Appendix C

Stormwater Management

Concept and Approval

DEPARTMENT OF PERMITTING SERVICES

Marc Elrich
County Executive

Hadi Mansouri
Acting Director

May 30, 2019

Mr. Shahriar Abdsharifabadi
Alpha Corporation
21351 Ridgetop Circle, Suite 200
Dulles, VA 20166

Re: **COMBINED STORMWATER MANAGEMENT CONCEPT/*SITE DEVELOPMENT STORMWATER MANAGEMENT PLAN*** for
Capital Crescent Trail – Pedestrian Crossing
SM File #: 284594
Tract Size/Zone: 55.8 Ac. / R-60
Total Concept Area: 0.59 Ac.
Watershed: Little Falls Branch

Dear Mr. Abdsharifabadi:

Based on a review by the Department of Permitting Services Review Staff, the stormwater management concept for the above-mentioned site is **acceptable**. The stormwater management concept proposes to meet required stormwater management goals via ESD with the use of bio-swales.

The following items will need to be addressed during the detailed sediment control/stormwater management plan stage:

1. A detailed review of the stormwater management computations will occur at the time of detailed plan review.
2. An engineered sediment control plan must be submitted for this development.
3. All filtration media for manufactured best management practices, whether for new development or redevelopment, must consist of MDE approved material.
4. If during construction the ground water table is at a shallow depth below the bottom to eliminate the use of bio-swales, an alternative of micro-bioretention planter boxes will be used.
5. At time of plan submittal use MCDPS latest ESD design standards for the practices to be used.

This list may not be all-inclusive and may change based on available information at the time.

This letter must appear on the sediment control/stormwater management plan at its initial submittal. The concept approval is based on all stormwater management structures being located outside of the Public Utility Easement, the Public Improvement Easement, and the Public Right of Way unless specifically approved on the concept plan. Any divergence from the information provided to this office; or additional information received during the development process; or a change in an applicable Executive Regulation may constitute grounds to rescind or amend any approval actions taken, and to reevaluate the site for additional or amended stormwater management requirements. If there are subsequent additions or modifications to the development, a separate concept request shall be required.

If you have any questions regarding these actions, please feel free to contact David Kuykendall at 240-777-6332.

Sincerely,

Mark C. Etheridge, Manager
Water Resources Section
Division of Land Development Services

MCE: CN284594 Capital Crescent Trail Pedestrian Crossing.DWK

cc: N. Braunstein
SM File # 284594

ESD: Required/Provided 1276 cf / 1281 cf
PE: Target/Achieved: 1.1"/1.1.1"
STRUCTURAL: 0.0 cf
WAIVED: 0.0 ac.

STORMWATER MANAGEMENT CONCEPT PLAN

CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY PROPOSED PEDESTRIAN CROSSING IMPROVEMENTS FROM ARLINGTON RD TO HILLANDALE RD

LITTLE FALLS PARKWAY
BETHESDA, MD 20815

STORMWATER CONCEPT APPLICATION #: 284-594

GENERAL NOTES:

THE GOAL OF FOLLOWING DRAWINGS IS TO DEMONSTRATE THE PROPOSED TRAFFIC IMPROVEMENTS AT THE INTERSECTION OF THE CAPITAL CRESCENT TRAIL (CCT) AND SURROUNDING SIDEWALKS AND TRAILS MEET OR EXCEED THE STORMWATER MANAGEMENT REQUIREMENTS FOR MONTGOMERY COUNTY AND THE STATE OF MARYLAND. THE PROJECT IS PLANNING TO DISTURB APPROXIMATELY 1.6 AC. THE PROJECT PROPOSES TO REMOVE TWO TRAVEL LANES OF THE EXISTING LITTLE FALLS PARKWAY PAVEMENT, PORTIONS OF THE DRIVEWAY ENTRANCE TO THE NEARBY COMMUNITY POOL AND REPLACE THEM WITH NEW PAVED TRAILS, A NEW RIGHT TURN LANE ON NORTH BOUND LITTLE FALLS PARKWAY AT ARLINGTON ROAD, AND GRASS AREAS.

THE WORK SHOWN ON THESE PLANS WILL CAUSE NO CHANGE IN THE DRAINAGE PATTERN AND DOES NOT PROPOSE ADDITIONAL NET NEW IMPERVIOUS AREAS. MAJORITY OF THE WORK DEPICTED IN THE FOLLOWING PLANS IS REMOVAL OF EXISTING SOUTHBOUND TRAVELWAYS ALONG LITTLE FALLS PARKWAY AND REPLACING IT WITH LANDSCAPE AREAS.

PROJECT NARRATIVE:

THE CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY IS LOCATED SOUTH OF THE INTERSECTION OF ARLINGTON ROAD AND LITTLE FALLS PARKWAY. THE TRAIL CURRENTLY CROSSES THE PARKWAY OVER TWO 22-FT WIDE (4 LANES WIDE) ROADWAY SECTIONS AND A GRASS MEDIAN MAKING AN UNSAFE CROSSING PATH FOR PEDESTRIANS AND BICYCLES AT THIS INTERSECTION. IN ADDITION TO THE CROSSING, THERE IS NO DIRECT CONNECTION BETWEEN THE LITTLE FALLS TRAIL EAST OF HILLANDALE ROAD AND THE CAPITAL CRESCENT TRAIL. CURRENTLY, VEHICULAR TRAFFIC HAS BEEN REDUCED TO TWO LANES OF TRAFFIC THROUGH THE PROJECT SITE.

THE PURPOSE OF THIS WORK IS TO REMOVE THE TEMPORARY NATURE OF THE EXISTING CONDITIONS AND CREATE A PERMANENT SOLUTION FOR THE CCT CROSSING AT LITTLE FALLS PARKWAY. NORTHBOUND LITTLE FALLS PARKWAY WILL BE RESTRIPED SO THAT IT CAN SUPPORT BOTH NORTHBOUND AND SOUTHBOUND TRAFFIC. THE EXISTING SOUTHBOUND TRAVELWAYS WILL BE REMOVED AND CONVERTED INTO LANDSCAPED AREAS. A RAISED SPEED TABLE WILL BE INTRODUCED TO THE REROUTED TRAVELWAYS CREATING A NEW CROSSING FOR THE CCT. THE PROJECT WILL ALSO INTRODUCE PAVED PATHS ALONG BOTH SIDES OF LITTLE FALLS PARKWAY PROVIDING A NEW PAVED PATH FOR BICYCLES AND PEDESTRIANS CONNECTING TO THE TRAIL.

THIS WORK ALSO PROVIDES AN 8-FT TRAIL CONNECTOR FROM LITTLE FALLS TRAIL TO THE CAPITAL CRESCENT TRAIL ALONG THE EAST SIDE OF HILLANDALE ROAD. A NEW RAISED SPEED TABLE IS INTRODUCED TO HILLANDALE ROAD FOR TRAIL USERS TO ACCESS MONTGOMERY COUNTY PARK'S BETHESDA COMMUNITY POOL THE PROJECT ALSO PROPOSES TO REPLACE AN EXISTING PAVED TRAIL BETWEEN THE CCT PARKING LOT LOCATED AT THE NORTHWEST INTERSECTION OF LITTLE FALLS PARKWAY AND ARLINGTON ROAD WITH AN ACCESSIBLE PAVED PATH.

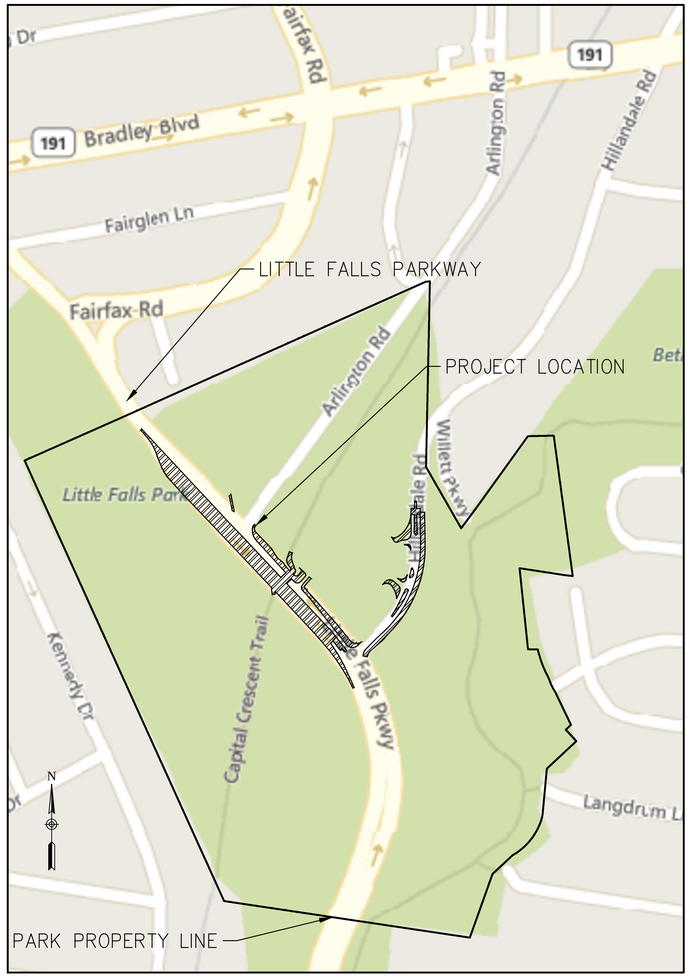
PROPOSED WATER RESOURCES IMPROVEMENTS:

STORMWATER MANAGEMENT STRATEGY FOR THE PROJECT IS TO PROVIDE FULL TREATMENT OF THE ENVIRONMENTAL SITE DESIGN VOLUME (ESDv). FULL ESDv TREATMENT WILL SATISFY THE GROUND WATER RECHARGE, WATER QUALITY, AND CHANNEL PROTECTION REQUIREMENTS PER MDE STORMWATER DESIGN MANUAL.

THE MAIN IMPROVEMENTS FOR THE SITE ARE ACHIEVED BY REMOVING MORE THAN 50% OF THE EXISTING IMPERVIOUS COVER AND INSTALLING NEW GRASS AREAS THROUGH STRATEGIC SITE DESIGN.

ALL POSSIBLE NON-STRUCTURAL ESD PRACTICES SUCH AS NON-ROOFTOP DISCONNECT, AND DISCHARGE TO NATURAL CONSERVATION AREAS HAVE BEEN INVESTIGATED FOR THE GIVEN PROJECT TO THE EXTENT PRACTICABLE TO ACHIEVE THE STORMWATER MANAGEMENT STRATEGY.

A BIO-SWALE IS PROPOSED TO PROVIDE TREATMENT FOR IMPERVIOUS AREAS WITHIN THE PROJECT LIMIT. IN ADDITION TO THE CONCEPT, WE HAVE PROVIDED AN ALTERNATIVE CONCEPT DESIGN SINCE THERE ARE NO INFORMATION ON HAND REGARDING THE GROUND WATER DEPTH AND EXISTING SUBSURFACE CONDITIONS. SHOULD THE GROUND WATER BECOMES AN ISSUE FOR INSTALLATION OF A BIO-SWALE, TWO CONCRETE BIO-RETENTION PLANTER STRUCTURES ARE PROPOSED AS AN ALTERNATIVE TO PROVIDE THE REQUIRED TREATMENT FOR THE PROJECT.



VICINITY MAP
SCALE: 1"=250'

INDEX OF DRAWINGS

SHEET NO. 1 OF 13

NUMBER	DRAWING NUMBER	SHEET TITLE
1	G-001	COVER SHEET
2	CV-001	NATURAL RESOURCES MAP
3	CV-100	EXISTING CONDITIONS PLAN
4	CD-100	CONCEPT DEMOLITION PLAN
5	C-101	CONCEPT SITE PLAN
6	C-102	CONCEPT SITE PLAN (ALTERNATIVE)
7	CG-101	CONCEPT GRADING PLAN
8	CG-101	CONCEPT GRADING PLAN (ALTERNATIVE)
9	C-200	SITE IMPERVIOUSNESS AND SOIL MAP
10	C-201	SITE ESDv AREA MAP
11	C-202	CONCEPT STORMWATER MANAGEMENT
12	C-203	CONCEPT STORMWATER MANAGEMENT (ALTERNATIVE)
13	C-204	BIO-RETENTION PLANTER BOX DETAILS

SWM Concept Summary Table	
SM#	284-594
Type of Concept	Concept/ Site Development
MNCP&PC	Capital Crescent Trail
Property Address	Little Falls Parkway
Property Legal Description	OATLAND ETC
Tract Size	55.8 ac.
Total Concept Project Area	1.6 ac.
Total Modified LOD	0.59 ac.
Zoning	R-60
Watershed and Stream Class	Willet Branch Use-I
RPA	No
100-YR Flood	No
Redevelopment or New Development	Redevelopment
Target PE / Proposed PE	1.1 / 1.1
Target ESDv / Proposed ESDv	1276 / 1281
ESD Measures	Bio-Swale (See Alternative)
Structural Storage Required / Provided	See Alternative
Structural Measures	See Alternative
Waiver Requested/QL/QN/Both	N/A
Other Waivers	N/A
WSSC Grid	208NW05
Water/Sewer Categories	W-1 / S-1
Other Information	

Proposed Site ESDv Summary Chart

Facility Designation	Type	Contributing Drainage Area (SF)	Contributing Impervious Area (SF)	Rv	min. ESDv (CF)	max. ESDv (CF)	Upstream ESDv Treatment (CF)	ESDv Achieved (CF)	Requred ESDv: 1276 CF
BS-1	Bio-Swale	15960	8980	0.56	740	1924	0	1281	Provided ESDv: 1281 CF
							Total	1281	

Aternative Desing Site ESDv Summary Chart

BR-01	Bio-Retention	13450	6890	0.51	573	1489	0	593	Provided ESDv (Alternative): 1482 CF
BR-02	Bio-Retention	16125	10848	0.66	881	2290	0	889	
							Total	1482	

COVER SHEET

STATE OF MARYLAND — DOUGLAS QUINN — No. 26334 — REGISTERED PROFESSIONAL ENGINEER — 3-28-19

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	G-001

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY PED CROSSING IMPROVEMENT PLAN FROM ARLINGTON RD TO HILLANDALE RD

SCALE:

THE MARYLAND-NATIONAL CAPITAL Park and Planning Commission

SABRA & ASSOCIATES, INC.

ALPHA CORPORATION
21351 RIDGETOP CIRCLE
SUITE 200
DULLES, VA. 20166
(703) 450-0800
www.alphacorporation.com

BY:

PLOTTED: $DATETIME$
FILE: $FILE$

SHEET NO. 2 OF 13

NATURAL RESOURCES MAP

LEGEND

- FLEXIBLE BOLLARD
- TREES & TREE CANOPY LINE
- SOIL DIVIDE
- WETLAND BOUNDARY
- STREAM BUFFER
- MAJOR CONTOUR
- MINOR CONTOUR
- APPROXIMATE PROJECT LIMIT
- STREAM CENTER LINE
- TRAFFIC LIGHT
- 100-YR FLOOD PLAIN
- STEEP SLOPES 25
- STEEP SLOPES 15-25

NATURAL RESOURCES NOTES:

1. THE BACKGROUND INFORMATION HAS BEEN OBTAINED FROM THE COUNTY GIS. NO FIELD SURVEY WAS CONDUCTED.
2. PROJECT IS LOCATED WITHIN THE WILLET BRANCH WATERSHED.
3. THE PROJECT LIMIT IS LOCATED OUTSIDE THE 100-YR FLOODPLAIN.
4. THE WORK WILL NOT IMPACT ANY OF THE NATURAL RESOURCES SHOWN ON THIS DRAWING.
5. THE WORK SHOWN ON SUBSEQUENT DRAWINGS WILL IMPROVE THE DRAINAGE CONDITIONS WITHIN THE PROJECT LIMIT BY REMOVING EXISTING SECTIONS OF LITTLE FALLS PARKWAY AND THE COMMUNITY POOL ENTRANCE AND INTRODUCING NEW PERVIOUS COVER RESULTING IN A NET REDUCTION OF IMPERVIOUS SURFACES.

STATE OF MARYLAND — JOSEPH M. QUINN — No. 26334 — REGISTERED PROFESSIONAL ENGINEER — 7-24-19

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

SABRA & ASSOCIATES, INC.

ALPHA CORPORATION
21351 RIDGETOP CIRCLE
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www.alphacorporation.com

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	CV-001

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY PED CROSSING IMPROVEMENT PLAN FROM ARLINGTON RD TO HILLANDALE RD

SCALE: 1" = 60'

PLOTTED: $DATE TIME$
FILE: $FILE$
BY:

SHEET NO. 3 OF 13

EXISTING LITTLE FALLS TRAIL

APPROXIMATE PROJECT LIMIT

EXISTING VEGETATED ISLAND

EXISTING EDGE OF PAVEMENT (TYP)

ARLINGTON ROAD

HILLANDALE ROAD

EXISTING STORM CURB INLET

EXISTING STORM GRATE INLET

EXISTING STORM HEADWALL

EXISTING STORM ENDWALL

LITTLE FALLS PKWY

EXISTING STORM INLET

EXISTING EDGE OF PAVEMENT (TYP)

APPROXIMATE PROJECT LIMIT

EXISTING STORM INLET

EXISTING VEGETATED ISLAND

EXISTING PAVED TRAIL

EXISTING STORM ENDWALL

EXISTING FLEXIBLE BOLLARD (TYP)

VEHICULAR TRAFFIC PATTERN (TYP)

EXISTING TRAFFIC LIGHT (TYP)

EXISTING TRAFFIC LIGHT (TYP)

LEGEND

- FLEXIBLE BOLLARD
- EXISTING TREES AND CANOPY LINE
- EXISTING MAJOR CONTOUR 270
- EXISTING MINOR CONTOUR 274
- EXISTING TRAFFIC LIGHT
- APPROXIMATE PROJECT LIMIT

EXISTING CONDITIONS NOTES:

1. THE BACKGROUND INFORMATION IS OBTAINED FROM THE COUNTY GIS.
2. LITTLE FALLS PARKWAY CURRENTLY HAS TWO 22-FT TRAVEL WAYS IN EACH DIRECTION WITH A GRASS MEDIAN SEPARATING THE TWO PATHWAYS.
3. THE SOUTHBOUND TRAVELWAY OF LITTLE FALLS PARKWAY HAS BEEN CONVERTED INTO ONE VEHICLE TRAVEL LANE.

SCALE: 1"=40'
40' 0 40' 80'

EXISTING CONDITION PLAN

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	CV-100

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO HILLANDALE RD

SCALE: 1" = 40'

STATE OF MARYLAND — JOSEPH DORAK — No. 28334 — REGISTERED PROFESSIONAL ENGINEER — 3-28-19

THE MARYLAND-NATIONAL CAPITAL Park and Planning Commission

SABRA & ASSOCIATES, INC.

ALPHA CORPORATION
21351 RIDGETOP CIRCLE
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DULLES, VA. 20166
(703) 450-0800
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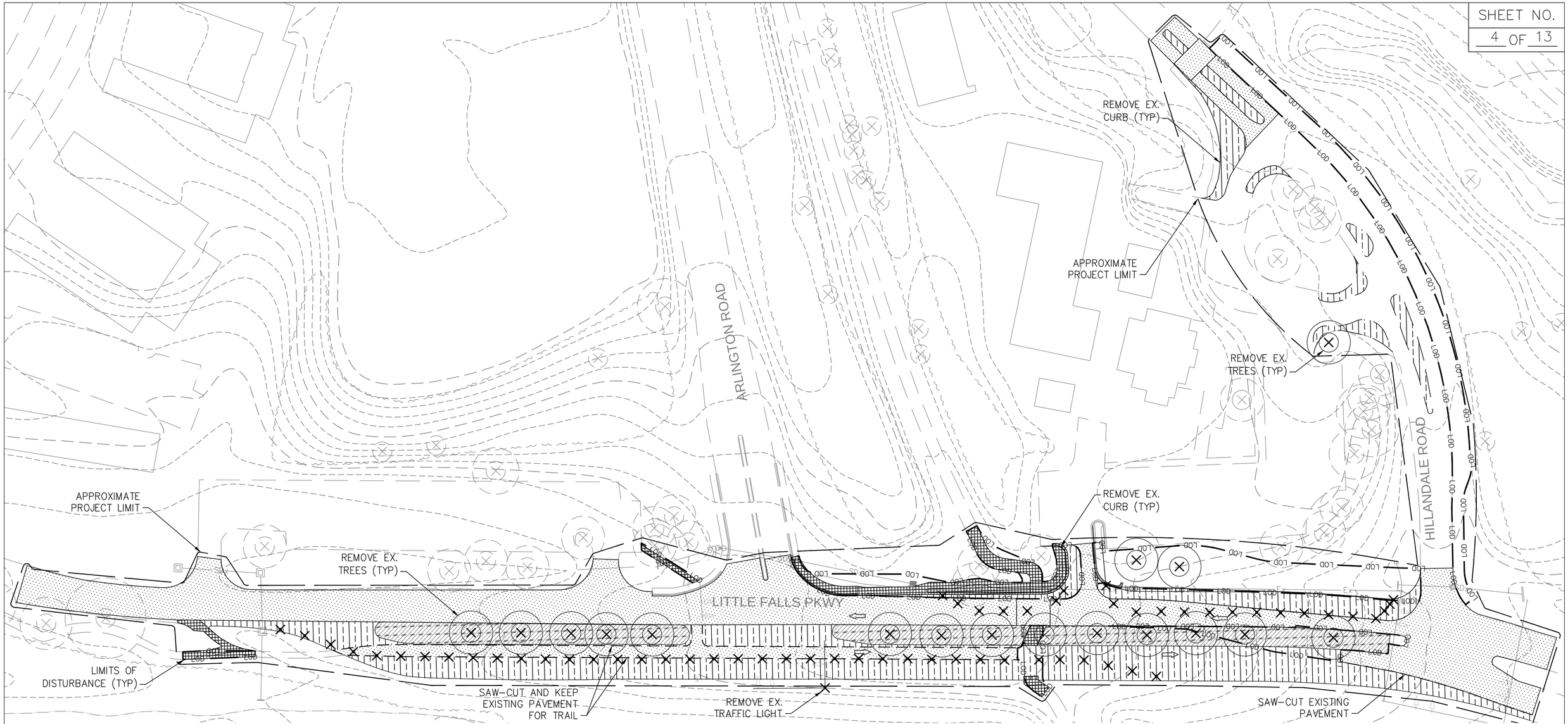
BY:

PLOTTED: $DATETIME$
FILE: $FILE$



LEGEND

- REMOVE FEATURE
- REMOVE FULL DEPTH ASPHALT
- REMOVE PEDESTRIAN PATHS
- EXISTING VEGETATED ISLANDS
- MILL 3-IN SURFACE MATERIAL
- APPROXIMATE PROJECT LIMIT
- LIMITS OF DISTURBANCE — LOD — LOD — LOD
- SAWCUT

DEMOLITION PLAN NOTES:

1. MILLING SHALL NOT EXPOSE SUB-BASE LAYER OF THE EXISTING ASPHALT.
2. THE LIMITS OF DISTURBANCE IS ONLY FOR PLACES WHERE; (1) NEW IMPERVIOUS COVER IS INTRODUCED, AND (2) FULL DEPTH OF ASPHALT IS REMOVED AND REPAVED. SEE ADDITIONAL NARRATIVE ON SHEET C-201.TOTAL LIMITS OF DISTURBANCE WITHIN THE PROJECT IS 0.59 AC.

SCALE: 1"=40'
40' 0 40' 80'

DEMOLITION PLAN

STATE OF MARYLAND — DAVID QUINN — No. 28334 — REGISTERED PROFESSIONAL ENGINEER — 7-26-19

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	CD-101

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: 1" = 40'

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

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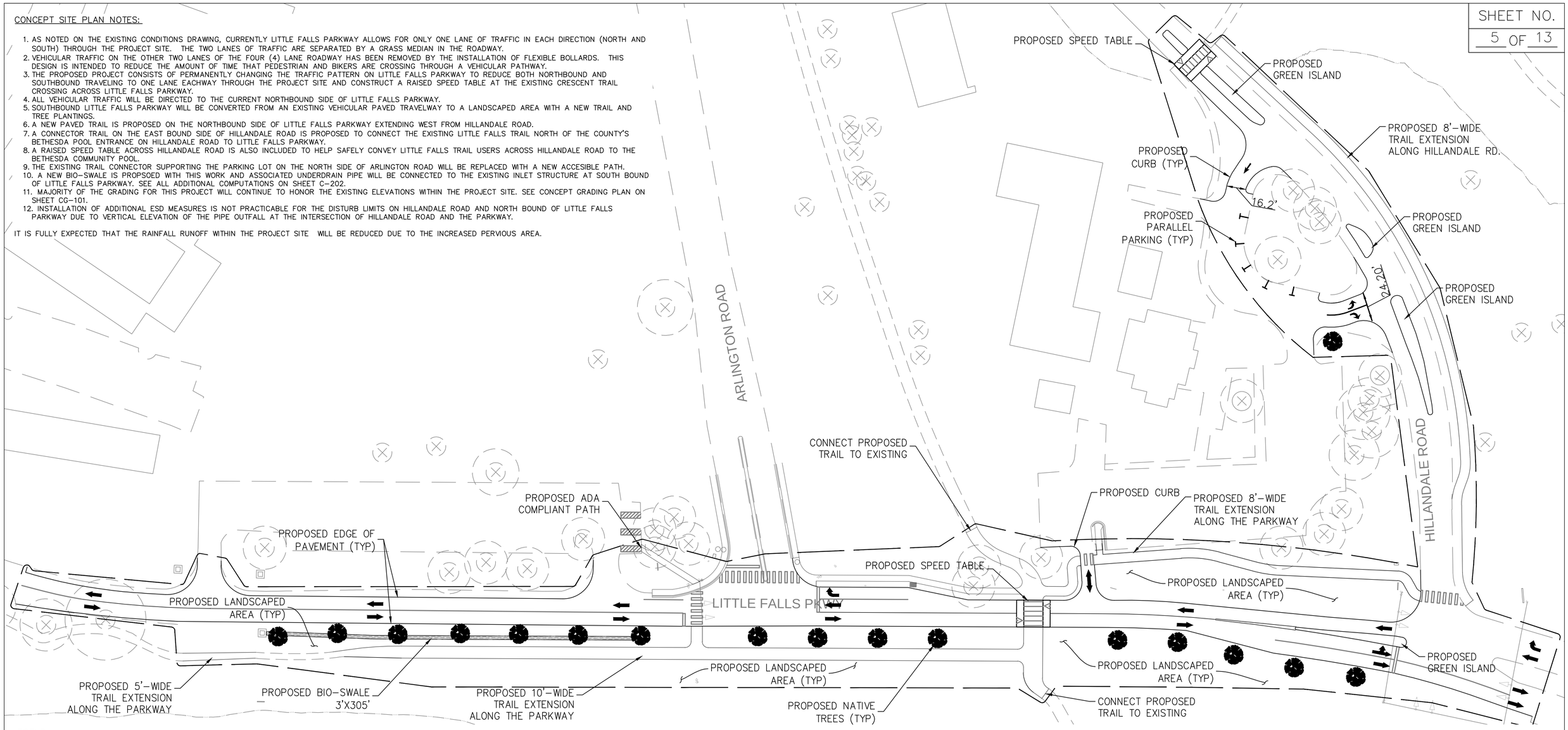
PLOTTED: $DATETIME$
FILE: $FILE$

BY:

CONCEPT SITE PLAN NOTES:

1. AS NOTED ON THE EXISTING CONDITIONS DRAWING, CURRENTLY LITTLE FALLS PARKWAY ALLOWS FOR ONLY ONE LANE OF TRAFFIC IN EACH DIRECTION (NORTH AND SOUTH) THROUGH THE PROJECT SITE. THE TWO LANES OF TRAFFIC ARE SEPARATED BY A GRASS MEDIAN IN THE ROADWAY.
2. VEHICULAR TRAFFIC ON THE OTHER TWO LANES OF THE FOUR (4) LANE ROADWAY HAS BEEN REMOVED BY THE INSTALLATION OF FLEXIBLE BOLLARDS. THIS DESIGN IS INTENDED TO REDUCE THE AMOUNT OF TIME THAT PEDESTRIAN AND BIKERS ARE CROSSING THROUGH A VEHICULAR PATHWAY.
3. THE PROPOSED PROJECT CONSISTS OF PERMANENTLY CHANGING THE TRAFFIC PATTERN ON LITTLE FALLS PARKWAY TO REDUCE BOTH NORTHBOUND AND SOUTHBOUND TRAVELING TO ONE LANE EACHWAY THROUGH THE PROJECT SITE AND CONSTRUCT A RAISED SPEED TABLE AT THE EXISTING CRESCENT TRAIL CROSSING ACROSS LITTLE FALLS PARKWAY.
4. ALL VEHICULAR TRAFFIC WILL BE DIRECTED TO THE CURRENT NORTHBOUND SIDE OF LITTLE FALLS PARKWAY.
5. SOUTHBOUND LITTLE FALLS PARKWAY WILL BE CONVERTED FROM AN EXISTING VEHICULAR PAVED TRAVELWAY TO A LANDSCAPED AREA WITH A NEW TRAIL AND TREE PLANTINGS.
6. A NEW PAVED TRAIL IS PROPOSED ON THE NORTHBOUND SIDE OF LITTLE FALLS PARKWAY EXTENDING WEST FROM HILLANDALE ROAD.
7. A CONNECTOR TRAIL ON THE EAST BOUND SIDE OF HILLANDALE ROAD IS PROPOSED TO CONNECT THE EXISTING LITTLE FALLS TRAIL NORTH OF THE COUNTY'S BETHESDA POOL ENTRANCE ON HILLANDALE ROAD TO LITTLE FALLS PARKWAY.
8. A RAISED SPEED TABLE ACROSS HILLANDALE ROAD IS ALSO INCLUDED TO HELP SAFELY CONVEY LITTLE FALLS TRAIL USERS ACROSS HILLANDALE ROAD TO THE BETHESDA COMMUNITY POOL.
9. THE EXISTING TRAIL CONNECTOR SUPPORTING THE PARKING LOT ON THE NORTH SIDE OF ARLINGTON ROAD WILL BE REPLACED WITH A NEW ACCESIBLE PATH.
10. A NEW BIO-SWALE IS PROPSOED WITH THIS WORK AND ASSOCIATED UNDERDRAIN PIPE WILL BE CONNECTED TO THE EXISTING INLET STRUCTURE AT SOUTH BOUND OF LITTLE FALLS PARKWAY. SEE ALL ADDITIONAL COMPUTATIONS ON SHEET C-202.
11. MAJORITY OF THE GRADING FOR THIS PROJECT WILL CONTINUE TO HONOR THE EXISTING ELEVATIONS WITHIN THE PROJECT SITE. SEE CONCEPT GRADING PLAN ON SHEET CG-101.
12. INSTALLATION OF ADDITIONAL ESD MEASURES IS NOT PRACTICABLE FOR THE DISTURB LIMITS ON HILLANDALE ROAD AND NORTH BOUND OF LITTLE FALLS PARKWAY DUE TO VERTICAL ELEVATION OF THE PIPE OUTFALL AT THE INTERSECTION OF HILLANDALE ROAD AND THE PARKWAY.

IT IS FULLY EXPECTED THAT THE RAINFALL RUNOFF WITHIN THE PROJECT SITE WILL BE REDUCED DUE TO THE INCREASED PERVIOUS AREA.



LEGEND

PROPOSED NATIVE TREE

APPROXIMATE PROJECT LIMIT

PAINTED DIRECTION ARROWS

PROPOSED BIO-SWALE

SCALE: 1"=40'

40' 0 40' 80'

CONCEPT SITE PLAN

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C-101

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: 1" = 40'

STATE OF MARYLAND — DAVID W. QUINN — No. 26334 — REGISTERED PROFESSIONAL ENGINEER — 7-26-19

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

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ALPHA CORPORATION
21351 RIDGETOP CIRCLE
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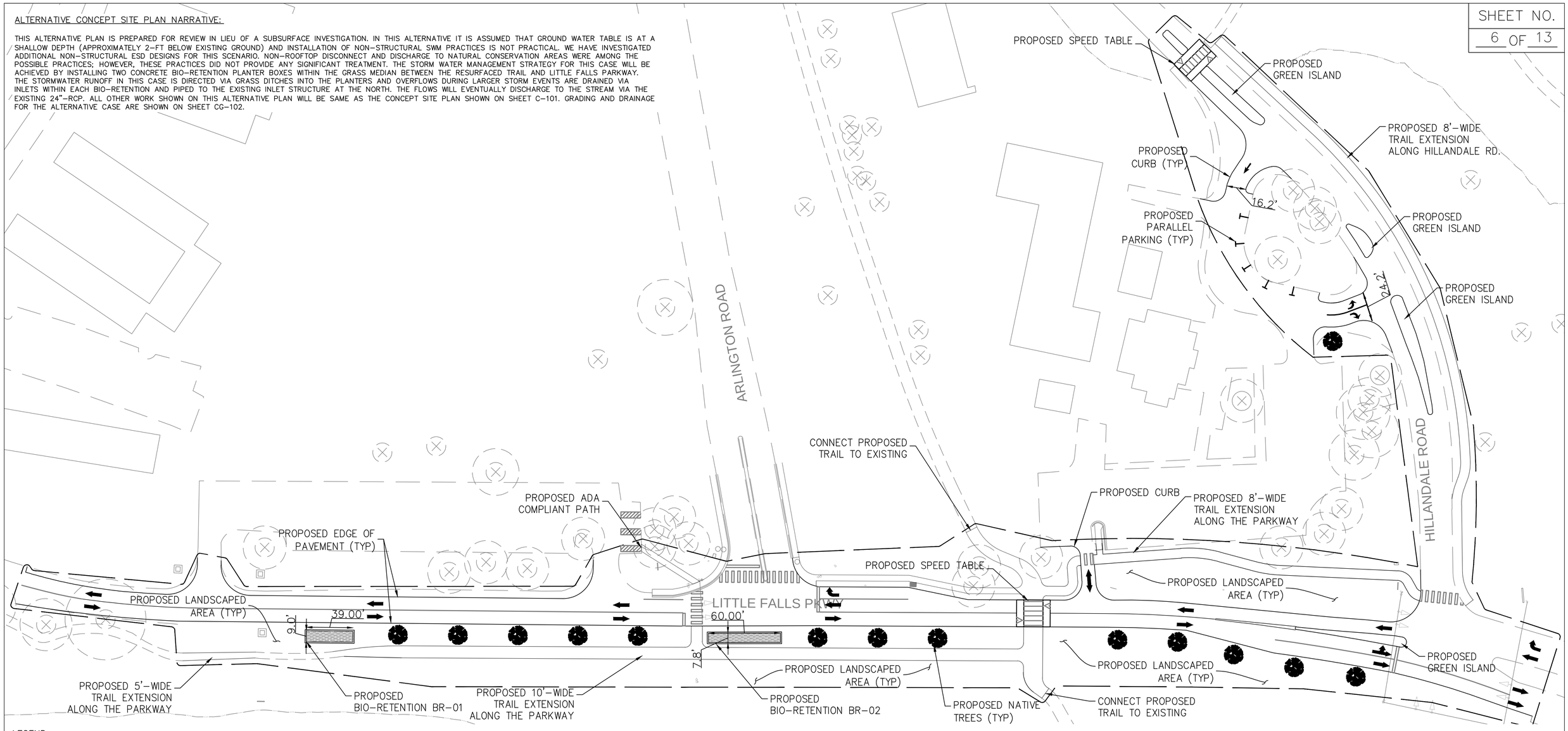
DULLES, VA. 20166
(703) 450-0800
www.alphacorporation.com

BY:

PLOTTED: $DATETIME$
FILE: $FILE$

ALTERNATIVE CONCEPT SITE PLAN NARRATIVE:

THIS ALTERNATIVE PLAN IS PREPARED FOR REVIEW IN LIEU OF A SUBSURFACE INVESTIGATION. IN THIS ALTERNATIVE IT IS ASSUMED THAT GROUND WATER TABLE IS AT A SHALLOW DEPTH (APPROXIMATELY 2–FT BELOW EXISTING GROUND) AND INSTALLATION OF NON–STRUCTURAL SWM PRACTICES IS NOT PRACTICAL. WE HAVE INVESTIGATED ADDITIONAL NON–STRUCTURAL ESD DESIGNS FOR THIS SCENARIO. NON–ROOFTOP DISCONNECT AND DISCHARGE TO NATURAL CONSERVATION AREAS WERE AMONG THE POSSIBLE PRACTICES; HOWEVER, THESE PRACTICES DID NOT PROVIDE ANY SIGNIFICANT TREATMENT. THE STORM WATER MANAGEMENT STRATEGY FOR THIS CASE WILL BE ACHIEVED BY INSTALLING TWO CONCRETE BIO–RETENTION PLANTER BOXES WITHIN THE GRASS MEDIAN BETWEEN THE RESURFACED TRAIL AND LITTLE FALLS PARKWAY. THE STORMWATER RUNOFF IN THIS CASE IS DIRECTED VIA GRASS DITCHES INTO THE PLANTERS AND OVERFLOWS DURING LARGER STORM EVENTS ARE DRAINED VIA INLETS WITHIN EACH BIO–RETENTION AND PIPED TO THE EXISTING INLET STRUCTURE AT THE NORTH. THE FLOWS WILL EVENTUALLY DISCHARGE TO THE STREAM VIA THE EXISTING 24"–RCP. ALL OTHER WORK SHOWN ON THIS ALTERNATIVE PLAN WILL BE SAME AS THE CONCEPT SITE PLAN SHOWN ON SHEET C–101. GRADING AND DRAINAGE FOR THE ALTERNATIVE CASE ARE SHOWN ON SHEET CG–102.



LEGEND

PROPOSED NATIVE TREE

APPROXIMATE PROJECT LIMIT

PAINTED DIRECTION ARROWS

PROPOSED BIO–RETENTIONS

SCALE: 1"=40'

40' 0 40' 80'

CONCEPT SITE PLAN (ALTERNATIVE)

STATE OF MARYLAND — DAVID QUINN — No. 26334 — REGISTERED PROFESSIONAL ENGINEER — 7-24-19

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C–102

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN FROM ARLINGTON RD TO HILLANDALE RD

SCALE: 1" = 40'

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

SABRA & ASSOCIATES, INC.

ALPHA CORPORATION
21351 RIDGETOP CIRCLE
SUITE 200
DULLES, VA. 20166
(703) 450–0800
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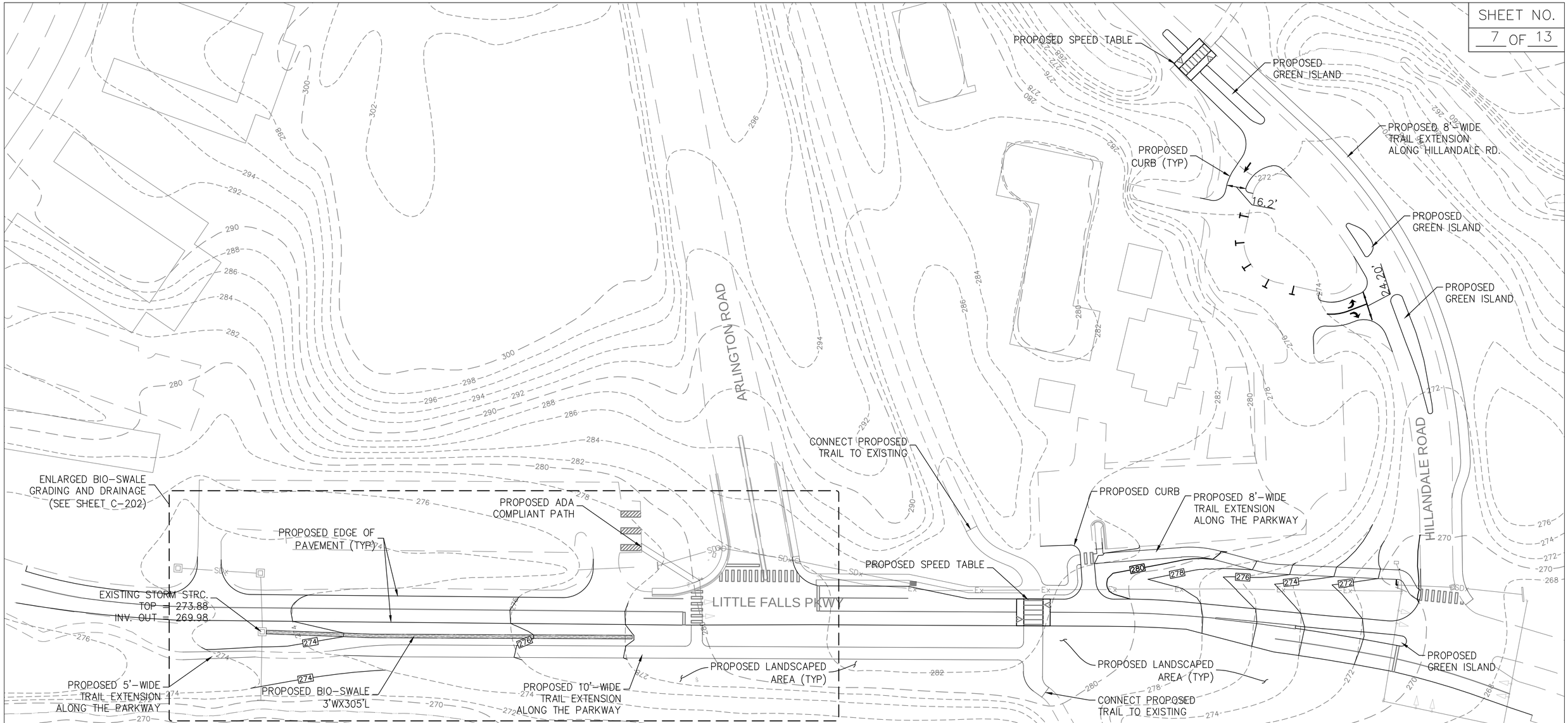
BY:

PLOTTED: $DATETIME$
FILE: $FILE$



LEGEND

PROPOSED MAJOR CONTOUR 280

PROPOSED MINOR CONTOUR 274

CONCEPT GRADING PLAN NOTES:

1. ALL EXISTING ELEVATIONS ARE OBTAINED FROM THE COUNTY GIS.
2. THE PROPOSED GRADING ON NORTH BOUND OF THE PARKWAY, BETWEEN HILLANDALE ROAD AND BETHESDA COMMUNITY POOL ENTRANCE ARE SOLELY TO IMPROVE THE DRAINAGE CONDITIONS OF THE EXISTING GRASSED SWALE.
3. FOR BIO-SWALE 1 ENLARGEMENT GRADING AND DRAINAGE SEE SHEET C-202.
4. ALL OTHER GRADING PROPOSED WITH THE PROJECT FOR THE NEW TRAILS AND THE CONVERSION OF SOUTHBOUND LITTLE FALLS PARKWAY WILL CONTINUE TO HONOR EXISTING DRAINAGE PATTERNS WITHIN THE PROJECT SITE.
5. NEW UNDER DRAINS, CLEANOUTS AND SECTIONS FOR THE BIO-SWALE ARE SHOWN ON SHEET C-202.

IT IS FULLY EXPECTED THAT THE RAINFALL RUNOFF WITHIN THE PROJECT SITE WILL BE REDUCED DUE TO THE INCREASED PERVIOUS AREA.

SCALE: 1"=40'

40' 0 40' 80'

CONCEPT GRADING PLAN

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	CG-101

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: 1" = 40'

STATE OF MARYLAND — DAVID QUINN — No. 28334 — REGISTERED PROFESSIONAL ENGINEER — 7-24-19

THE MARYLAND-NATIONAL CAPITAL
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BY:

PLOTTED: $$DATETIME$$
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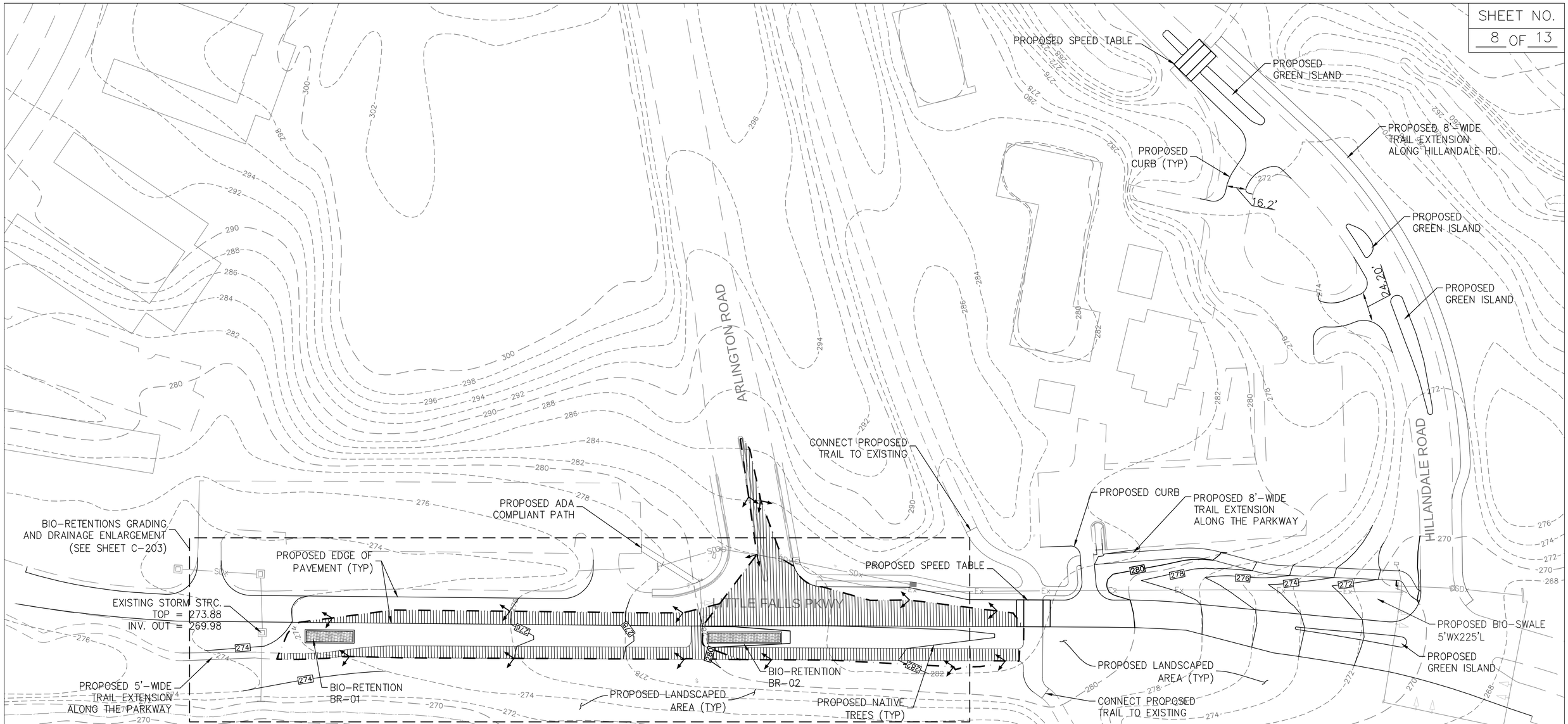

LEGEND

- PROPOSED MAJOR CONTOUR 280
- PROPOSED MINOR CONTOUR 274
- DRAINAGE DIVIDE
- TREATED IMPERVIOUS COVER

ALTERNATIVE CONCEPT GRADING PLAN NOTES:

1. ALL EXISTING ELEVATIONS ARE OBTAINED FROM THE COUNTY GIS.
2. FOR BIO-RETENTION ENLARGEMENTS GRADING AND DRAINAGE SEE SHEET C-203.
3. ALL OTHER GRADING PROPOSED WITH THE PROJECT FOR THE NEW TRAILS AND THE CONVERSION OF SOUTHBOUND LITTLE FALLS PARKWAY WILL CONTINUE TO HONOR EXISTING DRAINAGE PATTERNS WITHIN THE PROJECT SITE.
4. NEW UNDER DRAINS, CLEANOUTS AND STORM DRAIN NETWORK FOR THE BIO-RETENTION PLANTER BOXES ARE SHOWN ON SHEET C-203.

IT IS FULLY EXPECTED THAT THE RAINFALL RUNOFF WITHIN THE PROJECT SITE WILL BE REDUCED DUE TO THE INCREASED PERVIOUS AREAS.

STATE OF MARYLAND — DAVID DOBAY — No. 28334 — REGISTERED PROFESSIONAL ENGINEER — 7-24-19

SCALE: 1"=40'
40' 0 40' 80'

CONCEPT SITE GRADING PLAN (ALTERNATIVE)

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	CG-102

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: 1" = 40'

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

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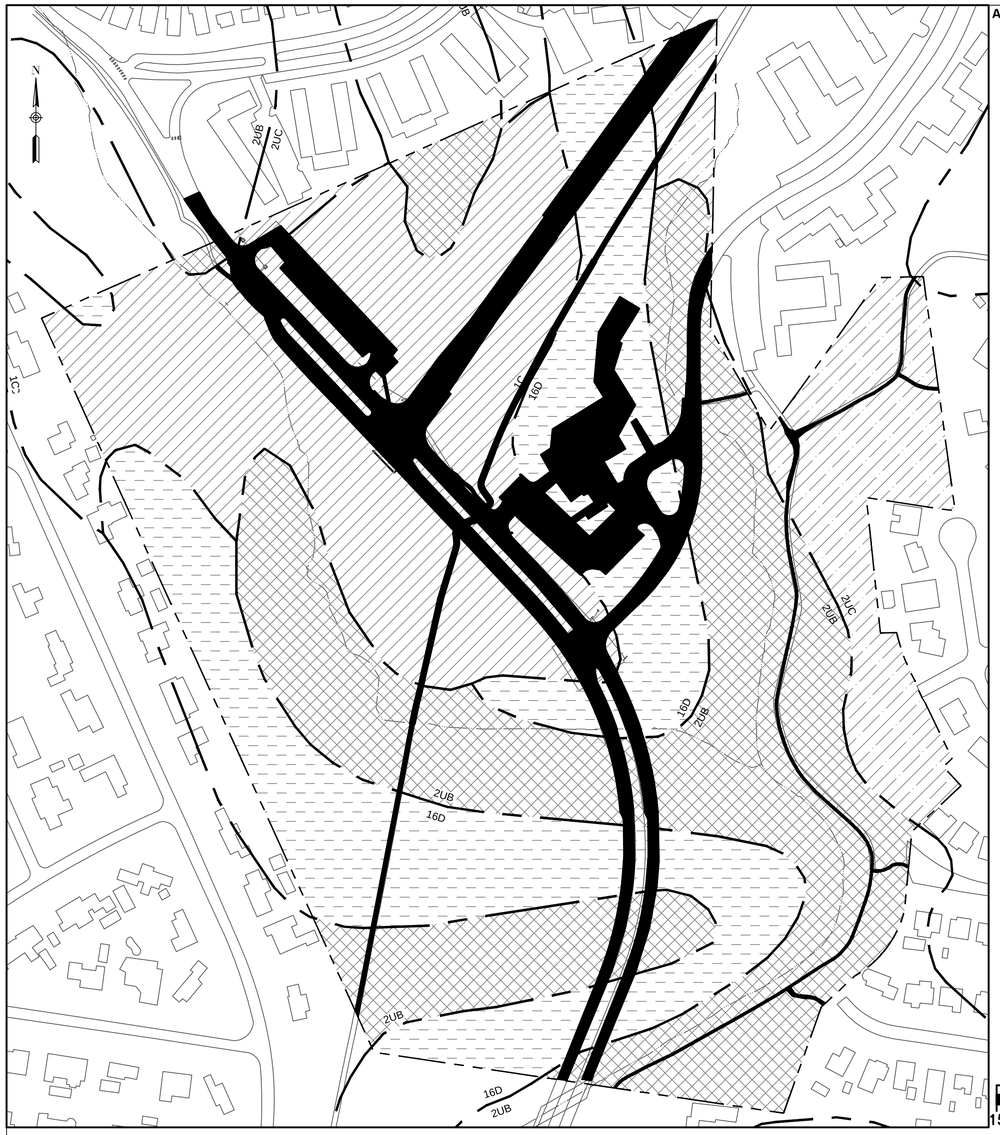

SCALE: 1"=150'

150' 0 150' 300'

A.

PROPERTY SOIL CHART					PROPERTY PE COMPUTATIONS				
MAP UNIT SYMBO	HSG RATING	AREA (SF)	AREA (AC)	% HSG	IMPERVIOUS COVER (SF)	IMPERVIOUS COVER (AC)	I	PE	WEIGHTED PE
1C	B	658720	15.12	27%	132113	3.03	20%	1.2	0.3
2UB	D	834688	19.16	34%	55686	1.28	7%	1.0	0.3
2UC	D	250537	5.75	10%	24920	0.57	10%	1.0	0.1
16D	C	686319	15.76	28%	104519	2.40	15%	1.0	0.3
	Total	2430579	55.80	100%	317238	7.28	-	-	**1.1**

LEGEND

- PROPERTY LIMITS
- SOIL DIVIDE
- EXISTING IMPERVIOUS COVER
- SOIL 1C
- SOIL 2UB
- SOIL 2UC
- SOIL 16D

SITE IMPERVIOUSNESS AND SOIL MAP NOTES:

1. THE BACKGROUND INFORMATION AND SOIL TYPES ARE OBTAINED FROM THE COUNTY GIS.
2. PERTAINING TO MONTGOMERY COUNTY WRTP-5, THE ENTIRE SITE PROPERTY WAS USED FOR DETERMINING THE Pe VALUE FOR THIS PROJECT (SEE TABLE ON THIS SHEET). THE SITE PROPERTY INCLUDES AREAS OWNED BY THE MARYLAND NATIONAL CAPITAL PARK AND PLANNING COMMISSION (MNCPPC), PORTIONS OF RIGHT OF WAY OF ADJOINING STREETS AND THE BETHESDA COMMUNITY POOL.
3. SEE ADDITIONAL COMPUTATIONS FOR ESDv ON SHEET C-201.

STATE OF MARYLAND
QUINN DORAK
No. 26334
REGISTERED
PROFESSIONAL ENGINEER
7-24-19

SITE IMPERVIOUSNESS AND SOIL MAP

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C-200

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: 1" = 150'

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

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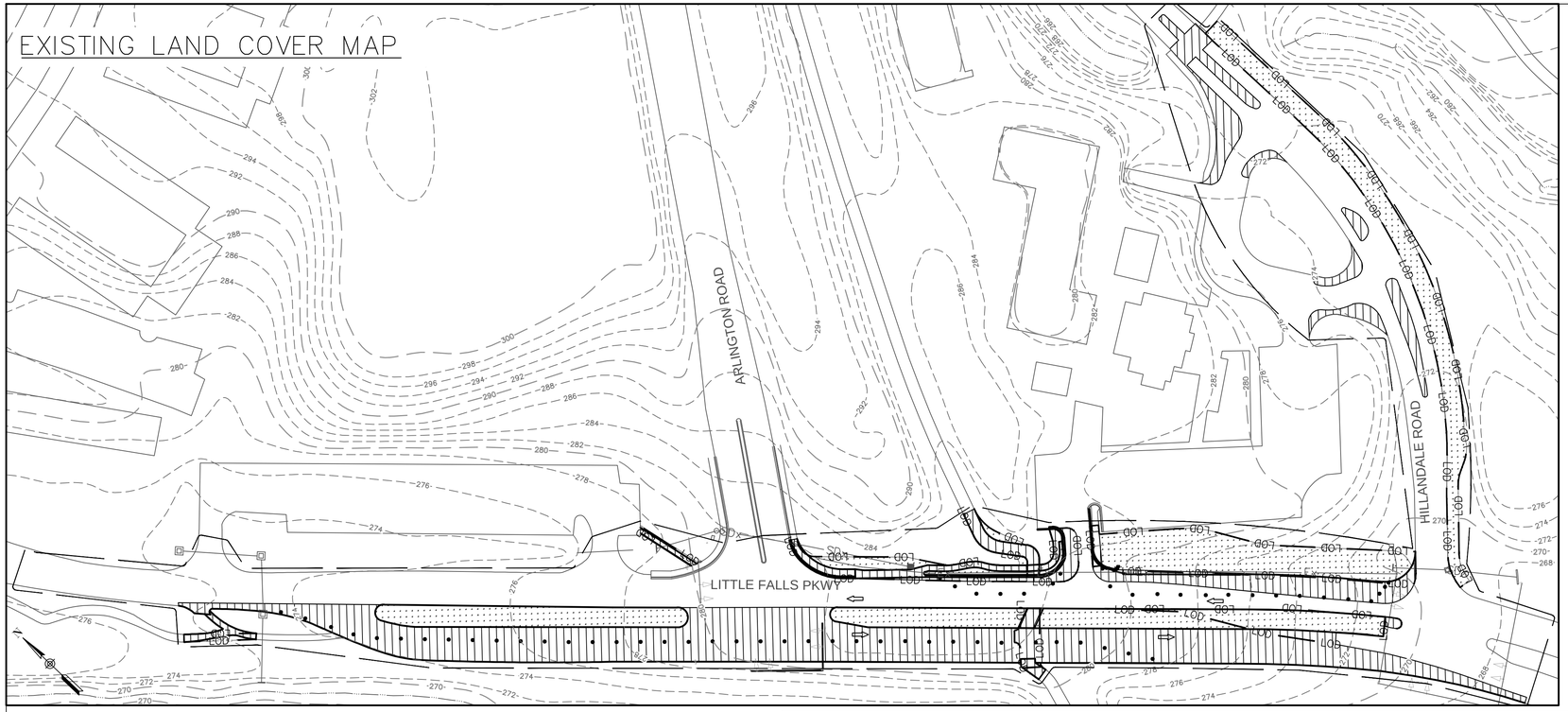
BY:

EXISTING LAND COVER MAP



LEGEND

LIMITS OF DISTURBANCE — LOD — LOD — LOD —

EXISTING IMPERVIOUS COVER

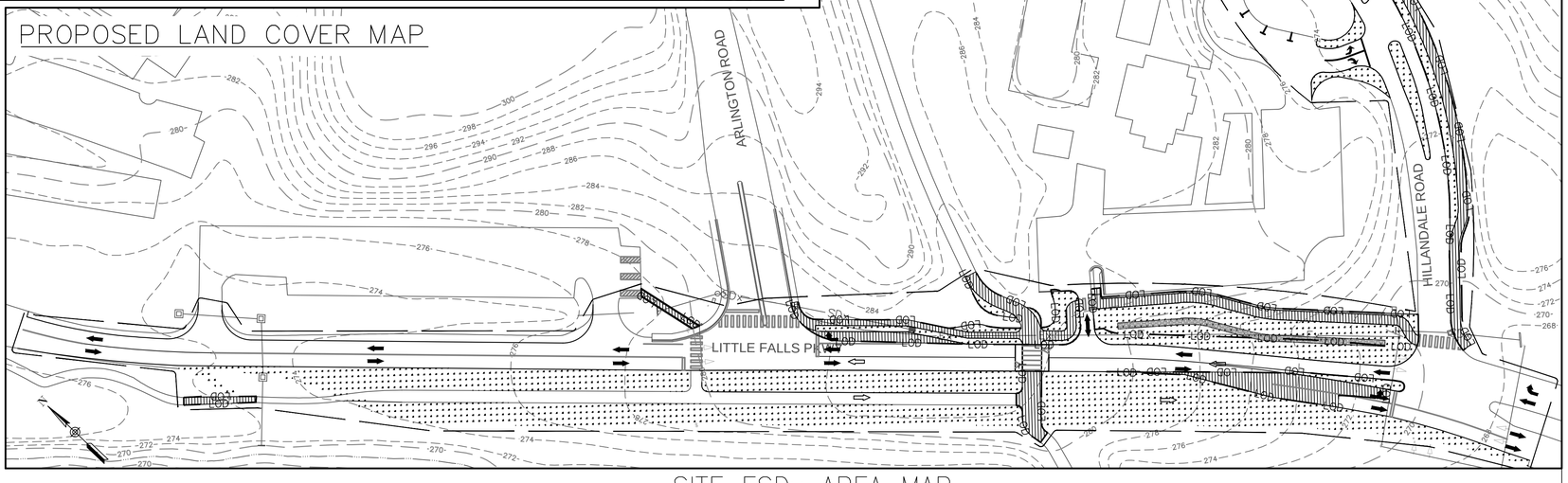
PROPOSED IMPERVIOUS COVER

PERVIOUS COVER

APPROXIMATE PROJECT LIMIT

SCALE: 1"=60'
60' 0 60' 120'

PROPOSED LAND COVER MAP



PROPOSED STORMWATER MANAGEMENT CONCEPT NARRATIVE:

THE CAPITAL CRESCENT TRAIL PROJECT AT LITTLE FALLS PARKWAY PROPOSES TO MAKE SIGNIFICANT SAFETY IMPROVEMENTS TO THE EXISTING TRAIL NETWORK THAT CROSSES AND IMPACTS LITTLE FALLS PARKWAY. IN AN EFFORT TO INCREASE SAFETY, THE PROJECT IS RECOMMENDING TO MAKE IMPROVEMENTS TO THE EXISTING ROADWAYS AND TRAILS INCLUDING THE PERMANENT REMOVAL OF TRAVELWAYS, INSTALLATION OF NEW TURN LANES, AND THE INSTALLATION OF NEW TRAILS AND ROADWAY CROSSINGS. ALL TOGETHER, THE PROJECT WILL DISTURB APPROXIMATELY 1.6 ACRES OF LAND. IT PROPOSES TO CONVERT 0.54 ACRES OF IMPERVIOUS ROADWAYS AND TRAILS TO PERVIOUS LAND FOR A NET REDUCTION OF IMPERVIOUS LAND OVER 50%.
PERTAINING TO PREVIOUS CONVERSATIONS WITH THE DEPARTMENT OF PERMITTING SERVICES (DPS), IT WAS AGREED UPON TO ONLY CONSIDER THE NEW IMPERVIOUS SURFACES AS THE LIMITS OF DISTURBANCE FOR THIS PROJECT. THE LIMITS OF MILL AND OVERLAY OF EXISTING ASPHALT AND AREAS WHERE IMPERVIOUS COVER IS CONVERTED TO GRASS AREAS ARE NOT COUNTED TOWARDS THE LOD* AREA. CONSIDERING THIS AGREEMENT A MODIFIED LOD AREA (A) OF 0.59 ACRES WAS USED FOR REQUIRED WATER QUALITY VOLUME COMPUTATIONS. A SUMMARY OF THE ESDv COMPUTATIONS IS PROVIDED IN THE TABLE BELOW.

(*) NOTE: THE LOD ONLY ACCOUNTS FOR THE AREAS WHERE; (1) NEW IMPERVIOUS COVER IS PROPOSED, (2) FULL DEPTH OF ASPHALT IS REPLACED WITH NEW ASPHALT.

B. ESDv Requirement Computations Based on LOD*

PROPOSED SITE LAND COVER TABLE

	(SF)	(AC)	% Cover
LOD* AREA (A)	25625	0.59	100%
IMP.	14045	0.32	55%
I=	55		
Rv = 0.05 + 0.009(I)	**0.54**		

ESDv = (P_{EX}RvxA)/12 (CF)

ESDv = (1.1 x 0.54 x 25625)/12 (CF)

ESDv **1276 CF**

SITE ESDv AREA MAP

STATE OF MARYLAND — DAVID QUINN — No. 26334 — REGISTERED PROFESSIONAL ENGINEER — 7-26-19

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C-201

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: 1" = 60'

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

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FILE: $$FILE$$

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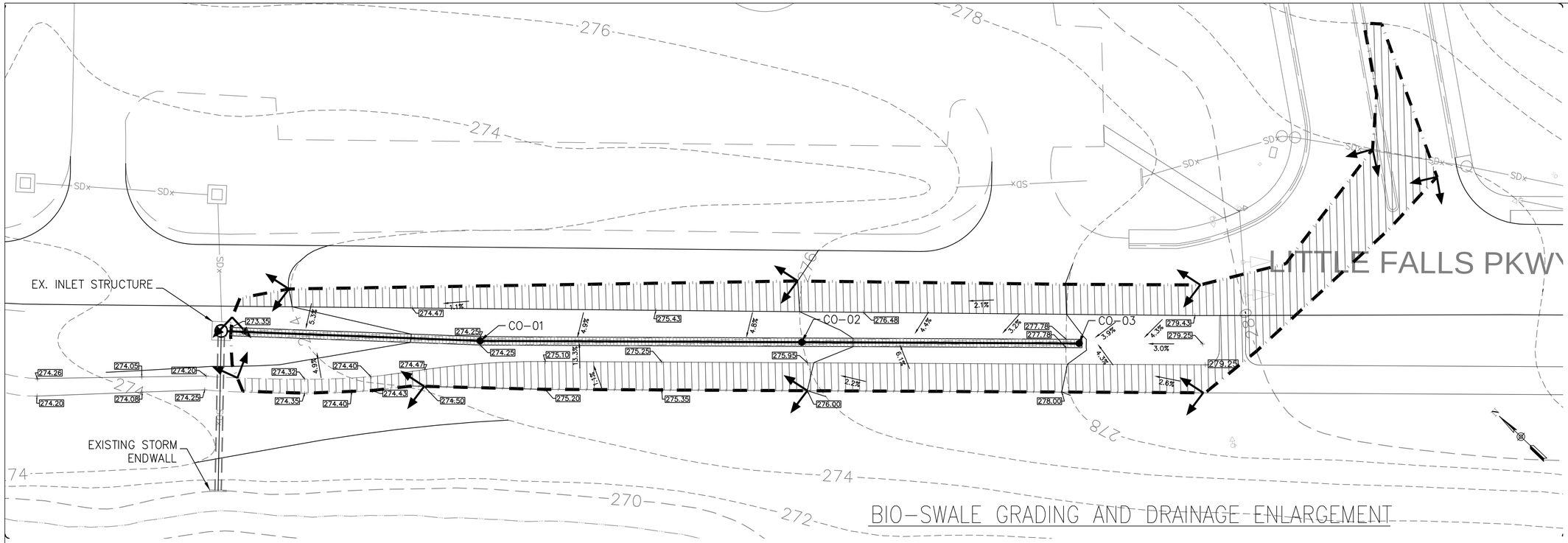
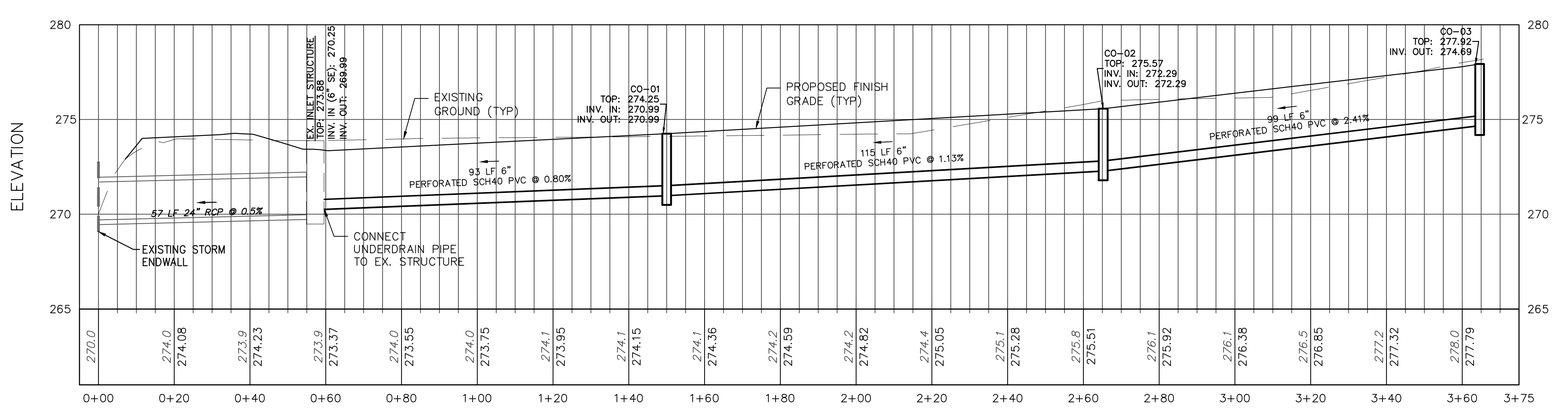
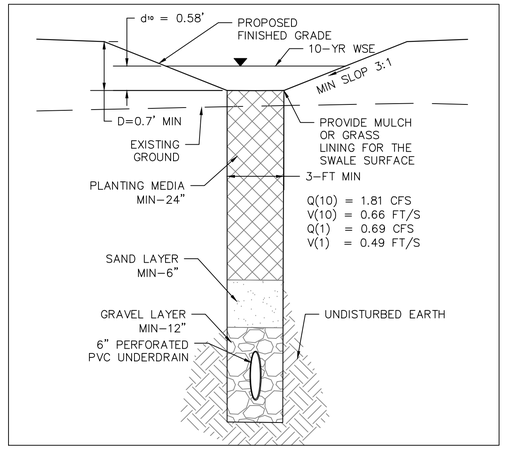




BIO-SWALE-1 DRAINAGE PROFILE

HORIZONTAL SCALE: 1"=20'
20' 0 20' 40'

VERTICAL SCALE: 1"=4'
4' 0 4' 8'



BIO-SWALE TYPICAL SECTION N.T.S

NOTE: OWNER IS RESPONSIBLE FOR ALL MAINTENANCE AND REGULAR INSPECTIONS.

LEGEND

DRAINAGE DIVIDE

TREATED IMPERVIOUS COVER

PROPOSED SPOT ELEVATION 278

Bio Swale-1 (Proposed Parraller to SB-Little Falls Parkway Before Arlington Rd.)			
Impervious Area	8980		
Total DA to Bio-Swale	15960		
I	56%	Proposed Area (SF)	915
Rv	0.56	Propoese Planting Medium Depth (Ft.)	2
Pe (MAX)	2.6	Gravel Layer Depth (Ft.)	1
Pe (MIN)	1.0	Sand Leyer Depth (Ft.)	0.5
		Void Ratio for Sand, Gravel, and Planting Medium	0.4
ESDv (MAX)	1924	**Required ESDv (CF)**	**1276**
ESDv (MIN)	740	ESDv (provided in the filter Media) (CF)	1281
		ESDv Met	**Yes**

STATE OF MARYLAND — ABDOLREZA SHARIFABADI — No. 28334 — REGISTERED PROFESSIONAL ENGINEER — 7-2-19

CONCEPT STORMWATER MANAGEMENT

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C-202

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO HILLANDALE RD

SCALE: AS SHOWN

PLOTTED: $DATETIME$
FILE: $FILE$

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

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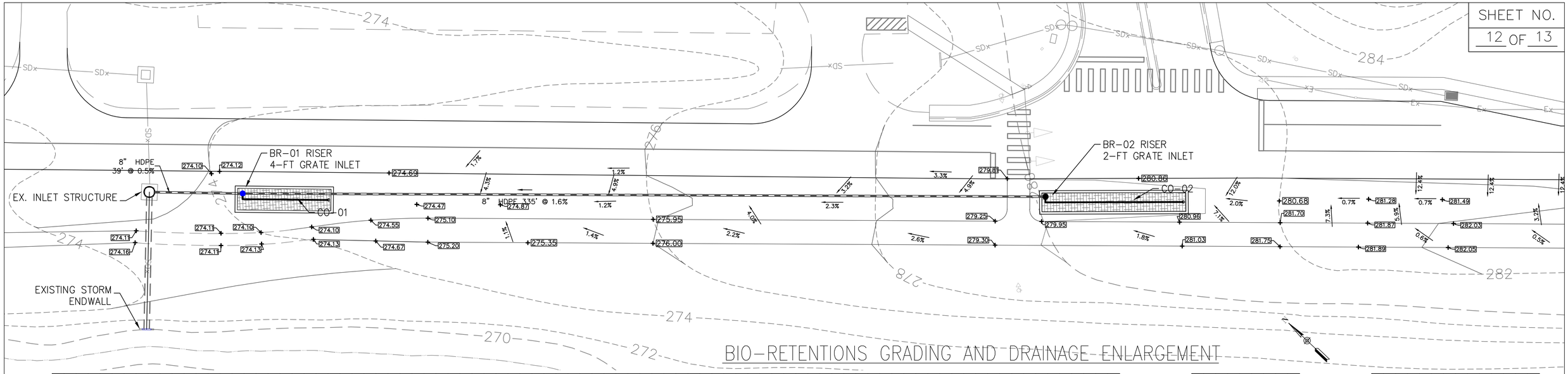
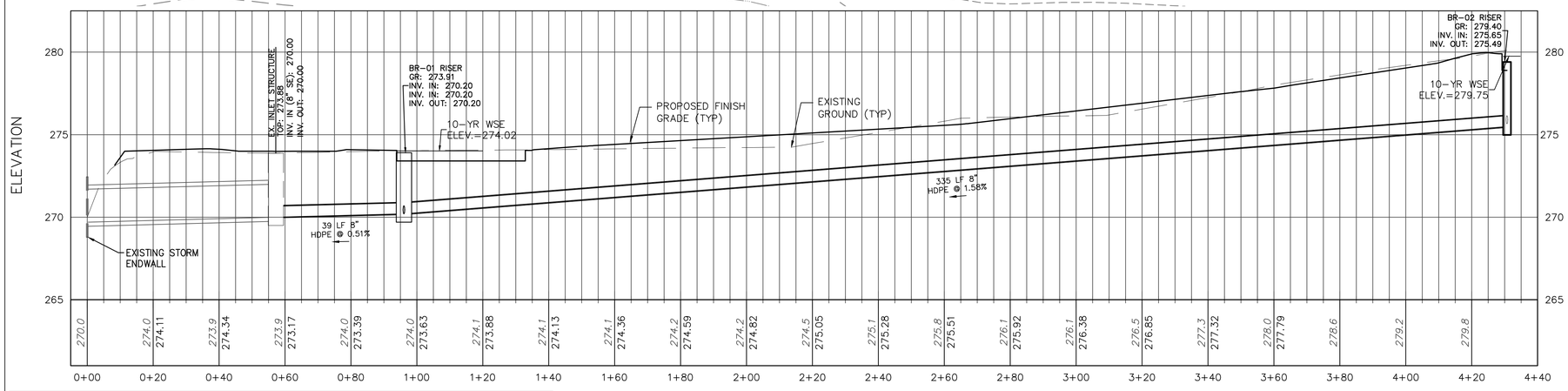
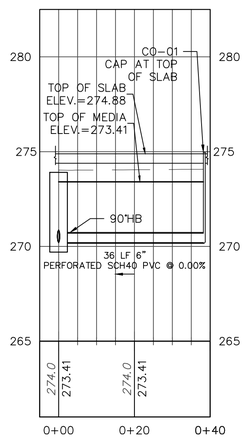


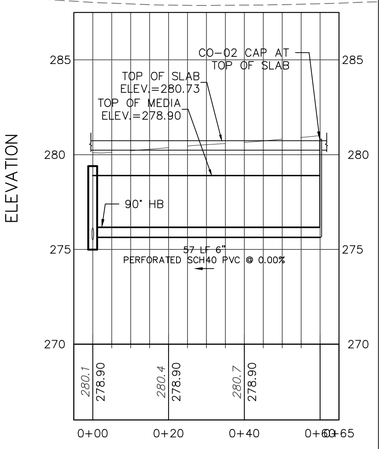
BIO-RETENTIONS GRADING AND DRAINAGE ENLARGEMENT



DRAINAGE PROFILE



BR-01 DRAINAGE PROFILE



BR-02 DRAINAGE PROFILE

BIO-RETENTION BR-01			
Impervious Area	6890		
Total DA-1	13450	Proposed Area (SF)	312
I	51%	Ponding depth	0.5
Rv	0.51	Propoese Planting Medium Depth (Ft.)	2
Pe (MAX)	2.6	Gravel Layer Depth (Ft.)	1
Pe (MIN)	1.0	Sand Leyer Depth (Ft.)	0.5
		Void Ratio for Sand, Gravel, and Planting Medium	0.4
ESDv (MAX)	1489		
ESDv (MIN)	573	ESDv (provided in the filter Media) (CF)	593
BIO-RETENTION BR-02			
Impervious Area	10848		
Total DA-2	16125	Proposed Area (SF)	468
I	67%	Ponding depth	0.5
Rv	0.66	Propoese Planting Medium Depth (Ft.)	2
Pe (MAX)	2.6	Gravel Layer Depth (Ft.)	1
Pe (MIN)	1.0	Sand Leyer Depth (Ft.)	0.5
		Void Ratio for Sand, Gravel, and Planting Medium	0.4
ESDv (MAX)	2290		
ESDv (MIN)	881	ESDv (provided in the filter Media) (CF)	889
		Required ESDv (CF)	**1276**
		Total ESDv Provided	1482
		ESDv Met	**Yes**

NOTE: OWNER IS RESPONSIBLE FOR ALL MAINTENANCE AND REGULAR INSPECTIONS.

LEGEND

PROPOSED SPOT ELEVATION 279

STATE OF MARYLAND — JOSEPH M. QUINN — No. 26334 — REGISTERED PROFESSIONAL ENGINEER — 3-28-19

CONCEPT STORMWATER MANAGEMENT (ALTERNATIVE)

VERTICAL SCALE: 1"=4' (4' 0 4' 8')

HORIZONTAL SCALE: 1"=20' (20' 0 20' 40')

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C-203

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: AS SHOWN

PLOTTED: $DATETIME$
FILE: $FILE$

THE MARYLAND-NATIONAL CAPITAL
Park and Planning Commission

SABRA & ASSOCIATES, INC.

ALPHA CORPORATION
21351 RIDGETOP CIRCLE
SUITE 200
DULLES, VA. 20166
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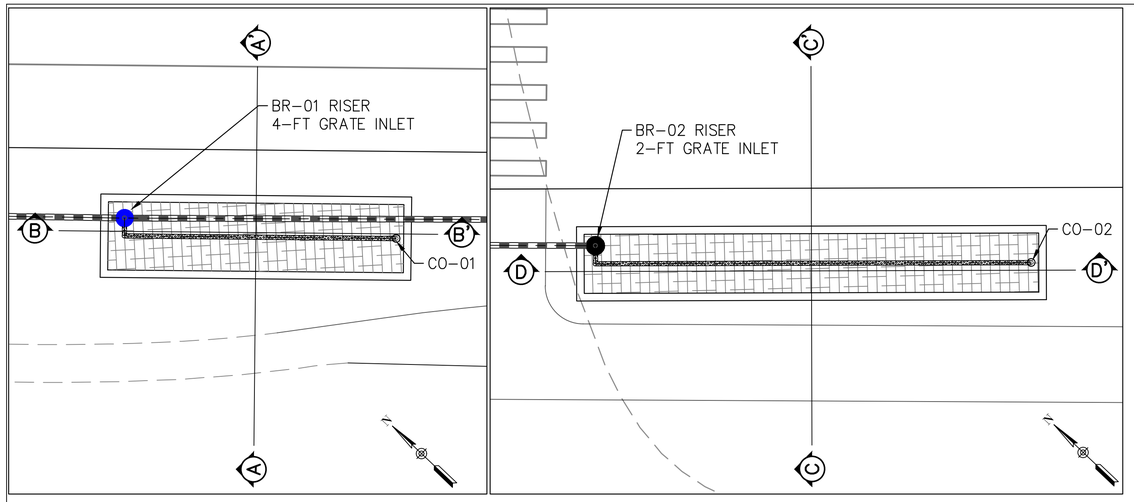
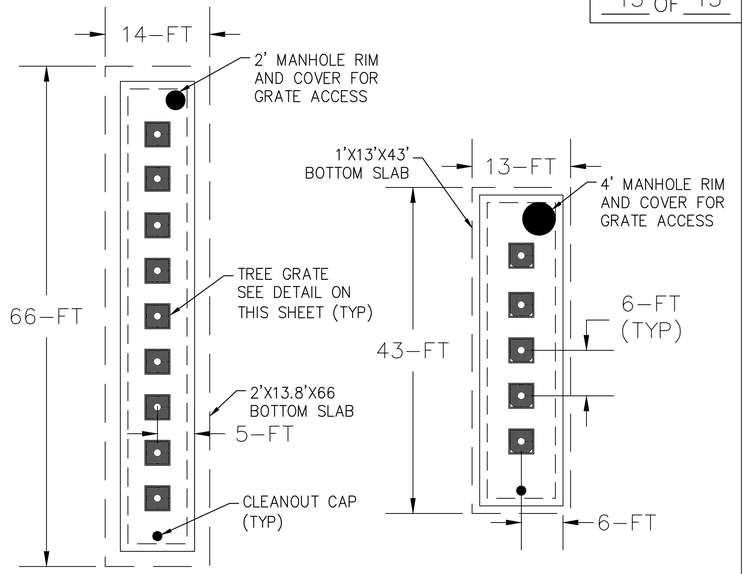
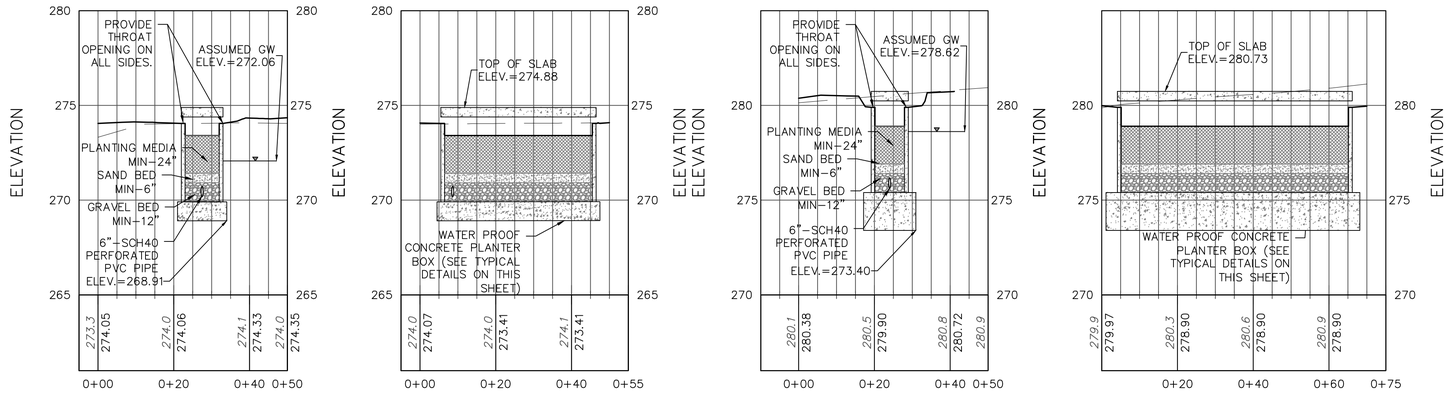


BIO-RETENTION ENLARGEMENT 1"=10'

STRUCTURE INFORMATION		
DIMENSIONS	**BIO-RETENTION BR-01**	**BIO-RETENTION BR-02**
PLANTER BOX SIZES (FT)		
WALL THICKNESS	1	1
WIDTH	9	7.8
LENGTH	39	60
TOP SLAB SIZES (FT)		
THICKNESS	1	1
WIDTH	11	9.8
LENGTH	41	62
BASE SLAB SIZES (FT)		
THICKNESS	1	2
WIDTH	13	13.8
LENGTH	43	66
CONCRETE VOLUME (CF)	1361	2897
WEIGHT GRATES AND COVER(LBS.)	800	900
WEIGHT OF STRUCTURE (LBS.)	204950	435480
BACKFILL AND SLIDING RESISTANCE FORCES		
ASSUMED BACKFILL γ_{SUB}	70	70
BURIED STRUCTURAL PERIMETER (FT)	104	144
P (LBS./FT)	306	306
SLIDING RESISTANCE (LBS.)	9558	13197
WEIGHT SOIL (LBS.)	31374	66856
BOX BOTTOM ELEV.	268.9	273.4
ASSUMED GW ELEV.	272.1	278.6
SUBMERGED DEPTH	3.1	5.2
BUOYANCY ANALYSIS RESULTS		
TOTAL RESISTING FORCES (LB.)	245882	515533
BUOYANT FORCE (LB.)	88649	197154
F.S. MIN 2.0	**2.8**	**2.6**



BIO-RETENTION PLAN DETAIL 1"=10'

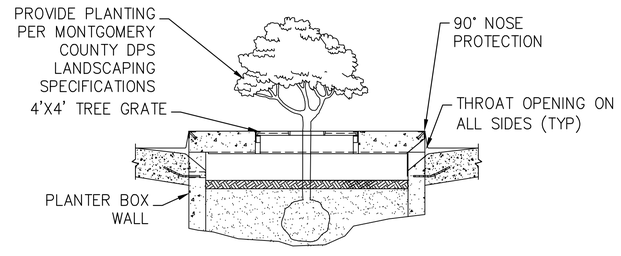


NOTE: OWNER IS RESPONSIBLE FOR ALL MAINTENANCE AND REGULAR INSPECTIONS.

BIO-RETENTION SECTION PROFILES

VERTICAL SCALE: 1"=4'
4' 0 4' 8'

HORIZONTAL SCALE: 1"=20'
20' 0 20' 40'



BIO-RETENTION TREE GRATE SECTION N.T.S

BIO-RETENTION PLANTER BOX DETAILS

STATE OF MARYLAND — DAVID QUINN — No. 28334 — REGISTERED PROFESSIONAL ENGINEER

NO.	REVISION	BY	APP'D	DATE

DESIGNED BY: S. ABDSHARIFABADI	DATE 03/27/2019
DRAWN BY: S. ABDSHARIFABADI	DATE 03/27/2019
CHECKED BY: D. QUINN	DATE 03/27/2019
DRAWING NO.:	C-204

Approved: _____
Chief, Traffic Engineering and Operations

Reviewed: _____
Manager, Transportation Systems Engineering

Reviewed: _____
Manager, Traffic Control and Lighting Engineering

Recommended: _____
Engineer, Transportation Systems Engineering

DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS
MONTGOMERY COUNTY, MARYLAND

CAPITAL CRESCENT TRAIL CROSSING
AT LITTLE FALLS PARKWAY
PED CROSSING IMPROVEMENT PLAN
FROM ARLINGTON RD TO
HILLANDALE RD

SCALE: AS SHOWN

THE MARYLAND-NATIONAL CAPITAL
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DULLES, VA. 20166
(703) 450-0800
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