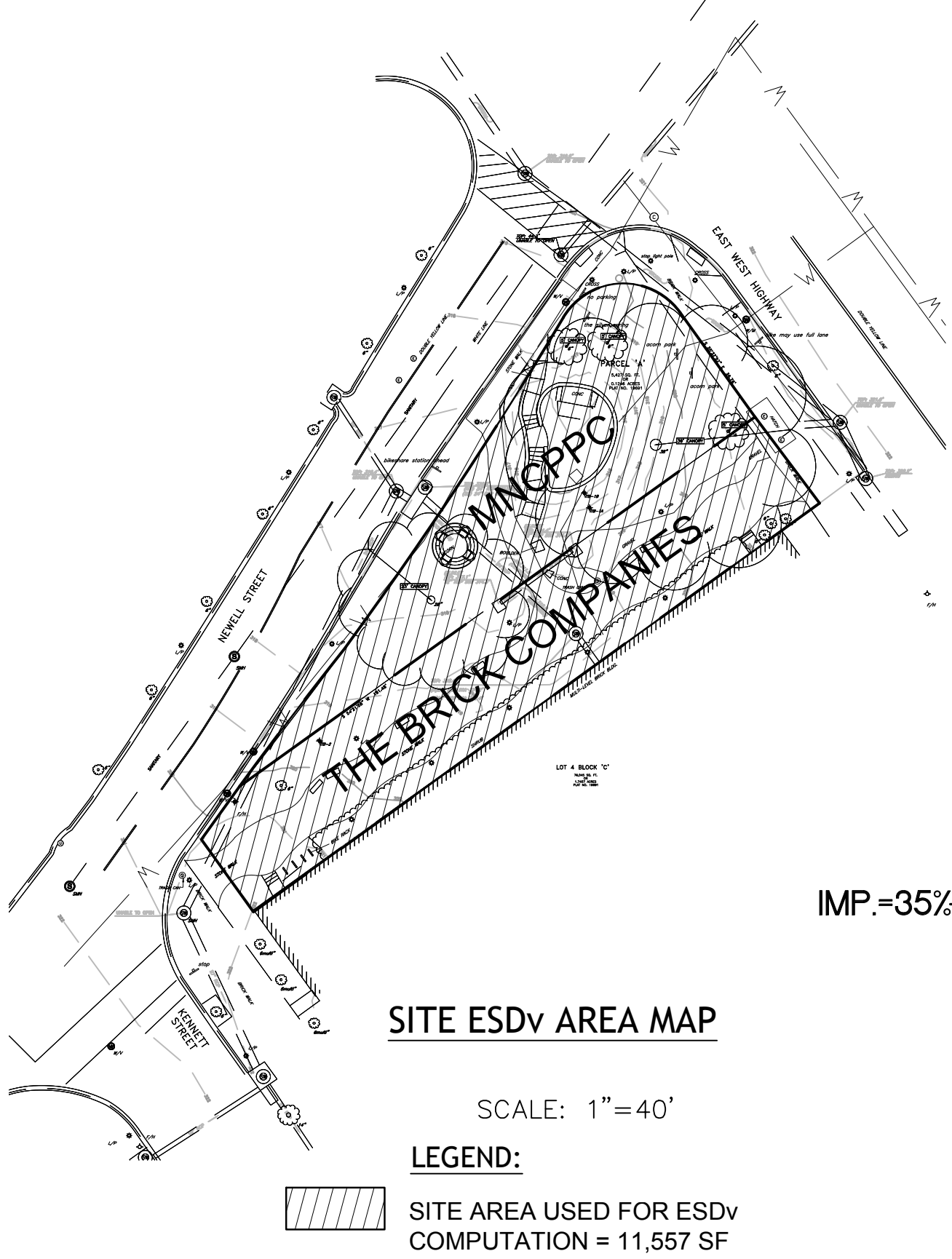




WATER RESOURCES TECHNICAL POLICY

WRTP-5

COMPUTATION OF REQUIRED ESD VOLUME

- The goal of the current stormwater management approach is to modify the developed runoff characteristics of a project in such a way that the property hydrology emulates "woods in good condition" after development. This is accomplished through the use of ESD practices, and requires the computation of an ESD target volume.
- When analyzing a project to determine the required ESD target volume, a P_E must first be determined. P_E is based on the developed impervious area, including existing and proposed imperviousness. The entire area of the property must be used to determine the P_E . When a property has more than one major drainage area (study point), each must be analyzed separately. Off-site areas are not included in P_E determination.
- Apply this average P_E to the proposed disturbed area to arrive at the total required ESD volume for the new improvements. (R_v is based on the disturbed area, not on the total area to the study point.) In some cases, such as for some construction on existing family lots, the disturbed area may extend beyond the property line to include driveways or other necessary disturbance.

Hydrologic Soil Group D										
%I	RCN*	$P_E = 1"$	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"	2.4"	2.6"
0%	80									
5%	81									
10%	82									
15%	83									
20%	84									
25%	85									
30%	85	78								
35%	85	78	77	77						
40%	86	79	78	79						
45%	87	82	81	79	77					
50%	88	82	81	79	78					
55%	89	83	82	80	78					
60%	90	84	82	80	78					
65%	91	85	83	81	78					
70%	92	85	83	81	78					
75%	93	86	84	81	78					
80%	94	86	84	82	79					
85%	95	86	84	82	79					
90%	96	87	84	82	79	77				
95%	97	88	85	82	80	78				
100%	98	89	86	83	80	78	77			

Cp, Addressed (RCN = Woods in Good Condition)

RCN Applied to Cp, Calculations

SWM COMPUTATIONS:

REQUIRED ESD VOLUME:

PER MONTGOMERY COUNTY DEPARTMENT OF PERMITTING SERVICES WATER RESOURCES TECHNICAL POLICY WRTP-5:

A. ENTIRE SITE AREA HSG "D" DATA:

ENTIRE SITE HSG "D" AREA	=	11,557 SF
ENTIRE SITE HSG "D" IMP. AREA	=	4,101 SF
ENTIRE SITE HSG "D" % IMPERVIOUSNESS (I)	=	35%
ENTIRE SITE HSG "D" P_E (SEE TABLE THIS SHEET)	=	1.6"

B. DISTURBED AREA DATA:

DISTURBED AREA (LOD)	=	9626 SF
DISTURBED IMP. AREA	=	4000 SF
DISTURBED % IMPERVIOUSNESS (I)	=	42%
$R_v = 0.05 + 0.009(I) = 0.05 + 0.009(32)$	=	0.42

PER MONTGOMERY COUNTY DEPARTMENT OF PERMITTING SERVICES WATER RESOURCES TECHNICAL POLICY WRTP-5:

$$ESD_v = (P_E \times R_v \times A) / 12$$

$$ESD_v = (1.6" \times 0.42 \times 9,626 \text{ SF}) / 12$$

$$ESD_v = 544 \text{ CF}$$

PROPOSED BMP FACILITIES VOLUMES:

BIORETENTION BR-1-1:

PROPOSED BIORETENTION AREA	=	61 SF
PROPOSED PONDING DEPTH	=	0.5 FT
PROPOSED PLANTING SOIL DEPTH	=	2 FT
PROPOSED SAND	=	0.5 FT
PROPOSED STONE LAYER	=	1 FT
VOID RATIO OF SAND, STONE, AND PLANTING SOIL	=	0.4 FT

STORAGE VOLUME PROVIDED

116 CF

PLAYGROUND INFILTRATION PI-1

PROPOSED PLAYGROUND INFILTRATION AREA	=	512 SF
PROPOSED SAND DEPTH	=	0.5 FT
PROPOSED STONE LAYER DEPTH	=	0.5 FT
VOID RATIO OF SAND AND STONE*	=	0.4

STORAGE VOLUME PROVIDED

205 CF

*NOTE: PLAYGROUND INFILTRATION IS NON-VEHICULAR AREA

BIORETENTION BR-1-2:

PROPOSED BIORETENTION AREA	=	108 SF
PROPOSED PONDING DEPTH	=	0.67 FT
PROPOSED PLANTING SOIL DEPTH	=	2 FT
PROPOSED SAND	=	0.5 FT
PROPOSED STONE LAYER	=	1 FT
VOID RATIO OF SAND, STONE, AND PLANTING SOIL	=	0.4 FT

STORAGE VOLUME PROVIDED

224 CF

PROPOSED SITE ESDv SUMMARY CHART:

Facility Designation:	Type:	Contributing Drainage Area (SF)	Contributing Impervious Area (SF)	R_v	min. ESDv (CF)	max. ESDv (CF)	Upstream ESDv Treatment (CF)	ESDv Achieved
BR-1-1	MICROBIORETENTION	4312	1,824	0.43	155	402	0	116
BR-1-2	MICROBIORETENTION	5,390	2,280	0.43	193	503	116	224
PI-1	PLAYGROUND INFILTRATION	1,720	1,459	0.81	117	303	0	205
							TOTAL	545

SUMMARY:

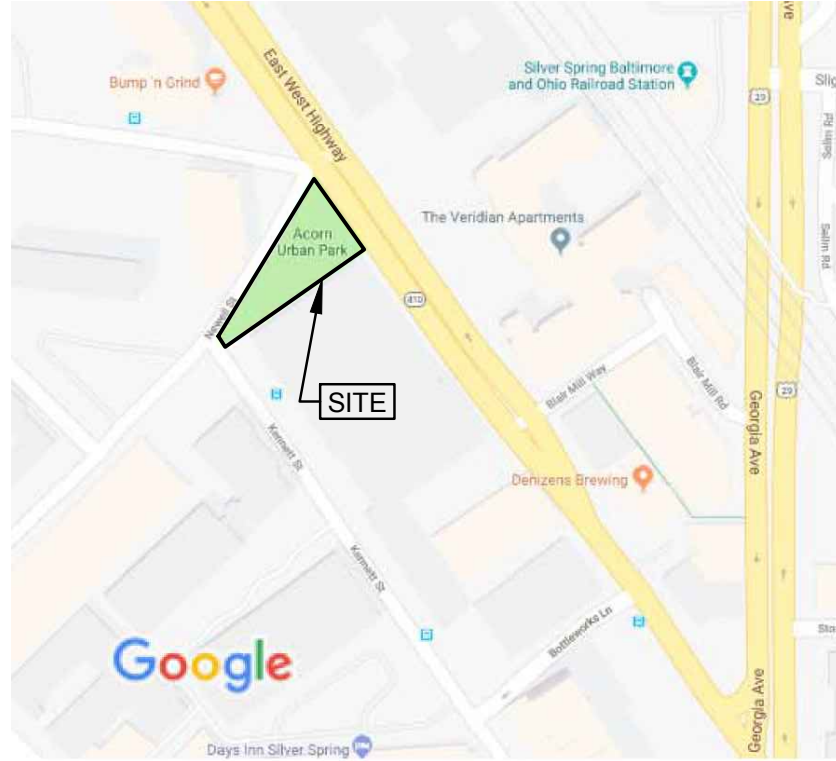
REQUIRED ESDv:

544 CF

PROVIDED ESDv:

545 CF

ACORN URBAN PARK SWM CONCEPT DRAWINGS:



VICINITY MAP
NOT TO SCALE

INDEX OF DRAWINGS:

SWM CONCEPT #	SHEET #	
1 OF 3	C0.01	SWM COMPUTATIONS AND SOILS MAP
2 OF 3	C3.00	STORMWATER CONCEPT PLAN
3 OF 3	C3.01	STORMWATER MANAGEMENT DETAILS

SWM Concept Summary Table	
SM#	283958
Type of Concept:	Concept / Site Development
MNCP&PC:	Acorn Urban Park
Property Address:	1190 East-West Highway
Property Legal Description:	Plat No. 19691 Parcel 'A', Block C
	Plat No. 19691 Lot 4, Block C
Property Size (ac./sq.ft.):	1.89 ac.
Total Concept Area (ac./sq.ft.):	0.22 ac.
Zoning:	CR-3.0 C-2.0 R-2.75 H-90 T
Watershed and Stream Class:	Rock Creek Use-I
Special Protection Area:	No
100 YR Floodplain:	No
Redevelopment or New Development:	Redevelopment
Target P_E /Proposed P_E :	1.6/1.6
Target ESDv/Provided ESDv:	544 / 545
ESD Measures:	Bioretention, Playground Infiltration
Structural Storage Required/Provided:	No
Structural Measures:	No
Waiver Request/QL/QN/Both:	N/A
Provided ESDv + Structural Storage Provided + Requested to be Waived =	N/A
Other Information:	

updated 6/5/2018

PROPOSED WATER RESOURCE IMPROVEMENTS:

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

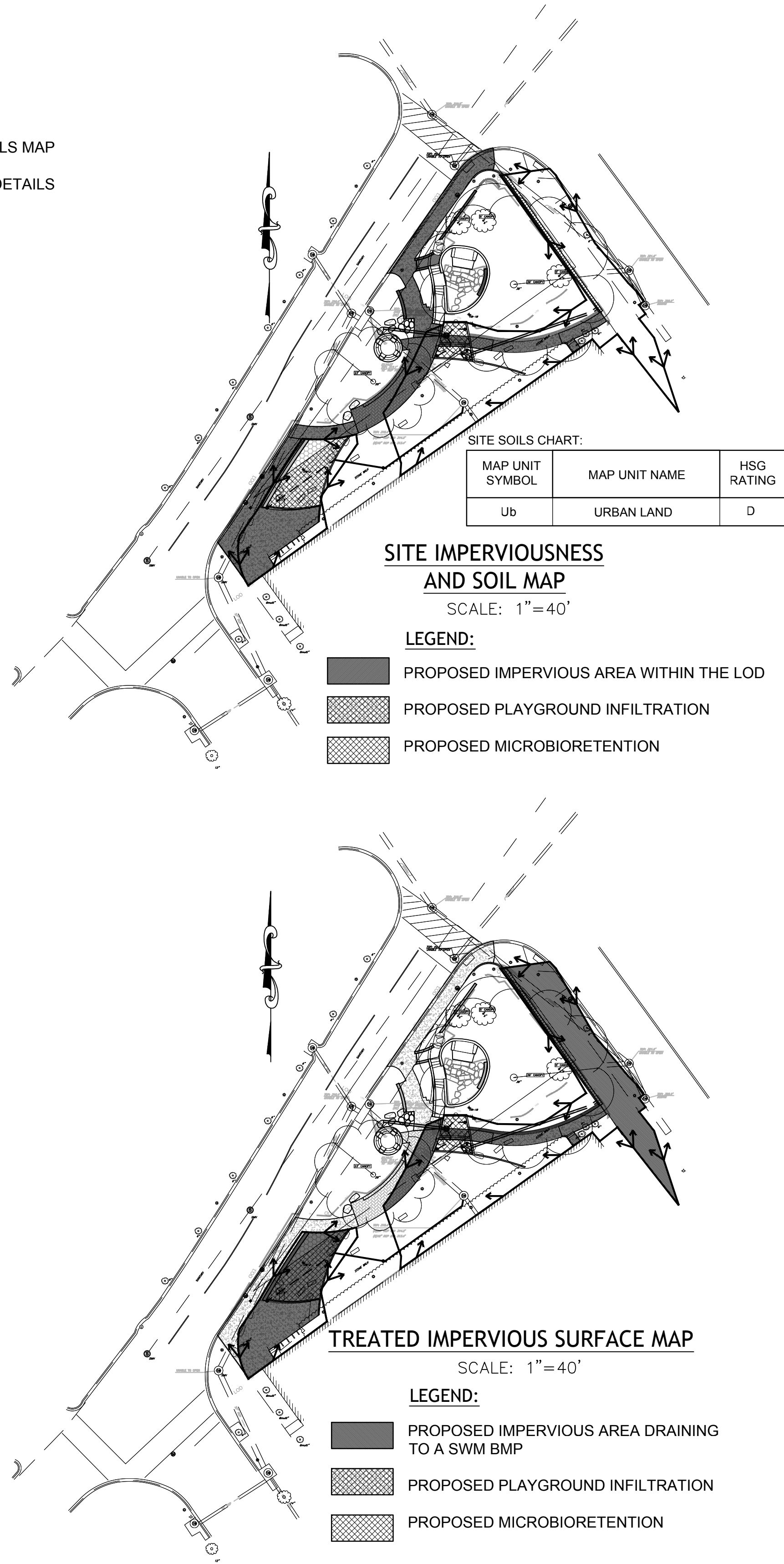
PROPOSED WATER RESOURCE IMPROVEMENTS INVOLVE DIVERSION OF MD-410 RUNOFF FROM THE SPRING GROTTTO, RUNOFF CONTROL / EROSION IMPROVEMENTS, AND ENVIRONMENTAL SITE DESIGN I.E. MICROBIORETENTION AND PLAYGROUND INFILTRATION UNDER THE ENGINEERED WOOD FIBER (EWF) PLAYGROUND - BASED ON PERMEABLE PAVEMENT DESIGN STANDARDS.

THREE STORMWATER MANAGEMENT PRACTICES ARE PROPOSED, TO INCLUDE ONE LANDSCAPE INFILTRATION AND TWO MICROBIORETENTION CELLS. INFILTRATION RATE IS 0.66 IN/HR IN THE VICINITY OF THE PERMEABLE PLAYGROUND (SEE INFILTRATION TEST BORING ITB-2) AND 0.27 AND 0.06 IN/HR (TWO TESTS - ITB-1A AND ITB-1B) IN THE VICINITY OF THE MICROBIORETENTIONS. THE MICROBIORETENTIONS ARE PROPOSED TO BE IN SERIES; RUNOFF FROM THE MD-410 SIDEWALK IS TO BE COLLECTED WITH A TRENCH DRAIN TO DISCHARGE TO THE UPPER CELL WHICH WILL OVER-FLOW TO THE LOWER CELL OVER A WEIR WALL.

COLLECTION OF SITE RUNOFF BY INLET(S) AT THE CENTER OF THE SITE IS TO BE MAINTAINED VIA RETENTION OF THE EXISTING INLET(S) OR BY ADDING NEW AND CONNECTING TO THE EXISTING DRAINAGE SYSTEM ON THE SITE WHICH DISCHARGES TO THE BACK OF THE SUMP INLET ON NEWELL STREET WHICH EMPTIES TO THE TRUNK DRAIN IN THE STREET. UNDER-DRAINS FOR THE TWO BIORETENTIONS WILL CONNECT TO THE EXISTING DRAINAGE SYSTEM ON SITE. THE EWF LANDSCAPE INFILTRATION WILL NOT REQUIRE AN UNDER-DRAIN SINCE IT HAS 0.66 INCHES PER HOUR INFILTRATION RATE.

USE OF PERMEABLE PAVEMENTS WILL BE CONSIDERED IN THE SITE DESIGN OVER AREAS WHICH DO NOT HAVE SUFFICIENT INFILTRATION RESULTS (DUE TO TEST FINDINGS OR WHERE NO TEST HAS BEEN PERFORMED. UN-QUALIFIED PERMEABLE PAVEMENTS WILL NOT BE ACCOUNTED FOR IN THE COMPUTATIONS, BUT SHOULD HELP MAINTAIN PRE-DEVELOPMENT HYDROLOGY AND PROMOTE TREE HEALTH.

SITE GRADES WILL BE MODERATELY FLATTER IN THE PROPOSED CONDITION. THE EXISTING SUMP AREA WITH THE INLETS WILL BE RAISED AND CONVERTED TO BIORETENTION AREA.



TREATED IMPERVIOUS SURFACE MAP

SCALE: 1"=40'

LEGEND:

- PROPOSED IMPERVIOUS AREA DRAINING TO A SWM BMP
- PROPOSED PLAYGROUND INFILTRATION
- PROPOSED MICROBIORETENTION

DESIGN		
Designer's Name		
Address		
City/State/Zip		
Telephone Number		

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.

License No. _____

Expiration Date _____

PROFESSIONAL STAMP



The Maryland-National Capital Park and Planning Commission

Montgomery County Department of Parks
9500 Brunett Avenue
Silver Spring, Maryland 20901
(301) 495-2535

REVIEW AND APPROVAL

Project Manager	Date
Construction Manager	Date
Park Manager	Date

ISSUED FOR PROCUREMENT ON _____

REVISIONS

Rev. No.	Date	Description

STORMWATER MANAGMENT COMPUTATIONS AND SOILS MAP
Stormwater Management Concept
Acorn Urban Park
1190 East-West Hwy, Silver Spring, Maryland, 20910

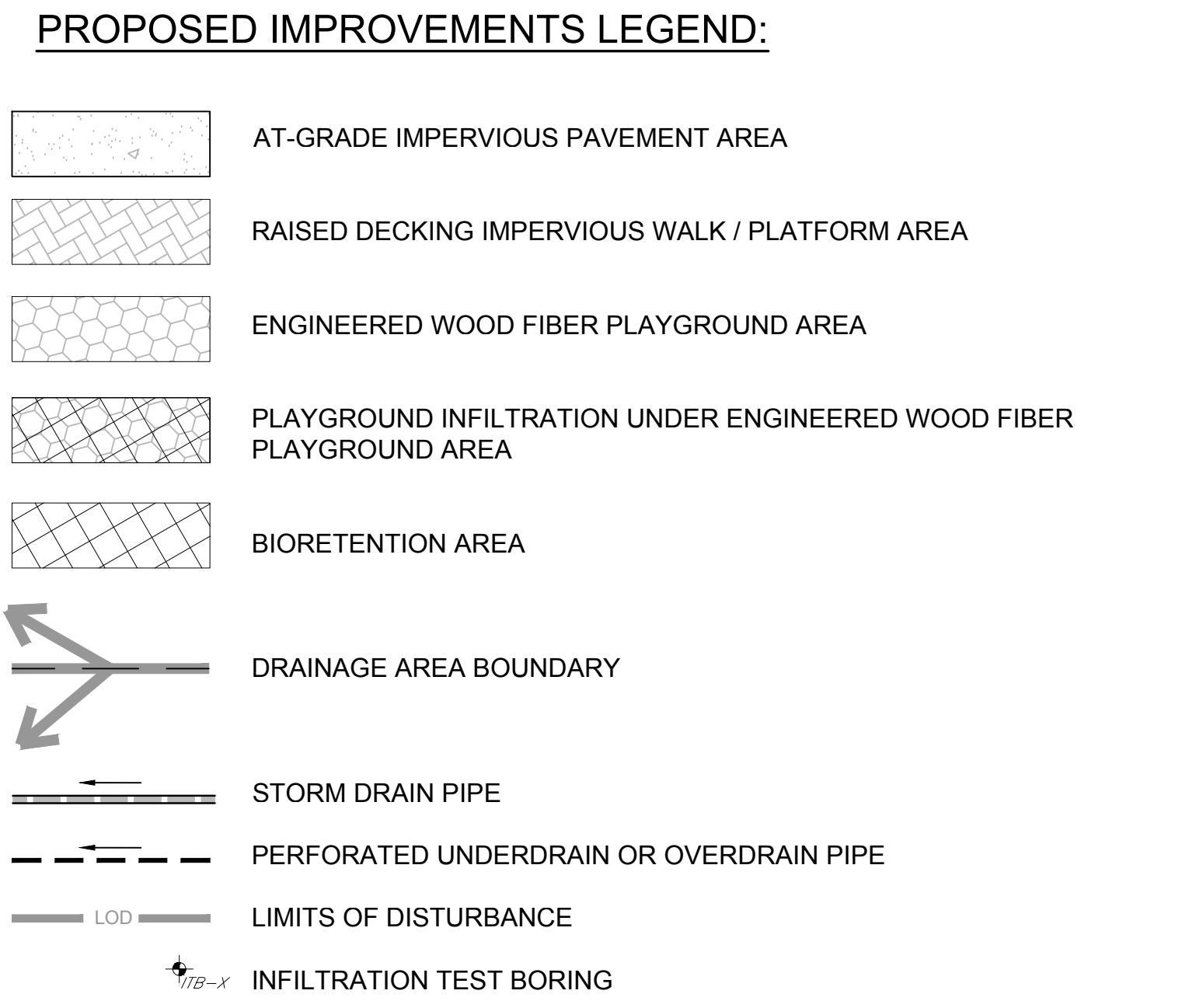
SCALE: AS SHOWN Liber 14771 Folio 0531

Date: **08/14/2018**

DWG. # **C-0.01**

SHT. # **1** of **3**

DPS# _____ of _____



ACORN URBAN PARK (THE SITE) IS LOCATED IN DOWNTOWN SILVER SPRING, MD ON THE WEST SIDE OF EAST-WEST HIGHWAY (MD-410). THE SITE IS BOUND BY NEWELL STREET TO THE WEST, KENNETT STREET TO THE SOUTHWEST, AN OFFICE BUILDING TO THE SOUTHEAST AND MD-410 TO THE EAST/NORTHEAST.

EXISTING AMENITIES AND SITE CONDITIONS INCLUDE THE PHYSICAL SPRING WHICH THE CITY OF SILVER SPRING IS NAMED AFTER, AN ACORN SHAPED GAZEBO, AND TREES INCLUDING TWO LARGE CANOPY TREES (28" AND 38" DBH). ALSO CURRENTLY ON THE SITE IS A VARIABLE WIDTH SIDEWALK BETWEEN 10 AND 16 FEET WIDE TRAVERSING THE SOUTHEAST SIDE OF THE SITE, PARK BENCHES, AND LIGHTING. SIDEWALKS ALONG SITE FRONTAGE INCLUDES A 13' WIDE WALK ALONG MD-410, A 15' WIDE WALK ALONG KENNETT STREET AND A 6' WIDE WALK ALONG NEWELL STREET AT THE NORTHWEST CORNER OF THE SITE ONLY.

THE SPRING HAS NOT BEEN ACTIVE SINCE NEARBY DEVELOPMENT CUT OFF THE FLOW. THE SPRING IS IN A STONE GROTTO BUILT AROUND THE SPRING SUMP WITH AN APPROXIMATELY 4' TALL WALL AND STEPS TO ACCESS THE AREA. AN EXISTING FOUNTAIN PUMP IN THE SPRING GROTTO HAS BEEN DE-COMMISSIONED.

EXISTING UTILITIES ON THE SITE INCLUDE WATER SUPPLY TO THE PUMP AND OFFICE BUILDING, ELECTRIC SUPPLY TO THE SITE LIGHTING AND THE PUMP, AND A STORM DRAIN RUNNING FROM THE OFFICE BUILDING TO AN INLET ON NEWELL STREET. TWO INLETS IN THE PARK EMPTY INTO THIS LINE. ADDITIONAL UTILITIES IN THE RIGHT OF WAY INCLUDE SANITARY AND STORM SEWER MAINS IN THE STREET AND A WATER MAIN UNDER THE SIDEWALK ALONG NEWELL STREET. UTILITIES ALONG MD-410 INCLUDE A STORM DRAIN MAIN TRAVERSING FROM THE STREET TO UNDER THE SIDEWALK, AN ELECTRIC MAIN WITH A VAULT AND A TELECOMMUNICATIONS LINE UNDER THE SIDEWALK, AND A WATER MAIN ALONG THE EAST SIDE OF MD-410.

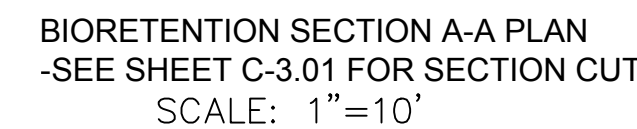
THE SITE PROPERTY INCLUDES AREAS OWNED BY THE MARYLAND NATIONAL CAPITAL PARK AND PLANNING COMMISSION (MNCPPC). PORTIONS OF RIGHTS OF WAY OF ADJOINING STREETS AND AN APPROXIMATELY 31' WIDE AREA ADJACENT TO THE BUILDING WHICH IS PART OF THE PROPERTY THAT THE OFFICE BUILDING IS LOCATED ON. THESE PROPERTIES ARE DOCUMENTED ON PLAT No. 19691 TITLED "LOT 4 & PARCEL 'A', BLOCK 'C', SILVER SPRING, 13TH ELECTION DISTRICT, MONTGOMERY COUNTY, MARYLAND."

EXISTING SITE TOPOGRAPHY AND DRAINAGE DIRECTS WATER PRIMARILY TO THE SUMP INLET AT NEWELL STREET WHILE A PORTION OF RUNOFF WILL END UP IN THE SPRING GROTTA SUMP. NEWELL STREET SLOPES DOWNWARD TOWARDS THE SUMP INLET AT 4% FROM BOTH THE SOUTHWEST AND NORTHEAST. SITE SLOPES ON THE SOUTHWEST ARE A SIMILAR 4%, BUT THE NORTHWEST PORTION OF THE SITE INCLUDES THE SPRING AREA WHICH SLOPES DOWN TO THE GROTTA WALL AT 4:1 (25%).

DRAINAGE AT THE NORTHEAST PORTION OF THE SITE HAS BEEN AN EROSION PROBLEM LEADING TO SEDIMENTATION IN THE GROTTO DUE TO THESE HIGH SLOPES AND WATER RUNNING OFF FROM THE MD-410 SIDEWALK BACK INTO THE SITE. EROSION AND SEDIMENT CONTROL MEASURES HAVE BEEN IMPLEMENTED INCLUDING A GRAVEL DRAINAGE CHANNEL AND EROSION CONTROL FILTER SOCKS.

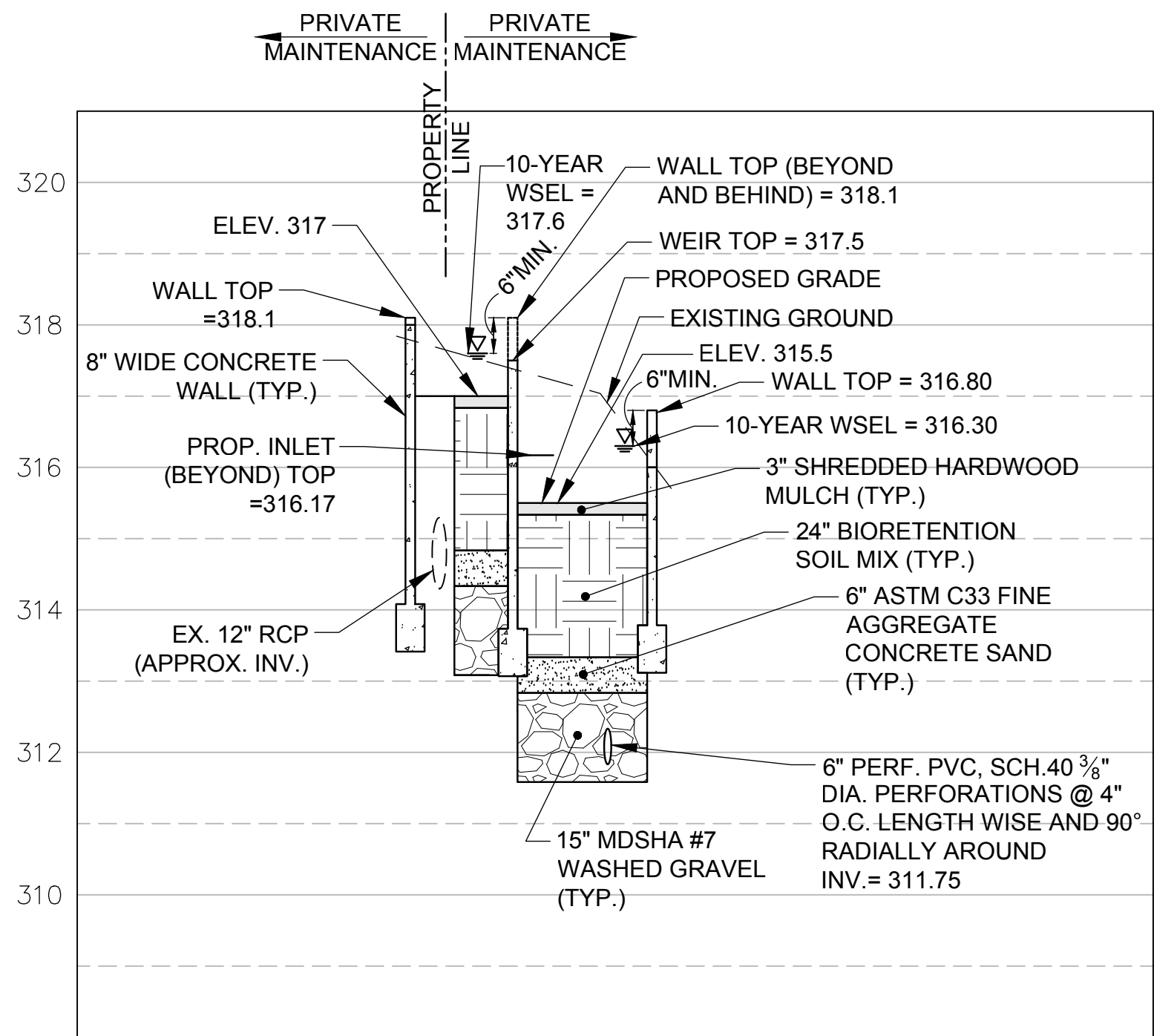
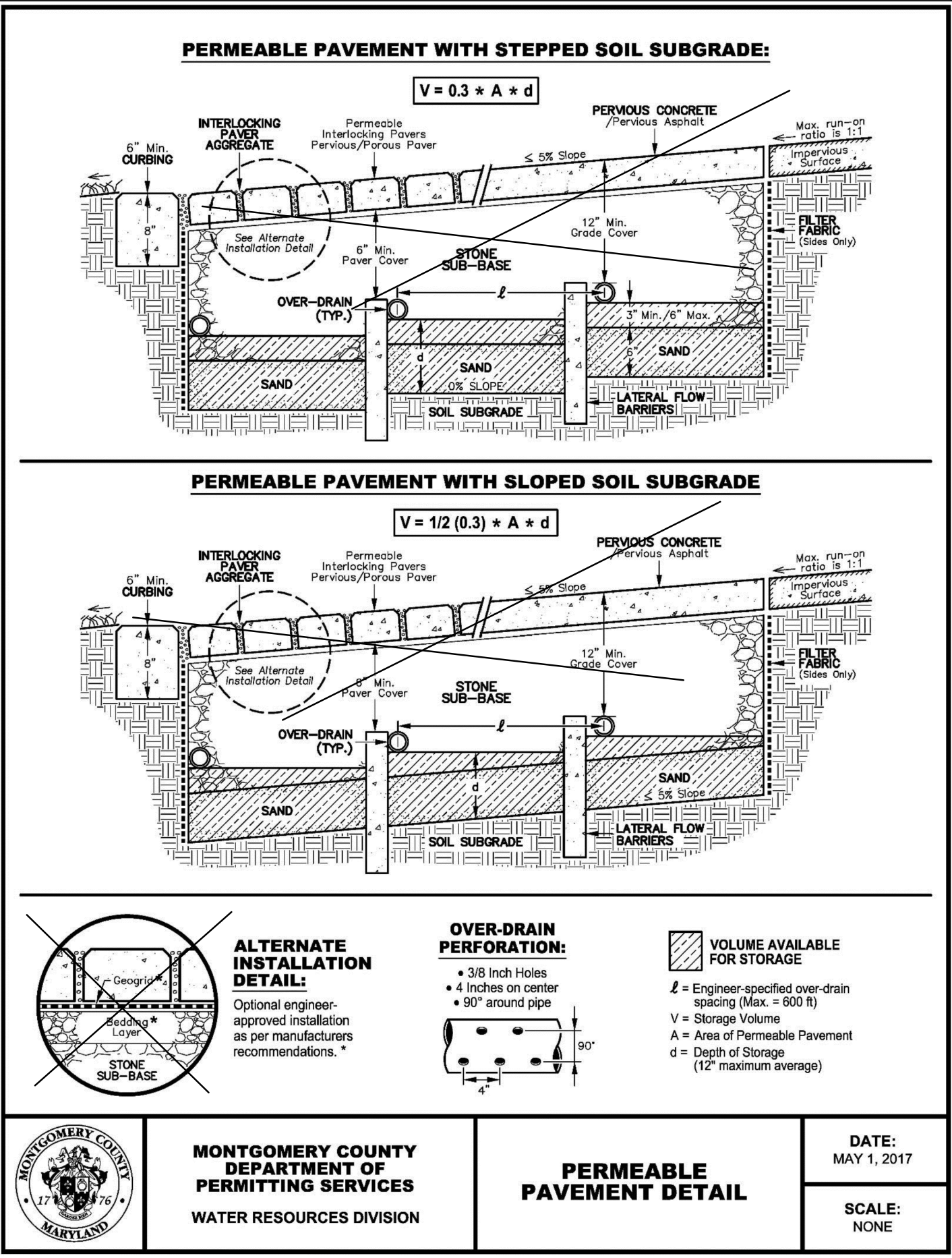
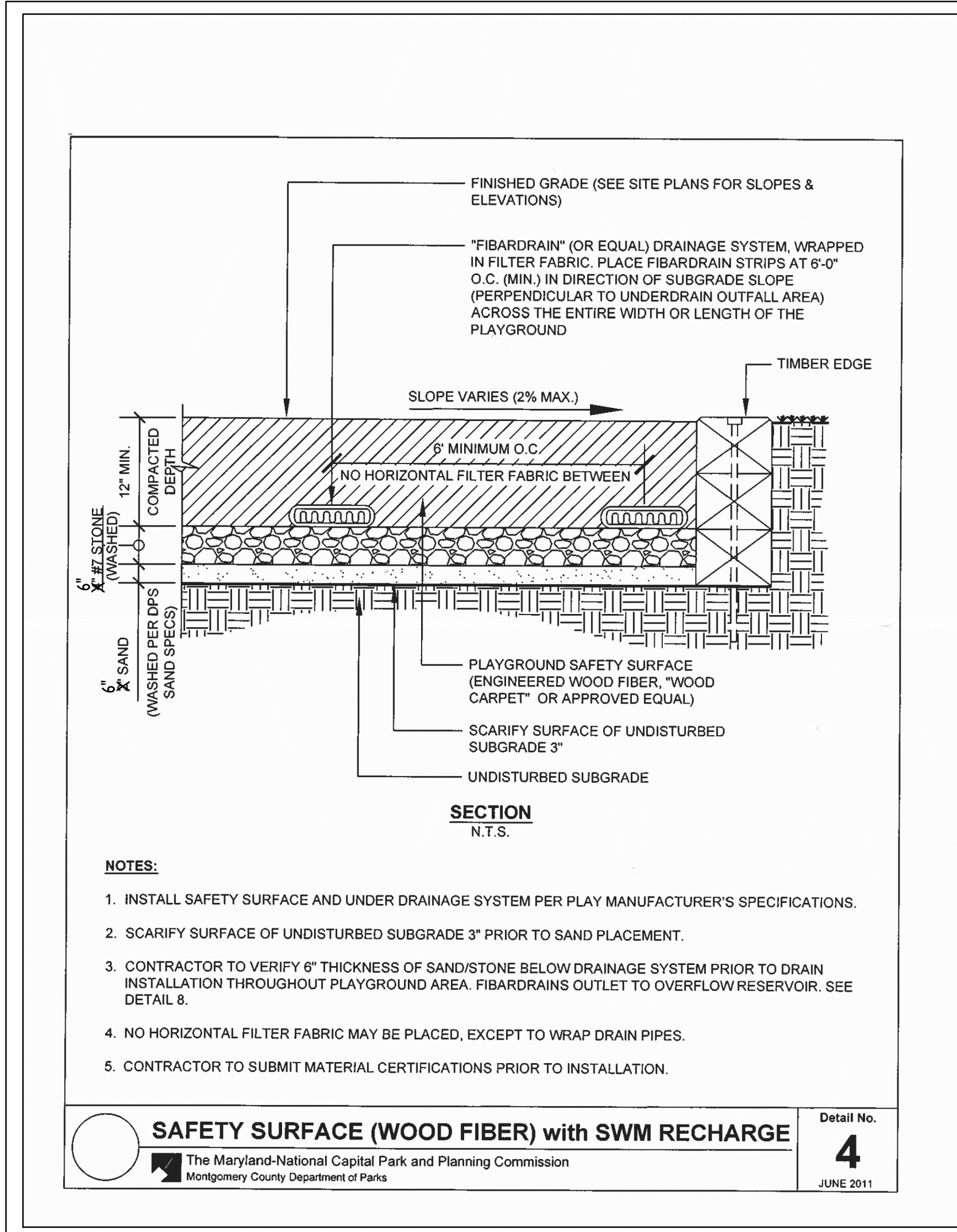
PROPOSED PARK AMENITY IMPROVEMENTS INCLUDE ACCESS IMPROVEMENTS TO THE ACORN GAZEBO AND THE SPRING, REVISED PAVEMENTS AREAS INCLUDE THE USE OF DECKING WITH DRILLED PIERS IN AREAS NEAR TREES TO LIMIT DAMAGE TO EXISTING TREE ROOTS AND LANDSCAPING WITH NEW PLANTINGS AND SEAT WALLS.

(IN FEET)
1 inch = 10 ft.



INFILTRATION TEST BORINGS INFORMATION:	
INFILTRATION TEST:	INFILTRATION RATE: (IN./HR.)
ITB-1A	0.27
ITB-1B	0.06
ITB-2	0.66

	DESIGN		Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. _____ Expiration Date _____ PROFESSIONAL STAMP  The Maryland-National Capital Park and Planning Commission Montgomery County Department of Parks 9500 Brunett Avenue Silver Spring, Maryland 20901 (301) 495-2535	REVIEW AND APPROVAL		ISSUED FOR PROCUREMENT ON _____		STORMWATER CONCEPT PLAN Stormwater Management Concept Acorn Urban Park 1190 East-West Hwy, Silver Spring, Maryland, 20910 SCALE: AS SHOWN Liber 14771 Folio 0531	Date: <u>08/14/2018</u> DWG. # <u>C-3.00</u> SHT. # <u>2</u> of <u>3</u> DPS# _____ of _____	
Designer's Name				REVISIONS		Rev. No.	Date			Description
Address	Landscape Architect	Date		Checked By:						
City/State/Zip	Architect	Date		Checked By:						
Telephone Number	Engineer	Date		Checked By:						
	Drawn by	Date		Checked By:						



SCALE: VERT: 1"=2'
HORIZ: 1"=10'

	DESIGN		Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
Designer's Name	Landscape Architect Date	Checked By:	
Address	Architect Date	Checked By:	License No. _____
City/State/Zip	Engineer Date	Checked By:	
Telephone Number	Drawn by Date	Checked By:	Expiration Date _____



The Maryland-National Capital
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REVIEW AND APPROVAL		ISSUED FOR PROCUREMENT ON _____		
		REVISIONS		
		Rev. No.	Date	Description
Project Manager	Date			
Construction Manager	Date			
Park Manager	Date			

STORMWATER MANAGEMENT DETAILS Stormwater Management Concept Acorn Urban Park 1190 East-West Hwy, Silver Spring, Maryland, 20910 SCALE: AS SHOWN Liber 14771 Folio 0531	Date: <u>08/14/2018</u> DWG. # <u>C-3.01</u> SHT. # <u>3</u> of <u>3</u> DPS# _____ of _____
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