manual, Chapter 5 and Virginia Water Resources Research Center Website]*

Filterra Devices

A Filterra device is a modified inlet with a designed media inside of a concrete box functioning similarly to a bioretention. Stormwater enters the Filterra device through a curb inlet opening and flows through the designed filter media to capture and remove pollutants from the runoff. The inlet is designed so that the first inch of rain is captured and treated and larger storms bypass the system to a high flow bypass inlet. The standard Filterra inlet can handle a contributing drainage area of 0.26 acres.

Each correctly installed Filterra unit is to be maintained by the supplier, or a supplier approved contractor, for a minimum of 1 year. The cost of this service is included in the price of each Filterra unit. Annual maintenance is required to keep the Filterra micro-bioretention functioning properly. Regular watering will be required during dry weather to ensure that the plant within the Filterra remains healthy. Over time, trash and heavy sediments accumulate on top of the mulch and should be removed at six-month intervals. Fresh mulch should then be placed back on top of the remaining media. Filterras are currently proposed throughout the different sidewalk segments.

Photos 2 and 3: Examples of Filterra facilities *[Photos taken from the Filterra Website]*