Docusign Envelope ID: 09A699D4-83CC-4166-B8C5-83D77DAE6A8D

City of Rockville
Get Into It

111 Maryland Avenue | Rockville, Maryland 20850-2364 | 240-314-5000
www.rockvillemd.gov

January 29, 2025

Mr. Andrew McGeorge
Hines
555 13th Street NW, Suite 400 W
Washington, District of Columbia 20004

SUBJECT: 1818 Chapman Avenue – Twinbrook Hines –Development Stormwater Management Concept Approval; SMC2021-00005, STP2022-00436

Dear Mr. McGeorge:

The Development Stormwater Management (SWM) Concept (Concept) received on January 15, 2025, for the above referenced site is conditionally approved. Staff has determined that the Development SWM Concept, as described below, achieves the required level of on-site Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP), P_E = 1.42-inches, equivalent to 79 percent of the required ESD volume (ESD_V). This letter supersedes the ESD to MEP established by the Pre-Application SWM Concept letter dated July 1, 2022.

This site is 9.37 acres and is identified as the Halpine subdivision, Lots 2, 3, 4, 5, and 6, Block 4 and Lot 1, Block B situated at 1818 Chapman Avenue north of the intersection of Chapman Avenue and Thompson Avenue. The proposed development includes the construction of a mixed-use building with multi-family apartments, retail and office space, an underground parking garage, and the removal and replacement of a portion of the Washington Metropolitan Area Transit Authority's (WMATA) Kiss & Ride. The property is located in the Rock Creek Watershed and is zoned Mixed-Use Transit District (MXTD). The on-site soils are predominately Urban Land which is classified as hydrologic soil group (HSG) D.

According to the Rockville City Code (Code), Chapter 19, Section 19-2 Definitions, the Site qualifies as Redevelopment because it proposes construction on a property where existing imperviousness is greater than 40 percent of the site. The property is currently 63 percent impervious.

In accordance with the Code, Chapter 19, Section 19-45, SWM is required for all new and replacement impervious area within the disturbed area because the land disturbing activity involves less than 50 percent of the site. According to the submitted Concept, the total limit of disturbance is 3.42 acres which is 36 percent of the site, and the on-site impervious area subject to SWM is 3.02 acres.

Per the Code, Chapter 19, Section 19-46, SWM also must be provided for imperviousness in a portion of the adjacent Chapman Avenue Right-of-way (ROW). According to the submitted Concept, the total impervious area in the adjacent ROW subject to SWM is 0.41 acres.

Mayor Monique Ashton | Councilmembers Kate Fulton, Barry Jackson, David Myles, Izola (Zola) Shaw, Marissa Valeri, Adam Van Grack
City Manager Jeff Mihelich | City Clerk/Director of Council Operations Sara Taylor-Ferrell | City Attorney Robert E. Dawson

Docusign Envelope ID: 09A699D4-83CC-4166-B8C5-83D77DAE6A8D

Your proposed Development SWM Concept, as shown on the attachment, is summarized as follows:

ON-SITE SUMMARY

Proposed new or replacement impervious areas are summarized as:

- A 437-unit multi-family residential building with an underground parking garage, retail, and office space.

Total on-site impervious area subject to SWM = 3.02 acres.

ESD Measures

- The Concept proposes to provide a minimum P_E = 1.42-inches equivalent to 79 percent of the required ESD_V in the following on-site measures:
  - Five On-Site Micro-Bioretention Planter Box Facilities.
  - Green Roof.

- Summary of ESD:
  - Total ESD_V provided = 14,845 cubic feet (cf.).
  - Total ESD_V required = 18,884 cf.
  - Percentage of ESD_V provided = 14,845 cf./18,884 cf. = 79 percent.

Structural Measures and/or Alternative Measures – Monetary Contribution

- Alternative Measures – Monetary Contribution in-lieu of providing full ESDv and Qp_{10} for the 3.02 acres of on-site impervious area.

ROW SUMMARY

Structural Measures and/or Alternative Measures – Monetary Contribution

- Alternative Measures – Monetary Contribution in-lieu of providing WQ_V, Cp_V, and Qp_{10} for the 0.41 acres of impervious area in the adjacent ROW of Chapman Avenue.

Docusign Envelope ID: 09A699D4-83CC-4166-B8C5-83D77DAE6A8D

CONDITIONS OF APPROVAL

Staff has determined that ESD to the MEP has been met.

The next step in the City of Rockville (City) SWM approval process is submission of a SWM Construction Plan for review and approval by the Department of Public Works (DPW) prior to permit issuance. In accordance with the Code, Chapter 19, Section 19-44, SWM must be provided by one of the following methods, which are listed in order of priority respectively: on-site ESD measures, on-site structural measures, and alternative measures which may include a monetary contribution.

This Development SWM Concept is conditionally approved subject to the following conditions, which must be addressed at the stages in the process as indicated below:

1) Submit a Stormwater Management Permit (SMP) Application, including the application and plan review fee, which is based on an initially submitted SWM construction estimate, in conjunction with detailed SWM plans (24"x36") and computations signed and sealed by a Professional Engineer (PE) licensed in the State of Maryland, except as otherwise noted, for review and approval by DPW.
2) The submitted material must:
   a) Demonstrate compliance with this Concept including locations, types, and sizing of ESD measures.
   b) Include computations and construction details for review and approval by DPW:
      i) Design shall be in conformance with the latest version of the Montgomery County Department of Permitting Services Design Specifications for Micro-Bioretention Planter Box facilities and Green Roof. Deviations from the specification must be approved by DPW.
      ii) Computations and plans must show the ESD_V water surface elevation.
      iii) Overflow structures, underdrains, and tee configurations within the Micro-Bioretention Planter Box facilities must be shown on the SWM construction plans and approved by DPW.
      iv) Where proximity of the Micro-Bioretention Planter Box facilities to the building is less than 10-feet, a licensed professional engineer in the State of Maryland must determine if any special treatment, including impermeable liners, is required. Evidence of such investigation and recommendation must be provided with the final engineering.
      v) The on-site underground structural measure shall be designed provide Cp_V for the same drainage area as previously provided by the pond. Plans must include structural drawings for the underground SWM facility with appropriate details and notes, sealed by a qualified PE licensed in the State of Maryland. (PE seal for structural components cannot be on the same sheet as PE seal for SWM unless it is the same engineer sealing both aspects of the design)
      vi) Include the design, construction specifications, plant media depth, plant media specifications, planting schedule with types, sizes, and quantities of planting material for the Micro-Bioretention Planter Box facilities and Green Roof.
      vii) SWM practices adjacent to pedestrian and parking uses shall meet Montgomery County Department of Permitting Services, Water Resources Technical Policy (MCDPS WRTP)-8 design guidelines for safe placement and fall prevention barriers.
      viii) Architectural/plumbing plans for the building must clearly detail the routing of roof runoff through the building to the Micro-Bioretention Planter Box facilities and must be provided for review to DPW.
      ix) Include a landscape design that has been coordinated with the Forest Conservation Plan (FCP), where applicable. The plan should include a planting schedule with types, sizes, and quantities of planting material, planting details, and notes, signed and sealed by a Landscape Architect licensed in the State of Maryland. The plan should differentiate between what planting material will be approved, bonded, and permitted with the SWM plan and what will be part of the Forestry Permit. The Landscape plan must show all stormwater appurtenances including pipes, overflow structures, inflow protection, etc. to ensure there are no conflicts.

Docusign Envelope ID: 09A699D4-83CC-4166-B8C5-83D77DAE6A8D

c) Identify paths for safe overland flow of the 100-year storm event with flow arrows.
d) Demonstrate that all components of the SWM system drain by gravity. Pumping of stormwater will not be permitted.

Storage provided exceeding the amount require to treat the one year, 24-hour design storm shall not be credited towards the total water quality (ESD or structural) volume provided.

3) The Applicant shall make a monetary contribution to the City Stormwater Fund as an Alternative to providing Cp_V and Qp_{10} for any new or replacement impervious area created by the construction of the development not treated on-site; and as an Alternative to providing Cp_V, WQ_V, and Qp_{10} for the contiguous ROW. Calculations for the contribution shall be submitted with the SMP application utilizing the final engineering impervious area and the monetary contribution rate in effect at that time. The contribution must be paid prior to SMP permit issuance.

   Monetary contribution is required for the following: Partial Cp_V and full Qp_{10}. Impervious area used is based on the prorated area that is not treated by ESD practices. On-site ESD is provided for 79 percent of the required volume; therefore, 79 percent of the 3.02 acre (0.63 acre) must be provided by a SWM alternative (Monetary Contribution).
   Partial Cp_V is calculated at 100 percent of the Cp_V rate applied to the impervious area not treated.
   a) Partial Cp_V for 0.63 acres.
   b) Full On-site Qp_{10} for 3.02 acres.
   c) Full Contiguous ROW Cp_V, WQ_V, and Qp_{10} for 0.41 acres.
4) The SWM facilities on-site shall be privately maintained. Submit to DPW staff a SWM Easement, Inspection, and Maintenance Agreement for the proposed SWM measures. The SWM Agreement is subject to review and approval by DPW and the City Attorney's Office and is to be executed by the property owner and other parties of interest. Access to the SWM facilities will be determined in conjunction with final engineering and must be included in the SWM Agreement. The SWM Agreement must be recorded in the Montgomery County Land Records prior to SMP permit issuance. Plans must delineate and label SWM easements.
5) The existing pond must be replaced with on-site underground structural measure. Additionally, the underground structural measure must provide the same treatment as previously provided by the pond. Concurrence from WMATA must be provided for the removal of the existing pond and the required treatment prior to the issuance of a Stormwater SMP.
6) Submit on-site Storm Drain plans (24"x36") and computations signed and sealed by a PE licensed in the State of Maryland, except as otherwise noted, for review by DPW.
7) Post financial security based on the final approved SWM construction cost estimate in a format acceptable to the City Attorney, either by letter of credit or performance bond. Approval, which is coordinated through DPW staff, is required prior to SMP permit issuance. Obtain approval of an FCP from the City Forester prior to DPW issuance of the SMP permit.
8) Required approvals and permits for drainage connections to existing storm drains in WMATA easements and ROWs must be obtained prior to the issuance of a SMP. Additionally, DPW Permits will not be issued prior to issuance of WMATA's Real Estate Permit.

This SWM approval does not supersede or negate other required project approvals. The Concept approval is contingent upon compliance of all other City and other governmental agency requirements including, but not limited to, City Forestry, Traffic and Transportation, and Planning and Development Services.

Docusign Envelope ID: 09A699D4-83CC-4166-B8C5-83D77DAE6A8D

Any significant changes to the proposed development may result in the requirement to submit a revised Development SWM Concept with review fee for approval by DPW.

If you have any questions, please contact Senior Civil Engineer Yi Kuo via email at ykuo@rockvillemd.gov or via telephone at 240-314-8520.

Sincerely,

John Scabis, P.E.
Chief of Engineering

JKS/YK/ktt

Attachments: 1818 Chapman Avenue – Twinbrook Commons – Development SWM Concept Plan, dated January 15, 2025.

cc: Jim Lapping, P.E., Engineering Supervisor
John Foreman, Planning and Development Services Manager
Sean Murphy, P.E, Principal Engineer
Shaun Ryan, Planning and Development Supervisor
Nelson Ortiz, Principal Planner
NB Ventures I, L.L.C.
Heather Dlhopolsky, Wire Gill LLP
Laurent Mounaud, VIKA Maryland
WMATA
Permit plan, SMC2021-00005, STP2022-00436
Day file

STORMWATER MANAGEMENT CONCEPT
SMC#: SMC2021-00005
TWINBROOK HINES
4TH ELECTION DISTRICT ROCKVILLE
MONTGOMERY COUNTY, MARYLAND

SHEET INDEX

CSWM	1 OF 5	CONCEPT STORMWATER MANAGEMENT COVER SHEET
CSWM	2 OF 5	CONCEPT STORMWATER MANAGEMENT DRAINAGE AREA MAP
CSWM	3 OF 5	CONCEPT STORMWATER MANAGEMENT PLAN
CSWM	4 OF 5	CONCEPT STORMWATER MANAGEMENT DETAILS
CSWM	5 OF 5	CONCEPT STORMWATER MANAGEMENT DETAILED SECTIONS

STORMWATER MANAGEMENT CONCEPT GENERAL NOTES

1. ALL STORM DRAIN PIPES PROPOSED ARE EITHER REINFORCED CONCRETE PIPE (RCP), HIGH PERFORMANCE POLYPROPYLENE (HP) OR POLYVINYL CHLORIDE (PVC).
2. STORM DRAIN PIPE SIZES SHOWN ARE ESTIMATED AND ARE SUBJECT TO CHANGE DURING FINAL ENGINEERING DESIGN.
3. QUANTITY AND LOCATION OF ENVIRONMENTALLY SENSITIVE DESIGN (ESD) MEASURES ARE SUBJECT TO CHANGE DURING FINAL ENGINEERING DESIGN.
4. ALL WATER AND SEWER LINES SHOWN ARE APPROXIMATE AND ARE SUBJECT TO CHANGE UPON FINAL ENGINEERING DESIGN.
5. ALL UTILITY LAYOUTS SHOWN ON THIS CONCEPT PLAN ARE SUBJECT TO ADJUSTMENT IN LOCATION, SIZE AND CONFIGURATION DURING FINAL ENGINEERING TO ACCOMMODATE LOCATIONS OF TREES, DRY UTILITIES, STREET LIGHTS AND OTHER CONFLICTING FEATURES. LAYOUTS SHOWN HEREON ARE CONCEPTUAL AND NOT INTENDED TO REFLECT FINAL LOCATION OF THESE UTILITIES.

SWM CONCEPT SUMMARY TABLE
General Property Information
SMC# 2021-00005
Type of Concept: *SWM Concept*
Development Review Process/Case No.: *STP2022-00436*
Property Address: *1818 Chapman Ave, Rockville MD 20852*
Property Legal Description: *Twinbrook Station Lot 1, Block B Plat No. 23781 and Lot 2,3,4,5,6 Block 4*
Property Size (ac./sq.ft.): *9.37 Ac /408,194 Sqft*
Total Concept Area (ac./sq.ft.): *3.42 acres/ 149,109 square feet* (On Site after ROW Dedication)
Watershed: *Rock Creek Watershed*
100 YR Floodplain: *n/a*
Ex. % impervious/Redevelopment or New Development: *40% Redevelopment*
SWM Summary
Total On-Site Impervious Area subject to SWM: *3.02 acres (131,594 sq.ft.)*
Target ESDv/Provided ESDv. *18,884 cu.ft./ 14,845 cu.ft.*
ESD Measures: *5 Micro Bioretention Facilities and Green Roof*
Structural Storage Required/Provided: *5,716 cu.ft./ 0 cu.ft.*
Structural Measures: *Monetary Contribution*
Qp10 (10-Year Quantity Control) Measures: *Monetary Contribution*
Contiguous Right-of-Way Impervious Area subject to SWM: 0.41 acres *(0.13 acres in Thompson and 0.28 acres in Chapman)*
Contiguous Right-of-Way Cpv (Channel Protection Volume) & WQv (Water Quality Volume) Measures: *Monetary Contribution*
Contiguous Right-of-Way Qp10 (10-Year Quantity Control) Measures: *Monetary Contribution*

	Area	Impervious	Type of	PE (inch)		ESDv (cuft)	
	a.c.	a.c.	Measure	Req	Provided	Req	Provided
MBF #1	0.16	0.16	Bio	1.80	2.52	1,010	1,417
MBF #2	0.35	0.35	Bio	1.80	2.53	2,188	3,080
MBF #3	0.35	0.35	Bio	1.80	2.16	2,150	2,576
MBF #4 + GR	0.45	0.45	Bio + GR	1.80	2.40	2,801	3,741
MBF #5	0.45	0.45	Bio	1.80	2.42	2,793	3,752
GR	0.05	0.05	GR	1.80	1.69	298	280
Untreated Area	1.61	1.21	None	1.80	0.00	7,644	-
Total	3.42	3.02		1.80	1.42	18,884	14,845

ENGINEER / PLANNER / LANDSCAPE ARCHITECT:
VIKA MARYLAND, LLC
20251 CENTURY BOULEVARD
SUITE 400
GERMANTOWN, MD 20874
PH: 301.916.4100
CONTACT: LAURENT MOUNAUD
e-mail: mounaud@vika.com

OWNER / APPLICANT:
HINES CONCEPTUAL CONSTRUCTION GROUP
2800 POST OAK BOULEVARD
HOUSTON, TX 77056
CAMERON CHRISTIAN
CAMERON.CHRISTIAN@HINES.COM

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. 36749, Expiration Date: JANUARY 21, 2027

LAURENT G. MOUNAUD
NAME

PROFESSIONAL SEAL

VIKA MARYLAND, LLC
20251 Century Blvd., Suite 400
Germantown, MD 20874
301.916.4100 | vika.com
Our Site Set on the Future.

THE INFORMATION, DESIGN AND CONTENT OF THESE DRAWINGS OR DOCUMENTS ARE PROPRIETARY TO VIKA MARYLAND, LLC AND, AS AN INSTRUMENT OF INTELLECTUAL PROPERTY, THESE DRAWINGS AND/OR DOCUMENTS MUST NOT BE FORWARDED, SHARED, COPIED, DIGITALLY CONVERTED, MODIFIED OR USED FOR ANY PURPOSE, IN ANY FORMAT, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM VIKA MARYLAND, LLC. ONLY PRINTED COPIES OF DRAWINGS ARE APPROVED, SIGNED AND SEALED PLANS OR DRAWINGS MAY BE UTILIZED FOR CONSTRUCTION PURPOSES. © 2019 VIKA MARYLAND, LLC

NO.	DESCRIPTION OF REVISION	P.E. INITIAL	DATE	DPW	DATE

APPROVAL OF REVISIONS AFTER INITIAL PLAN APPROVAL

BEFORE BEGINNING CONSTRUCTION
CONTACT
"MISS UTILITY"
AT
WWW.MISSUTILITY.NET
OR
1-800-257-7777
OR 811
AT LEAST 48 HOURS
PRIOR TO EXCAVATION

THIS PLAN IS FOR STORMWATER MANAGEMENT ONLY

DESIGNED _____
DRAFTED _____
CHECKED _____

DEPARTMENT OF PUBLIC WORKS
CITY OF
ROCKVILLE
111 MARYLAND AVE. ROCKVILLE, MARYLAND

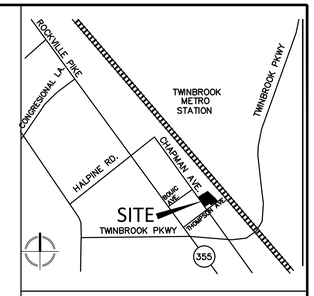
COVER SHEET

1818 CHAPMAN
LOT 2,3,4,5 & 6, P1 BLOCK 4 & B
SUBDIVISION 0201
ELECTION DISTRICT NO. 4 CITY OF ROCKVILLE, MARYLAND

DATE SUBMITTED:
VIKA JOB NO. VM50024J
SCALE
SHEET NO. CSWM-1 OF 5
FILE #

LAYOUT: CSWM-1, Plotted By: Mounaud

Z:\50000-59999\59024\CAD\SITE\PLOT SHEETS\59024SWM_2_CSWM.dwg - Friday, January 3, 2025 1:41:19 PM



VICINITY MAP
SCALE 1"=2,000'

LEGEND:

- GREEN ROOF
- MICRO-BIORETENTION PLANTER
- WATER LINE
- SEWER LINE
- UNDERGROUND STORMWATER STRUCTURE
- DRAINAGE DIVIDE
- PROPOSED ONSITE IMPERVIOUS
- PROPOSED WMATA SITE IMPERVIOUS
- IMPERVIOUS AREA WITHIN CONTIGUOUS ROW

HYDROLOGIC SOIL GROUP NOTE:

ENTIRE SITE IS COMPRISED OF URBAN LAND (MAP UNIT 400)
HYDROLOGIC SOIL GROUP D.

HORIZ. DATUM = NAD 83/91
VERT. DATUM = NGVD 88

30 15 0 30 60 90
SCALE: 1"=30'

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. 36749, Expiration Date: JANUARY 21, 2027.

LAURENT G. MOUNAUD
NAME

PROFESSIONAL SEAL

STATE OF MARYLAND
LAURENT GUY MOUNAUD
No. 36749
PROFESSIONAL ENGINEER
01/15/2025

VIKA MARYLAND, LLC
20251 Century Blvd., Suite 400
Germantown, MD 20874
301.916.4100 | vika.com
Our Site Set on the Future.

THE INFORMATION, DESIGN AND CONTENT OF THESE DRAWINGS, CODIGOWARE, ARE PROPRIETARY TO VIKA MARYLAND, LLC AND CONSTITUTE ITS PROPRIETARY INTELLECTUAL PROPERTY. THESE DRAWINGS AND/OR DOCUMENTS MUST NOT BE FORWARDED, SHARED, COPIED, DIGITALLY CONVERTED, MODIFIED OR USED FOR ANY PURPOSE, IN ANY FORM OR MEDIUM, WITHOUT THE EXPRESS AUTHORIZATION FROM VIKA MARYLAND, LLC. VIOLATIONS MAY RESULT IN PROSECUTION. ONLY APPROVED, SIGNED AND SEALED PLANS OR DRAWINGS MAY BE UTILIZED FOR CONSTRUCTION PURPOSES. © 2019 VIKA MARYLAND, LLC

NO.	DESCRIPTION OF REVISION	P.E. INITIAL	DATE	DPW	DATE

APPROVAL OF REVISIONS AFTER INTIAL PLAN APPROVAL

BEFORE BEGINNING CONSTRUCTION
CONTACT
"MISS UTILITY"
AT
WWW.MISSUTILITY.NET
OR
1-800-257-7777
OR 811
AT LEAST 48 HOURS
PRIOR TO EXCAVATION

THIS PLAN IS FOR STORMWATER MANAGEMENT ONLY

DESIGNED
DRAFTED
CHECKED

DEPARTMENT OF PUBLIC WORKS
CITY OF
ROCKVILLE
111 MARYLAND AVE. ROCKVILLE, MARYLAND

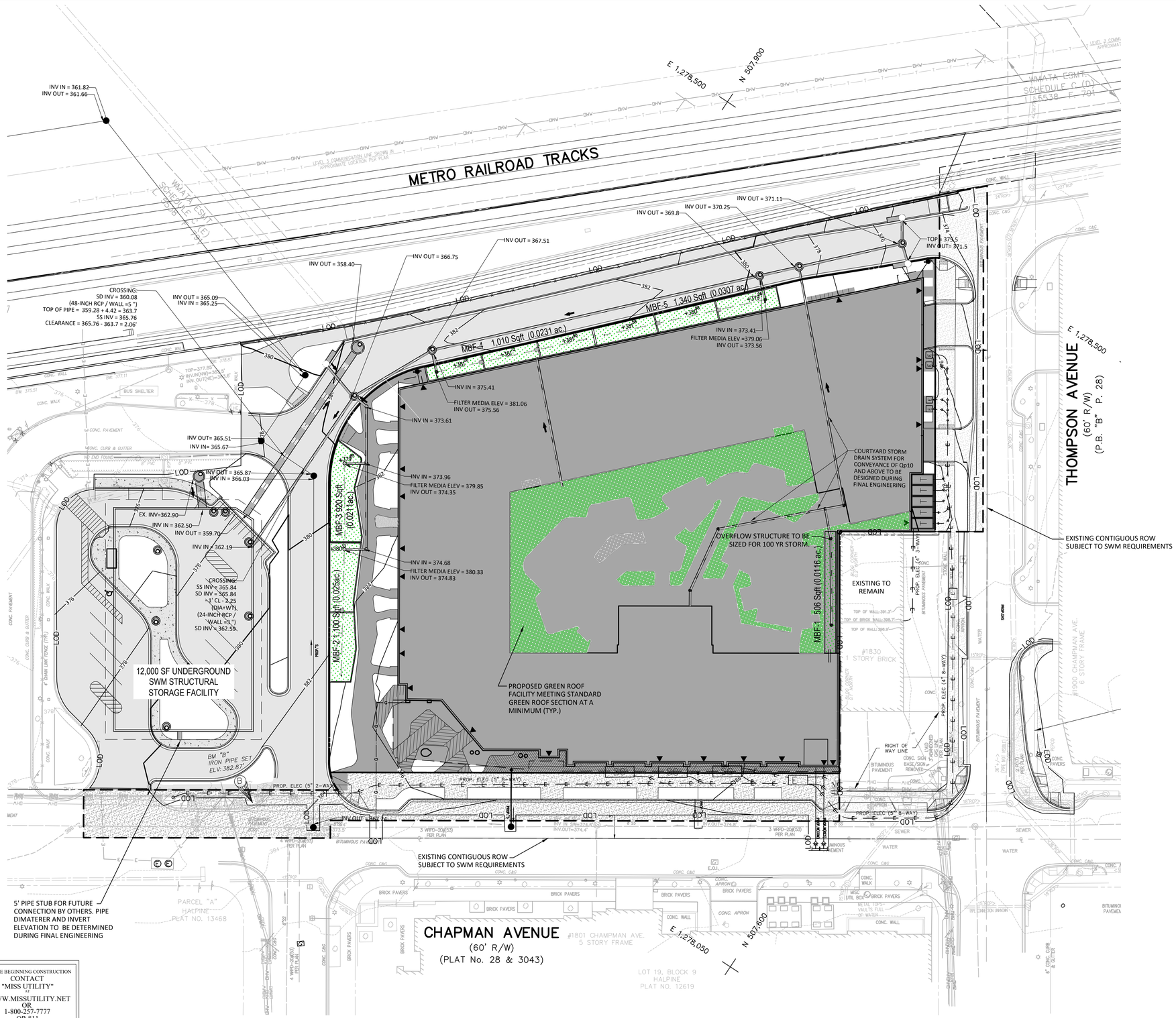
DRAINAGE AREA MAP

1818 CHAPMAN
LOT 2,3,4,5 & 6, P1 BLOCK 4 & B
SUBDIVISION 0201
ELECTION DISTRICT NO. 4 CITY OF ROCKVILLE, MARYLAND

DATE SUBMITTED:
VIKA JOB NO. VM50024J
SCALE
SHEET NO. CSWM-2 OF 5
FILE #

LAYOUT: CSWM-2, Plotted By: Mounaud

Z:\50000s-59500\50024\CAD\STE\P&OT SHEETS\50024200_2_CSWM.dwg – Friday, January 3, 2025 1:41:50 PM



LEGEND:

- GREEN ROOF
- MICRO-BIORETENTION PLANTER
- WATER LINE
- SEWER LINE
- UNDERGROUND STORMWATER STRUCTURE
- PROPOSED ONSITE IMPERVIOUS
- PROPOSED WMATA SITE IMPERVIOUS
- IMPERVIOUS AREA WITHIN CONTIGUOUS ROW

HYDROLOGIC SOIL GROUP NOTE:

ENTIRE SITE IS COMPRISED OF URBAN LAND (MAP UNIT 400)
HYDROLOGIC SOIL GROUP D.

HORIZ. DATUM = NAD 83/91
VERT. DATUM = NGVD 88

30 15 0 30 60 90

SCALE: 1"=30'

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. 36749
Expiration Date: JANUARY 21, 2027

LAURENT G. MOUNAUD
NAME

PROFESSIONAL SEAL
STATE OF MARYLAND
LAURENT GUY MOUNAUD
No. 36749
PROFESSIONAL ENGINEER
01/15/2025

VIKA MARYLAND, LLC
20251 Century Blvd., Suite 400
Germantown, MD 20874
301.916.4100 | vika.com
Our Site Set on the Future.

THE INFORMATION, DESIGN AND CONTENT OF THESE DRAWINGS OR DOCUMENTS ARE PROPRIETARY TO VIKA MARYLAND, LLC AND CONSTITUTE ITS PROPRIETARY INTELLECTUAL PROPERTY. THESE DRAWINGS AND/OR DOCUMENTS MUST NOT BE FORWARDED, SHARED, COPIED, DIGITALLY CONVERTED, MODIFIED OR USED FOR ANY PURPOSE, IN ANY FORMAT, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM VIKA MARYLAND, LLC. VIOLATIONS MAY RESULT IN PROSECUTION. ONLY APPROVED, SIGNED AND SEALED PLANS OR DRAWINGS MAY BE UTILIZED FOR CONSTRUCTION PURPOSES. © 2019 VIKA MARYLAND, LLC

NO.	DESCRIPTION OF REVISION	P.E. INITIAL	DATE	DPW	DATE

APPROVAL OF REVISIONS AFTER INTIAL PLAN APPROVAL

BEFORE BEGINNING CONSTRUCTION
CONTACT
"MISS UTILITY"
AT
WWW.MISSUTILITY.NET
OR
1-800-257-7777
OR 811
AT LEAST 48 HOURS
PRIOR TO EXCAVATION

THIS PLAN IS FOR STORMWATER MANAGEMENT ONLY

DESIGNED _____
DRAFTED _____
CHECKED _____

DEPARTMENT OF PUBLIC WORKS
CITY OF
ROCKVILLE
111 MARYLAND AVE. ROCKVILLE, MARYLAND

STORMWATER
MANAGEMENT
PLAN

1818 CHAPMAN
LOT 2,3,4,5 & 6, P1 BLOCK 4 & B
SUBDIVISION 0201
ELECTION DISTRICT NO. 4 CITY OF ROCKVILLE, MARYLAND

DATE SUBMITTED:

VIKA JOB NO.
VM50024J

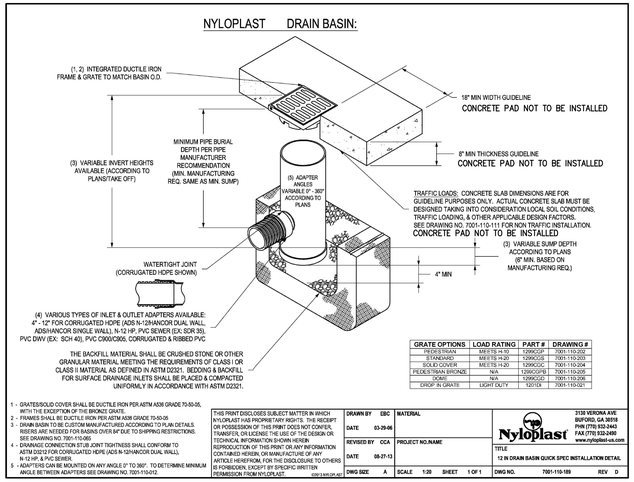
SCALE

SHEET NO. CSWM-3
OF 5

FILE #

LAYOUT: CSWM-3, Plotted By: Mounaud

Z:\50000-50500\50024\LDAD\SITE\PLOT SHEETS\50024000_P_CSWM.dwg - Friday, January 3, 2025 2:17:37 PM



GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-10	1299CGP	7001-110-202
STANDARD	MEETS H-20	1299CGS	7001-110-203
SOLID COVER	MEETS H-20	1299CGC	7001-110-204
PEDESTRIAN BRONZE	N/A	1299CGPB	7001-110-205
DOME	N/A	1299CGD	7001-110-206
DROP IN GRATE	LIGHT DUTY	1201DR	7001-110-021

1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE BRONZE GRATE.
2 - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR RAISING OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-013

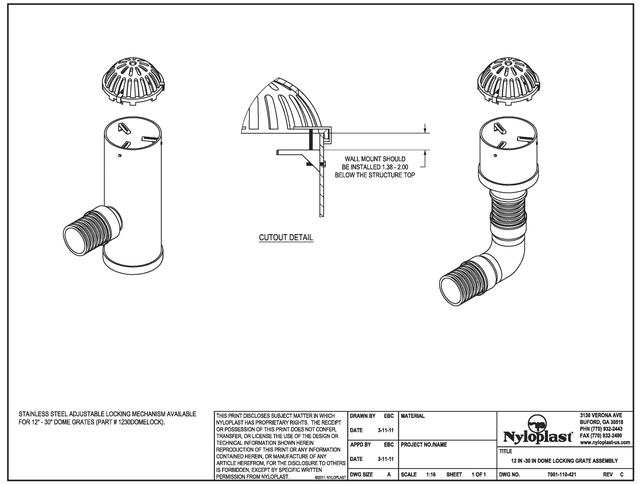
THIS PRINT DISCLOSES SUBJECT MATTER IN WHICH NYLOPLAST HAS PROPRIETARY RIGHTS. THE RECEIPT OR POSSESSION OF THIS PRINT DOES NOT CONFER, TRANSFER, OR LICENSE THE USE OF THE DESIGN OR TECHNICAL INFORMATION SHOWN HEREIN. REPRODUCTION OF THIS PRINT OR ANY INFORMATION CONTAINED HEREIN, OR MANUFACTURE OF ANY ARTICLE HEREFROM, FOR THE DISCLOSURE TO OTHERS IS FORBIDDEN, EXCEPT BY SPECIFIC WRITTEN PERMISSION FROM NYLOPLAST.

DRAWN BY	EBC	MATERIAL	
DATE	03-29-06		
REVISED BY	CCA	PROJECT NO./NAME	
DATE	08-27-13		
DWG SIZE	A	SCALE 1:20 SHEET 1 OF 1	

Nyloplast
3126 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: 12 IN DRAIN BASIN QUICK SPEC INSTALLATION DETAIL
DWG NO. 7001-110-189 REV D

MICRO-BIOFILTER DRAIN BASIN



STAINLESS STEEL ADJUSTABLE LOCKING MECHANISM AVAILABLE FOR 12" - 30" DOME GRATES (PART # 1230DOMELOCK).

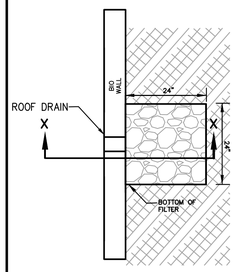
THIS PRINT DISCLOSES SUBJECT MATTER IN WHICH NYLOPLAST HAS PROPRIETARY RIGHTS. THE RECEIPT OR POSSESSION OF THIS PRINT DOES NOT CONFER, TRANSFER, OR LICENSE THE USE OF THE DESIGN OR TECHNICAL INFORMATION SHOWN HEREIN. REPRODUCTION OF THIS PRINT OR ANY INFORMATION CONTAINED HEREIN, OR MANUFACTURE OF ANY ARTICLE HEREFROM, FOR THE DISCLOSURE TO OTHERS IS FORBIDDEN, EXCEPT BY SPECIFIC WRITTEN PERMISSION FROM NYLOPLAST.

DRAWN BY	EBC	MATERIAL	
DATE	3-11-11		
APPD BY	EBC	PROJECT NO./NAME	
DATE	3-11-11		
DWG SIZE	A	SCALE 1:16 SHEET 1 OF 1	

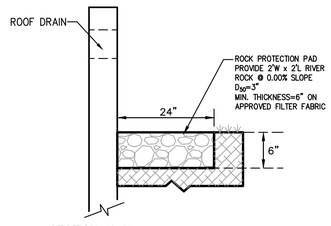
Nyloplast
3126 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: 12 IN -30 IN DOME LOCKING GRATE ASSEMBLY
DWG NO. 7001-110-421 REV C

MICRO-BIOFILTER DRAIN BASIN GRATE ASSEMBLY



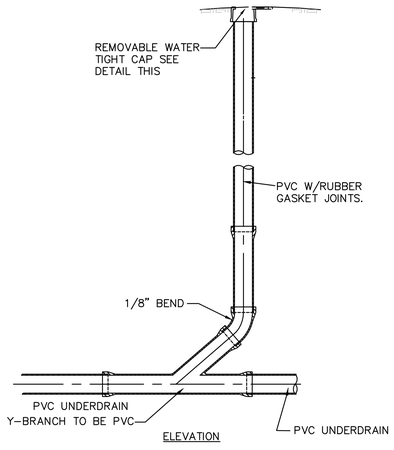
PLANVIEW



SECTION X-X

ROCK PROTECTION PAD DETAIL

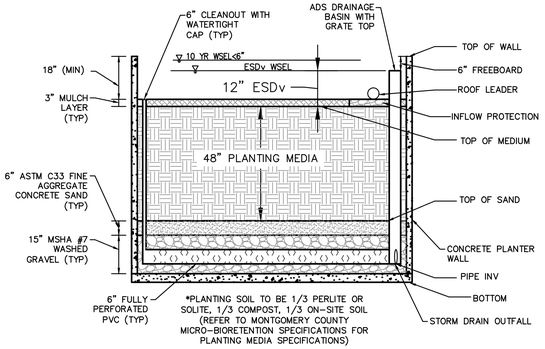
NOT TO SCALE



ELEVATION

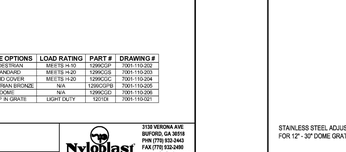
TYPICAL MICRO-BIOFILTER CLEANOUT DETAIL

NOT TO SCALE



MICRO-BIORETENTION PLANTER BOX TYPICAL SECTION

PLANVIEW



SECTION X-X

WEIR AND ROCK PROTECTION PAD DETAIL

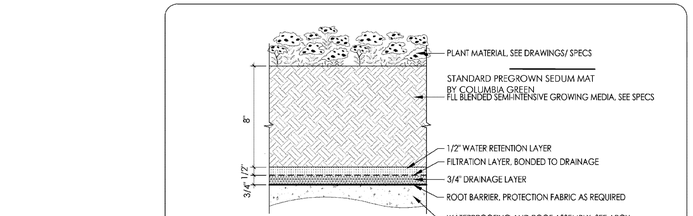
NOT TO SCALE

ELEVATION VIEW SECTION A-A

NOTE: PERFORATIONS WILL BE 3/8" DIAMETER AT 4" ON CENTER EVERY 90°

P.V.C PERFORATION DETAIL

N.T.S.



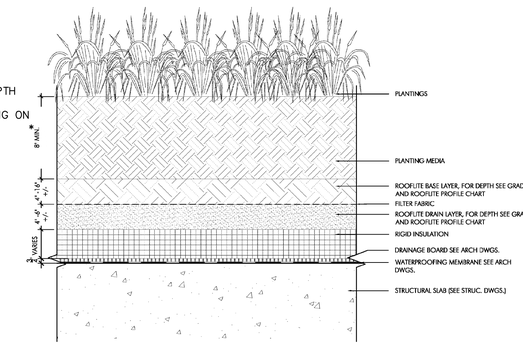
NOTE:
1. SYSTEM COMPONENTS ARE SHOWN AT NOMINAL SIZE. COMPRESSION WILL OCCUR AT RETENTION LAYER BASED ON AMOUNT (HEIGHT/VOLUME) OF GROWING MEDIA PLACED ON SYSTEM. MAXIMUM COMPRESSION ½" ±.

COLUMBIA GREEN TECHNOLOGIES | LGR1.02b | 8" DEPTH SEMI-INTENSIVE LAYERED GREEN ROOF
LAYERED SYSTEM | DETAIL SCALE: 3"=1'-0"

Corporate Office: 79 SE Taylor Street, Suite 201 Portland, OR 97214
Telephone: (503) 327-8723 · www.columbia-green.com

01 EXTENSIVE PLANTING AREA

1 1/2" = 1'-0"



02 INTENSIVE PLANTING AREA

1 1/2" = 1'-0"

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. 36749 Expiration Date: JANUARY 21, 2027

LAURENT G. MOUNAUD
NAME

PROFESSIONAL SEAL
STATE OF MARYLAND · LAURENT GUY MOUNAUD · No. 36749 · PROFESSIONAL ENGINEER
01/15/2025

VIKA MARYLAND, LLC
20251 Century Blvd., Suite 400
Germantown, MD 20874
301.916.4100 | vika.com
Our Site Set on the Future.

THE INFORMATION, DESIGN AND CONTENT OF THESE DRAWINGS OR DOCUMENTS ARE COPYRITABLY TO VIKA MARYLAND, LLC AND, AS AN INSTRUMENT OF PROFESSIONAL PROPERTY, THESE DRAWINGS AND/OR DOCUMENTS MUST NOT BE FORWARDED, SHARED, COPIED, DIGITALLY CONVERTED, MODIFIED OR USED FOR ANY PURPOSE, IN ANY FORMAT, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM VIKA MARYLAND, LLC. THESE DRAWINGS ARE NOT VALID UNLESS APPROVED, SIGNED AND SEALED PLANS OR DRAWINGS MAY BE UTILIZED FOR CONSTRUCTION PURPOSES. © 2019 VIKA MARYLAND, LLC

NO.	DESCRIPTION OF REVISION	P.E. INITIAL	DATE	DPW	DATE

APPROVAL OF REVISIONS AFTER INTIAL PLAN APPROVAL

BEFORE BEGINNING CONSTRUCTION CONTACT "MISS UTILITY" AT WWW.MISSUTILITY.NET OR 1-800-257-7777 OR 811 AT LEAST 48 HOURS PRIOR TO EXCAVATION

THIS PLAN IS FOR STORMWATER MANAGEMENT ONLY

DESIGNED _____
DRAFTED _____
CHECKED _____

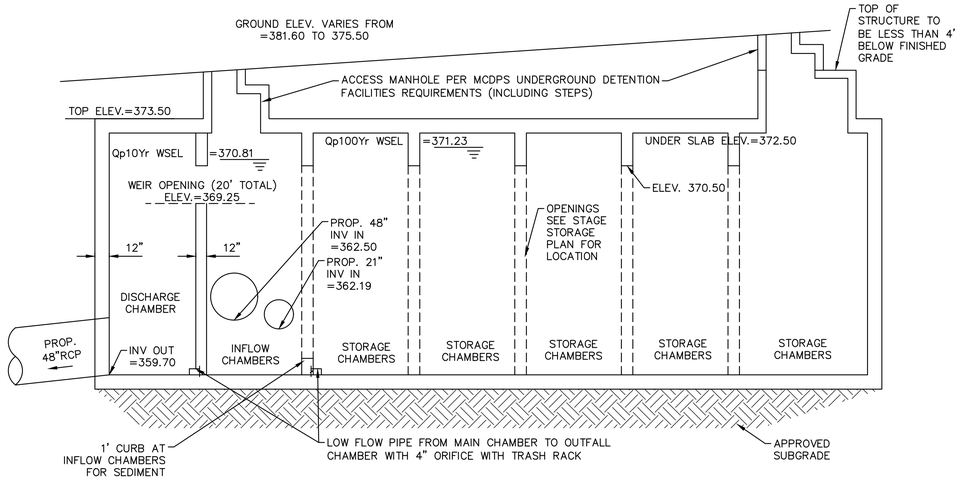
DEPARTMENT OF PUBLIC WORKS
CITY OF
ROCKVILLE
111 MARYLAND AVE. ROCKVILLE, MARYLAND

STORMWATER MANAGEMENT DETAILS

1818 CHAPMAN
LOT 2,3,4,5 & 6, P1 BLOCK 4 & B
SUBDIVISION 0201
ELECTION DISTRICT NO. 4 CITY OF ROCKVILLE, MARYLAND

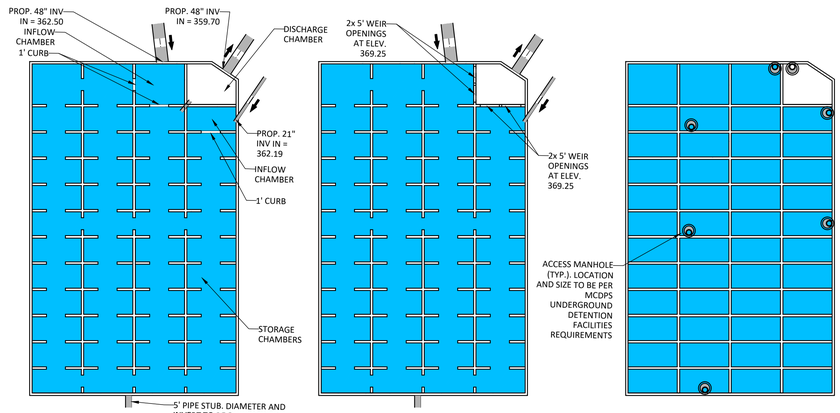
DATE SUBMITTED:
VIKA JOB NO. VM50024J
SCALE
SHEET NO. CSWM-4 OF 5
FILE #

LAYOUT: CSWM-4, Plotted By: Mounaud
Z:\50000-59999\59024\CAD\SITE\PLOT SHEETS\59024SD_2_CSWM.dwg - Friday, January 3, 2025 1:42:40 PM



UNDERGROUND SWM STORAGE VAULT CONCEPTUAL SECTION

NTS



UNDERGROUND SWM STORAGE VAULT VOLUME STAGE STORAGE PLAN

SCALE: 1"=30'

MCDPS UNDERGROUND DETENTION FACILITIES REQUIREMENTS

UNDERGROUND DETENTION FACILITIES

A. Design Considerations

1. Applicability

These specifications are appropriate for all underground pipe or vault detention, whether intended to detain channel protection flow attenuation volume, or temporarily store a portion of the water quality ESD treatment volume prior to releasing it to a quality BMP. Pipes or vaults may be located below vehicular or non-vehicular areas, and must be a minimum of 10-feet horizontally from other utilities.

2. Design Storm

The facility must be sized to provide storage for the required treatment volume, with safe conveyance of larger flows through the facility. The facility must be designed to safely pass a 10-year storm flow, at a minimum. Where the facility is located below a flow splitter, it must be sized to safely pass whatever portion of the 10-year event is delivered to it via the splitter.

3. Groundwater

In general, underground storage should not be located in areas of shallow groundwater. In situations where groundwater is encountered, additional design requirements may be necessary.

4. Geotechnical Analysis

Soil borings must be performed in the location of the proposed detention facility in order to determine presence and location of fill materials, rock, or groundwater. Borings must extend to a minimum of 2 feet below the facility.

B. Specifications and Details

1. Control Structure (for flow attenuation systems only)

The control structure shall be composed of cast in place concrete, and must be rectangular. The minimum inside dimensions of each internal cell must be 4-feet by 4-feet. Control structures for underground detention facilities may not be pre cast. Structures must be designed for H-20 loading at a minimum. Structural computations, signed and sealed by the designing structural engineer, must be submitted concurrent with detailed plan review. Direct access to both sides of the control structure is required.

2. Overflow Weir Sizing Criteria

The overflow weir in the control structure must be designed to safely pass larger flows through the facility.

3. Low Flow Control Orifice

The low flow orifice may be no smaller than 2-inches in diameter without specific approval from DPS, and must be protected by a trash rack. All trash racks must be removable. The trash rack dimensions overall must allow it to pass thru the access manhole opening. The open area of the trash rack must exceed the low flow orifice area by a ratio of at least 10 to 1. The trash rack must be made of expanded metal or perforated half round HDPE pipe. The perforations must be 1 inch in diameter and spaced 4 in on center. Trash racks must be attached to the walls of the concrete structure by use of stainless steel anchor bolts.

4. Storage Pipe

Except as noted below, all storage pipes must be circular, and must be a minimum of 48-inches in diameter. Metal, HDPE, or reinforced concrete may be used. Crossover connections must be provided between storage pipes, and these must be a minimum of 48-inches in diameter, also. Pipes may not be closer together than ½ the inside pipe diameter, or 3-feet, whichever is greater. This dimension may be reduced when flowable fill is used as pipe bedding. Spacing for reinforced concrete pipes may be Outer Pipe Diameter / 6 or a minimum of 1-foot in order to get compaction. Minimum earth cover must be per the manufacturer's specifications, based on the design load and considering flotation where required. Ph and resistivity tests may be required on a case by case basis, wherever soil acidity is a concern.

a. Metal Pipe

Metal storage pipes must be circular, aluminized, Type 2, and must be designed for the appropriate loading (pipes may not be less than 14-guage). Pipe ends must be re rolled, matched and numbered by the manufacturer. Connecting bands must be corrugated, and sleeve gaskets must be used. All connections must be per the latest DPS band detail. A 24-inch connecting band and 24-inch flat neoprene or rubber sleeve gasket, with four rods and lugs, must be used for all pipe connections.

b. Concrete Pipe

Gasketed concrete pipe must be used. Pipe shall meet ASTM C-76. ASTM C-361 is also acceptable. Gaskets must meet ASTM C-443. Pipe must be cast without lift holes. Pipe may be *circular* or elliptical. Elliptical pipes must have a minimum vertical inside dimension of 48-inches. All pipe joints must be soil tight when used for flow attenuation, and must be water tight when used to store the water quality volume.

c. HDPE Pipe

Circular High Density Polyethylene pipe is acceptable for use in underground storage facilities. Joints must be silt tight when used for flow attenuation, and must be water tight when used to store the water quality volume. Concrete manholes must be used at all HDPE pipe connections. Pipe installation must comply with ASTM D2321.

d. Concrete Vaults

Concrete vaults may be used for underground detention, with special design approved by the Department on a case by case basis. Proprietary structures must be specifically approved by DPS in advance of submission. Concrete design shall meet the requirements of ACI 350, Environmental Engineering Concrete Structures, with freezing and thawing exposures. Concrete shall be a Type II or IIA cement, with a 28 day compressive strength of 4500 psi for cast in place and 5000 psi for pre-cast structures. Type III cement is also acceptable so long as tricalcium aluminate is limited to 8%. Concrete shall also meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 420, Mix No. 6. All joints must be soil tight when used for flow attenuation, and must be water tight when used to store the water quality volume.

5. Pipe Bedding

Bedding must extend a minimum of 6-inches below the bottom of the pipe, and shall extend to the springline. Bedding stone shall be well graded granular material meeting AASHTO M-43. Flowable fill is also acceptable, with proper anchorage during installation. For flexible pipe (CMP, HDPE), flowable fill must extend to the top of the pipe.

6. Access

All facility access manhole openings must be 28-inch diameter. There must be at least one manhole for every 100-feet of pipe. There must be a minimum of two manholes per pipe run. Where required, access ladders must be used, rather than manhole steps. Manhole covers must be bolted. Concrete manholes must be used for access to HDPE pipes. Manhole access is required at the terminal end of all pipe runs.

a. At all access points to underground stormwater structures where more than nine inches of adjustment rings are required to match final grade, a concrete riser that is a minimum of forty eight inches in diameter must be used. Corrugated metal pipe (CMP) storage systems may have a CMP riser with a minimum of forty eight inches inside diameter.

b. The top of underground stormwater management structures cannot be located more than four feet below proposed and/or final grade. If, in the as-built stage, it is revealed that the top of an underground structure is more than four feet below final grade, a plan revision will be required to provide safe and acceptable egress and ingress into the structure.

c. All interior structure access openings must be a minimum of twenty-eight (28) inches in diameter or thirty-six inches square. Removal manhole covers, access doors, grates, etc. shall be magnetic and not weight more than 600 pounds. (Grates with openings at least two inches square need not be magnetic.) Access covers need not be magnetic and may weigh more than 600 pounds if they are hinged and counterbalanced so one person can easily open the cover; open and lock to a 90° angle; and, fitted with lift assistance mechanisms and safety bar(s) to secure cover(s) in an open position. All covers, hinges, lift assistance mechanisms and safety bars shall be manufactured as a single unit. Hinged covers shall have recessed hinges that do not protrude above the surface of the cover. The surface of all covers shall not be smooth. The surface of all covers shall be slip resistant. All castings in traffic bearing areas shall meet H-20 loading requirements. All castings shall meet AASHTO M105 and M306 specifications.

d. The following will apply when a concrete riser is required for access. The manhole riser must be pre-cast concrete and may be square or round. It must be at least forty eight inches in diameter. If a round manhole riser is used it must be forty eight inches inside diameter for the entire height, it cannot be necked down to accommodate the manhole frame. A lop slab must be used. The opening in the top of the underground structure must match the inside dimensions of the riser.

e. Solid concrete adjustment rings may be used to raise the manhole a maximum of nine inches to match the final grade.

f. Steps in the manhole risers and structures must comply with Standard Details No. MC-520.01 for spacing and No. MD-383.92 for the step material requirements.

BEFORE BEGINNING CONSTRUCTION
CONTACT
"MISS UTILITY"
AT
WWW.MISSUTILITY.NET
OR
1-800-257-7777
OR 811
AT LEAST 48 HOURS
PRIOR TO EXCAVATION

THIS PLAN IS FOR STORMWATER MANAGEMENT ONLY

VAULT ELEVATION – DISCHARGE TABLE

Inputs:

Opening$_1$ Dia., in/elev:	4.00	359.70	Opening$_2$: Elevation:	369.25	Length:	20.00 FT
Opening$_1$ Area (SF)	0.0873		Orifice "C" factor:	0.60	Area:	26.00
Opening$_1$ "C" factor:	0.60		Weir "C" factor:	3.10	Weir Height	1.30 FT

TR-20 RESULTS
Q100 = 173.58 CFS
Q10 = 121.97 CFS

	WSEL	opening1 Orifice h (ft)	opening1 Orifice Q (cfs)	opening2 Orifice h (ft)	opening2 Orifice Q (cfs)	opening2 Weir h (ft)	opening2 Weir Q (cfs)	Total Riser Flow Q (cfs)	48" RCP BARREL ORIFICE WSEL-INV	ORIFICE Orifice Cond.	ORIFICE h (ft)	ORIFICE Q (cfs)	PIPE h (ft)	PIPE Q (cfs)	Outfall Control Q (cfs)
	359.70	0.00	0.00			0.00	0.00	0.00	0.00	Not submerged	0	0.00	1.20	65.07	0.00
	361.00	1.13	0.45			0.00	0.00	0.45	1.30	Not submerged	0	0.00	2.50	93.92	0.45
	369.25	9.38	1.29			0.00	0.00	1.29	9.55	Orifice-->	7.55	166.26	10.75	194.76	1.29
	369.50	9.63	1.30			0.25	7.75	9.05	9.80	Orifice-->	7.80	168.99	11.00	197.01	9.05
	370.00	10.13	1.34			0.75	40.27	41.61	10.30	Orifice-->	8.30	174.32	11.50	201.44	41.61
	370.18	10.31	1.35			0.93	55.52	56.86	10.48	Orifice-->	8.48	176.19	11.68	203.00	56.86
	370.50	10.63	1.37			1.25	86.65	88.02	10.80	Orifice-->	8.80	179.49	12.00	205.77	88.02
WSEL Q10	370.808	10.94	1.39	0.91	119.29	1.56	120.57	121.96	11.11	Orifice -->	9.11	182.61	12.31	208.40	121.96
	371.00	11.13	1.40	1.10	131.30	1.75	143.53	144.93	11.30	Orifice-->	9.30	184.52	12.50	210.02	144.93
WSEL Q100	371.225	11.36	1.42	1.33	144.10	1.98	172.08	173.50	11.53	Orifice -->	9.53	186.74	12.73	211.90	173.50
	371.50	11.63	1.43	1.60	158.35	2.25	209.25	210.68	11.80	Orifice-->	9.80	189.42	13.00	214.18	189.42
	372.00	12.13	1.46	2.10	181.42	2.75	282.74	284.21	12.30	Orifice-->	10.30	194.19	13.50	218.26	194.19
	372.50	12.63	1.49	2.60	201.86	3.25	363.26	364.75	12.80	Orifice-->	10.80	198.85	14.00	222.26	198.85

General Equations

Orifice$_1$: Q = C * A * (2 * g * h)^ 1/2
Q=(H^0.5)* 0.42

Weir$_2$: Q = C * L * (h)^3/2
Q=(H^1.5)* 62

Orifice$_2$: Q = C * A * (2 * g * h)^ 1/2
Q=(H^0.5)* 125.19

Barrel Equations

INV. =	359.70	INV. OUT =	358.50
CL =	361.70	CL OUT =	360.50
c=	0.60	L =	122
A=	12.57	K_{43} =	1

Q = CA (2gH)^ 0.5 KP= 0.00723 (from chart)
Q = (H^ 0.5)* 60.51 A = 12.57
Q= A(2gH/ 1+K_e+K_o *L)^0.5
Q=(H)^ 0.5 * 59.40

VAULT STAGE – STORAGE TABLE

VAULT STORAGE

elevation	surface area	avg surf area	dy	storage volume at stage	cummulative volume	acre-ft		cummulative volume above Cpv (acre-ft)
359.70	10,489	△	△	0	0	0.00000		
360.70	10,489	10,489	1.00	10,489	**10,489**	0.24079		
360.70	10,510	10,500	0.00	0	**10,489**	0.24079		
369.25	10,510	10,510	8.55	89,861	**100,350**	2.30371	CpV/Weir Elev	**0.00000**
370.00	10,510	10,510	0.75	7,883	**108,232**	2.48466		**0.18096**
370.50	10,510	10,510	0.50	5,255	**113,487**	2.60530		**0.30160**
370.50	10,126	10,318	0.00	0	**113,487**	2.60530		**0.30160**
372.50	10,126	10,126	2.00	20,252	**133,739**	3.07022		**0.76652**

TR-20 RESULTS

Prop Vault Routing to POI
Rockville Montgomery County

Area or Reach Identifier	Drainage Area (sq mi)	10-year Peak Flow by Storm (cfs)	100-year Peak Flow by Storm (cfs)		
DA	0.033	133.49	191.28		
To Vault	0.033	133.49	191.28		
DOWNSTREAM		121.97	173.58		
OUTLET	0.033	121.97	173.58		

Q10 (cfs) =	121.97	WSEL =	370.808
Q100 (cfs) =	173.58	WSEL =	371.225

TR-55 PEAK DISCHARGE FLOWS TO VAULT

WinTR-55 Current Data Description

--- Identification Data ---

User: LGM
Project: Twinbrook Hines
SubTitle: Proposed Conditions
State: Maryland
County: Montgomery NOAA_C

Date: 12/17/2024
Units: English
Areal Units: Acres

Storm Data

Rainfall Depth by Rainfall Return Period

10-Yr (in)	100-Yr (in)
5.1	7.2

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
SP1 Vault	133.49	191.20

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Manning's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
SP1 Vault							
SHEET	9	0.1000	0.150				0.013
SHALLOW	79	0.0100	3.1				0.011
CHANNEL	1896				7.000		0.075
					Time of Concentration		0.1

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
SP1 Vault	Commercial & business	D	21.05	95
	Total Area / Weighted Curve Number		21.05	95

CPv COMPUTATION

The following procedure shall be used to design the channel protection storage volume (Cpv). The method is based on the Design Procedures for Stormwater Management Extended Detention Structures (MDE, 1987) and utilizes the NRCS, TR-55 Graphical Peak Discharge Method (USDA, 1986).

- Compute the time of concentration (t_c) and the one-year post-development runoff depth (Q_a) in inches. t_c = 0.1 hr and Q_a = 2.0 in P=2.6
- Compute the initial abstraction (I_a) [$I_a = \frac{200}{CN} - 2$] and the ratio I_a/P where P is the one-year rainfall depth (see Table 2-2). I_a = 200/95 - 2 = 0.105 I_a / P = 0.105 / 2.6 = 0.04048
- With t_c and I_a/P, find the unit peak factor (q_u) from Figure D.11.1 and compute the one year post-development peak discharge $q_i = q_u A Q_a$ where A is the drainage in square miles. q_i = 1020x(21.05x0.0015625)x2=67.09 cfs
- If $q_i \leq 2.0$ cfs, Cpv is not required. Provide for water quality (WQ_v) and groundwater recharge (Re_v) as necessary. q_i > 2 cfs so Cpv Required
- With q_o, find the ratio of outflow to inflow (q_o/q_i) for T = 24 hours from Figure D.11.2 (use T=12 hours in USE III/IV waters). q_o/q_i= 0.02
- Compute the peak outflow discharge $q_o = \frac{q_o}{q_i} \times q_i$ q_o= 0.02 x 67.09 = 1.34 cfs
- With q_o/q_i, compute the ratio of storage to runoff volume (V_s/V_r).

$$\frac{V_s}{V_r} = 0.683 - 1.43\left(\frac{q_o}{q_i}\right) + 1.64\left(\frac{q_o}{q_i}\right)^2 - 0.804\left(\frac{q_o}{q_i}\right)^3$$

0.683-0.0286+0.000656-0.000006432=0.65505

- Compute the extended detention storage volume $V_s = \left(\frac{V_s}{V_r}\right) \times V_r$ (note: $V_r = Q_a$); Vs=0.65505xQa=1.3101

Convert V_s to acre-feet by $\frac{V_s}{A}$, where V_s is in inches and A is in acres.
Cpv=1.3101x21.05 / 12 = 2.29ac-ft = 100,106 cuft

- Compute the required orifice area (A_o) for extended detention design:

$$A_o = \frac{q_o}{C\sqrt{2gh_o}} = \frac{q_o}{4.81\sqrt{h_o}}$$ = 1.34 / (4.81 sqrt (9.55)) = 0.0901

where h_o is the maximum storage depth associated with V_o.

- Determine the required maximum orifice diameter (d_o) $d_o = \sqrt{\frac{4A_o}{\pi}}$. = sqrt (4x 0.0901/3.14) = 0.3387 ft or 4.06 in

A d_o of less than 3.0" is subject to local jurisdictional approval, and is not recommended unless an internal control for orifice protection is used (App. D.8).

D.11.1

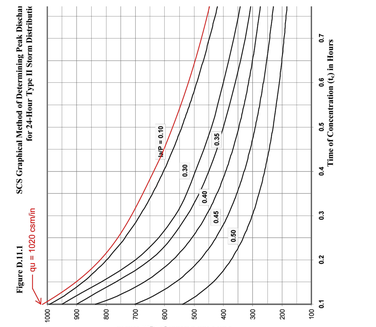
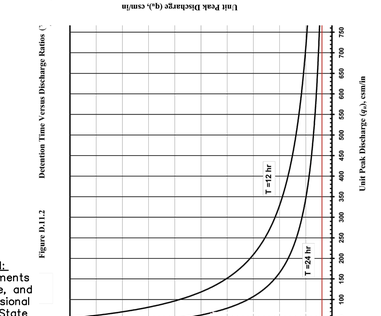


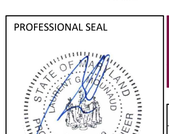
Figure D.11.2



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. 36749, Expiration Date: JANUARY 21, 2027

LAURENT G. MOUNAUD
NAME

PROFESSIONAL SEAL



VIKA MARYLAND, LLC
20251 Century Blvd., Suite 400
Germantown, MD 20874
301.916.4100 | vika.com
Our Site Set on the Future.

THE INFORMATION, DESIGN AND CONTENT OF THESE DRAWINGS OR DOCUMENTS ARE PROPRIETARY TO VIKA MARYLAND, LLC AND CONSTITUTE ITS PROPRIETARY INTELLECTUAL PROPERTY. THESE DRAWINGS AND/OR DOCUMENTS MUST NOT BE FORWARDED, SHARED, COPIED, DIGITALLY CONVERTED, REPRODUCED OR USED IN WHOLE OR IN ANY FORMAT, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM VIKA MARYLAND, LLC. VIOLATIONS MAY RESULT IN PROSECUTION. ONLY APPROVED, SIGNED AND SEALED PLANS OR DRAWINGS MAY BE UTILIZED FOR CONSTRUCTION PURPOSES. © 2019 VIKA MARYLAND, LLC

NO.	DESCRIPTION OF REVISION	P.E. INITIAL	DATE	DPW	DATE

APPROVAL OF REVISIONS AFTER INTIAL PLAN APPROVAL

DESIGNED _____
DRAFTED _____
CHECKED _____

DEPARTMENT OF PUBLIC WORKS
CITY OF
ROCKVILLE
111 MARYLAND AVE. ROCKVILLE, MARYLAND

STORMWATER MANAGEMENT DETAILS

1818 CHAPMAN
LOT 2,3,4,5 & 6, P1 BLOCK 4 & B
SUBDIVISION 0201
ELECTION DISTRICT NO. 4 CITY OF ROCKVILLE, MARYLAND

DATE SUBMITTED:
VIKA JOB NO. VM50024J

SCALE

SHEET NO. CSWM-5 OF 5

FILE #

LAYOUT: CSWM-5, Plotted By: Mounaud

Z:\50000-59999\50024\CAD\SITE\PLOT SHEETS\50024000_P_CSWM.dwg - Wednesday, January 15, 2025 11:02:54 AM