GENERAL NOTES

1. This site has been addressed by the Prince William County Mapping Office as: *a) 13001 CHINN PARK DR, WOODBRIDGE VA 22192 & b) 13190 TROWBRIDGE DR, WOODBRIDGE VA 22192* (addresses for subdivision lots shall appear on the approved plat for recordation).
2. Addresses assigned are for the layout of individual businesses or dwelling units and are for exterior doors as shown on this plan only. Any deviation in design or layout will require that a revised plan be submitted to the Office of Mapping for re-addressing. It is the responsibility of the developer to inform the County Office of Mapping before a change in layout occurs and to submit complete and accurate information for re-addressing. Prince William County does not assume any responsibility where re-addressing is required even though tenants have already occupied a portion of the building.
3. Methods and materials used in the construction of the improvements herein shall conform to the current County construction standards and specifications and/or current VDOT standards and specifications.
4. The contractor or developer is required to notify the Prince William County Department of Public Works in writing three (3) days prior to the beginning of the construction and specifically request inspection before beginning 703- 792-7070.
   - A. Installation of approved erosion control devices.
   - B. Clearing and Grading
   - C. Subgrade excavation.
   - D. Installing storm sewers or culverts.
   - E. Setting curb and gutter forms.
   - F. Placing curb and gutter.
   - G. Placing other concrete.
   - H. Placing gravel base.
   - I. Placing any bituminous surfacing.
   - *J. Installing water mains outside the Service Authority's boundaries.
   - *K. Installing sanitary sewer outside the Service Authority's boundaries.
5. Measures to control erosion and siltation, including detention ponds serving as silt basins during construction, must be provided prior to issuance of the site development permit. The approval of these plans in no way relieves the developer or his agent of the responsibilities contained in the Virginia Erosion and sediment Control Handbook.
6. A permit must be obtained from the Office of the Resident Engineer, Virginia Department of Transportation (VDOT) Prince William County, prior to construction in existing State right-of-way, 707-366-1900.
7. Approval of this plan does not guarantee issuance of an entrance permit by VDOT when such permit is required under State law.
8. The exact location of all guard rails will be determined by VDOT personnel. "A joint inspection will be held with the Developer, County Representatives, and Representatives, of the Virginia Department of Transportation (VDOT) to determine if and where guard rail and/or paved ditches will be needed. The developer will be responsible for providing guardrail and paved ditches as determined by this joint inspection." Refer to Virginia Department of Transportation (VDOT) Guard Rail and Paved Ditch Specifications.
9. An approved set of plans and all applicable permits must be available at the construction site. Also, a representative of the developer must be available at all times.
10. Warning signs, markers, barricades or flagmen should be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).
11. ~~All unsuitable material shall be removed from the construction limits of the roadway before placing embankment.~~
12. ~~All pavement sections on the approved plans are based on a minimum CBR value of 10. CBR tests are to be performed by the engineer and submitted to the Prince William County Planning Office for review prior to placement of base material. CBR values less than 10 will require submittal of revised pavement section.~~
13. ~~All roadside ditches at grades of more than 5% shall be paved with cement concrete to the limits indicated on the plans and as required at the field inspection.~~
14. ~~All springs shall be capped and piped to the nearest storm sewer manholes or curb inlet. The pipe shall be minimum 6" diameter and conform to VDOT standard SB-1.~~
15. ~~All standard street name signs, traffic control devices, and street lights shall be installed by the developer when the first building unit is occupied.~~
16. Construction debris shall be containerized in accordance with the Virginia Litter Control Act; no less than one litter receptacle shall be provided at the construction site
17. The contractor shall provide adequate means of cleaning mud from trucks and/or other equipment prior to entering public streets, and it is the contractors responsibility to clean streets, allay dust, and to take whatever measures are necessary to insure that the streets are maintained in a clean, mud and dust free condition at all times.
18. ~~* Notification shall be given to the appropriate utility Company (Service Authority, Virginia-American Water Company, or Dale Service Corporation) prior to construction of water and/or sanitary sewer lines. Information should also be obtained from the appropriate authority concerning permits, cut sheets, and connections to existing lines.~~
19. ~~All sanitary sewers and water mains and appurtenances shall be constructed in accordance with the current standards and specifications of Prince William County and/or the Service Authority.~~
20. The developer and/or contractor shall be responsible to supply all utility companies with copies of plans that have been approved by Prince William County and advising them that all grading shall conform to the approved plans, and further that the utility companies shall be responsible for honoring these plans and the finished grades in the installation of their utility lines.
21. Contractors shall notify operators who maintain underground utility lines in the area of proposed excavating or blasting at least two (2) working days, but not more than ten (10) working days, prior to commencement of excavation or demolition. Names and telephone numbers of theoperators underground utility lines in Prince William County appear below. These numbers shall also be used to serve in an emergency condition.

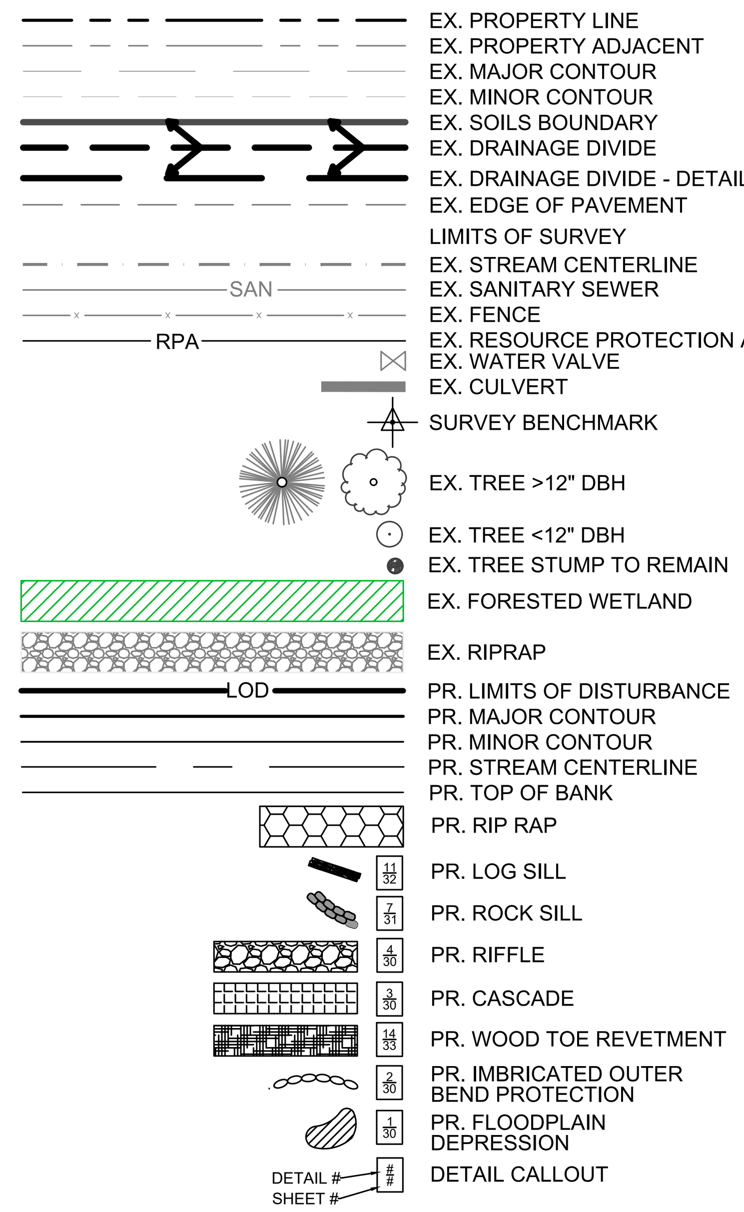
Washington Gas Light Co.
Virginia Power Co.
Northern Virginia Electric Co-op
Columbia Gas of Virginia
Continental Telephone of VA
Colonial Pipeline Co.
Transcontinental Gas Pipe Line Corp.

MISS UTILITY 1-800-552-7001

Service Authority	**703-335-7900**
	(After hours-Emergency 335-7990)
Virginia-American Water	**703-491-2136**
Dale Service Corporation	**703-494-4161**

22. ~~The service Authority requires that a clean-out be placed within one foot (0.3 meters) of the property line.~~
23. The location of existing utilities shown in these plans are taken from existing records. It shall be the contractors responsibility to verify the exact horizontal and vertical location of all existing utilities as needed prior to construction. The contractor shall inform the engineer of any conflicts arising from his existing utility verification and the proposed construction.
24. The developer will be responsible for any damage to the existing streets and utilities which occurs as a result of his construction project within or contiguous to the existing right-of-way.
25. All utilities placed under existing streets shall be bored or jacked.
26. When grading is proposed within easements of utilities, letters of permission from all involved companies must be provided to Prince William County Planning Office prior to issuance of grading and/or site development permits.
27. ~~The developer will be responsible for the relocation of any utilities which is required as a result of his project.~~The relocation should be done ~~prior to construction.~~
28. Before burning, blasting, transportation or storage of explosives in Prince William County, a permit shall be obtained from the Fire Marshal's Office, 792-6360.
29. Fire and Rescue Services must be notified immediately (703-792-6810) in the event that unusual items such as tanks, cylinders, unidentified containers, etc. which could contain potentially hazardous materials are discovered or observed. All activities must cease and not be resumed until authorization to proceed is given by the Fire Marshal's Office.
30. ~~Sidewalk underdrains shall be installed per Section 650.65 of the Design and Construction Standards Manual.~~
31. ~~All walkways outside of the right-of-way limits will be maintained by the homeowners association.~~
32. Maintenance of the Storm Drainage or Storm Water Management facilities located therein shall be pursuant to Section 700 of the Prince William County Design and Construction Standards Manual.
33. If units shown on this plan will be occupied in phases, a phasing plan must be approved by the engineering inspection branch prior to the issuance of any occupancy permits. (Detached single family subdivision exempt.)
34. These plans identify the location of all known gravesites. Gravesites shown on this plan will be protected in accordance with state law. In the event gravesites are discovered during construction, the County's Archaeologist must be notified immediately (792-6830). All activities must cease and not be resumed until authorization to proceed is given by the County Archaeologist.
35. ~~Roof top mechanical equipment, if any, must be enclosed within a wall or similar screening barrier, designed in harmony with the building.~~
36. Individual sign permits will be required from the Zoning Office for all free standing and facade signs prior to erecting the signs.
37. All buffer areas shall be screened according to the Design and Construction Standards Manual.
38. For proffer statements and proffer analyses, see project booklet.
39. For waivers see sheet(s) N/A of ______ .
40. Anticipated sewage flows: N/A
41. Anticipated fire flows: N/A
42. Distance to nearest existing school or proposed school site: < 0.5 MILE

LEGEND



SURVEY AND TOPOGRAPHIC INFORMATION

1. Horizontal and vertical control surveys were performed by *CAP LAND SURVEYING, PLLC* in *MAY-AUGUST 2021*
2. All elevations must be referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). ** This survey is referenced to NAVD 1988 Vertical Datum.*
3. Source of topographic mapping is *CAP LAND SURVEYING, PLLC*. dated *MAY-AUGUST 2021*.
4. ~~Boundary survey was performed by~~ ______ ~~dated~~ ______
   Boundary survey was not performed. Boundary data was obtained by RES from Prince William County through GIS in October 2022.
5. The application of the professional's seal and signature as required by Section 1.14 of the STATE BOARD OF ARCHITECTS, PROFESSIONAL ENGINEERS, LAND SURVEYORS AND CERTIFIED LANDSCAPE ARCHITECTS RULES AND REGULATIONS shall be evidence that: the boundary data is correct to the best of the land surveyor's knowledge, and complies with the minimum standards and procedures of the said Board; the topograhic information is accurate to within one-half of the contour interval, as shown. Application of the seal and signature indicates acceptance of responsibility for the work shown hereon.

DESIGNATED PLANS EXAMINER CERTIFICATE

1ST SUBMISSION REVIEWED AND RECOMMENDED FOR SUBMISSION

DESIGNATED PLANS EXAMINER   REG. NUMBER   DATE

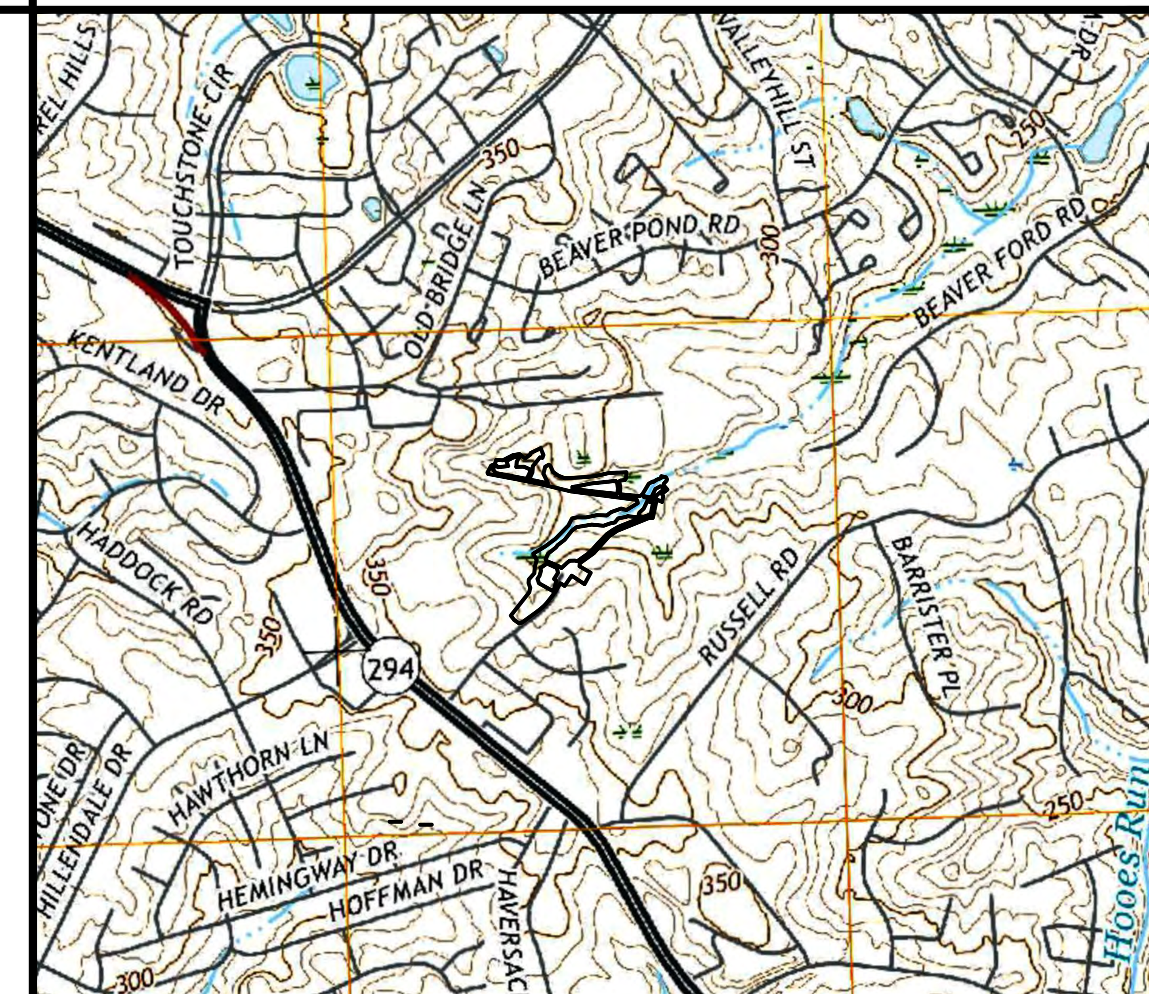
2ND SUBMISSION REVIEWED AND RECOMMENDED FOR SUBMISSION

DESIGNATED PLANS EXAMINER   REG. NUMBER   DATE

BOND ESTIMATE

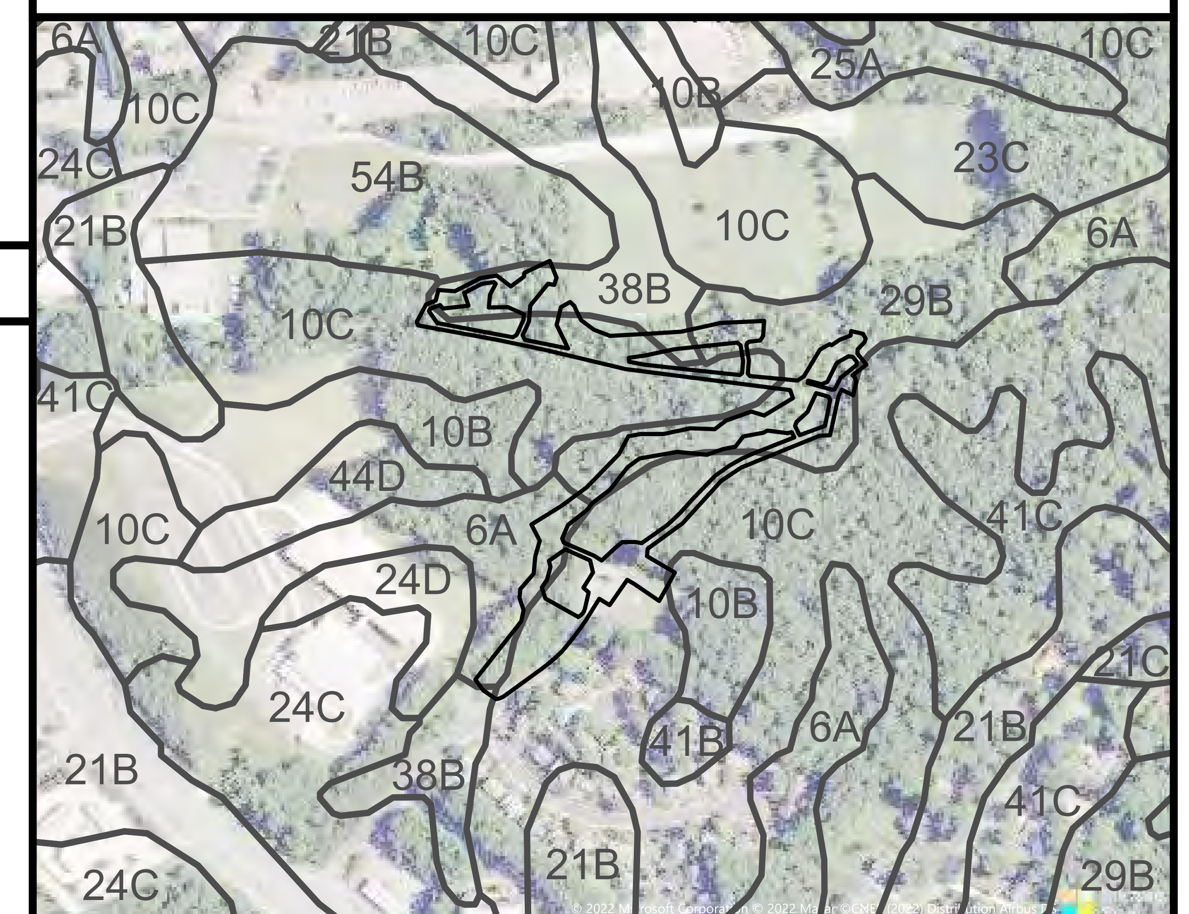
VICINITY MAP

1" = 1000'



SOILS MAP

1" = 400'



SOILS INFORMATION WAS OBTAINED FROM THE NATURAL RESOURCES CONSERVATION SERVICE WEB SOIL SURVEY ISSUED SEPTEMBER 2019.

SOILS DATA

MAP UNIT SYMBOL	MAP UNIT NAME	ACRES IN DRAINAGE AREA	PERCENT OF DRAINAGE AREA
6A	Baile loam, 0 to 4 percent slopes	6.16	6%
10B	Buckhall loam, 2 to 7 percent slopes	6.35	7%
10C	Buckhall loam, 7 to 15 percent slopes	30.00	32%
21B	Fairfax loam, 2 to 7 percent slopes	10.97	12%
24C	Glenelg-Buckhall complex, 7 to 15 percent slopes	11.74	12%
24D	Glenelg-Buckhall complex, 15 to 25 percent slopes	2.35	2%
29B	Hoadly loam, 2 to 7 percent slopes	3.63	4%
38B	Meadowville loam, 0 to 5 percent slopes	8.42	9%
41B	Neabsco loam, 0 to 7 percent slopes	0.50	1%
41C	Neabsco loam, 7 to 15 percent slopes	1.33	1%
44D	Occoquan sandy loam, 7 to 25 percent slopes	2.70	3%
54B	Urban land-Udorthents complex, 0 to 7 percent slopes	10.88	11%

REVIEWED BY: ______________________ APPROVED BY: ______________________

This plan has been reviewed and has been found to be in general conformance with the requirements of Prince William County. The developer is hereby authorized to obtain all necessary land development permits, subject to all designs, procedures, materials and workmanship being in compliance with lawful requirements. If not bonded or permitted (if applicable) within five (5) years of the authorized date or lawfully extended, this authorization will expire. A valid agreement and bond with Prince William County must be maintained to assure plan and permit validity.

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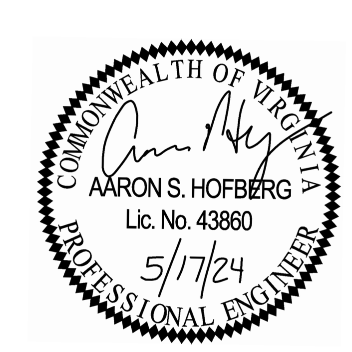
REVISIONS

DATE	DESIGNER	NO.	DESCRIPTION



PROFESSIONAL SEAL & SIGNATURE

THESE PLANS ARE IN CONFORMANCE WITH PRINCE WILLIAM COUNTY STANDARDS AND ORDINANCES. ANY DEVIATION OR CHANGE IN THESE PLANS SHALL BE APPROVED BY THE DIRECTOR OF PLANNING PRIOR TO CONSTRUCTION.

PRINCE WILLIAM COUNTY

COVER SHEET

PROJECT NAME: CHINN PARK STREAM RESTORATION & STORMWATER BMP
PROJECT NUMBER: –

SUBDIVISION or SITE PLAN NAME: CHINN PARK STREAM RESTORATION & STORMWATER BMP SPR2023-00397 S03
MARKET NAME:
PLAN NUMBER: SPR2023-00397 S03
PLAN TYPE:

MAGISTERIAL DISTRICT: OCCOQUAN
PRESENT ZONING & USE: a) A-1 & b) R-4
DATE OF PLAN: (MM/DD/YYYY) 10/16/23

OWNER: a) PWC BOARD OF COUNTY SUPERVISORS & b) SYCAMORE RIDGE HOMES ASSOCIATES
OWNER ADDRESS: a) 5 COUNTY COMPLEX COURT, SUITE 170, PRINCE WILLIAM, VA 22192 & b) 3302 OLD BRIDGE RD STE B, WOODBRIDGE, VA 22192
OWNER PHONE#: a) 703-792-5534
OWNER EMAIL: a) TOMDOMBROSKI@PWCOUNTY.COM

DEVELOPER: DEVELOPER ADDRESS: DEVELOPER PHONE#:   DEVELOPER EMAIL:

NAME, ADDRESS, & TELEPHONE NO. of ENGINEER: ARCHITECT or SURVEYOR CERTIFYING PLAN: HGS, LLC. A RES COMPANY, 1408 ROSENEATH RD, SUITE B, RICHMOND, VA 23230, 804-353-6017, ALAMBERT@RES.US

PARCEL INDENTIFICATION NUMBERS: a) 8192-79-9203 & b) 8192-78-3126

TOTAL AREA: 75.46 ACRES   PROJECT AREA: 4.75 ACRES   DISTURBED AREA: 5.02 AC   IMPERVIOUS AREA: 0.62 AC   BMP STORAGE:

RELATED PLANS TRACKING NUMBERS (Including Rez. & S.U.P.):

Subdivision/Site Plan Name: CHINN PARK STREAM RESTORATION & STORMWATER BMP – SPR2023-00397 S03

PWC File Number:

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B9	BMP RETROFIT EROSION AND SEDIMENT CONTROL DETAILS
B10	BMP RETROFIT NARRATIVE, NOTES AND CREDITING SUMMARY

GENERAL NOTES:

1. THE PURPOSE OF THIS PROJECT IS TO PROVIDE NUTRIENT REDUCTIONS AND FUNCTIONAL UPLIFT TO STREAM CHANNELS BY UTILIZING STREAM RESTORATION AND BMP IMPROVEMENTS.
2. THE PROPERTY SHOWN HEREON IS RECORDED IN THE NAME OF:
   a. GPIN: 8192-79-9203 OWNER: PRINCE WILLIAM COUNTY
   b. GPIN: 8192-78-3126 OWNER: SYCAMORE RIDGE HOMES ASSOCIATES
3. ACCORDING TO PRINCE WILLIAM COUNTY ASSESSMENTS, THE PROPERTY IS 74.7957 ACRES (a) AND 0.6636 ACRES (b).
4. THIS PROPERTY IS CURRENTLY ZONED A-1 (a) AND R-4 (b).
5. THE LAND USE OF THE PROPERTY WILL NOT CHANGE WITH THE PROPOSED STREAM RESTORATION AND BMP.
6. TOPOGRAPHIC INFORMATION SHOWN HEREON WAS ACQUIRED BY RES FROM CAP LAND SURVEYING, PLLC. CONTOUR INTERVAL IS ONE (1) FOOT. ALL ELEVATIONS ARE BASED ON U.S.G.S. OR U.S.C. & G.S. MEAN SEA LEVEL DATUM. CONTOUR INFORMATION OUTSIDE THE PROJECT LIMITS IS FROM COUNTY GIS DATA WITH A CONTOUR INTERVAL OF TWO (2) FEET.
7. SOILS INFORMATION IS BASED ON THE USDA WEB SOIL SURVEY'S DATABASE CURRENT DATA FOR PRINCE WILLIAM COUNTY.
8. THE PROPERTY SHOWN HEREON IS NOT LOCATED WITHIN A 100-YEAR FLOODPLAIN.
9. THE PROPERTY SHOWN HEREON HAS NO ARCHEOLOGICAL OR HISTORIC FEATURES AS INCLUDED IN THE STATE OR NATIONAL REGISTER OF HISTORIC PLACES.
10. STORMWATER MANAGEMENT IS NOT REQUIRED AS NO NEW IMPERVIOUS SURFACES OR MANAGED TURF AREAS WILL BE ESTABLISHED.
11. SEDIMENT AND EROSION CONTROL WILL BE PROVIDED IN ACCORDANCE WITH THE "VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK" (VESCH).
12. WETLAND DELINEATION WAS ACQUIRED FROM PRINCE WILLIAM COUNTY.
13. ALL WETLAND DELINEATIONS, PERMITS AND MITIGATION PLANS SHALL BE OBTAINED AND EVIDENCE OF SUCH BE PROVIDED TO THE COUNTY PRIOR TO LAND DISTURBANCE.

CONSTRUCTION NOTES:

1. ALL EXISTING UNDERGROUND UTILITIES SHALL BE PHYSICALLY LOCATED BY THE CONTRACTOR PRIOR TO THE BEGINNING OF ANY CONSTRUCTION IN THE VICINITY OF THESE UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH UTILITY COMPANIES FOR THE RELOCATION OF SERVICES/UTILITIES IF REQUIRED.
2. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING ROADS AND UTILITIES WHICH OCCUR AS A RESULT OF PROJECT CONSTRUCTION WITHIN OR CONTIGUOUS TO EXISTING RIGHT-OF-WAY.
3. STREET SURFACES SHALL BE MAINTAINED IN A CLEANED CONDITION, MUD AND DUST FREE AT ALL TIMES. ADEQUATE MEANS SHALL BE PROVIDED TO CLEAN TRUCKS AND OTHER EQUIPMENT USING THE COMPLETED STREETS.
4. LAND CONSERVATION NOTES:
   a. MEASURES TO CONTROL EROSION, SILTATION AND STORM WATER SHALL BE PROVIDED PURSUANT TO, AND IN COMPLIANCE WITH, ALL CURRENT STATE AND LOCAL REGULATIONS. HOWEVER, THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE DEVELOPER, OR HIS AGENT, OF ANY LEGAL RESPONSIBILITY WHICH MAY BE REQUIRED BY THE CODE OF VIRGINIA OR ANY ORDINANCE ENACTED BY PRINCE WILLIAM COUNTY. A GRADING PERMIT IS REQUIRED BEFORE ANY LAND DISTURBING ACTIVITIES ON THE PROJECT ARE UNDERTAKEN.
   b. ALL SLOPES AND DISTURBED AREAS ARE TO BE TOP-SOILED AND SEEDED WITHIN SEVEN (7) DAYS OF REACHING FINAL GRADE.
   c. ADDITIONAL DITCH/SWALE LININGS SHALL BE PROVIDED AT THE DEVELOPER'S EXPENSE IF DETERMINED NECESSARY BY THE ENGINEER OF RECORD OR ASSIGNEE DURING FIELD REVIEW.
5. ALL FILL, BASE AND SUBBASE MATERIAL WITHIN THE RESTORATION AREA SHALL BE COMPACTED WITH TRACKED EQUIPMENT.
6. DURING ROUGH GRADING OF THE SITE, THE CONTRACTOR WILL IMMEDIATELY NOTIFY THE ENGINEER IF GROUND WATER SEEPAGE IS IDENTIFIED. IDENTIFICATION OF SUCH GROUND WATER MAY REQUIRE THAT ADDITIONAL DRAINAGE CONNECTIONS BE MADE.
7. CONSTRUCTION STAKEOUT SHALL BE PERFORMED UNDER THE SUPERVISION OF A LICENSED SURVEYOR. STAKEOUT SHOULD INCLUDE CENTERLINE ALIGNMENT, STRUCTURE VERTICES AND/OR TIE-INS AS INDICATED IN THE APPLICABLE DETAILS.
8. CONTRACTOR SHALL CONFIRM IN-FIELD UPSTREAM / DOWNSTREAM TIE-IN ELEVATIONS AND ALIGNMENT WITH THE ENGINEER OF RECORD OR ASSIGNEE TWO (2) WEEKS PRIOR TO CONNECTION/GRADING.
9. PRIOR TO TREE CLEARING THE ENGINEER OF RECORD, OR ASSIGNEE, AND SUPERINTENDENT SHALL REVIEW TREES FOR SELECTIVE CLEARING WITHIN THE LIMITS OF DISTURBANCE. IT IS THE DESIGN INTENT TO MINIMIZE CLEARING TO THE GREATEST EXTENT POSSIBLE. IN ANY CASE WHERE A TREE SCHEDULED FOR DEMOLITION CAN BE PROPERLY SAVED WITHOUT IMPACTING THE PROPOSED FUNCTIONALITY OF THE DESIGN, THE CONTRACTOR SHALL LEAVE THE TREE IN PLACE.
10. THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ), IN ACCORDANCE WITH THE CLEAN WATER ACT AS AMENDED AND PURSUANT TO THE STATE WATER CONTROL LAW AND REGULATIONS, REQUIRES CONSTRUCTION SITE OPERATORS SECURE, OR WILL SECURE, BY INDICATING PROOF OF APPLICATION, A VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (VPDES) PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES, REFERENCE: (9-VAC25-1480-10 ET SEQ. FOR CONTEXT). CONSTRUCTION ACTIVITIES INCLUDE, CLEARING, GRADING AND EXCAVATING WHICH RESULTS IN LAND DISTURBANCE EQUAL TO OR GREATER THAN ONE (1) ACRE. IN ORDER TO ENSURE COMPLIANCE WITH THE DEQ PERMITTING REQUIREMENT, ALL APPLICATIONS FOR GRADING PERMITS WITHIN PRINCE WILLIAM COUNTY, SUBJECT TO CRITERIA AS PREVIOUSLY DESCRIBED, SHALL BE REQUIRED TO PROVIDE RECEIPT OF PROOF THAT CONSTRUCTION SITE OPERATORS HAVE SECURED OR WILL SECURE A VPDES CONSTRUCTION PERMIT PRIOR TO THE ISSUANCE OF THE GRADING PERMIT.
11. THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE OWNER OF COMPLYING WITH OTHER APPLICABLE LOCAL, STATE AND FEDERAL REQUIREMENTS.
12. EMERGENCY VEHICLE ACCESS SHALL BE PROVIDED DURING ALL PHASES OF CONSTRUCTION.

NOTICE REQUIRED:

CONTRACTORS SHALL NOTIFY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION AND/OR BLASTING AT LEAST TWO (2) WORKING DAYS, BUT NOT MORE THAN TEN (10) WORKING DAYS PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION. NAMES AND TELEPHONE NUMBERS OF THE OPERATORS OF UNDERGROUND UTILITY LINES APPEAR BELOW. THESE NUMBERS SHALL ALSO BE USED TO SERVE IN AN EMERGENCY CONDITION.

DOMINION ENERGY	866-366-4357
VERIZON COMMUNICATIONS	800-922-0204
MISS UTILITY	811 OR 800-552-7001

EMERGENCY

POLICE: 911 OR (703) 792–6650

FIRE & RESCUE: 911 OR (703) 792–6800

SURVEY NOTES:

GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR DATA IS ONE (1) FOOT. THE SURVEY IS REFERENCED TO NAVD 1988 VERTICAL DATUM AND VIRGINIA STATE GRID, NORTH ZONE, NAD83 HORIZONTAL DATUM. TOPOGRAPHIC INFORMATION OUTSIDE THE SURVEY LIMITS IS BASED ON COUNTY GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.

WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.

PROPERTY LINES ADJACENT TO WORK AREA WERE SURVEYED IN 2021 BY CAP SURVEY. ALL OTHER PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

NO CEMETERIES, HISTORIC SITES, OR OTHER FACILITIES ARE KNOWN TO EXIST WITHIIN THE PROJECT AREA.

res

HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION &
STORMWATER BMP
PRINCE WILLIAM COUNTY

NOTES

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024

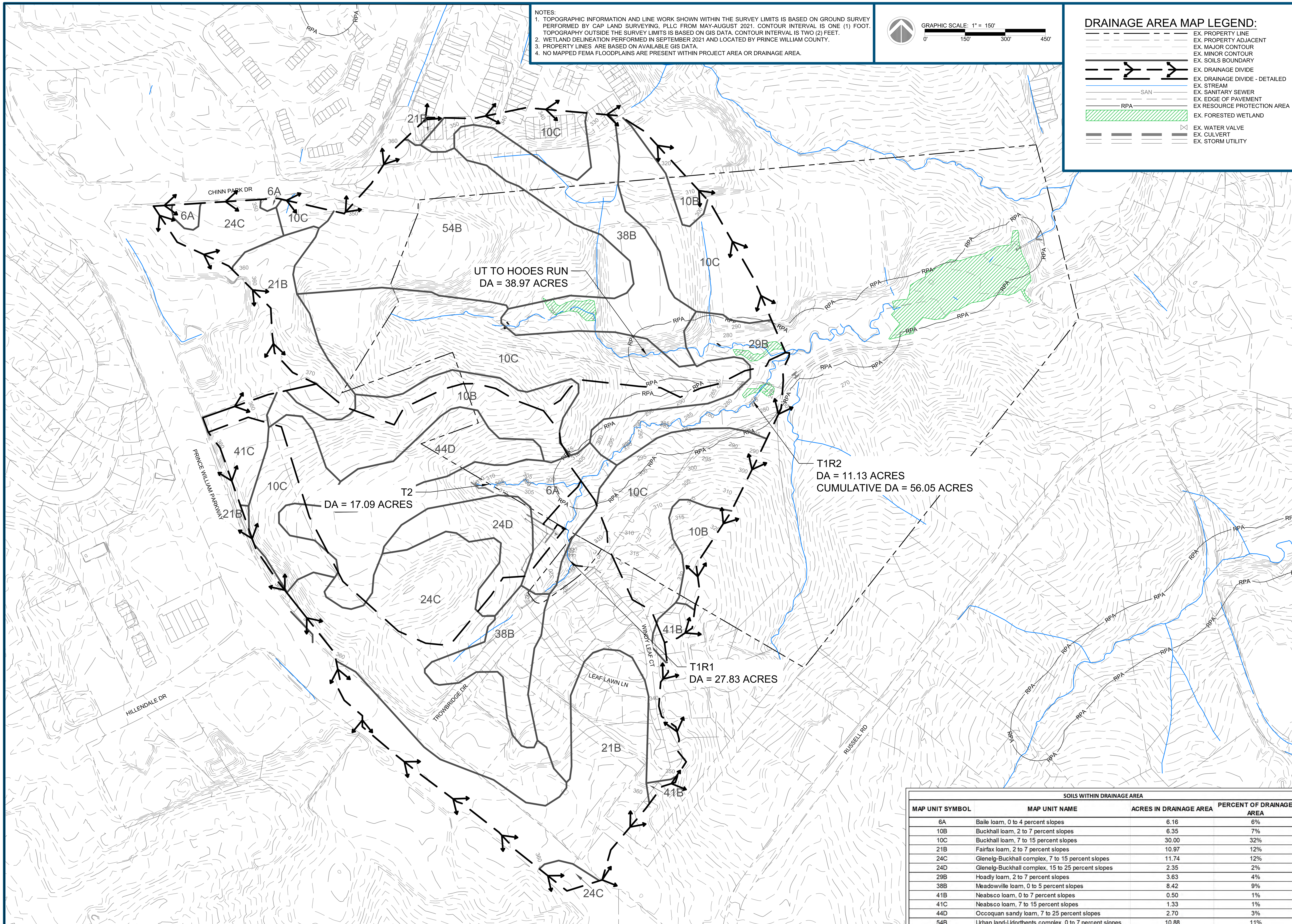
SHEET NO:

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.
4. NO MAPPED FEMA FLOODPLAINS ARE PRESENT WITHIN PROJECT AREA OR DRAINAGE AREA.

GRAPHIC SCALE: 1" = 150'
0' 150' 300' 450'

DRAINAGE AREA MAP LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SOILS BOUNDARY
- EX. DRAINAGE DIVIDE
- EX. DRAINAGE DIVIDE - DETAILED
- EX. STREAM
- SAN EX. SANITARY SEWER
- EX. EDGE OF PAVEMENT
- RPA EX RESOURCE PROTECTION AREA
- EX. FORESTED WETLAND
- EX. WATER VALVE
- EX. CULVERT
- EX. STORM UTILITY



SOILS WITHIN DRAINAGE AREA

MAP UNIT SYMBOL	MAP UNIT NAME	ACRES IN DRAINAGE AREA	PERCENT OF DRAINAGE AREA
6A	Baile loam, 0 to 4 percent slopes	6.16	6%
10B	Buckhall loam, 2 to 7 percent slopes	6.35	7%
10C	Buckhall loam, 7 to 15 percent slopes	30.00	32%
21B	Fairfax loam, 2 to 7 percent slopes	10.97	12%
24C	Glenelg-Buckhall complex, 7 to 15 percent slopes	11.74	12%
24D	Glenelg-Buckhall complex, 15 to 25 percent slopes	2.35	2%
29B	Hoadly loam, 2 to 7 percent slopes	3.63	4%
38B	Meadowville loam, 0 to 5 percent slopes	8.42	9%
41B	Neabsco loam, 0 to 7 percent slopes	0.50	1%
41C	Neabsco loam, 7 to 15 percent slopes	1.33	1%
44D	Occoquan sandy loam, 7 to 25 percent slopes	2.70	3%
54B	Urban land-Udorthents complex, 0 to 7 percent slopes	10.88	11%

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

DRAINAGE AREA MAP

PRINCE WILLIAM COUNTY, VA

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5/17/24
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CONSTRUCTION PLAN REVIEW
x ----
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REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	3 OF 48

NOTES:
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4. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 60'
0' 60' 120' 180'

EX. CONDITIONS LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- LOS — LIMITS OF SURVEY
- EX. EDGE OF PAVEMENT
- EX. STREAM CENTERLINE
- SAN — EX. SANITARY SEWER
- x — EX. FENCE
- RPA — EX. RESOURCE PROTECTION AREA
- EX. FORESTED WETLAND
- LOD — PR. LIMITS OF DISTURBANCE

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EXISTING CONDITIONS KEY SHEET

PRINCE WILLIAM COUNTY, VA

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AARON S. HOFBERG
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5/17/24
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CONSTRUCTION PLAN REVIEW
x Signature ---- Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	4 OF 48

FILENAME:R:\Rescad\Projects\102215-Chinn Park Stream And BMP Design\CADD\Plan Sheets\EXISTING CONDITIONS.dwgDATE:9/3/2024 1:51 PM BY:Cdarragh

NOTES:
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GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

EX. CONDITIONS LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- LIMITS OF SURVEY
- EX. EDGE OF PAVEMENT
- EX. STREAM CENTERLINE
- EX. SANITARY SEWER
- EX. FENCE
- EX. RESOURCE PROTECTION AREA
- EX. WATER VALVE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE >12" DBH
- EX. TREE <12" DBH
- EX. FORESTED WETLAND
- EX. RIPRAP
- PR. LIMITS OF DISTURBANCE

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EXISTING CONDITIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
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AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

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Signature	Date 11/2021
60% DESIGN REVIEW	
Signature	Date 11/14/2022
CONSTRUCTION PLAN REVIEW	
Signature	Date ----
REVISIONS:	----
PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	5 OF 48

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- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
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- LOS — LIMITS OF SURVEY
- EX. EDGE OF PAVEMENT
- EX. STREAM CENTERLINE
- SAN — EX. SANITARY SEWER
- x — EX. FENCE
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- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE >12" DBH
- EX. TREE <12" DBH
- EX. FORESTED WETLAND
- EX. RIPRAP
- LOD — PR. LIMITS OF DISTURBANCE

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EXISTING CONDITIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
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AARON S. HOFBERG
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5/17/24
PROFESSIONAL ENGINEER

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60% DESIGN REVIEW	
x Signature	11/14/2022 Date
CONSTRUCTION PLAN REVIEW	
x Signature	---- Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	6 OF 48

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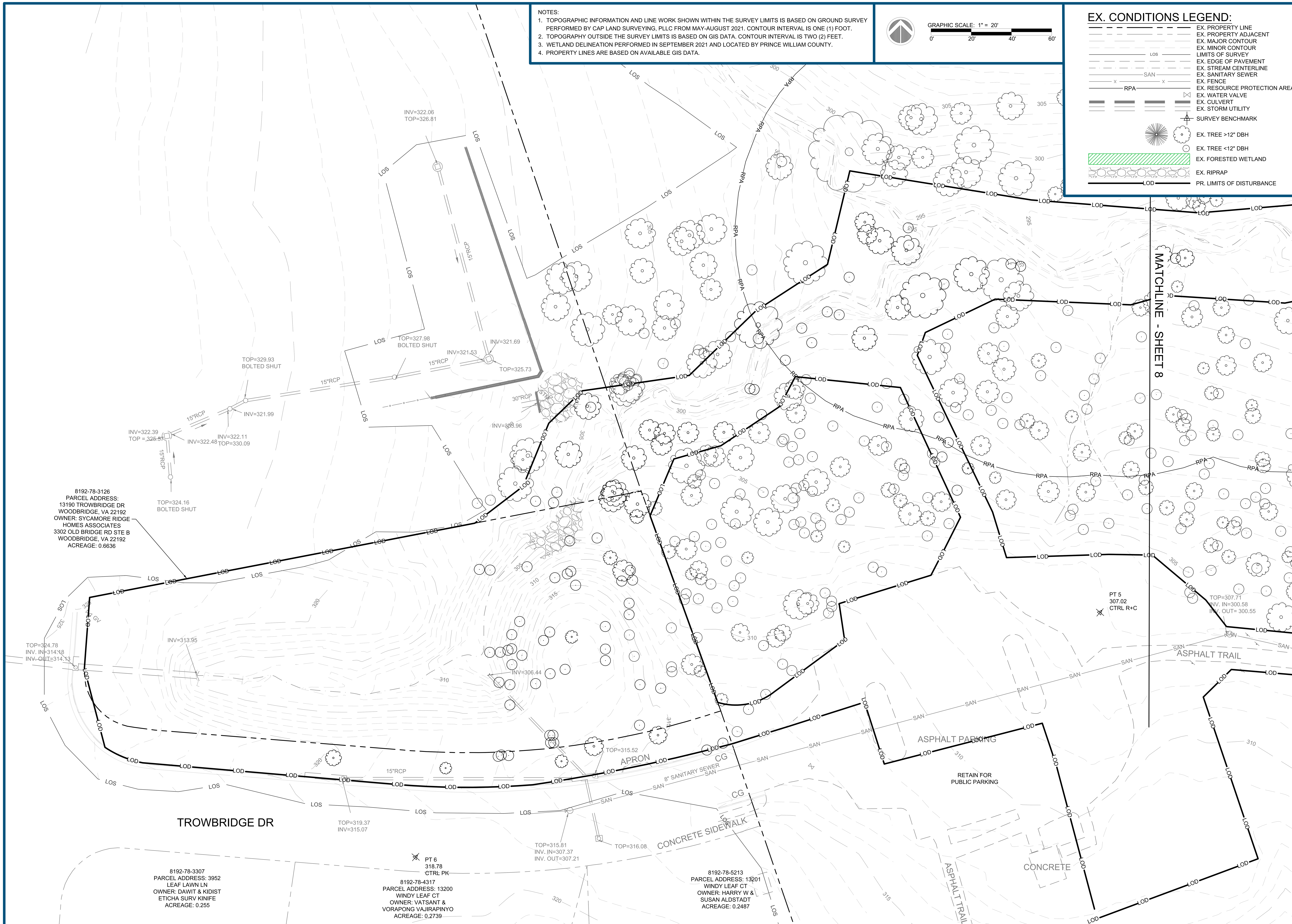
0' 20' 40' 60'

EX. CONDITIONS LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. LIMITS OF SURVEY (LOS)
- EX. EDGE OF PAVEMENT
- EX. STREAM CENTERLINE
- EX. SANITARY SEWER (SAN)
- EX. FENCE (x)
- EX. RESOURCE PROTECTION AREA (RPA)
- EX. WATER VALVE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE >12" DBH
- EX. TREE <12" DBH
- EX. FORESTED WETLAND
- EX. RIPRAP
- PR. LIMITS OF DISTURBANCE (LOD)



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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EXISTING CONDITIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
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5/17/24
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30% DESIGN REVIEW	
x	11/2021
Signature	Date
60% DESIGN REVIEW	
x	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	
x	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	7 OF 48

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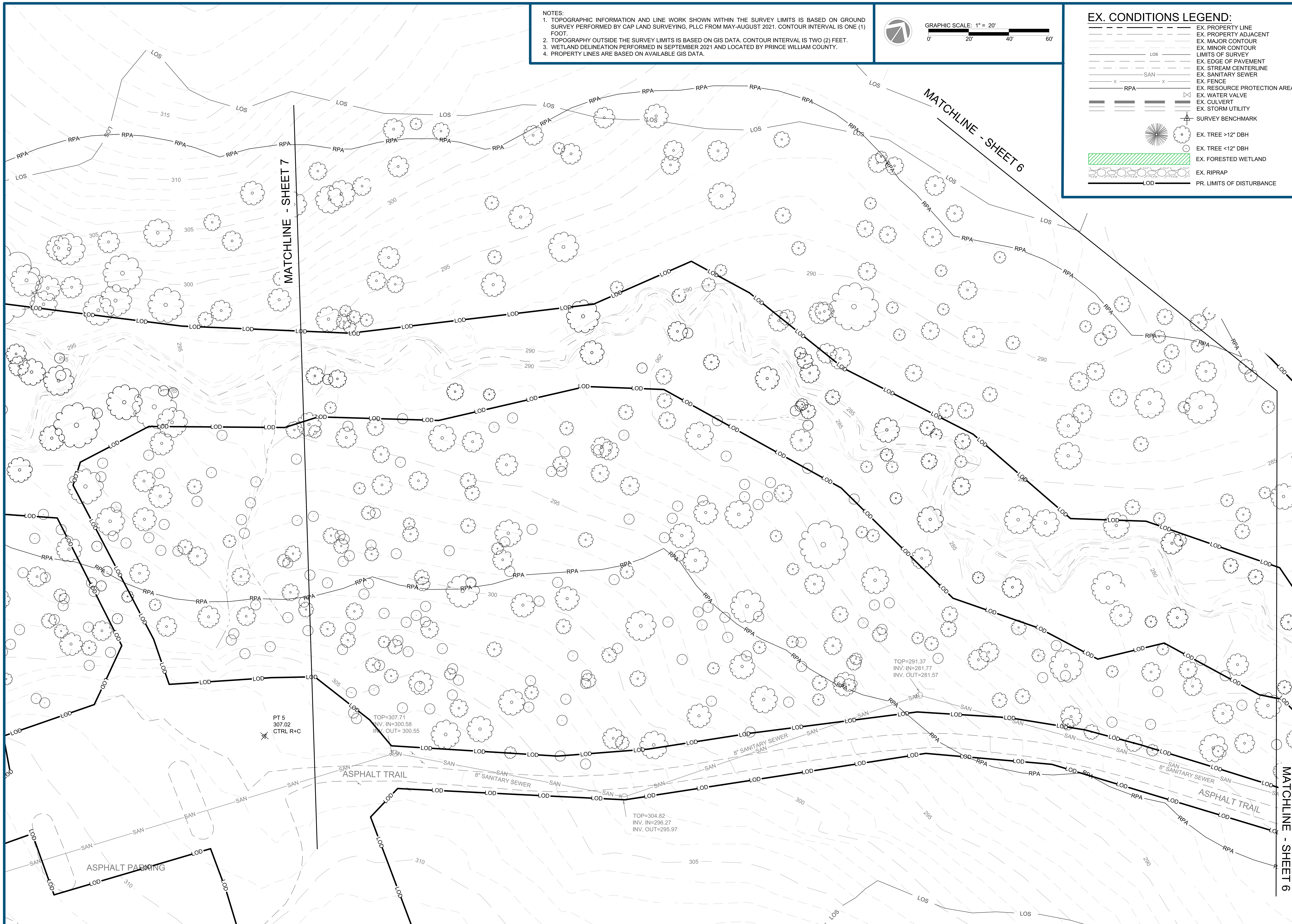

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EXISTING CONDITIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	
x Signature	11/2021 Date
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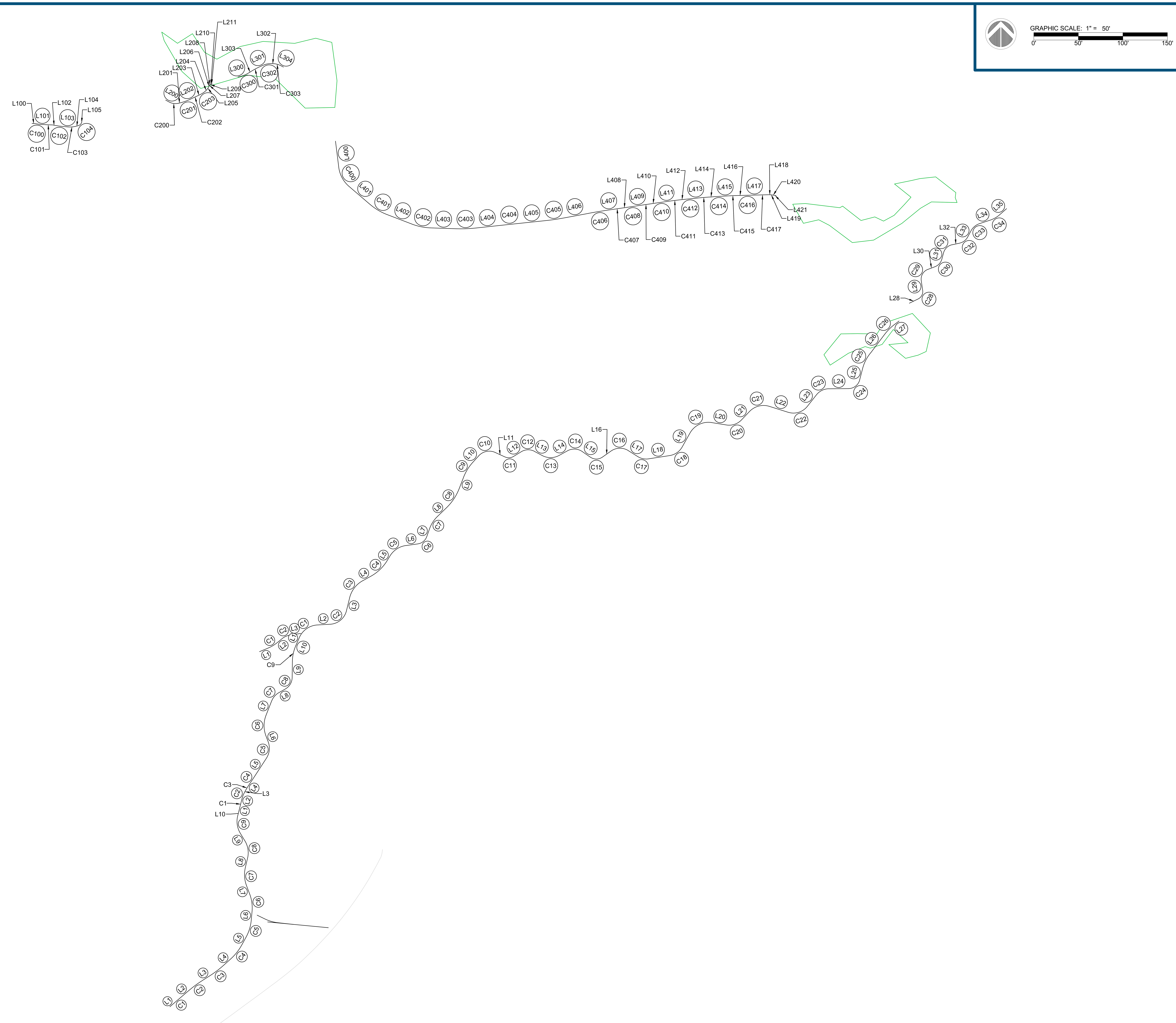
x Signature	11/14/2022 Date
CONSTRUCTION PLAN REVIEW	
x Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	8 OF 48



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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

GEOMETRY PLAN LAYOUT

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
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REVISIONS:

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DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	9 OF 48

INFILTRATION CASCADE LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L1		3.94	N49° 34' 04.18"E	1+00.00	6928182.07	11817202.82
C1	16963.19	14.00	N49° 32' 39.06"E	1+03.94	6928184.62	11817205.82
L2		10.02	N49° 31' 13.94"E	1+17.94	6928193.70	11817216.47
C2	138.21	20.00	N53° 39' 58.14"E	1+27.96	6928200.21	11817224.09
L3		8.14	N57° 48' 42.34"E	1+47.96	6928212.05	11817240.19
C3	118.41	20.00	N52° 58' 22.94"E	1+56.10	6928216.39	11817247.08
L4		10.84	N48° 08' 03.54"E	1+76.10	6928228.42	11817263.03
C4	59.18	20.00	N38° 27' 10.91"E	1+86.94	6928235.65	11817271.10
L5		10.07	N28° 46' 18.29"E	2+06.94	6928251.24	11817283.48
C5	48.96	20.00	N17° 04' 12.34"E	2+17.00	6928260.06	11817288.32
L6		9.74	N5° 22' 06.39"E	2+37.00	6928279.05	11817294.15
C6	44.26	20.00	N7° 34' 40.44"W	2+46.74	6928288.74	11817295.06
L7		10.46	N20° 31' 27.27"W	2+66.74	6928308.40	11817292.45
C7	34.05	20.00	N3° 41' 57.69"W	2+77.21	6928318.20	11817288.78
L8		11.29	N13° 07' 31.88"E	2+97.21	6928337.87	11817287.51
C8	25.97	20.00	N8° 56' 17.42"W	3+08.50	6928348.87	11817290.07
L9		10.03	N31° 00' 06.73"W	3+28.50	6928368.14	11817287.04
C9	25.59	20.00	N8° 36' 34.64"W	3+38.53	6928376.74	11817281.87
L10		5.95	N13° 46' 57.45"E	3+58.53	6928396.02	11817278.95

PR T1R1 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L1		3.01	N14° 32' 24.06"E	3+64.00	6928401.80	11817280.37
C1	774.91	9.51	N14° 11' 18.18"E	3+67.01	6928404.71	11817281.12
L2		1.39	N13° 50' 12.31"E	3+76.52	6928413.93	11817283.46
C2	29.06	7.38	N21° 06' 42.02"E	3+77.91	6928415.28	11817283.79
L3		2.57	N28° 23' 11.73"E	3+85.29	6928422.14	11817286.44
C3	76.47	7.09	N31° 02' 30.31"E	3+87.86	6928424.41	11817287.66
L4		1.81	N34° 05' 35.93"E	3+94.95	6928430.48	11817291.32
C4	504.32	9.28	N33° 33' 58.08"E	3+96.76	6928431.98	11817292.33
L5		25.26	N33° 02' 20.23"E	4+06.04	6928439.71	11817297.46
C5	20.24	19.06	N6° 14' 52.58"E	4+31.30	6928460.88	11817311.23
L6		7.44	N20° 43' 48.61"W	4+50.36	6928479.14	11817313.23
C6	31.73	23.38	N0° 22' 24.48"E	4+57.80	6928486.10	11817310.60
L7		17.29	N21° 28' 37.57"E	4+81.18	6928508.95	11817310.75
C7	18.58	12.64	N40° 57' 20.82"E	4+98.47	6928525.04	11817317.08
L8		8.42	N60° 26' 04.07"E	5+11.10	6928534.40	11817325.20
C8	14.99	15.60	N30° 36' 41.92"E	5+19.52	6928538.55	11817332.52
L9		17.97	N0° 47' 19.77"E	5+35.12	6928551.38	11817340.11
C9	45.90	18.54	N12° 21' 27.92"E	5+53.09	6928569.35	11817340.36
L10		2.47	N23° 55' 36.07"E	5+71.63	6928587.33	11817344.30

PR T2 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L1		10.90	N67° 30' 26.46"E	0+00.00	6928580.39	11817303.44
C1	37.69	10.96	N59° 10' 22.65"E	0+10.90	6928584.56	11817313.51
L2		7.64	N50° 50' 18.84"E	0+21.86	6928590.16	11817322.89
C2	18.21	9.57	N65° 53' 25.85"E	0+29.50	6928594.98	11817328.82
L3		12.66	N80° 56' 32.86"E	0+39.07	6928598.85	11817337.45

PR T1R2 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L1		8.18	N23° 28' 57.39"E	5+74.00	6928589.60	11817345.30
C1	23.60	24.57	N55° 46' 48.43"E	5+82.18	6928597.09	11817348.56
L2		14.84	N86° 49' 02.51"E	6+06.74	6928610.29	11817367.97
C2	19.98	25.49	N50° 15' 55.48"E	6+21.58	6928611.12	11817382.79
L3		14.86	N13° 42' 48.45"E	6+47.07	6928626.33	11817401.09
C3	30.00	24.78	N37° 22' 29.86"E	6+61.93	6928640.76	11817404.61
L4		10.40	N61° 02' 11.27"E	6+86.71	6928659.90	11817419.23
C4	50.00	25.72	N46° 18' 08.45"E	6+97.10	6928664.93	11817428.32
L5		6.12	N31° 34' 05.64"E	7+22.82	6928682.51	11817446.71
C5	25.00	22.01	N56° 47' 28.72"E	7+28.94	6928687.72	11817449.91
L6		13.57	N82° 00' 51.80"E	7+50.95	6928699.39	11817467.74
C6	12.45	13.58	N50° 46' 03.68"E	7+64.52	6928701.27	11817481.18
L7		9.24	N19° 31' 15.55"E	7+78.10	6928709.44	11817491.18
C7	36.30	16.85	N32° 49' 07.73"E	7+87.34	6928718.15	11817494.27
L8		13.74	N46° 06' 59.91"E	8+04.19	6928732.18	11817503.32
C8	60.00	26.20	N33° 36' 18.15"E	8+17.92	6928741.71	11817513.22
L9		13.48	N21° 05' 36.40"E	8+44.13	6928763.36	11817527.61
C9	53.44	19.68	N31° 38' 38.96"E	8+57.61	6928775.94	11817532.47
L10		10.03	N42° 11' 41.52"E	8+77.29	6928792.60	11817542.73
C10	16.00	20.21	N78° 23' 10.76"E	8+87.32	6928800.03	11817549.47
L11		12.18	S65° 25' 20.00"E	9+07.53	6928803.83	11817567.98
C11	10.11	9.85	N86° 40' 17.39"E	9+19.71	6928798.76	11817579.05
L12		10.23	N58° 45' 54.78"E	9+29.56	6928799.31	11817588.50
C12	15.00	15.53	N88° 26' 03.76"E	9+39.80	6928804.62	11817597.25
L13		9.79	S61° 53' 47.27"E	9+55.33	6928805.03	11817612.10
C13	20.00	19.93	N89° 33' 46.72"E	9+65.13	6928800.41	11817620.73
L14		10.42	N61° 01' 20.72"E	9+85.05	6928800.56	11817639.84
C14	16.03	17.81	S87° 08' 27.46"E	9+95.47	6928805.61	11817648.96
L15		10.97	S55° 18' 15.65"E	10+13.29	6928804.76	11817665.85
C15	11.73	14.29	N89° 46' 46.54"E	10+24.25	6928798.52	11817674.87
L16		11.76	N54° 51' 48.72"E	10+38.54	6928798.57	11817688.29
C16	17.64	20.69	N88° 28' 11.26"E	10+50.30	6928805.34	11817697.91
L17		12.64	S57° 55' 26.20"E	10+71.00	6928805.86	11817717.43
C17	17.61	12.56	S78° 22' 04.78"E	10+83.64	6928799.15	11817728.14
L18		23.98	N81° 11' 16.65"E	10+96.20	6928796.67	11817740.19
C18	19.51	17.68	N55° 13' 35.67"E	11+20.18	6928800.35	11817763.88
L19		17.68	N29° 15' 54.69"E	11+37.86	6928810.09	11817777.92
C19	23.72	28.94	N64° 13' 19.33"E	11+55.55	6928825.52	11817786.56
L20		16.75	S80° 49' 16.03"E	11+84.49	6928837.34	11817811.04
C20	19.09	18.55	N71° 20' 17.93"E	12+01.24	6928834.66	11817827.57
L21		12.97	N43° 29' 51.89"E	12+19.79	6928840.37	11817844.46
C21	21.79	24.33	N75° 29' 23.49"E	12+32.76	6928849.78	11817853.39
L22		22.18	S72° 31' 04.91"E	12+57.09	6928855.56	11817875.74
C22	19.74	23.80	N72° 56' 00.45"E	12+79.27	6928848.90	11817896.90
L23		16.62	N38° 23' 05.80"E	13+03.07	6928855.47	11817918.29
C23	17.84	15.90	N63° 54' 38.82"E	13+19.69	6928868.50	11817928.62
L24		22.24	N89° 26' 11.83"E	13+35.59	6928875.26	11817942.43
C24	12.98	16.99	N51° 55' 40.51"E	13+57.83	6928875.48	11817964.66
L25		13.12	N14° 25' 09.20"E	13+74.82	6928885.23	11817977.10
C25	45.00	20.86	N27° 41' 59.25"E	13+87.94	6928897.93	11817980.37
L26		24.92	N36° 59' 25.60"E	14+08.80	6928916.23	11817989.98
C26	57.88	15.91	N44° 51' 54.18"E	14+33.72	6928936.14	11818004.98
L27		6.48	N52° 44' 22.76"E	14+49.63	6928947.38	11818016.16

PR T1R2 DS LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L28		10.92	N64° 08' 41.30"E	14+80.00	6928971.24	11818032.85
C28	9.28	11.74	N27° 54' 30.11"E	14+90.92	6928976.00	11818042.68
L29		10.98	N8° 19' 41.08"W	15+02.65	6928985.70	11818047.81
C29	11.68	15.82	N30° 29' 35.84"E	15+13.64	6928996.57	11818046.22
L30		8.49	N69° 18' 52.76"E	15+29.46	6929009.18	11818053.65
C30	12.71	12.09	N42° 03' 31.61"E	15+37.95	6929012.18	11818061.59
L31		7.09	N14° 48' 10.46"E	15+50.04	6929020.82	11818069.39
C31	12.63	13.93	N46° 22' 47.26"E	15+57.13	6929027.68	11818071.20
L32		8.59	N77° 57' 24.07"E	15+71.06	6929036.81	11818080.78
C32	13.58	11.86	N52° 56' 05.17"E	15+79.64	6929038.60	11818089.18
L33		7.62	N27° 54' 46.27"E	15+91.50	6929045.52	11818098.34
C33	17.27	13.25	N49° 53' 36.79"E	15+99.13	6929052.26	11818101.91
L34		12.32	N71° 52' 27.31"E	16+12.38	6929060.59	11818111.80
C34	31.15	12.61	N60° 16' 41.80"E	16+24.70	6929064.42	11818123.51
L35		10.16	N48° 40' 56.28"E	16+37.31	6929070.63	11818134.39

R1SP1 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L100		3.81	S85° 39' 50.69"E	1+00.00	6929172.97	11817048.08
C100	50403.22	6.41	S81° 04' 21.86"E	1+03.81	6929172.68	11817051.88
L101		3.20	N89° 50' 19.65"E	1+10.22	6929171.68	11817058.22
C101	153.74	9.86	S87° 24' 45.21"E	1+13.42	6929171.69	11817061.41
L102		3.29	S79° 26' 57.39"E	1+23.28	6929171.25	11817071.27
C102	92.13	11.07	S82° 58' 36.09"E	1+26.57	6929170.64	11817074.50
L103		3.44	S84° 55' 59.08"E	1+37.64	6929169.29	11817085.48
C103	23.98	8.10	N85° 23' 03.15"E	1+41.07	6929168.99	11817088.90
L104		3.13	N75° 42' 05.39"E	1+49.18	6929169.64	11817096.94
C104	5.38	5.01	N49° 03' 03.92"E	1+52.31	6929170.41	11817099.97
L105		1.24	N22° 24' 02.46"E	1+57.32	6929173.58	11817103.62

R1SP2 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L200		4.61	S60° 50' 12.26"E	2+00.00	6929199.15	11817198.14
C200	14.15	10.70	S82° 29' 43.22"E	2+04.61	6929196.90	11817202.17
L201		2.27	N75° 50' 45.81"E	2+15.31	6929195.54	11817212.52
C201	58.96	11.19	N70° 24' 36.30"E	2+17.58	6929196.09	11817214.72
L202		2.96	N64° 58' 26.78"E	2+28.76	6929199.84	11817225.25
C202	1872.21	7.08	N64° 51' 56.52"E	2+31.73	6929201.09	11817227.93
L203		2.47	N64° 45' 26.26"E	2+38.81	6929204.10	11817234.35
C203	27.18	7.24	N57° 07' 23.83"E	2+41.29	6929205.16	11817236.58
L204		2.64	N44° 38' 41.27"E	2+48.53	6929209.08	11817242.65
L205		3.63	N33° 52' 48.01"E	2+51.17	6929210.95	11817244.50
L206		1.46	N24° 12' 03.72"E	2+54.80	6929213.97	11817246.53
L207		0.74	N23° 42' 51.50"E	2+56.26	6929215.30	11817247.12
L208		0.69	N38° 03' 07.15"E	2+57.00	6929215.98	11817247.42
L209		0.77	N54° 53' 20.81"E	2+57.69	6929216.52	11817247.85
L210		0.80	N69° 53' 46.11"E	2+58.46	6929216.96	11817248.47
L211		1.06	N72° 58' 17.79"E	2+59.26	6929217.24	11817249.23

R1SP3 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L300		2.00	N76° 34' 00.15"E	3+00.00	6929225.00	11817279.30
C300	35.89	11.95	N67° 01' 30.55"E	3+02.00	6929225.47	11817281.25
L303		1.39	N57° 29' 00.96"E	3+13.96	6929230.11	11817292.20
C301	83.97	12.09	N61° 36' 30.08"E	3+15.34	6929230.86	11817293.37
L301		3.68	N65° 43' 59.20"E	3+27.43	6929236.60	11817304.00
C302	21.73	10.30	N79° 19' 01.72"E	3+31.12	6929238.12	11817307.35
L302		1.87	S87° 05' 55.75"E	3+41.42	6929240.01	11817317.38
C303	19.67	8.18	S75° 10' 54.51"E	3+43.28	6929239.91	11817319.24
L304		3.65	S63° 15' 53.26"E	3+51.47	6929237.84	11817327.10

PR UT TO HOOES RUN R2 LINE / CURVE TABLE

NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION	START STATION	START NORTHING	START EASTING
L400		29.44	S7° 06' 19.74"E	4+00.00	6929153.07	11817388.75
C400	34.00	25.11	S28° 15' 43.39"E	4+29.44	6929123.85	11817392.40
L401		31.07	S49° 25' 07.04"E	4+54.55	6929102.23	11817404.02
C401	65.00	22.33	S59° 15' 40.50"E	4+85.62	6929082.02	11817427.61
L402		29.86	S69° 06' 13.96"E	5+07.95	6929070.66	11817446.71
C402	65.00	21.49	S78° 34' 35.11"E	5+37.81	6929060.01	11817474.61
L403		28.32	S88° 02' 56.25"E	5+59.31	6929055.78	11817495.58
C403	160.00	22.39	N87° 56' 34.37"E	5+87.62	6929054.81	11817523.88
L404		28.10	N83° 56' 04.99"E	6+10.01	6929055.61	11817546.24
C404	20000.00	21.71	N83° 57' 56.95"E	6+38.11	6929058.58	11817574.18
L405		28.68	N83° 59' 48.90"E	6+59.82	6929060.87	11817595.77
C405	275.00	21.97	N81° 42' 31.09"E	6+88.51	6929063.87	11817624.30
L406		26.91	N79° 25' 13.28"E	7+10.47	6929067.03	11817646.03
C406	604.53	23.19	N80° 31' 10.33"E	7+37.38	6929071.97	11817672.48
L407		3.00	N81° 37' 07.37"E	7+60.58	6929075.79	11817695.36
C407	2223.00	13.34	N81° 37' 07.37"E	7+63.58	6929076.23	11817698.33
L408		3.00	N81° 37' 07.37"E	7+76.91	6929078.18	11817711.52
C408	2223.00	13.34	N81° 37' 07.37"E	7+79.91	6929078.61	11817714.49
L409		3.00	N81° 37' 07.37"E	7+93.25	6929080.56	11817727.68
C409	2223.00	13.34	N81° 37' 07.37"E	7+96.25	6929080.99	11817730.65
L410		3.00	N81° 37' 07.37"E	8+09.58	6929082.94	11817743.84
C410	1763.07	13.34	N81° 50' 57.11"E	8+12.58	6929083.37	11817746.81
L411		3.00	N82° 23' 22.84"E	8+25.92	6929085.27	11817760.01
C411	800.00	13.34	N82° 58' 28.80"E	8+28.92	6929085.66	11817762.98
L412		3.00	N83° 33' 34.76"E	8+42.26	6929087.29	11817776.22
C412	800.00	13.34	N84° 08' 40.71"E	8+45.26	6929087.63	11817779.20
L413		3.00	N84° 43' 46.67"E	8+58.59	6929088.99	11817792.47
C413	800.00	13.34	N85° 18' 52.63"E	8+61.59	6929089.27	11817795.46
L414		3.00	N85° 53' 58.59"E	8+74.93	6929090.36	11817808.75
C414	800.00	13.34	N86° 29' 04.55"E	8+77.93	6929090.57	11817811.74
L415		3.00	N87° 04' 10.51"E	8+91.26	6929091.39	11817825.05
C415	800.00	13.34	N87° 39' 16.46"E	8+94.26	6929091.54	11817828.05
L416		3.00	N88° 14' 22.42"E	9+07.60	6929092.09	11817841.37
C416	1647.44	13.34	N88° 33' 23.24"E	9+10.60	6929092.18	11817844.37
L417		3.00	N88° 35' 11.33"E	9+23.94	6929092.52	11817857.70
C417	2751.33	14.84	N88° 35' 11.33"E	9+26.94	6929092.59	11817860.70
L418		1.39	S87° 06' 14.32"E	9+41.77	6929092.96	11817875.53
L419		2.11	S83° 58' 14.47"E	9+43.16	6929092.88	11817876.92
L420		2.30	S80° 33' 59.83"E	9+45.27	6929092.66	11817879.01
L421		2.00	S79° 18' 22.34"E	9+47.57	6929092.29	11817881.28

res
HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B, RICHMOND VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

GEOMETRY TABLES

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	10 OF 48

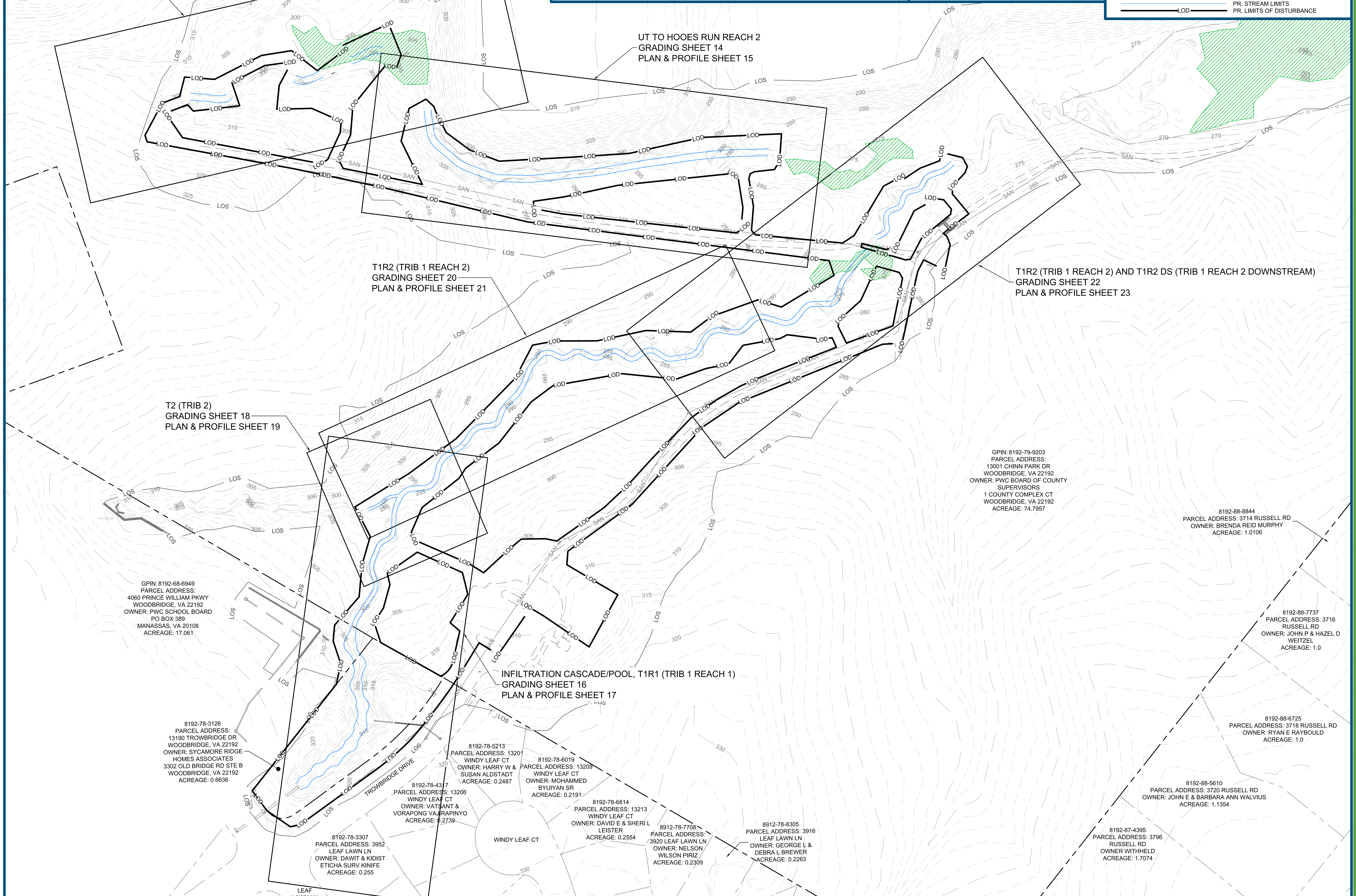
NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 60'

0' 60' 120' 180'

KEY PLAN LEGEND:

	EX. PROPERTY LINE
	EX. PROPERTY ADJACENT
	EX. MAJOR CONTOUR
	EX. MINOR CONTOUR
SAN	EX. SANITARY SEWER
LOS LOS	LIMITS OF SURVEY
	PR. STREAM LIMITS
LOD	PR. LIMITS OF DISTURBANCE



HGS, LLC. A RES COMPANY
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P: 804.353.6017
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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

GRADING AND PLAN & PROFILE KEY SHEET

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	
x	11/2021
Signature	Date
60% DESIGN REVIEW	
x	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	
x	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	11OF 48

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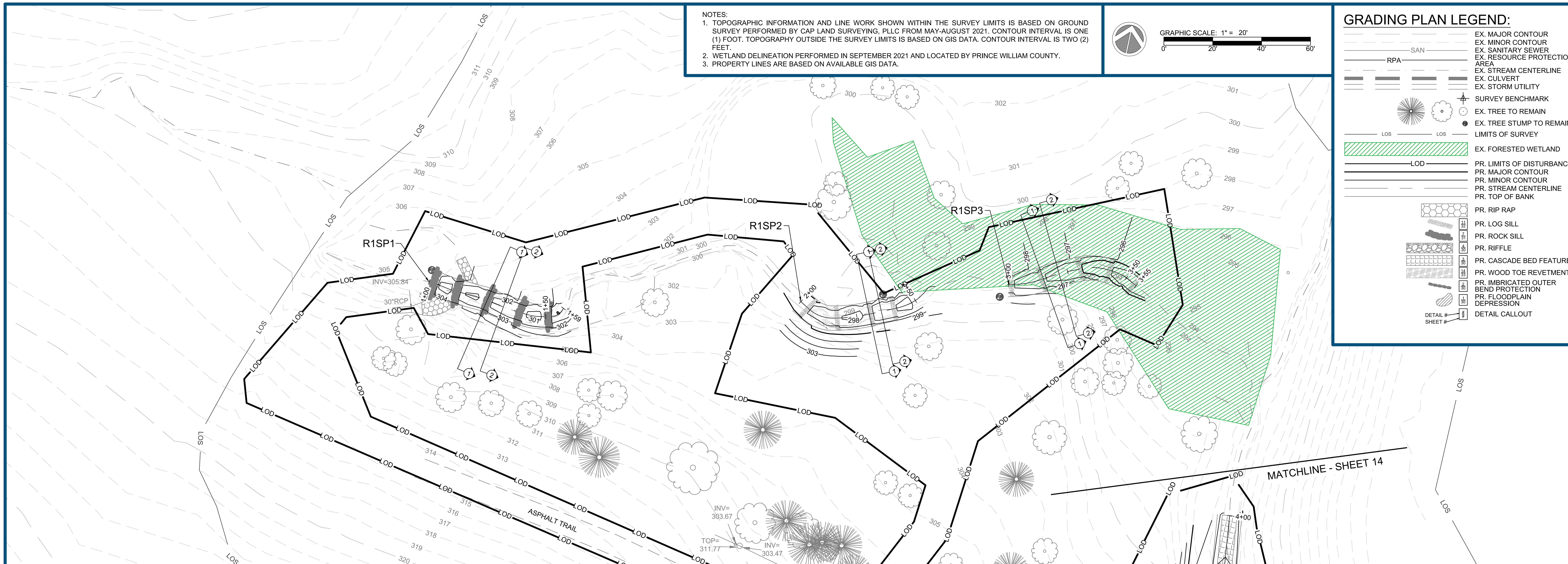
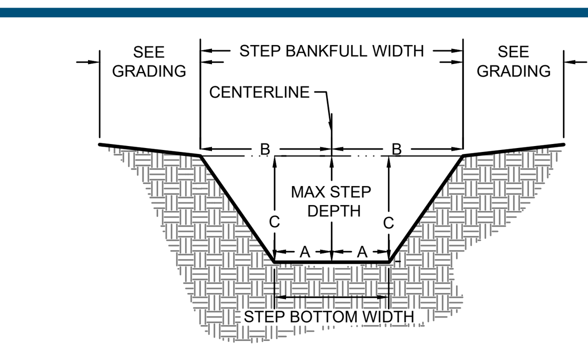
GRAPHIC SCALE: 1" = 20'

0' 20' 40' 60'



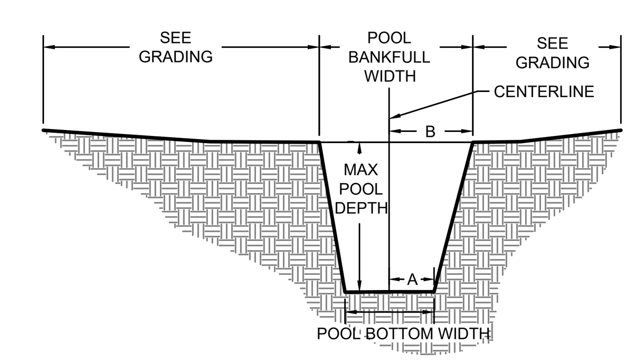
GRADING PLAN LEGEND:

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT (DETAIL #, SHEET #)



STEP CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	STEP BOTTOM WIDTH (FT)	MAX STEP DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	STEP BANKFULL WIDTH (FT)	C-BANK HEIGHT (FT)
UT TO HOOES RUN - REACH 1	1+00 - 3+55	3.0	6.0	1.1	5.0	10.0	1.1

STEP CROSS-SECTION GEOMETRY
NOT TO SCALE



POOL CROSS-SECTION GEOMETRY						
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO INSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)
UT TO HOOES RUN - REACH 1	1+00 - 3+55	0.5	1.0	6.0	2.0	11.0

POOL CROSS-SECTION GEOMETRY
NOT TO SCALE

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

UT TO HOOES RUN REACH 1 GRADING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	12 OF 48

NOTES:
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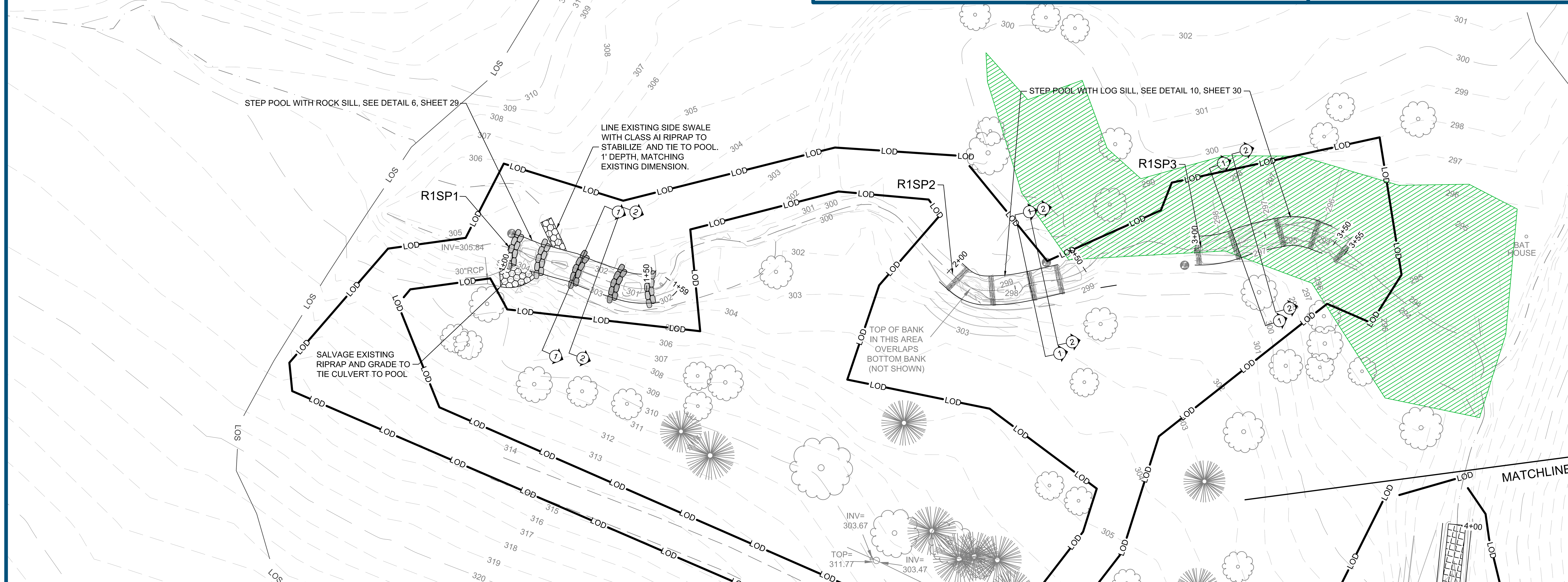
0' 20' 40' 60'

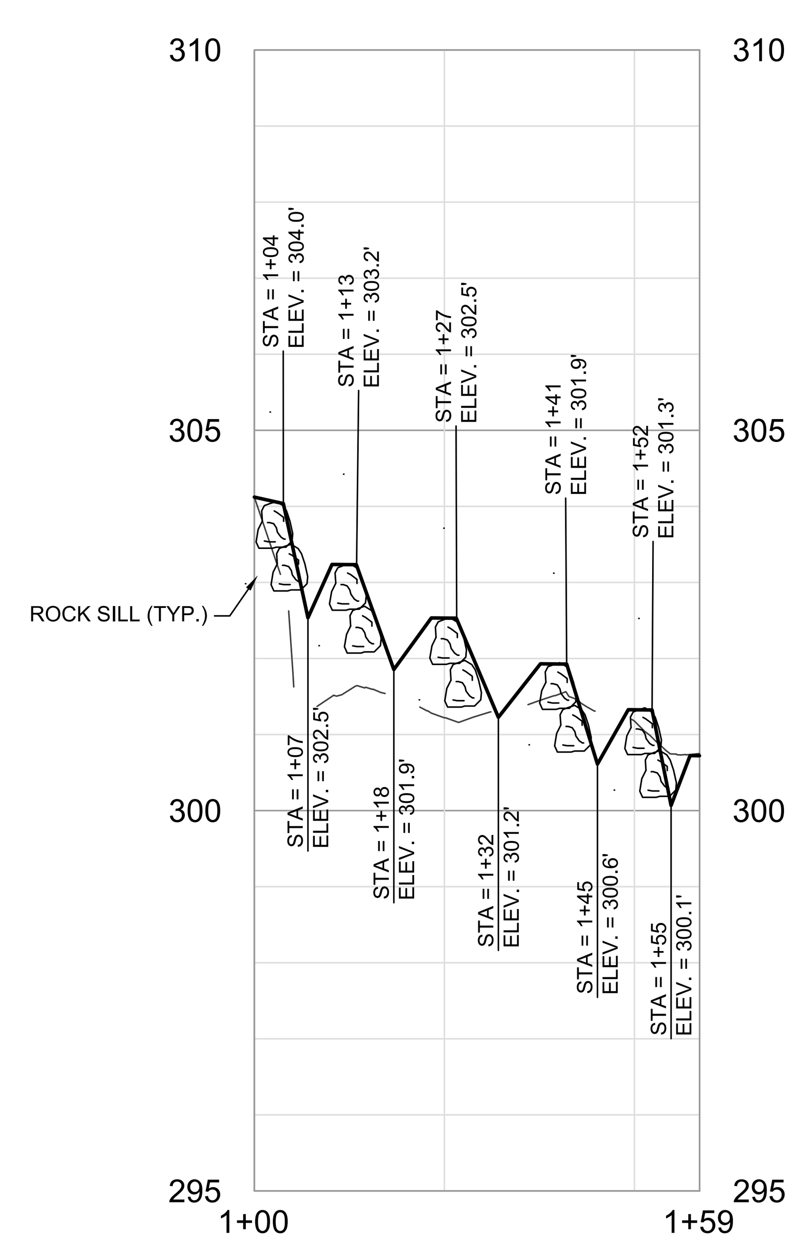


PLAN & PROFILE LEGEND:

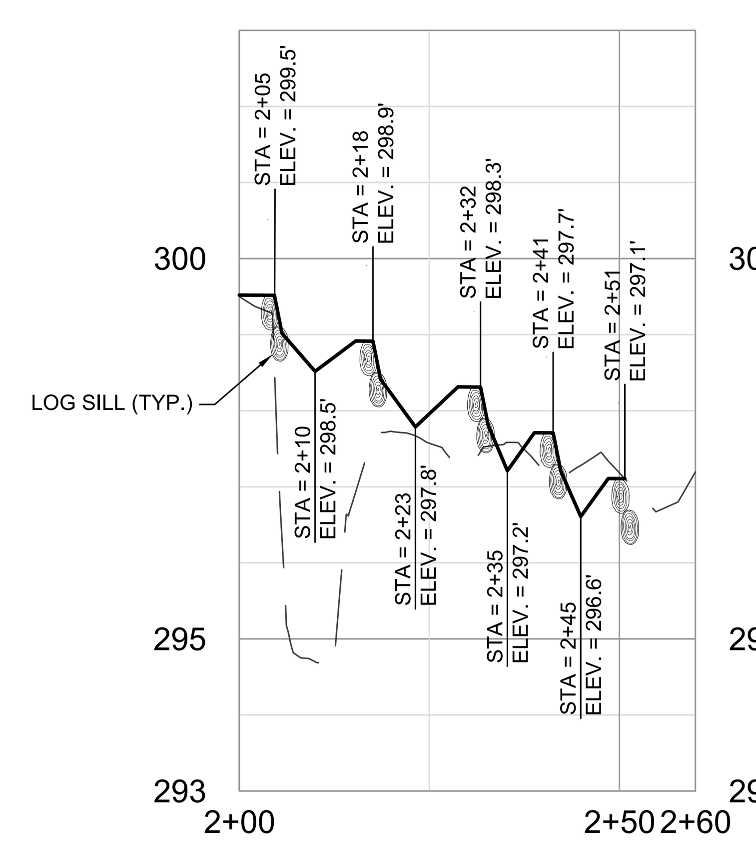
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT

PROFILE LEGEND:

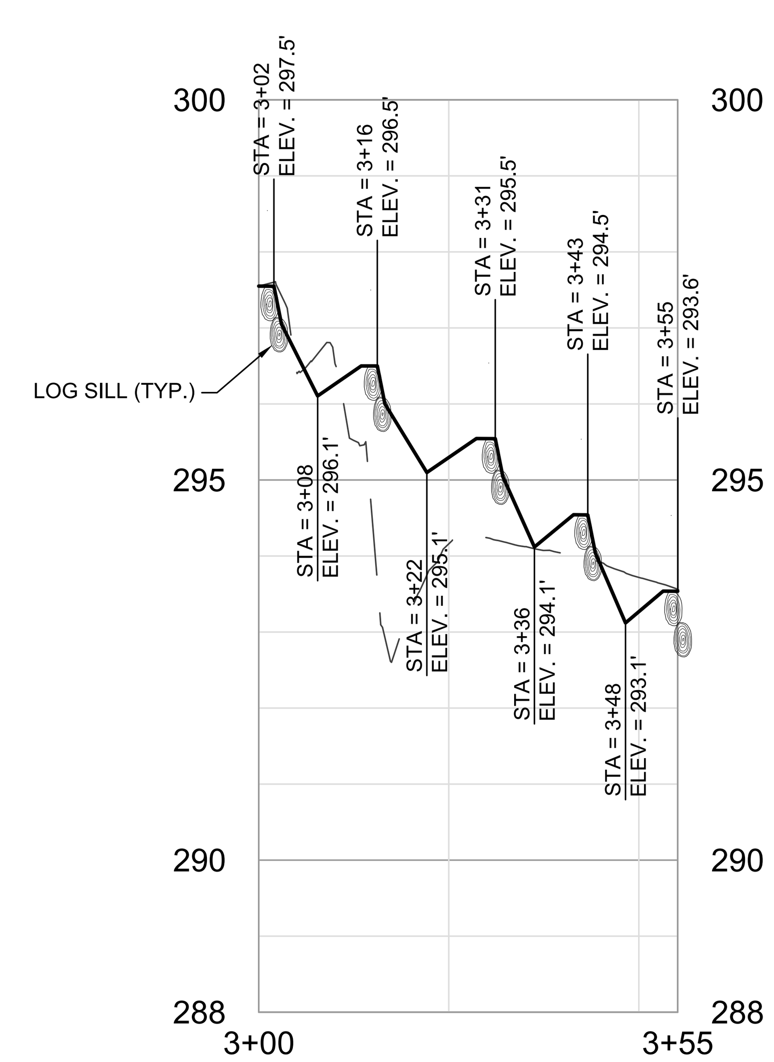
- EX. GRADE
- PR. GRADE



R1SP1 PROFILE



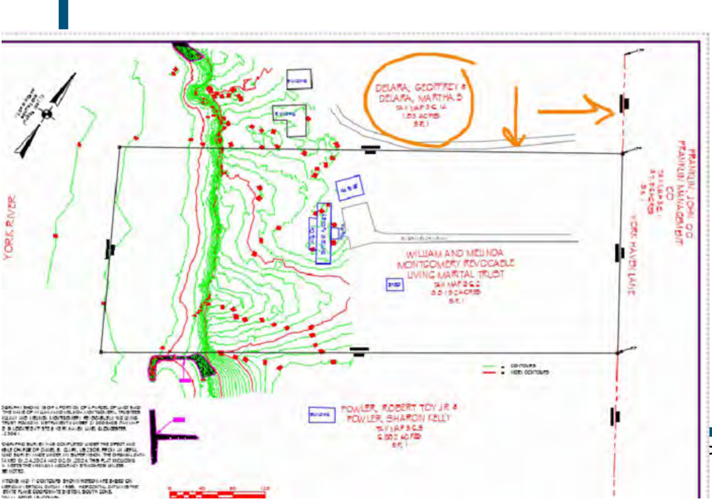
R1SP2 PROFILE



R1SP3 PROFILE

VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'

HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'



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P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP PRINCE WILLIAM COUNTY

UT TO HOOES RUN REACH 1 PLAN & PROFILE

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

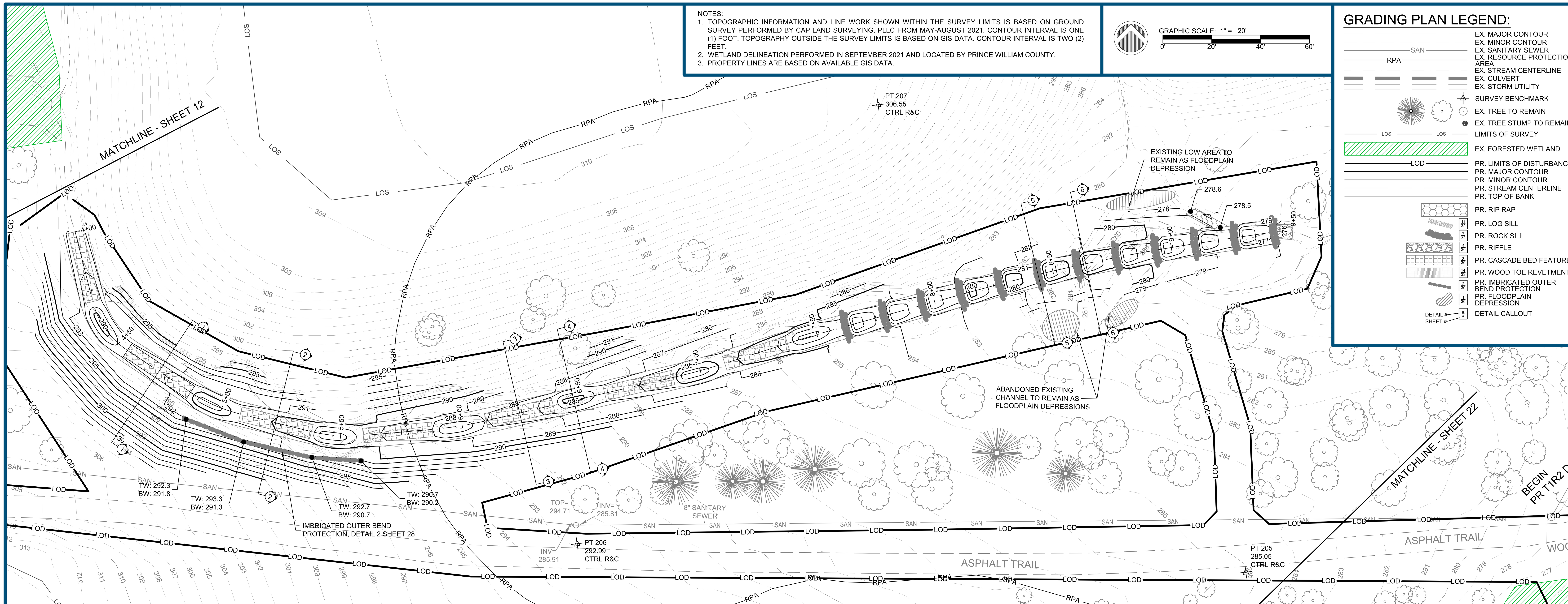
30% DESIGN REVIEW		11/2021
Signature		Date
60% DESIGN REVIEW		11/14/2022
Signature		Date
CONSTRUCTION PLAN REVIEW		----
Signature		Date
REVISIONS:	----	
PROJECT MANAGER:		ASL
DESIGNED:		AH/BS/LS
DRAWN:		LS
JOB NUMBER:		SPR2023-00397 S03
DESIGN TYPE:		RESTORATION
DATE:		9/3/2024
SHEET NO:		13 OF 48

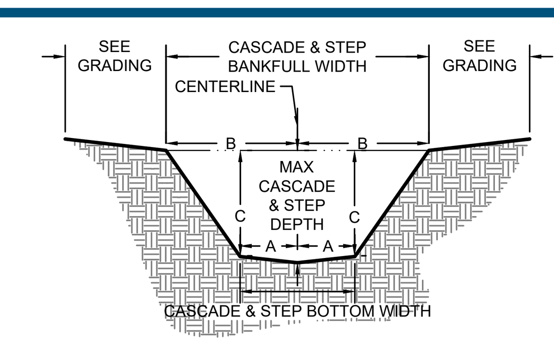
NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

GRAPHIC PLAN LEGEND:

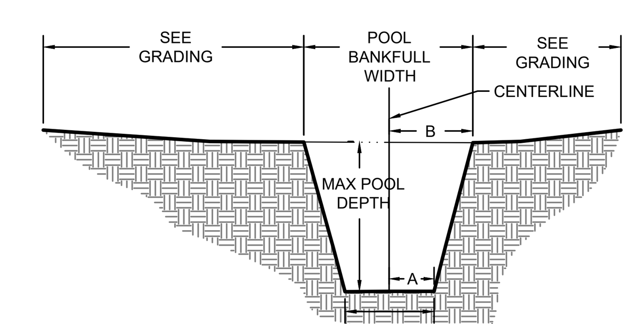
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT (DETAIL #, SHEET #)





CASCADE & STEP CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	CASCADE & STEP BOTTOM WIDTH (FT)	MAX CASCADE & STEP DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	CASCADE & STEP BANKFULL WIDTH (FT)	C-BANK HEIGHT (FT)
UT TO HOOES RUN - REACH 2 CASCADES	4+00 - 7+60	3.0	6.0	1.1	5.0	10.0	1.0
UT TO HOOES RUN - REACH 2 STEPS	7+60 - 9+50	3.0	6.0	1.0	5.0	10.0	1.0

CASCADE & STEP CROSS-SECTION GEOMETRY
NOT TO SCALE



POOL CROSS-SECTION GEOMETRY						
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO OUTSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)
UT TO HOOES RUN - REACH 2	4+00 - 7+60	0.0	1.0	6.0	3.0	12.0
UT TO HOOES RUN - REACH 2	7+60 - 9+50	2.0	4.0	6.0	2.8	12.0

POOL CROSS-SECTION GEOMETRY
NOT TO SCALE

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

UT TO HOOES RUN REACH 2 GRADING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x | 11/2021
Signature | Date

60% DESIGN REVIEW
x | 11/14/2022
Signature | Date

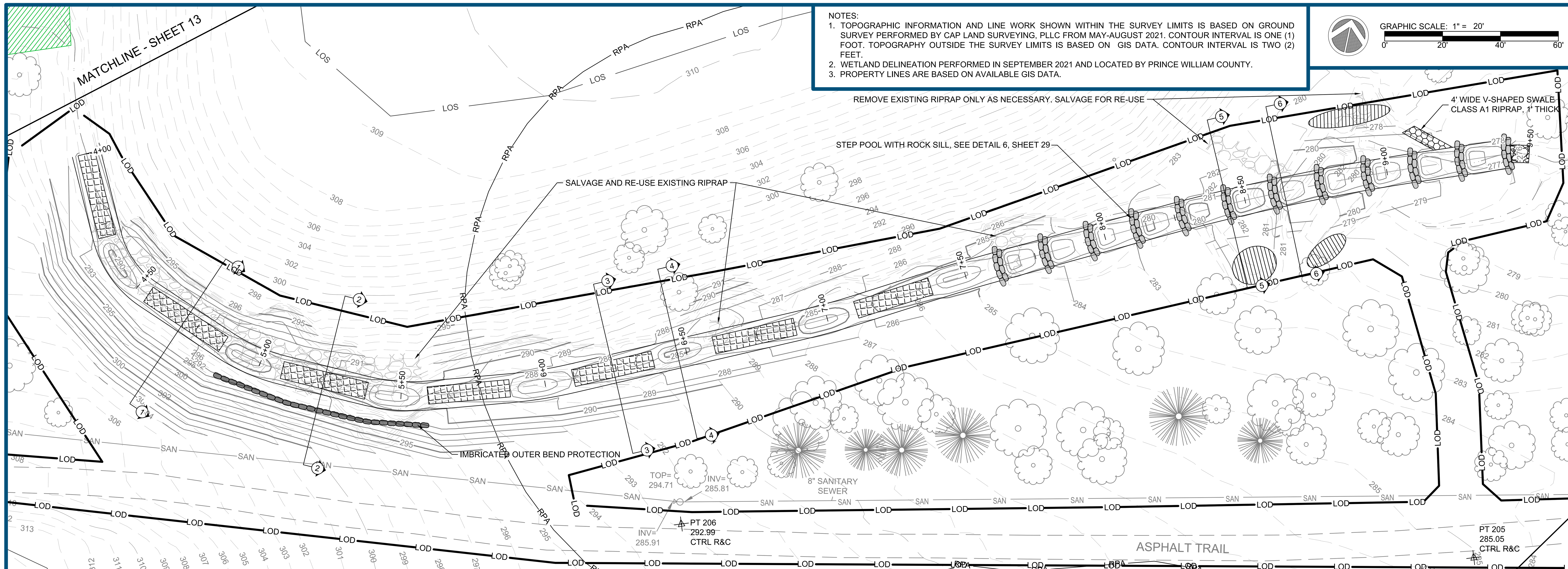
CONSTRUCTION PLAN REVIEW
x | ----
Signature | Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	14 OF 48

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

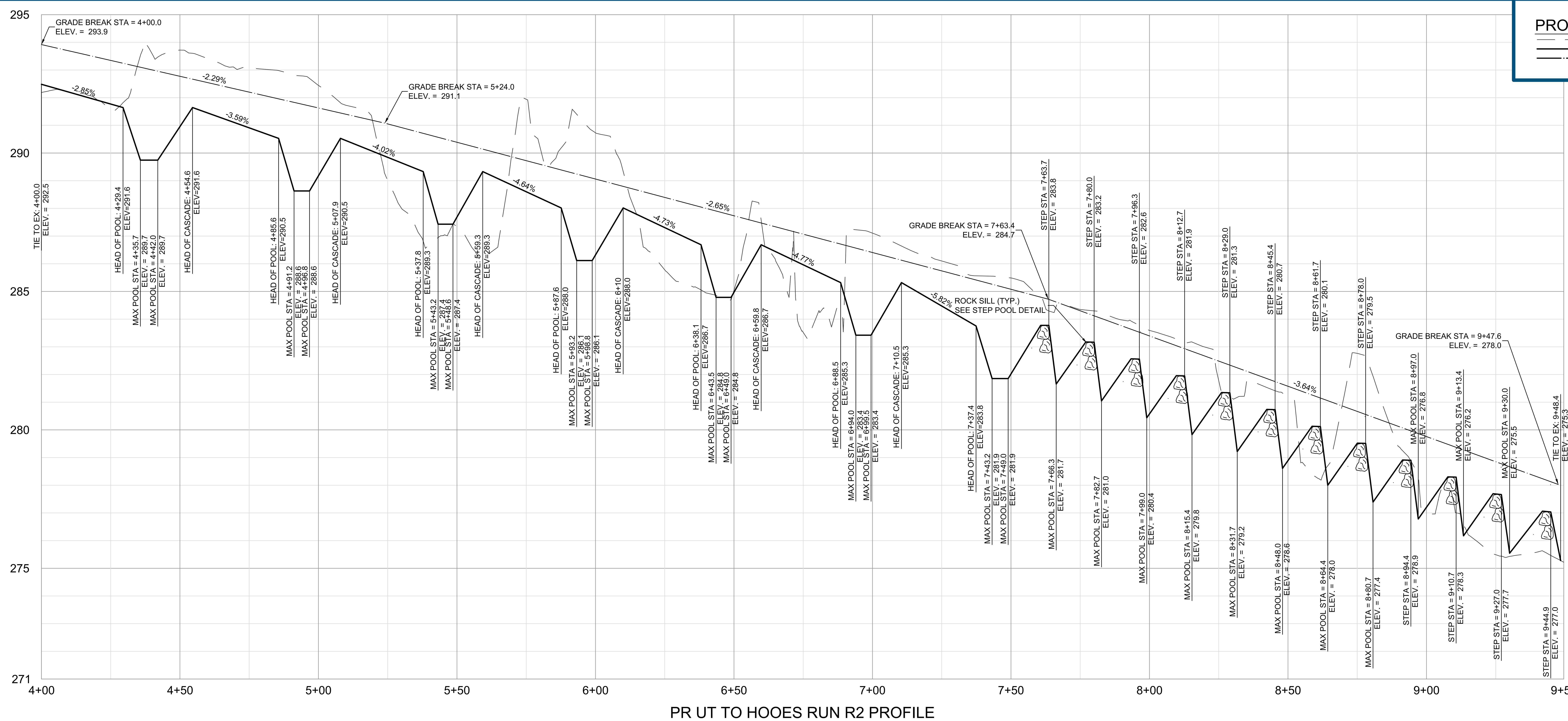


PLAN & PROFILE LEGEND:

EX. MAJOR CONTOUR
EX. MINOR CONTOUR
EX. SANITARY SEWER
EX. RESOURCE PROTECTION AREA
EX. STREAM CENTERLINE
EX. CULVERT
EX. STORM UTILITY
SURVEY BENCHMARK
EX. TREE TO REMAIN
EX. TREE STUMP TO REMAIN
LIMITS OF SURVEY
EX. FORESTED WETLAND
PR. LIMITS OF DISTURBANCE
PR. MAJOR CONTOUR
PR. MINOR CONTOUR
PR. STREAM CENTERLINE
PR. TOP OF BANK
PR. RIP RAP
PR. LOG SILL
PR. ROCK SILL
PR. RIFFLE
PR. CASCADE BED FEATURE
PR. WOOD TOE REVETMENT
PR. IMBRICATED OUTER BEND PROTECTION
PR. FLOODPLAIN DEPRESSION
DETAIL CALLOUT

PROFILE LEGEND:

EX. GRADE
PR. GRADE
PR. BANKFULL



VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'
HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

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1408 ROSENEATH ROAD, SUITE B, RICHMOND, VIRGINIA 23230
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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

UT TO HOOES RUN REACH 2 PLAN & PROFILE
PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	11/2021
Signature	Date
60% DESIGN REVIEW	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	15 OF 48

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
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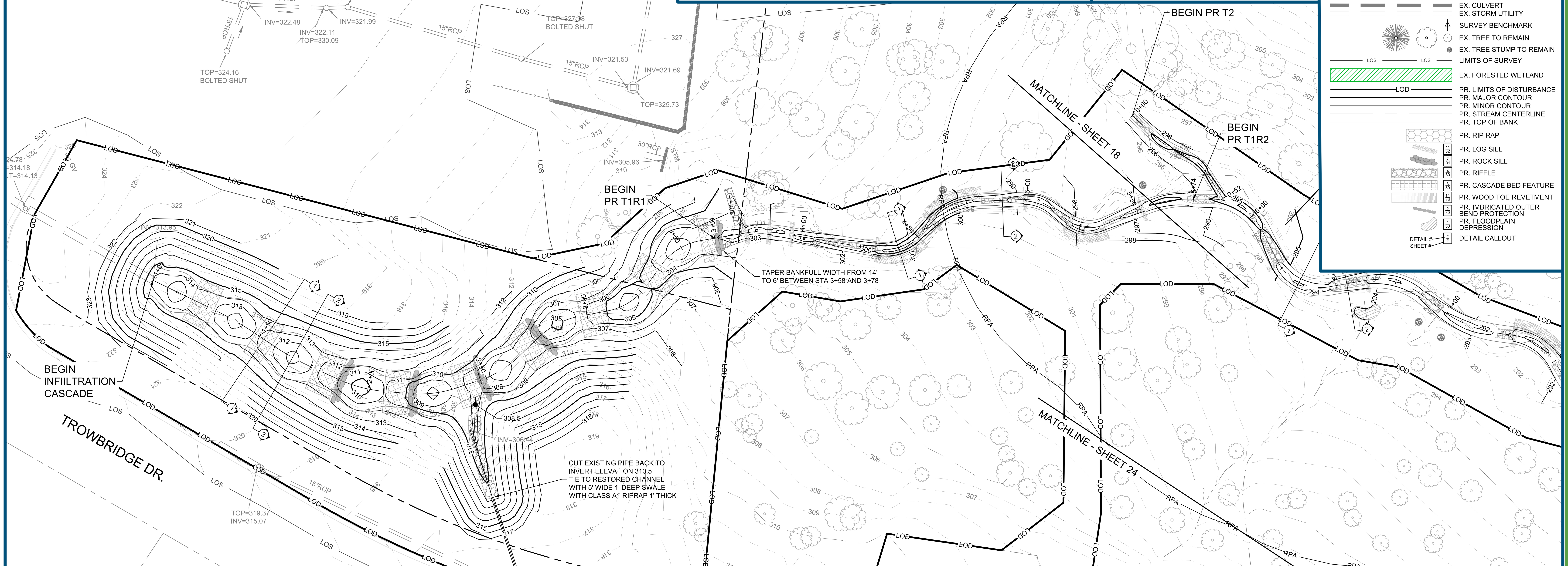
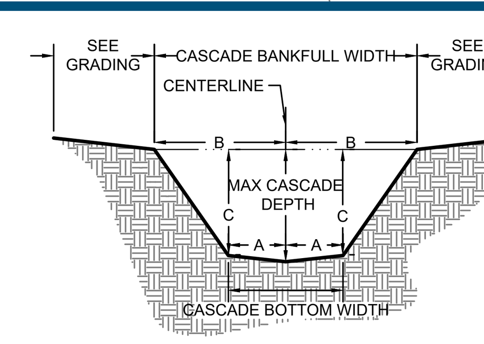
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

GRADING PLAN LEGEND:

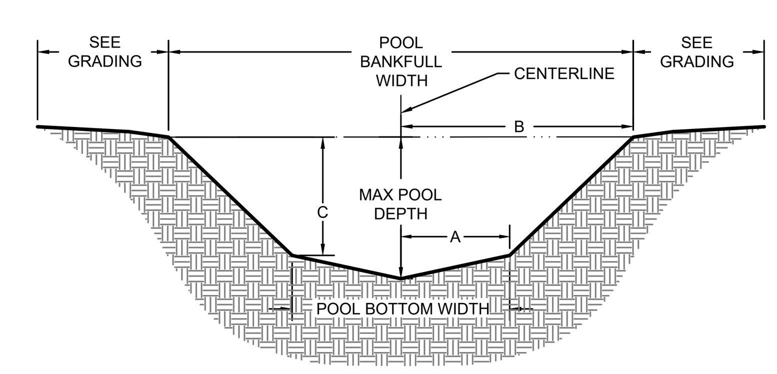
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT (DETAIL # / SHEET #)





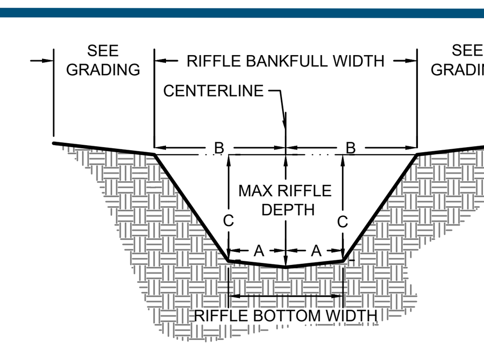
CASCADE CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	CASCADE BOTTOM WIDTH (FT)	MAX CASCADE DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	CASCADE BANKFULL WIDTH (FT)	C-BANK HEIGHT (FT)
INFILTRATION CASCADE	1+00 - 3+64	4.0	8.0	1.0	7.0	14.0	0.8

CASCADE CROSS-SECTION GEOMETRY
NOT TO SCALE



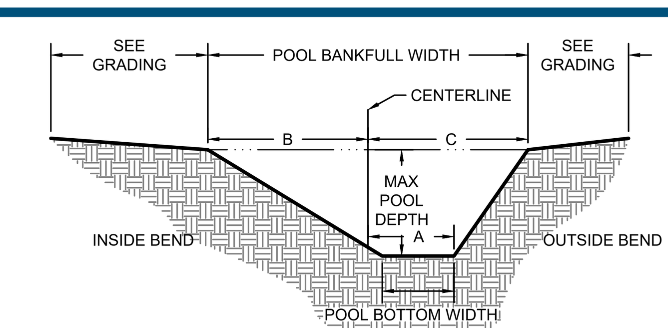
POOL CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO OUTSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)	C-BANK HEIGHT (FT)
INFILTRATION CASCADE	1+00 - 3+64	4.0	8.0	10.0	2.8	20.0	2.0

POOL CROSS-SECTION GEOMETRY
NOT TO SCALE



STEP/RIFFLE/CASCADE CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	RIFFLE BOTTOM WIDTH (FT)	MAX RIFFLE DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	RIFFLE BANKFULL WIDTH (FT)	C-BANK HEIGHT
T1R1	3+64 + 5+74	1.0	2.0	1.0	3.0	6.0	0.8

STEP/RIFFLE/CASCADE CROSS-SECTION GEOMETRY
NOT TO SCALE



POOL (POINT BAR) CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO INSIDE TOP OF BANK WIDTH (FT)	C-CENTERLINE OFFSET TO OUTSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)
T1R1	3+64 - 5+74	0.8	0.5	3.0	3.0	2.0	6.0

POOL (POINT BAR) CROSS-SECTION GEOMETRY
NOT TO SCALE

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

INFILTRATION CASCADE POOL & T1R1 GRADING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	16 OF 48

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
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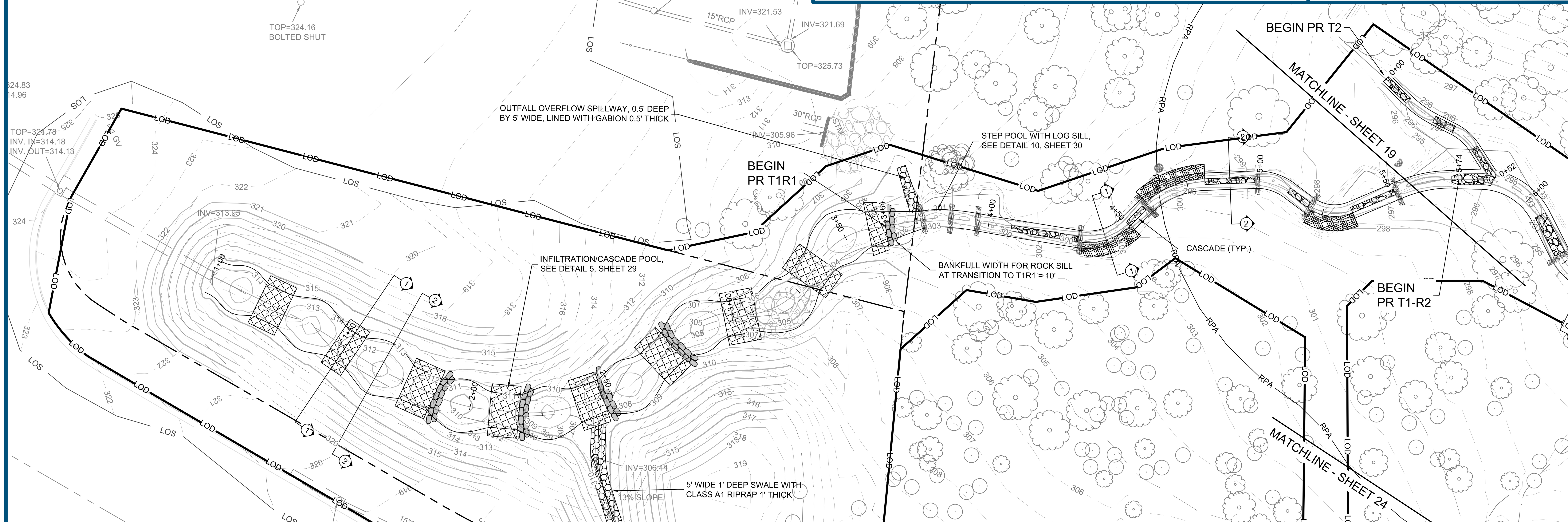
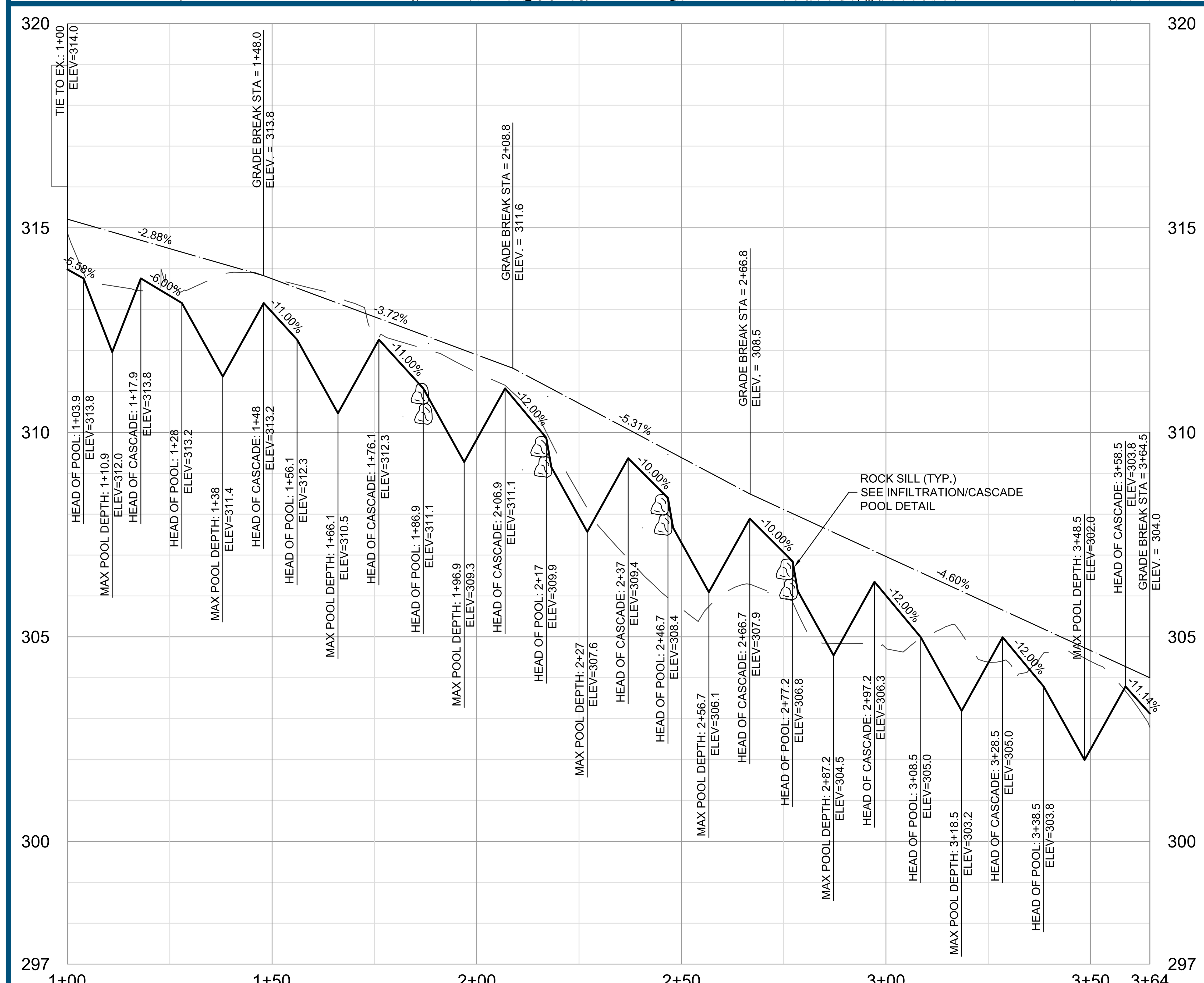
GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

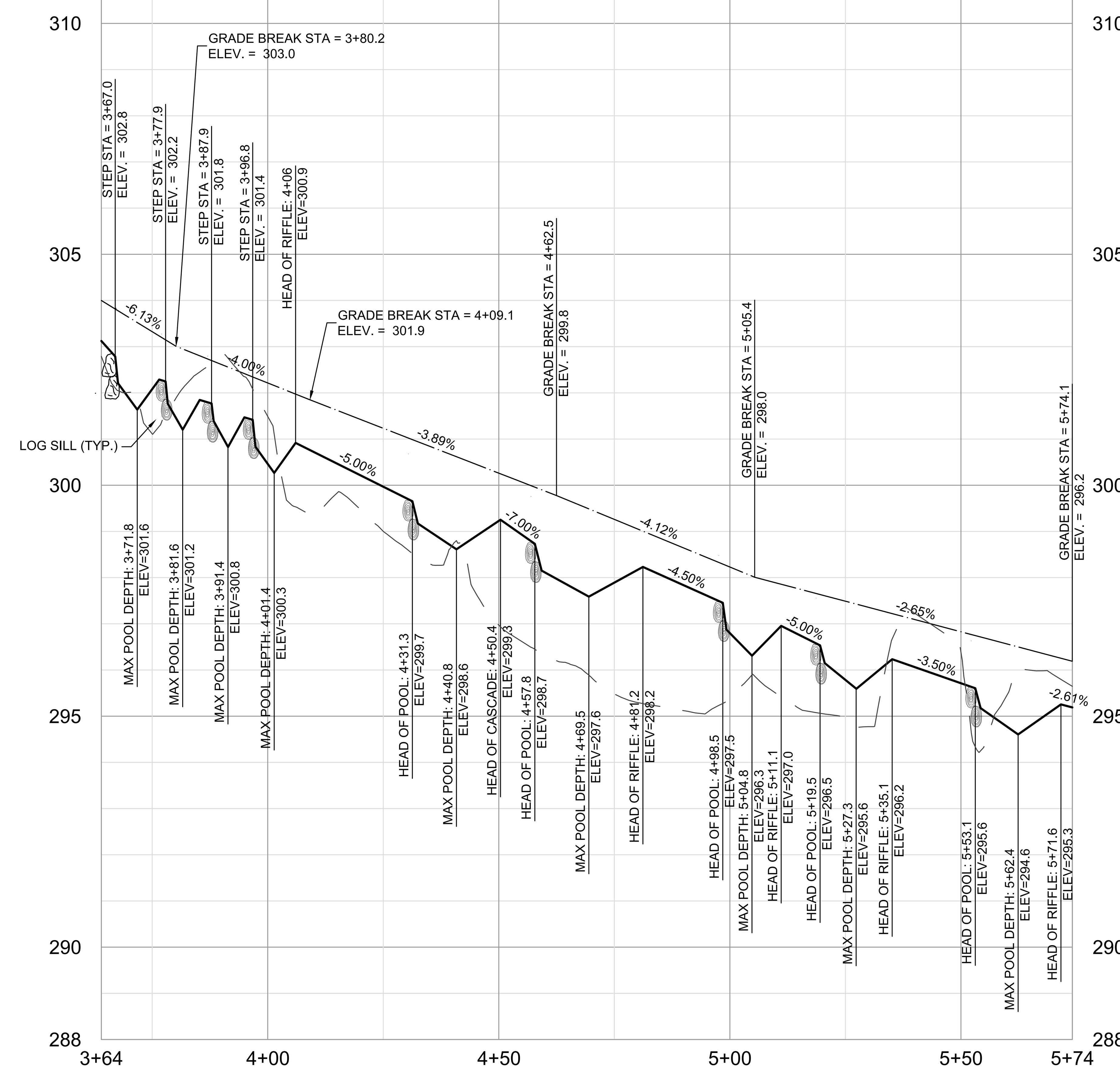


PLAN & PROFILE LEGEND:

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT



INFILTRATION CASCADE PROFILE



PR T1R1 PROFILE

PROFILE LEGEND:

- EX. GRADE
- PR. GRADE
- PR. BANKFULL

VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'

HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

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1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

INFILTRATION CASCADE POOL & T1R1 PLAN & PROFILE

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	11/2021
Signature	Date
60% DESIGN REVIEW	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	17 OF 48

NOTES:
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GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

GRADING PLAN LEGEND:

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
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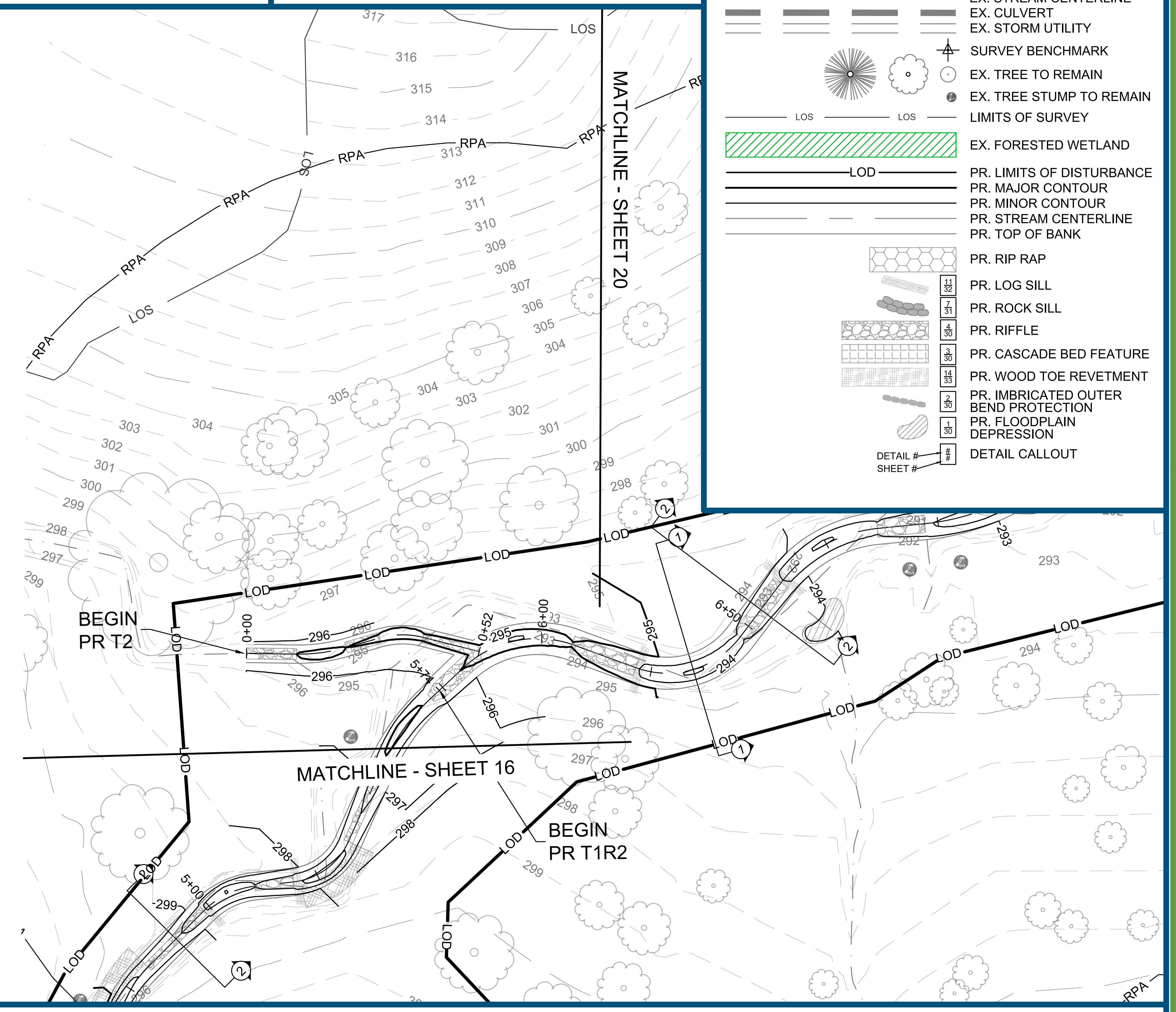
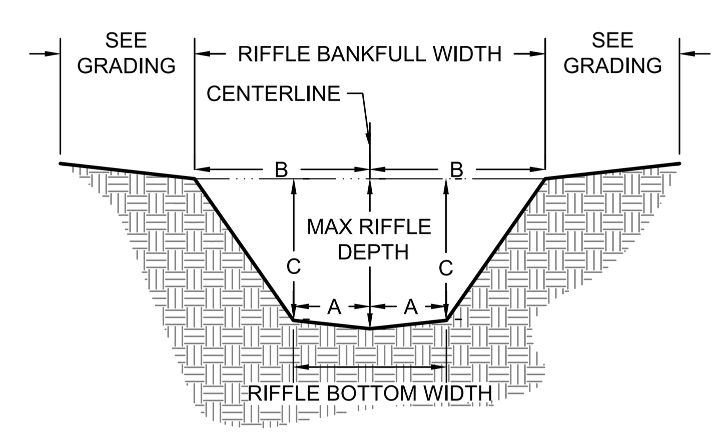
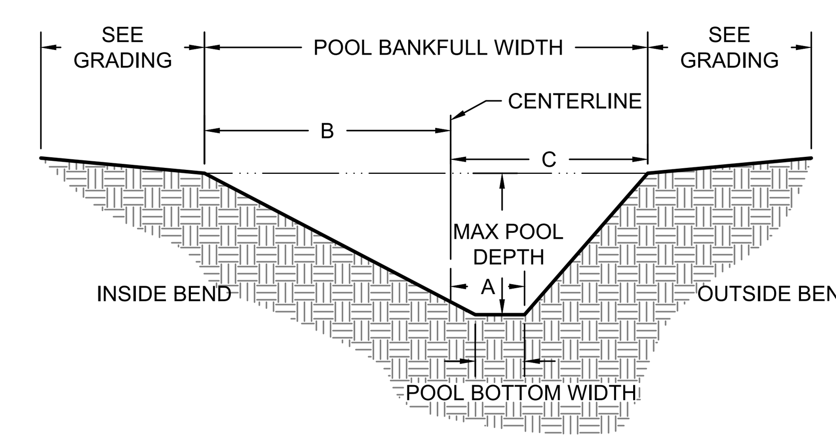
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT (DETAIL # / SHEET #)





RIFFLE CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	RIFFLE BOTTOM WIDTH (FT)	MAX RIFFLE DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	RIFFLE BANKFULL WIDTH (FT)	C-BANK HEIGHT
T2	0+00 - 0+55	1.0	2.0	0.6	2.0	4.0	0.4

RIFFLE CROSS-SECTION GEOMETRY
NOT TO SCALE



POOL (POINT BAR) CROSS-SECTION GEOMETRY								
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO INSIDE TOP OF BANK WIDTH (FT)	C-CENTERLINE OFFSET TO OUTSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)
T2	0+00 - 0+55	0.75	0.5	2.5	2.0	1.4	4.5

POOL (POINT BAR) CROSS-SECTION GEOMETRY
NOT TO SCALE

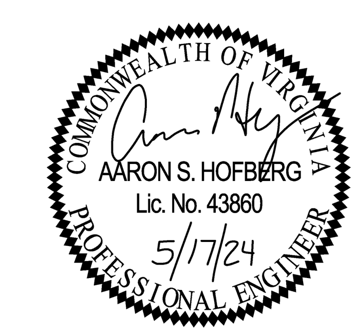
HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B, RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

T2 GRADING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:



30% DESIGN REVIEW
x ____ 11/2021
Signature Date

60% DESIGN REVIEW
x ____ 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ____ ----
Signature Date

REVISIONS:

PROJECT MANAGER: ASL
DESIGNED: AH/BS/LS
DRAWN: LS
JOB NUMBER: SPR2023-00397 S03
DESIGN TYPE: RESTORATION
DATE: 9/3/2024
SHEET NO: 18 OF 48

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
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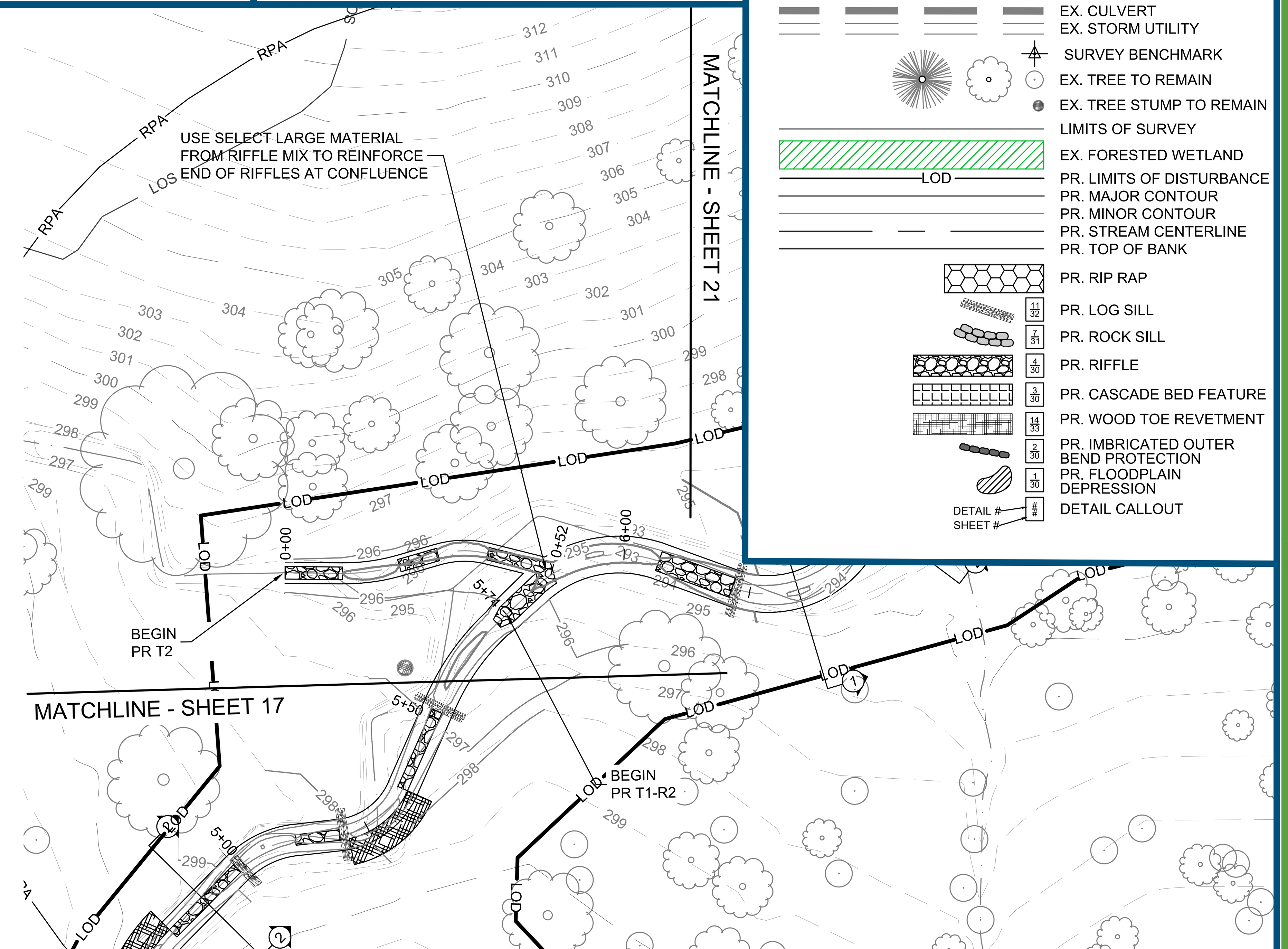
GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

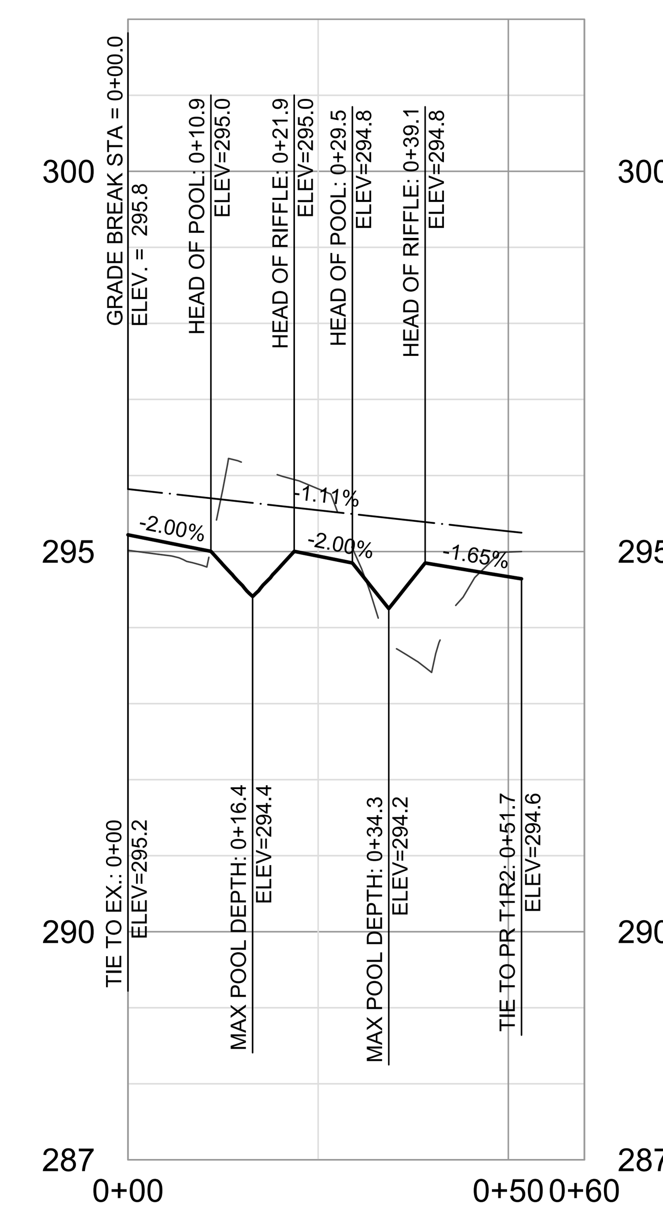


PLAN & PROFILE LEGEND:

EX. MAJOR CONTOUR
EX. MINOR CONTOUR
EX. SANITARY SEWER
EX. RESOURCE PROTECTION AREA
EX. STREAM CENTERLINE
EX. CULVERT
EX. STORM UTILITY
SURVEY BENCHMARK
EX. TREE TO REMAIN
EX. TREE STUMP TO REMAIN
LIMITS OF SURVEY
EX. FORESTED WETLAND
PR. LIMITS OF DISTURBANCE
PR. MAJOR CONTOUR
PR. MINOR CONTOUR
PR. STREAM CENTERLINE
PR. TOP OF BANK
PR. RIP RAP
PR. LOG SILL
PR. ROCK SILL
PR. RIFFLE
PR. CASCADE BED FEATURE
PR. WOOD TOE REVETMENT
PR. IMBRICATED OUTER BEND PROTECTION
PR. FLOODPLAIN DEPRESSION
DETAIL CALLOUT

PROFILE LEGEND:

EX. GRADE
PR. GRADE
PR. BANKFULL



PR T2 PROFILE

VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'

HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

T2 PLAN & PROFILE

PRINCE WILLIAM COUNTY, VA

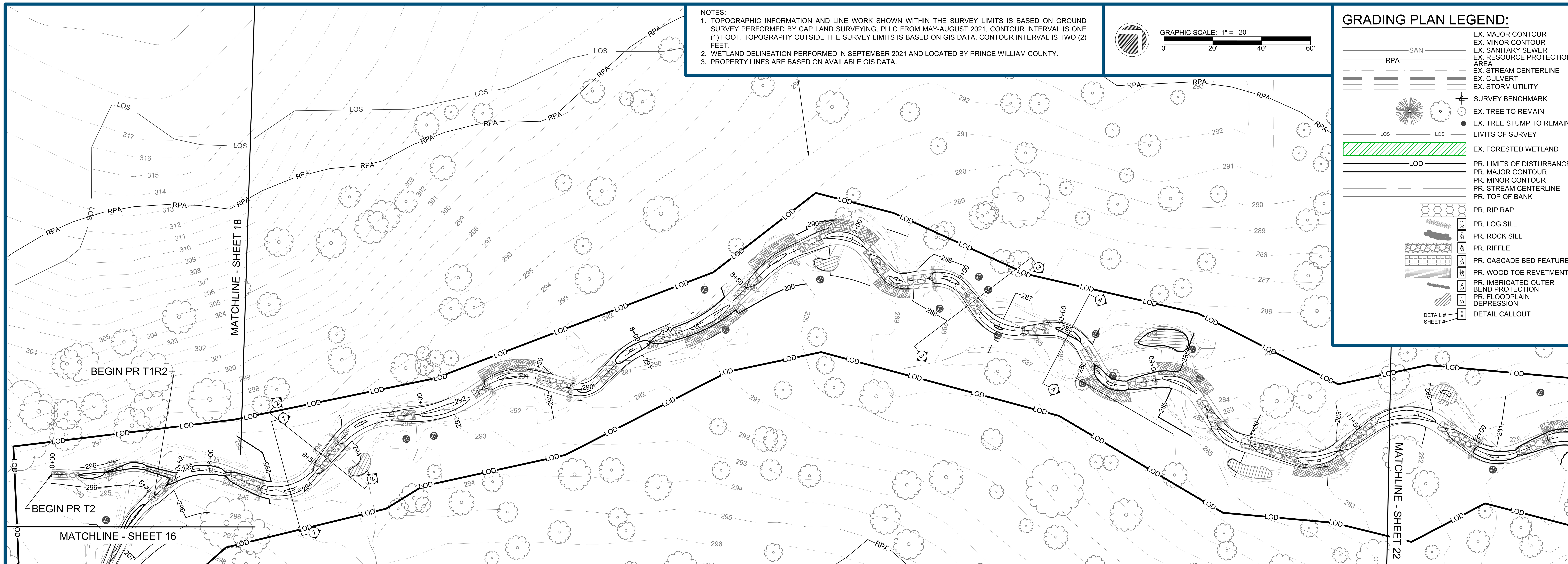
STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	
	11/2021
Signature	Date
60% DESIGN REVIEW	
	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	

Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	19 OF 48

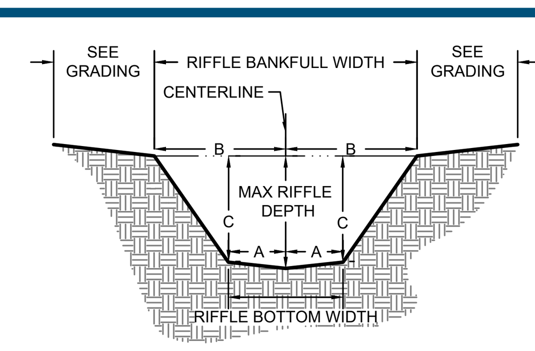


NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

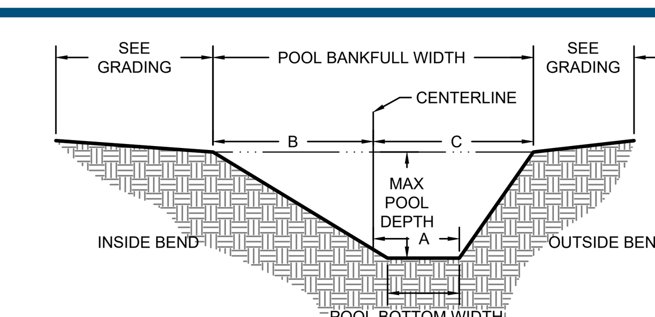
GRADING PLAN LEGEND:

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT



RIFFLE CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	RIFFLE BOTTOM WIDTH (FT)	MAX RIFFLE DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	RIFFLE BANKFULL WIDTH (FT)	C-BANK HEIGHT
T1R2	5+74 - 16+47	1.9	3.8	1.0	3.5	7.0	0.8

RIFFLE CROSS-SECTION GEOMETRY
NOT TO SCALE



POOL (POINT BAR) CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO INSIDE TOP OF BANK WIDTH (FT)	C-CENTERLINE OFFSET TO OUTSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)
T1R2	5+74 - 16+47	0.8	0.5	3.5	3.5	2.1	7.0

POOL (POINT BAR) CROSS-SECTION GEOMETRY
NOT TO SCALE

res
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1408 ROSENEATH ROAD, SUITE B, RICHMOND, VIRGINIA 23230
P: 804.353.6017
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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

T1R2 GRADING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

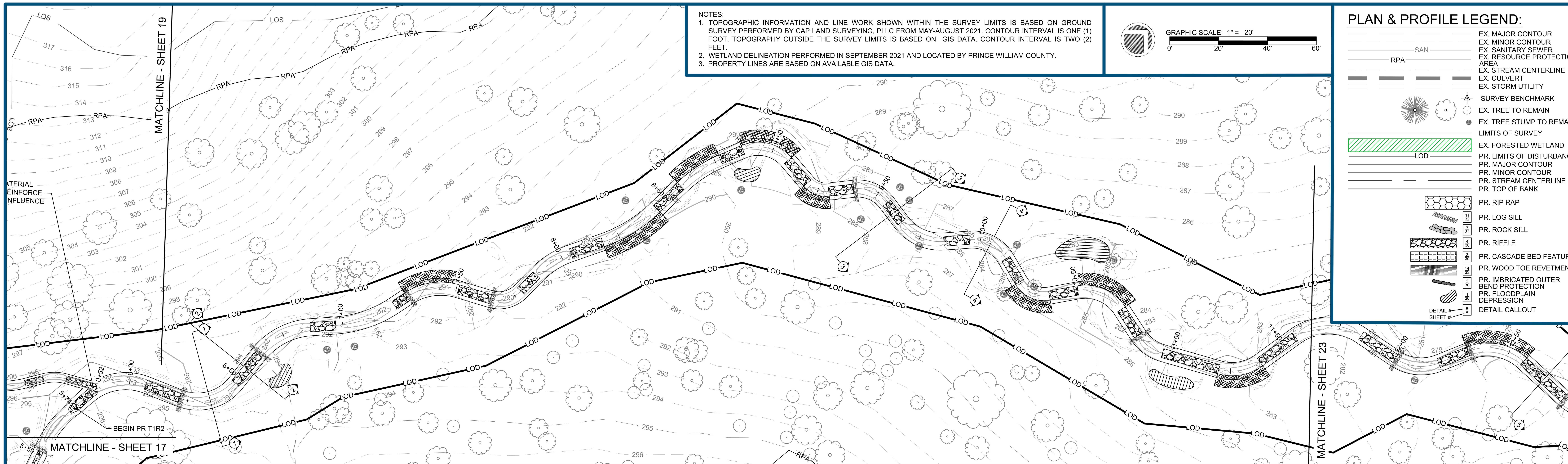
30% DESIGN REVIEW	
x	11/2021
Signature	Date

60% DESIGN REVIEW	
x	11/14/2022
Signature	Date

CONSTRUCTION PLAN REVIEW	
x	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	20 OF 48



NOTES:
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3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

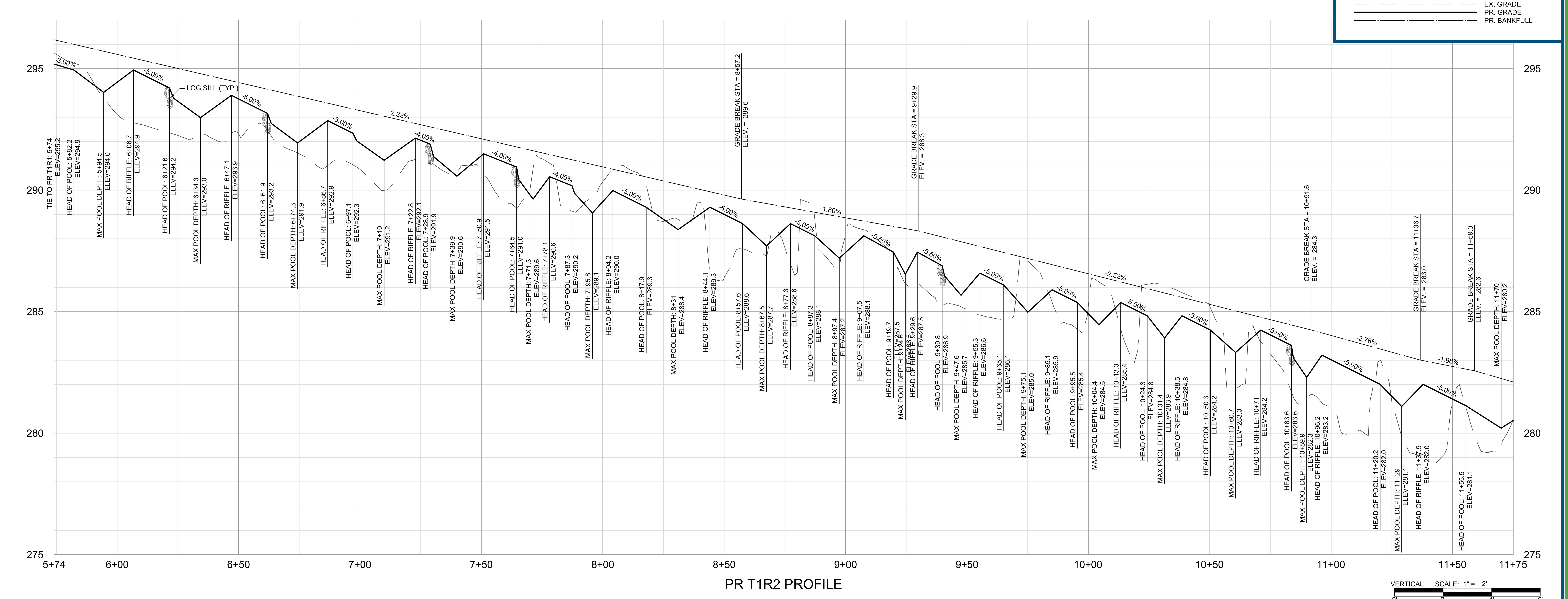
GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

PLAN & PROFILE LEGEND:

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CULVERT
- EX. STORM UTILITY
- SURVEY BENCHMARK
- EX. TREE TO REMAIN
- EX. TREE STUMP TO REMAIN
- LIMITS OF SURVEY
- EX. FORESTED WETLAND
- PR. LIMITS OF DISTURBANCE
- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- PR. STREAM CENTERLINE
- PR. TOP OF BANK
- PR. RIP RAP
- PR. LOG SILL
- PR. ROCK SILL
- PR. RIFFLE
- PR. CASCADE BED FEATURE
- PR. WOOD TOE REVETMENT
- PR. IMBRICATED OUTER BEND PROTECTION
- PR. FLOODPLAIN DEPRESSION
- DETAIL CALLOUT

PROFILE LEGEND:

- EX. GRADE
- PR. GRADE
- PR. BANKFULL



CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

T1R2 PLAN & PROFILE

PRINCE WILLIAM COUNTY, VA

res
HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B, RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	11/2021
Signature	Date
60% DESIGN REVIEW	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	21OF 48

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
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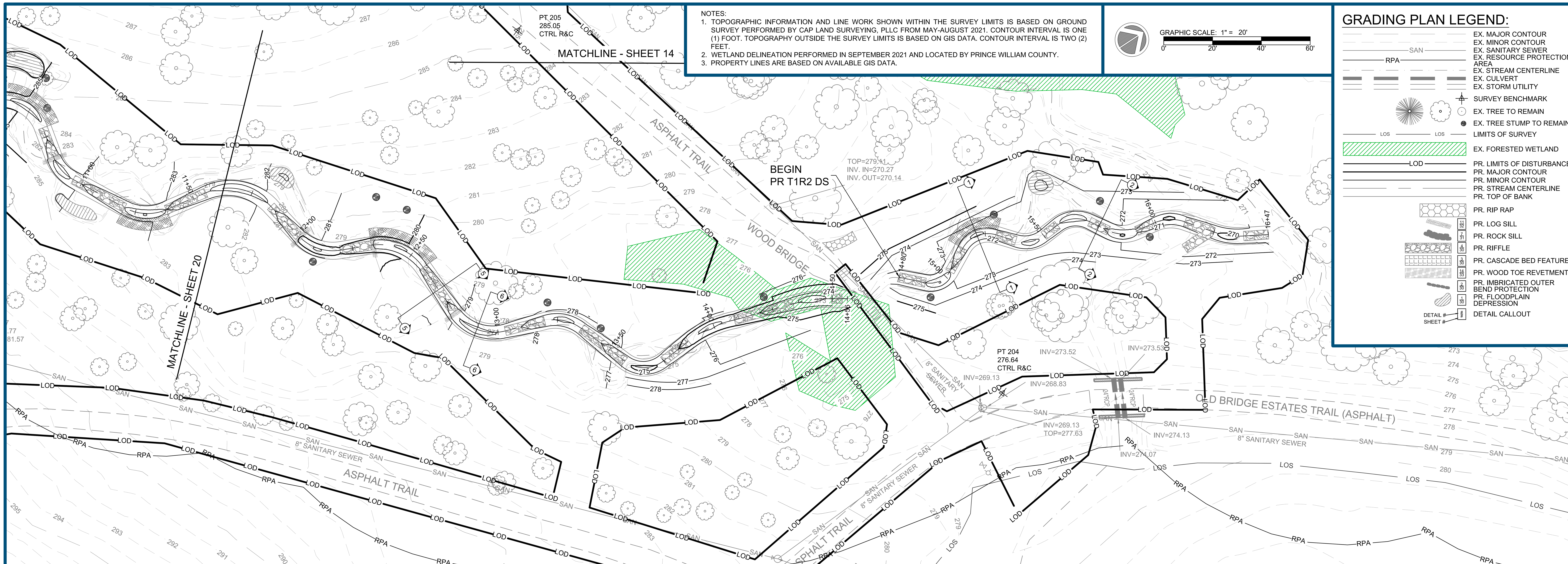
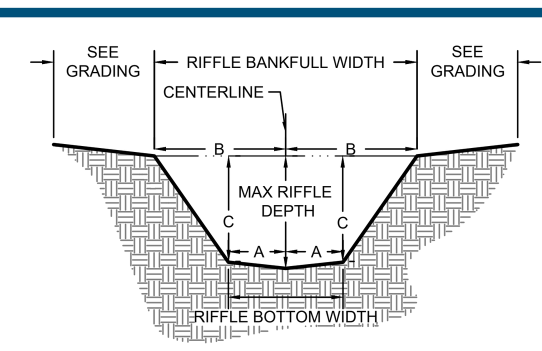
GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'



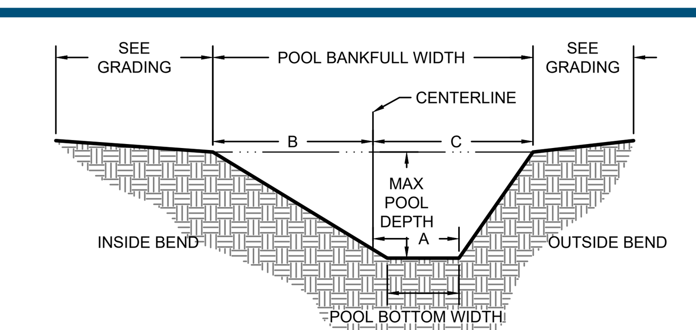
GRADING PLAN LEGEND:

EX. MAJOR CONTOUR
EX. MINOR CONTOUR
EX. SANITARY SEWER
EX. RESOURCE PROTECTION AREA
EX. STREAM CENTERLINE
EX. CULVERT
EX. STORM UTILITY
SURVEY BENCHMARK
EX. TREE TO REMAIN
EX. TREE STUMP TO REMAIN
LIMITS OF SURVEY
EX. FORESTED WETLAND
PR. LIMITS OF DISTURBANCE
PR. MAJOR CONTOUR
PR. MINOR CONTOUR
PR. STREAM CENTERLINE
PR. TOP OF BANK
PR. RIP RAP
PR. LOG SILL
PR. ROCK SILL
PR. RIFFLE
PR. CASCADE BED FEATURE
PR. WOOD TOE REVETMENT
PR. IMBRICATED OUTER BEND PROTECTION
PR. FLOODPLAIN DEPRESSION
DETAIL # / SHEET # DETAIL CALLOUT



RIFFLE CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	RIFFLE BOTTOM WIDTH (FT)	MAX RIFFLE DEPTH* (FT)	B-CENTERLINE OFFSET TO TOP OF BANK (FT)	RIFFLE BANKFULL WIDTH (FT)	C-BANK HEIGHT
T1R2	5+74 - 16+47	1.9	3.8	1.0	3.5	7.0	0.8

RIFFLE CROSS-SECTION GEOMETRY
NOT TO SCALE



POOL (POINT BAR) CROSS-SECTION GEOMETRY							
REACH	STATION	A-CENTERLINE OFFSET TO BOTTOM OF BANK (FT)	POOL BOTTOM WIDTH (FT)	B-CENTERLINE OFFSET TO INSIDE TOP OF BANK WIDTH (FT)	C-CENTERLINE OFFSET TO OUTSIDE TOP OF BANK WIDTH (FT)	MAX POOL DEPTH (FT)	POOL BKF WIDTH (FT)
T1R2	5+74 - 16+47	0.8	0.5	3.5	3.5	2.1	7.0

POOL (POINT BAR) CROSS-SECTION GEOMETRY
NOT TO SCALE

res
HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

T1R2 LOWER REACH GRADING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x Robert C. Sight III 11/2021
Signature Date

60% DESIGN REVIEW
x Darlene Wilfong 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER: ASL
DESIGNED: AH/BS/LS
DRAWN: LS
JOB NUMBER: SPR2023-00397 S03
DESIGN TYPE: RESTORATION
DATE: 9/3/2024
SHEET NO: 22 OF 48

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
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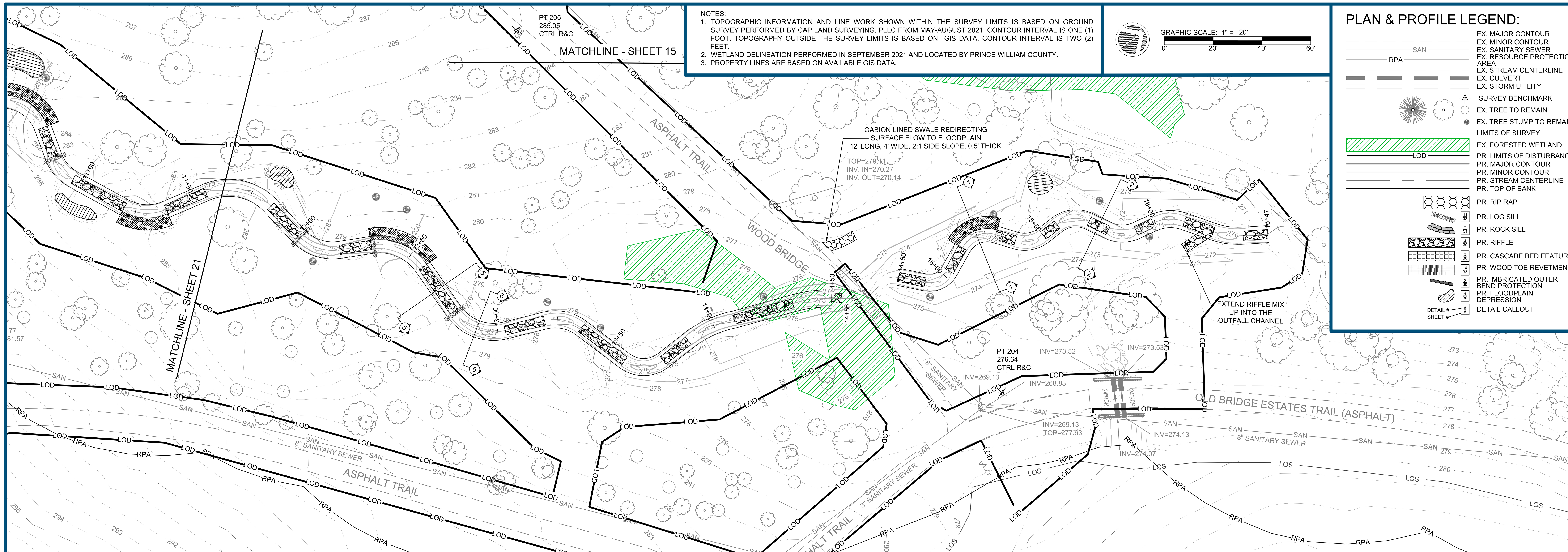
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA.

GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

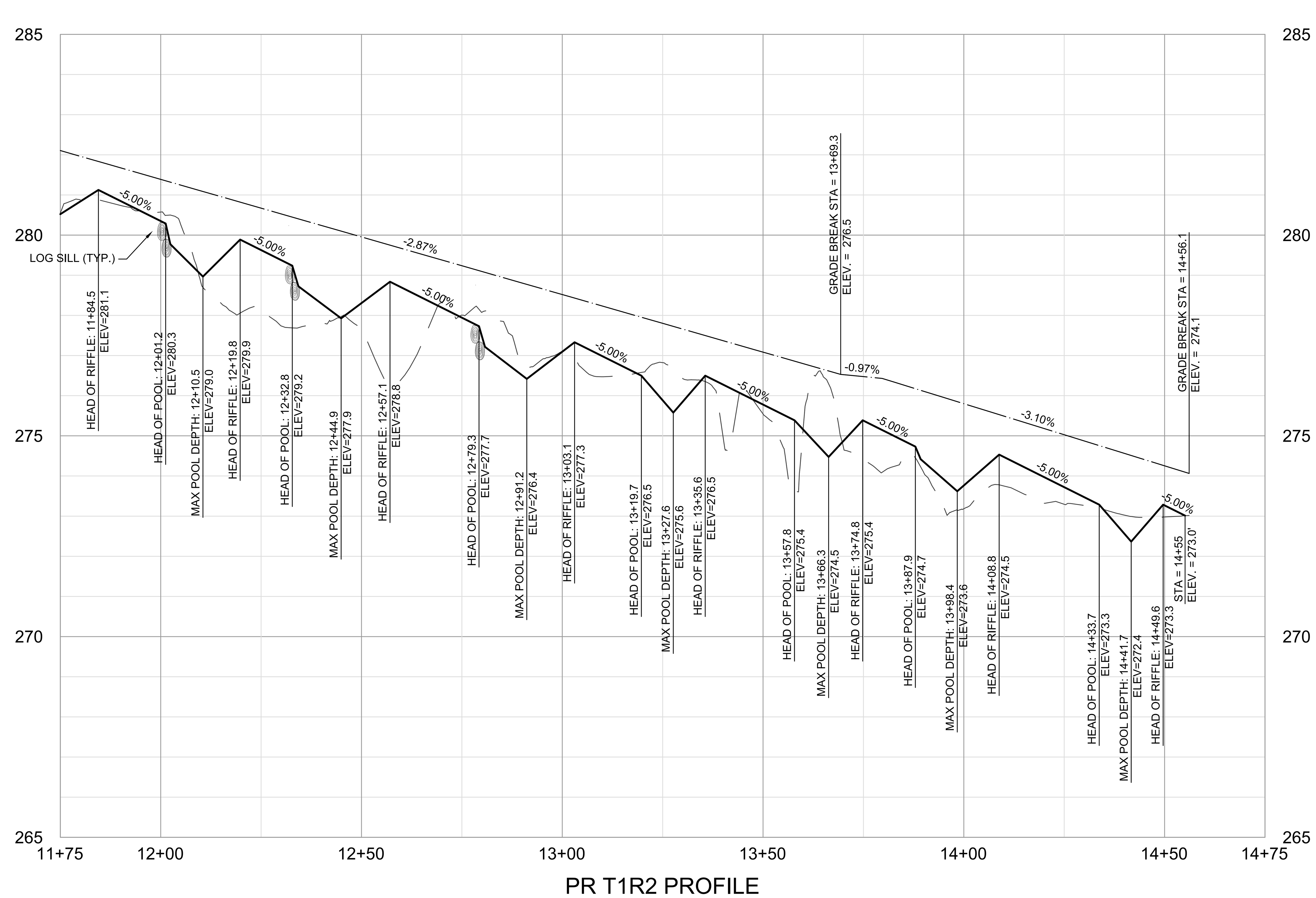
PLAN & PROFILE LEGEND:

EX. MAJOR CONTOUR
EX. MINOR CONTOUR
EX. SANITARY SEWER
EX. RESOURCE PROTECTION AREA
EX. STREAM CENTERLINE
EX. CULVERT
EX. STORM UTILITY
SURVEY BENCHMARK
EX. TREE TO REMAIN
EX. TREE STUMP TO REMAIN
LIMITS OF SURVEY
EX. FORESTED WETLAND
PR. LIMITS OF DISTURBANCE
PR. MAJOR CONTOUR
PR. MINOR CONTOUR
PR. STREAM CENTERLINE
PR. TOP OF BANK
PR. RIP RAP
PR. LOG SILL
PR. ROCK SILL
PR. RIFFLE
PR. CASCADE BED FEATURE
PR. WOOD TOE REVETMENT
PR. IMBRICATED OUTER BEND PROTECTION
PR. FLOODPLAIN DEPRESSION
DETAIL CALLOUT

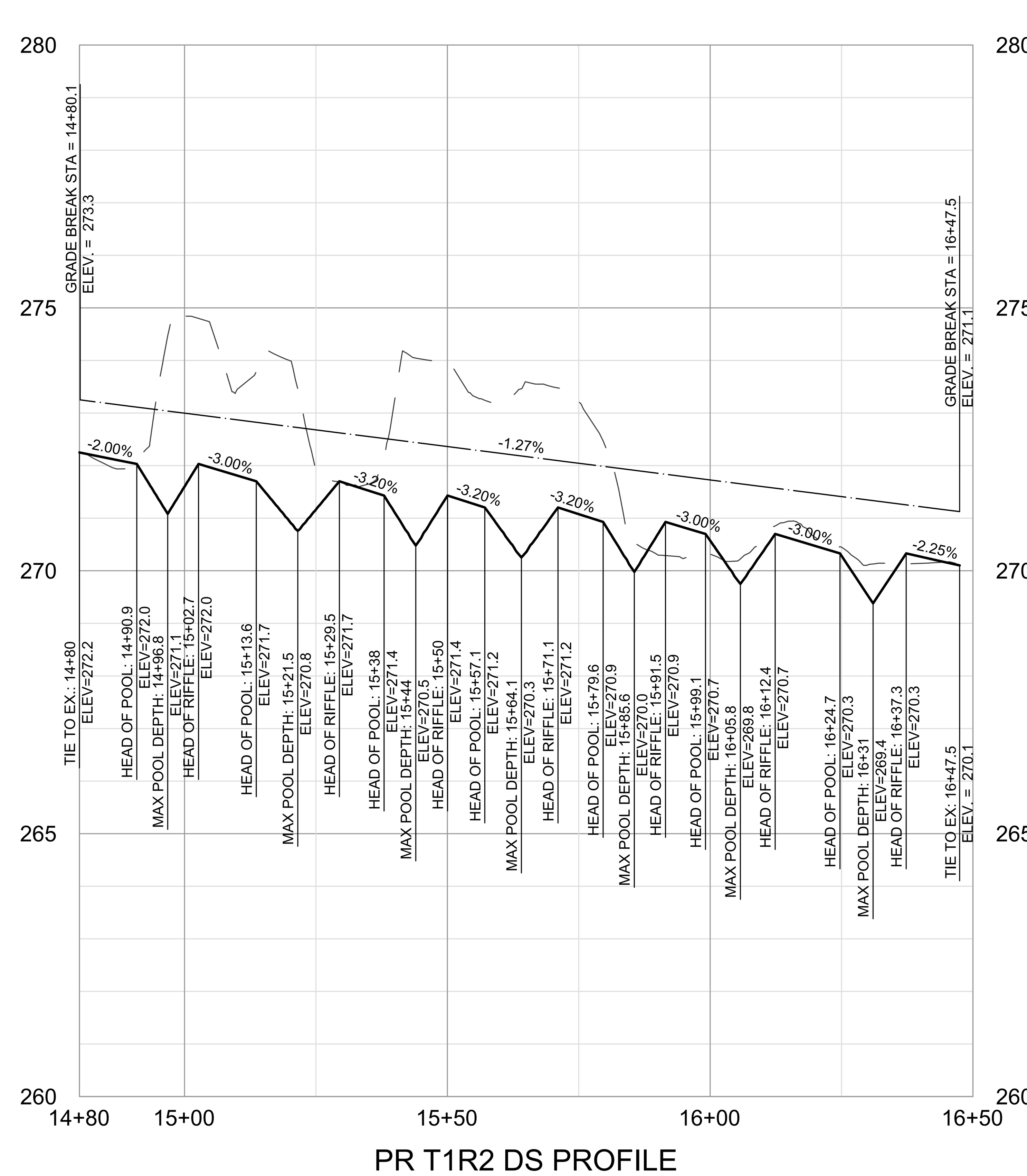


PROFILE LEGEND:

EX. GRADE
PR. GRADE
PR. BANKFULL



PR T1R2 PROFILE



PR T1R2 DS PROFILE

VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'

HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

res

HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

T1R2 LOWER REACH PLAN & PROFILE

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	
	11/2021
Signature	Date
60% DESIGN REVIEW	
	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	

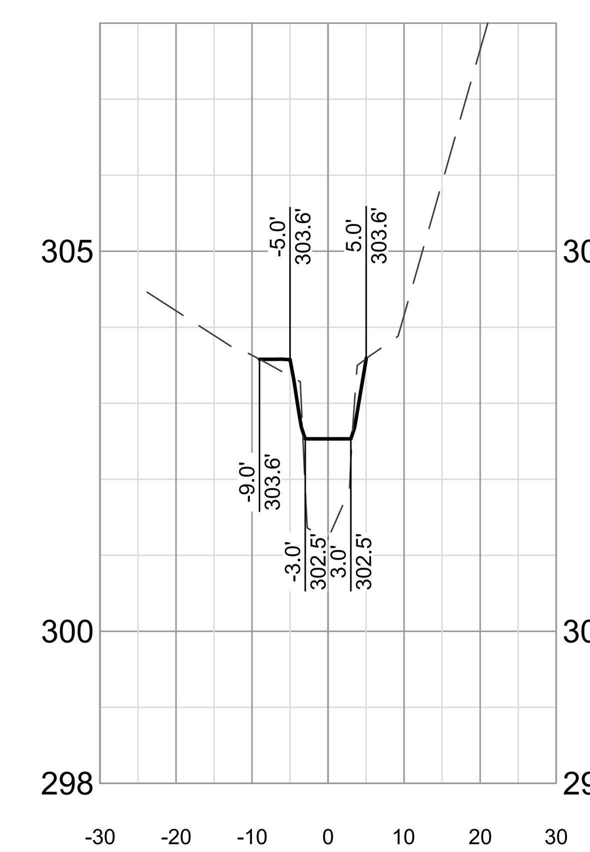
Signature	Date

REVISIONS:

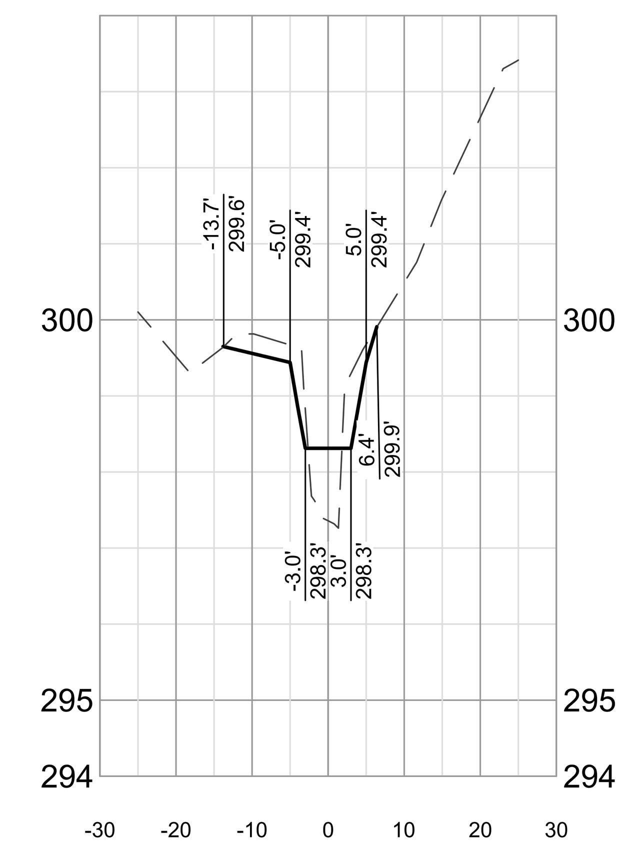
PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	23 OF 48

CROSS SECTION LEGEND:
EX. GRADE
PR. GRADE

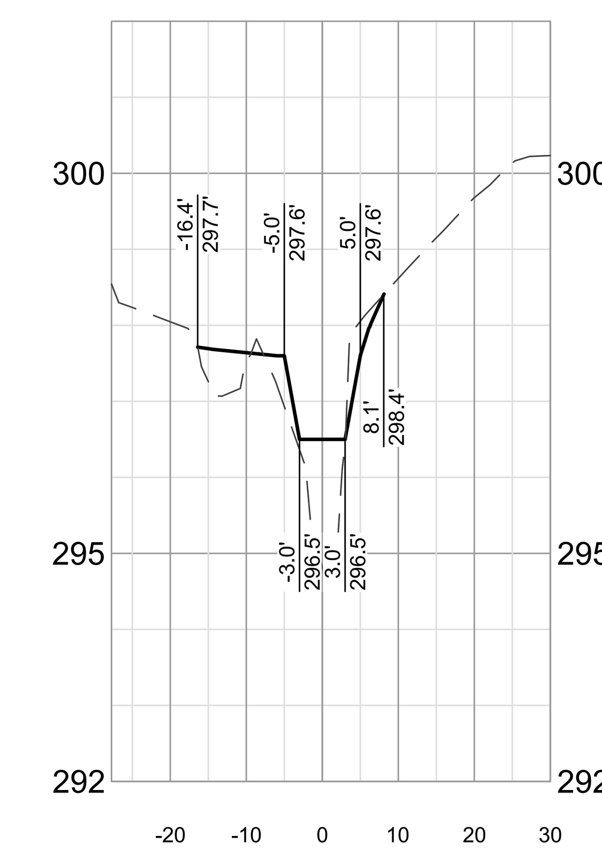
R1SP1 #1, STATION 1+24.9



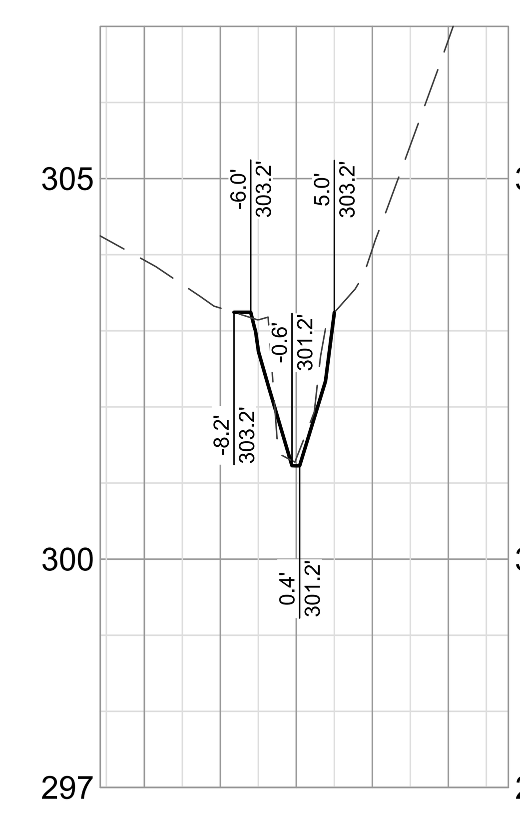
R1SP2 #1, STATION 2+30.2



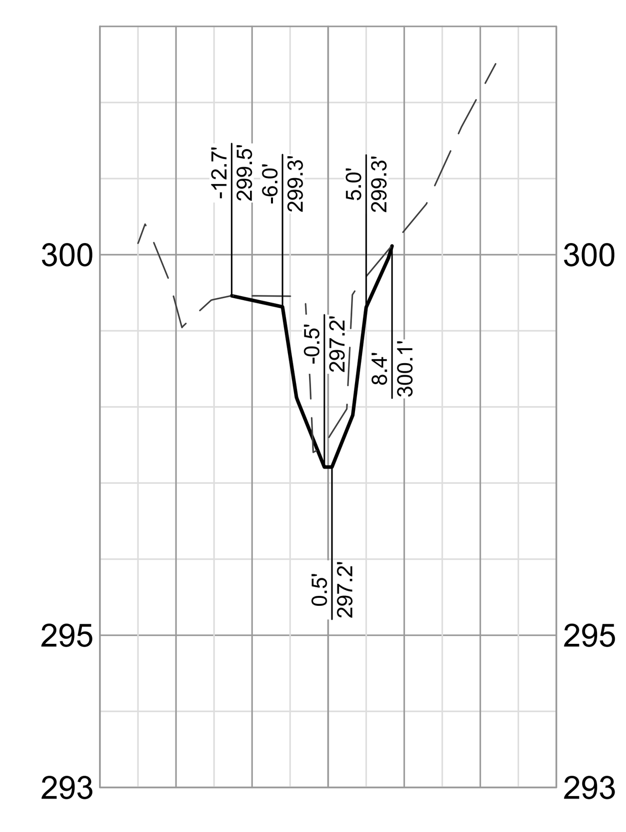
R1SP3 #1, STATION 3+14.7



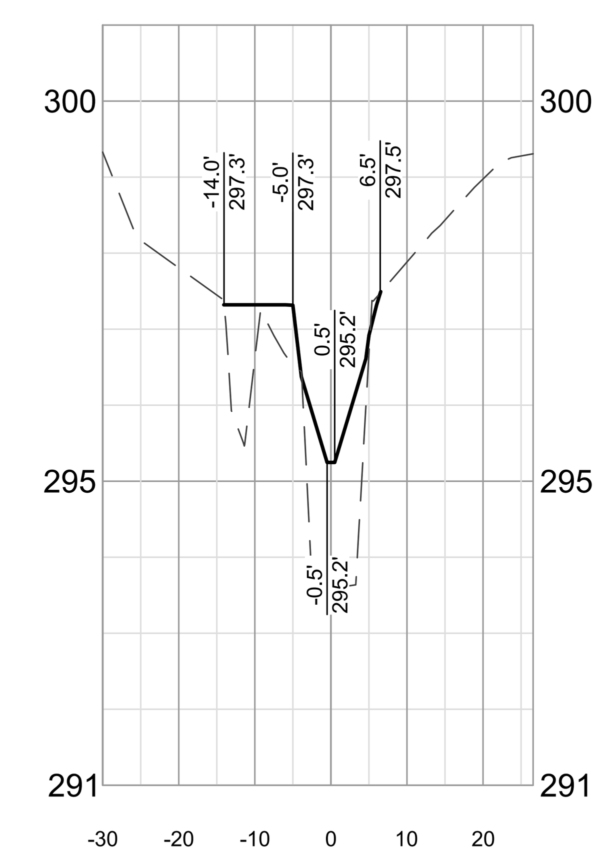
R1SP1 #2, STATION 1+32.1



R1SP2 #2, STATION 2+35.3



R1SP3 #2, STATION 3+21.4



VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'
HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

UT TO HOOES RUN REACH 1 CROSS SECTIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

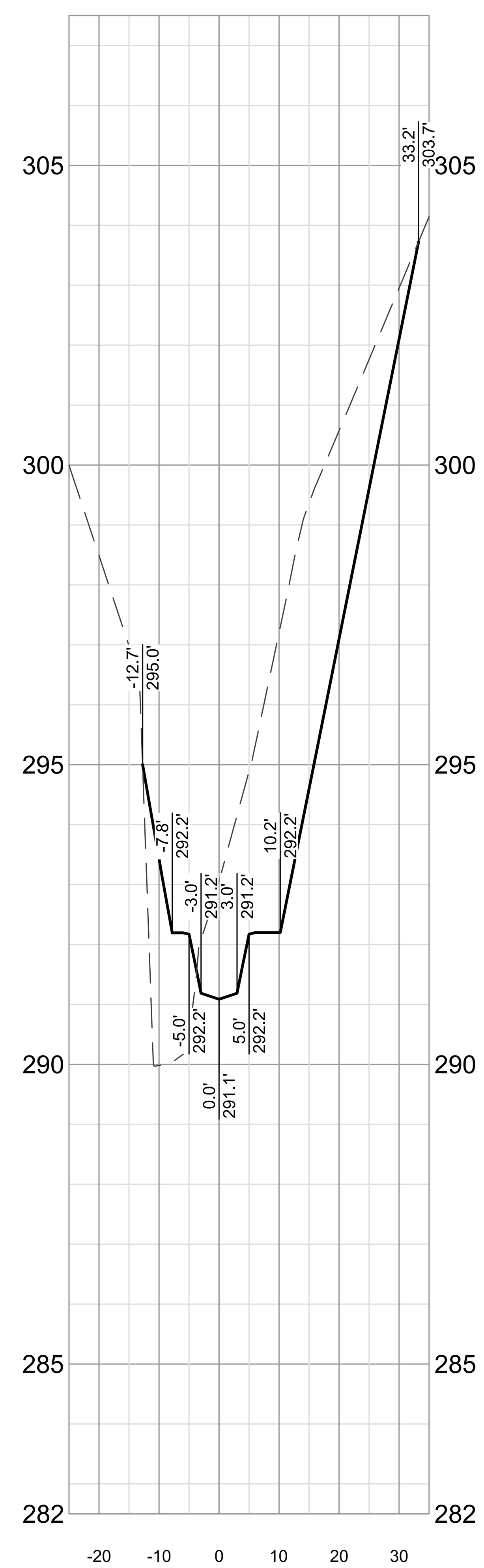
CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

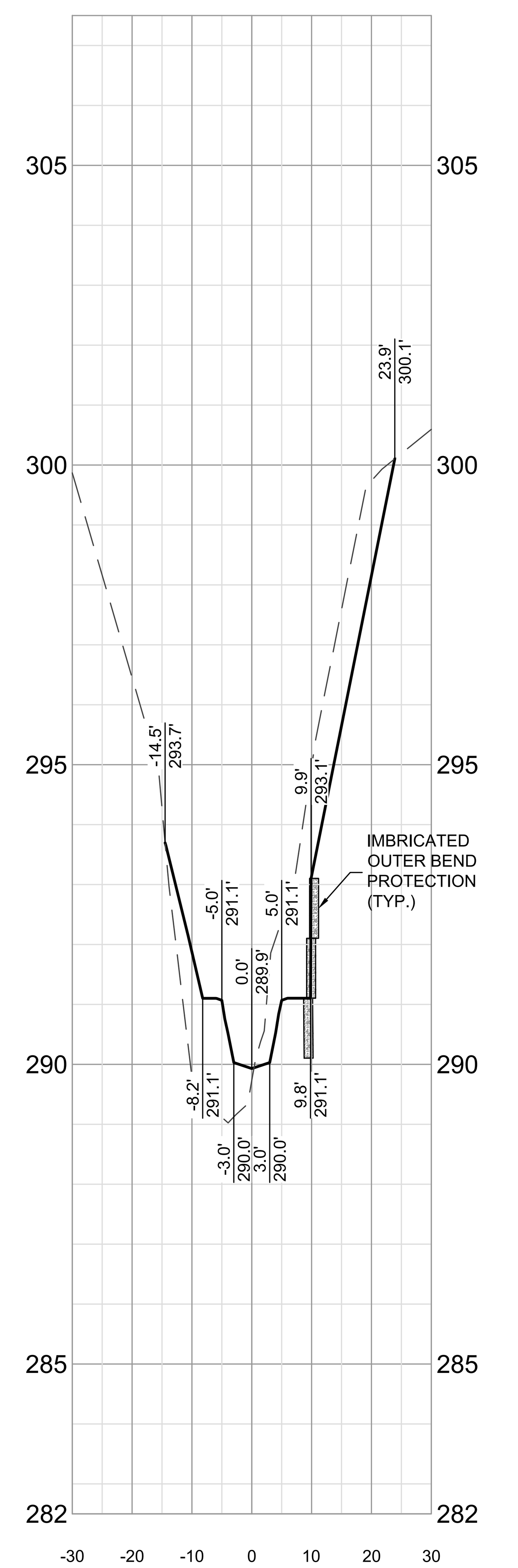
PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	24 OF 48

CROSS SECTION LEGEND:
EX. GRADE
PR. GRADE

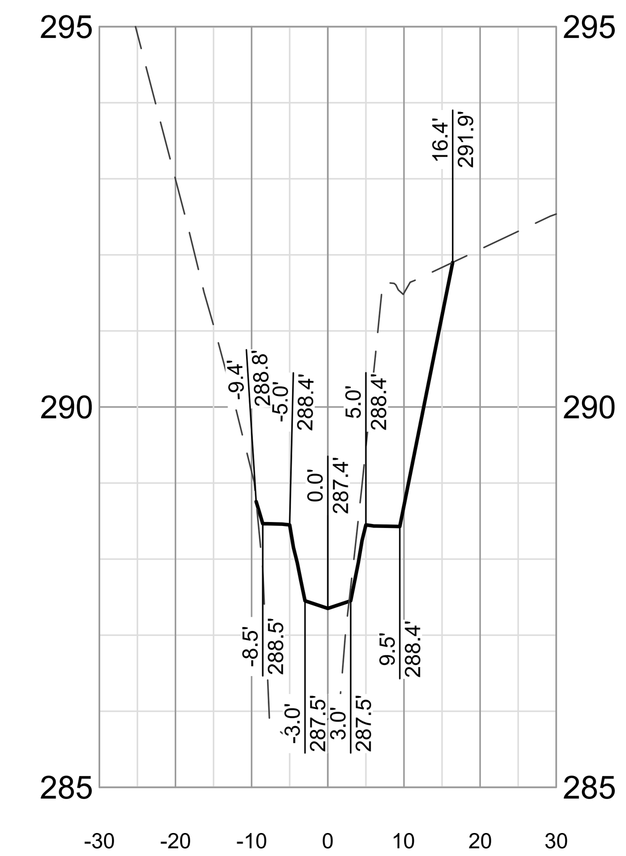
PR UT TO HOOES RUN R2 #1, STATION 4+70.1



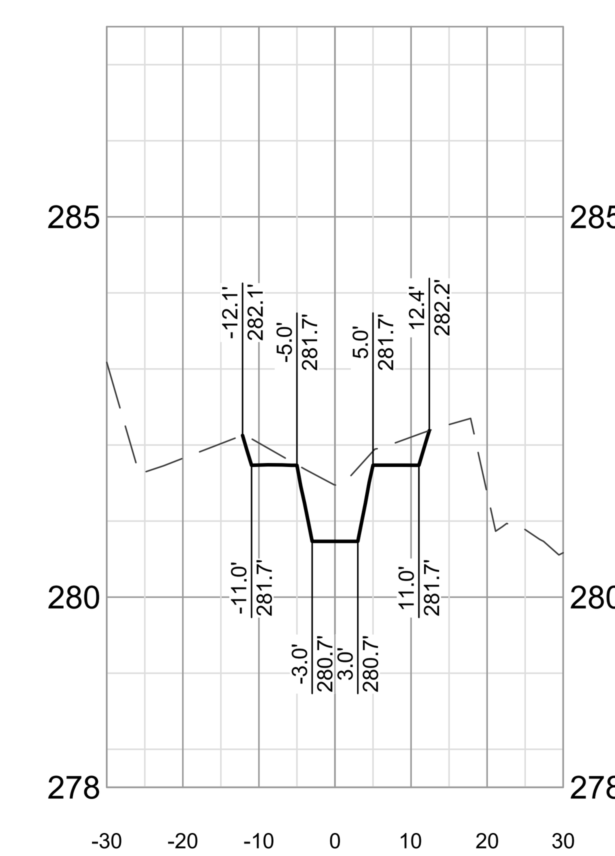
PR UT TO HOOES RUN R2 #2, STATION 5+22.9



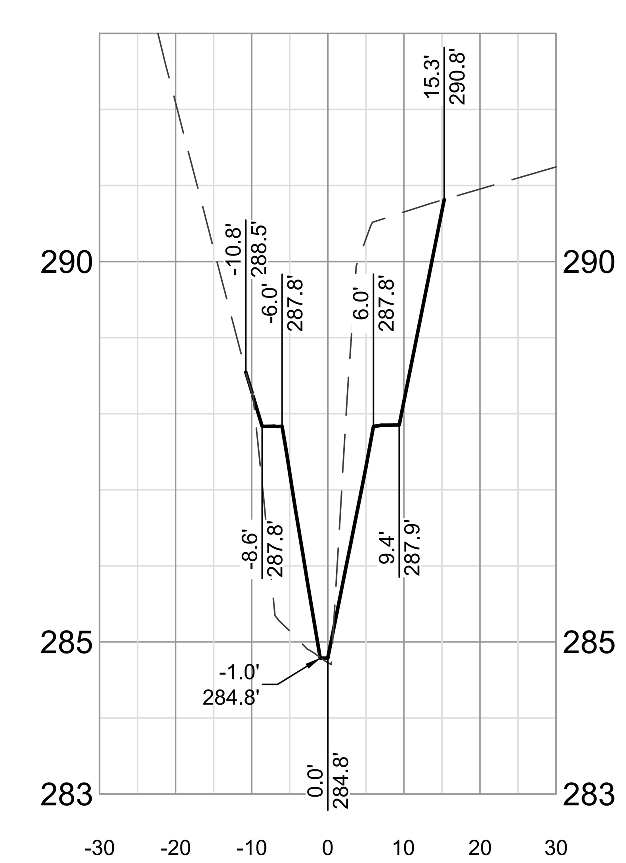
PR UT TO HOOES RUN R2 #3, STATION 6+24.1



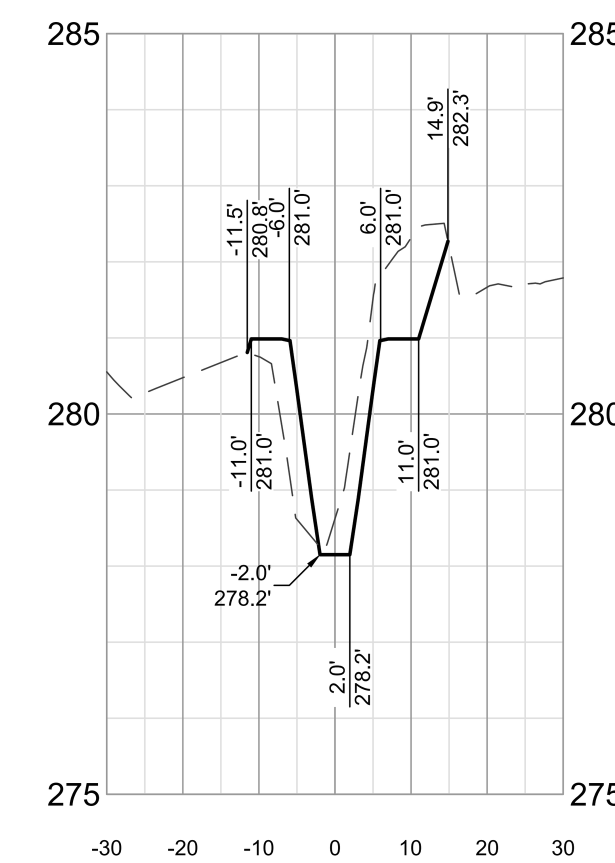
PR UT TO HOOES RUN R2 #5, STATION 8+43.8



PR UT TO HOOES RUN R2 #4, STATION 6+46.8



PR UT TO HOOES RUN R2 #6, STATION 8+63.8



VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'
HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

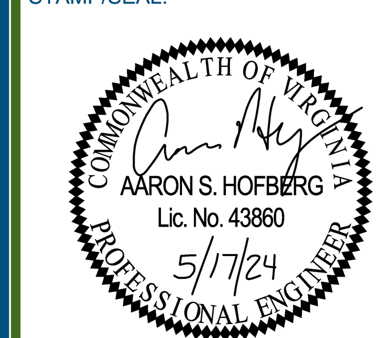
HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B, RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

UT TO HOOES RUN REACH 2 CROSS SECTIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:



30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

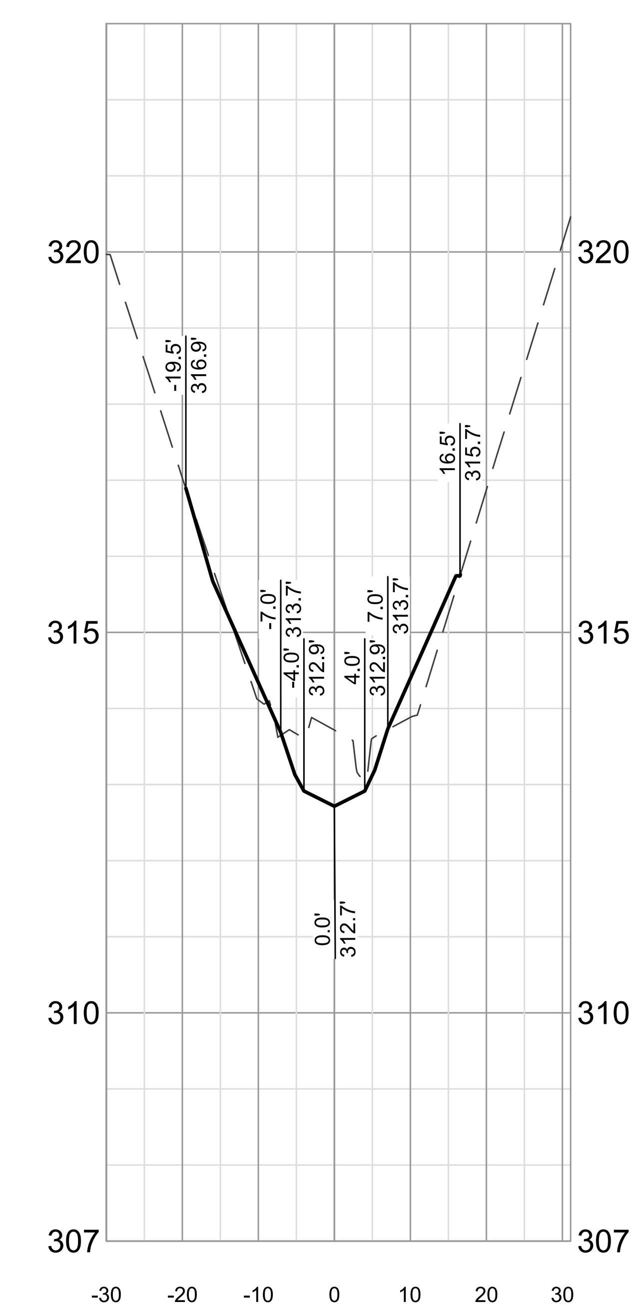
CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

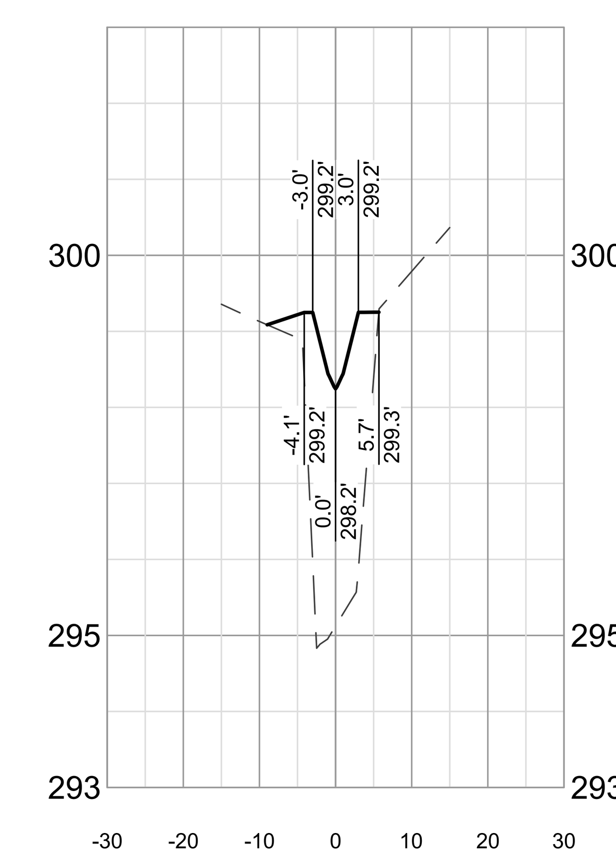
PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	25 OF 48

CROSS SECTION LEGEND:
EX. GRADE
PR. GRADE

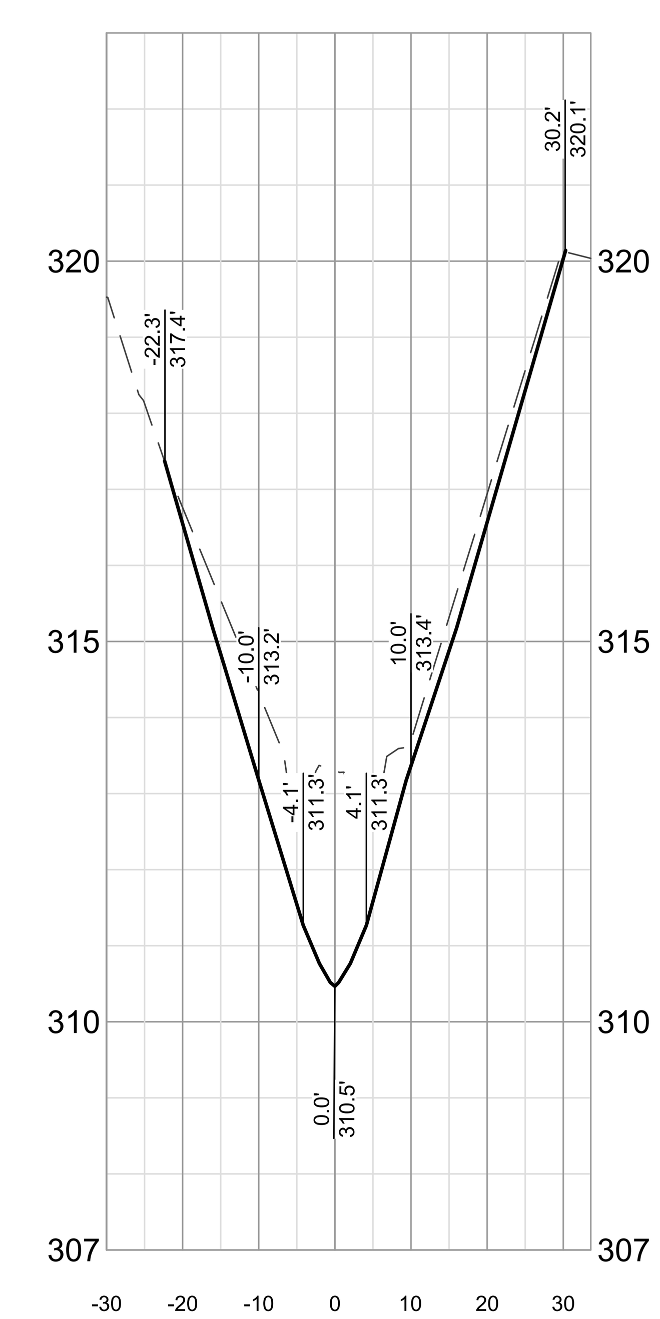
INFILTRATION CASCADE #1, STATION 1+52.0



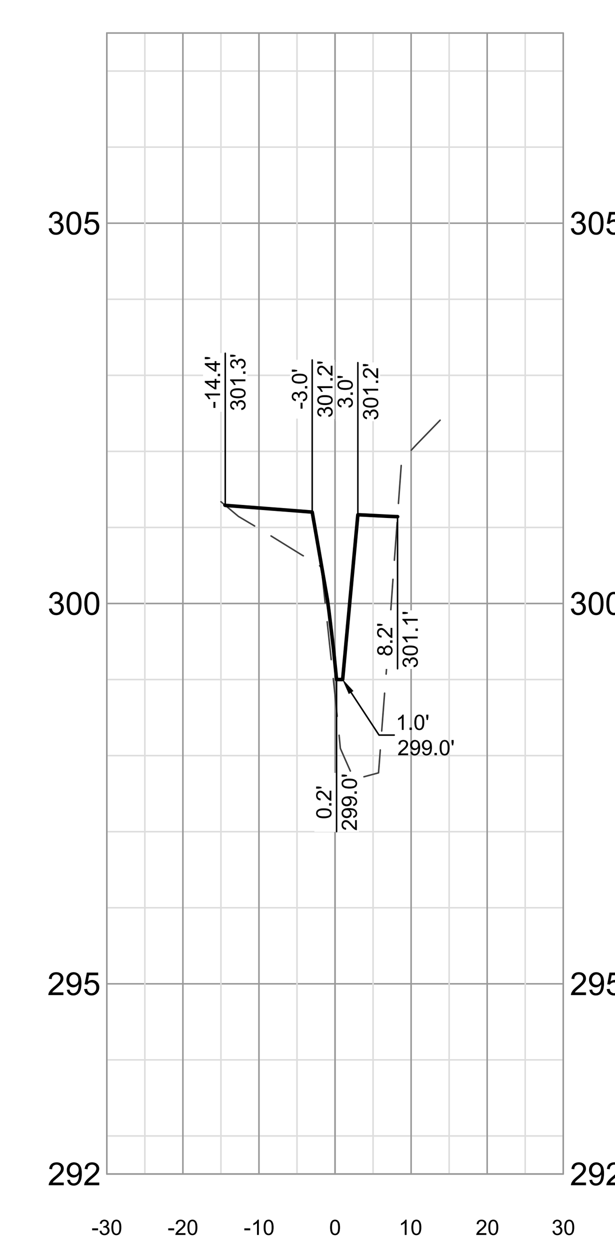
PR T1R1 #2, STATION 4+89.8



INFILTRATION CASCADE #2, STATION 1+66.1



PR T1R1 #1, STATION 4+40.8



VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'
HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

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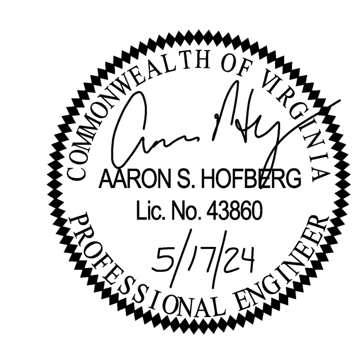
CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

INFILTRATION CASCADE POOL & T1R1 CROSS SECTIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:



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Signature	Date
60% DESIGN REVIEW	
x	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	
x	----
Signature	Date

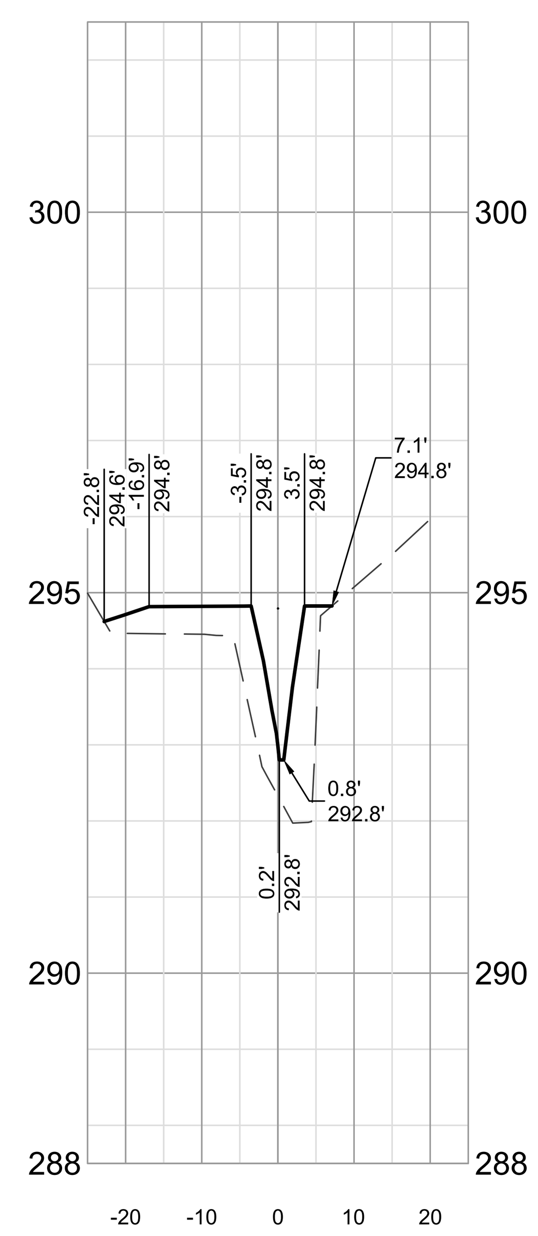
REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	26 OF 48

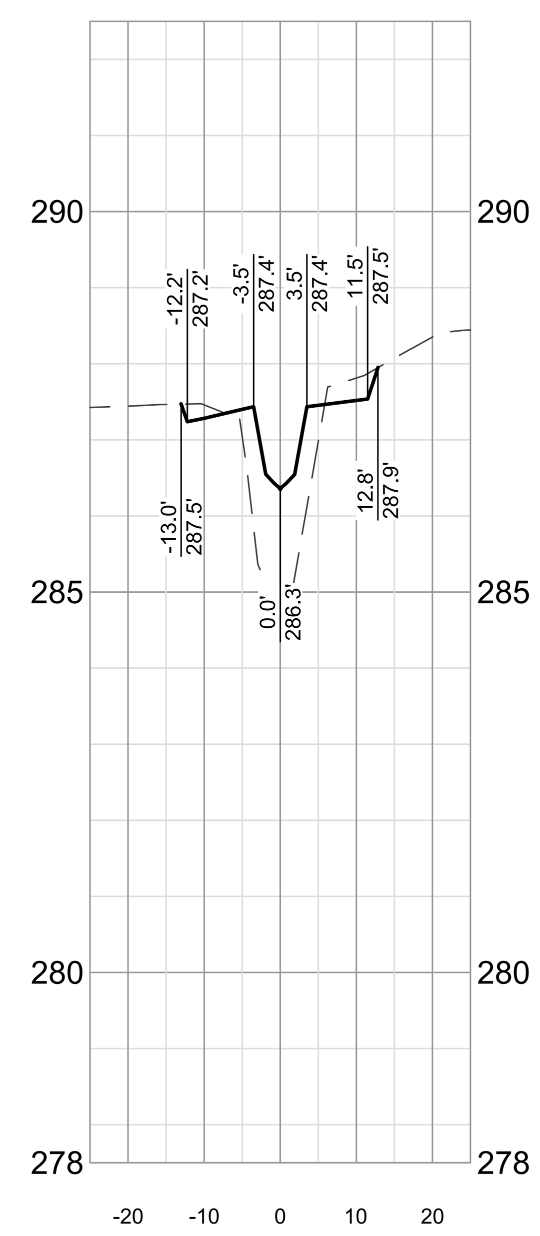
CROSS SECTION LEGEND:

EX. GRADE
PR. GRADE

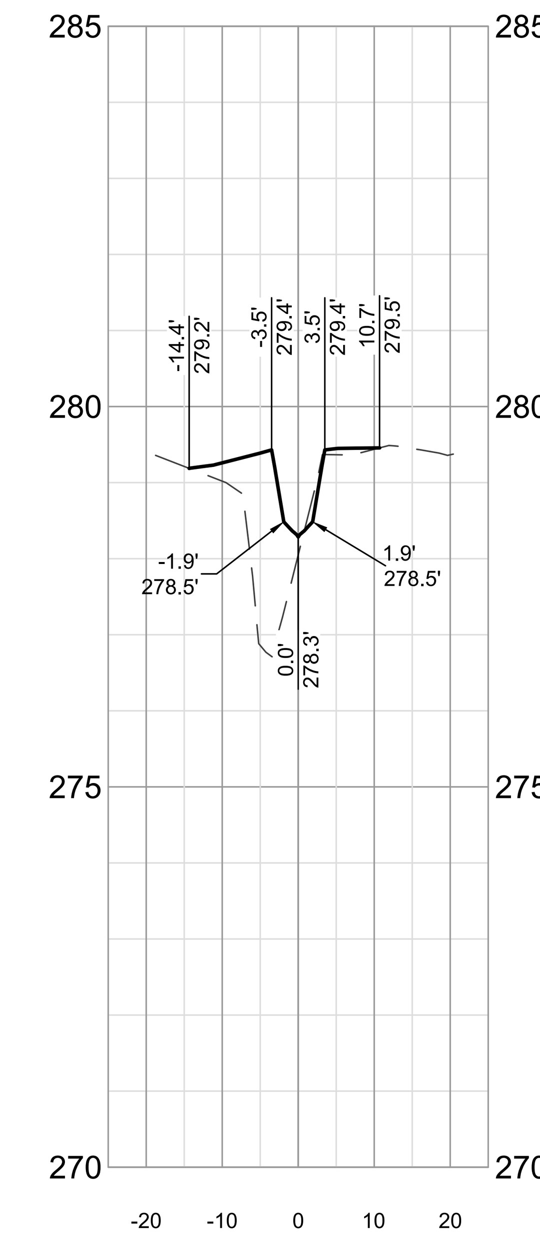
PR T1R2 #1, STATION 6+34.3



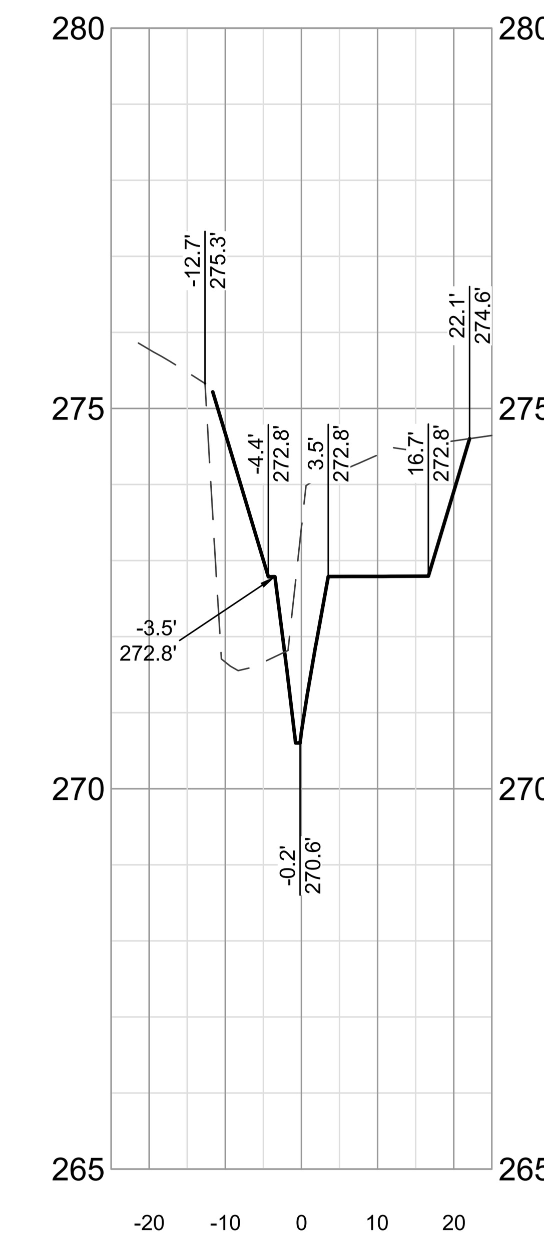
PR T1R2 #3, STATION 9+60.2



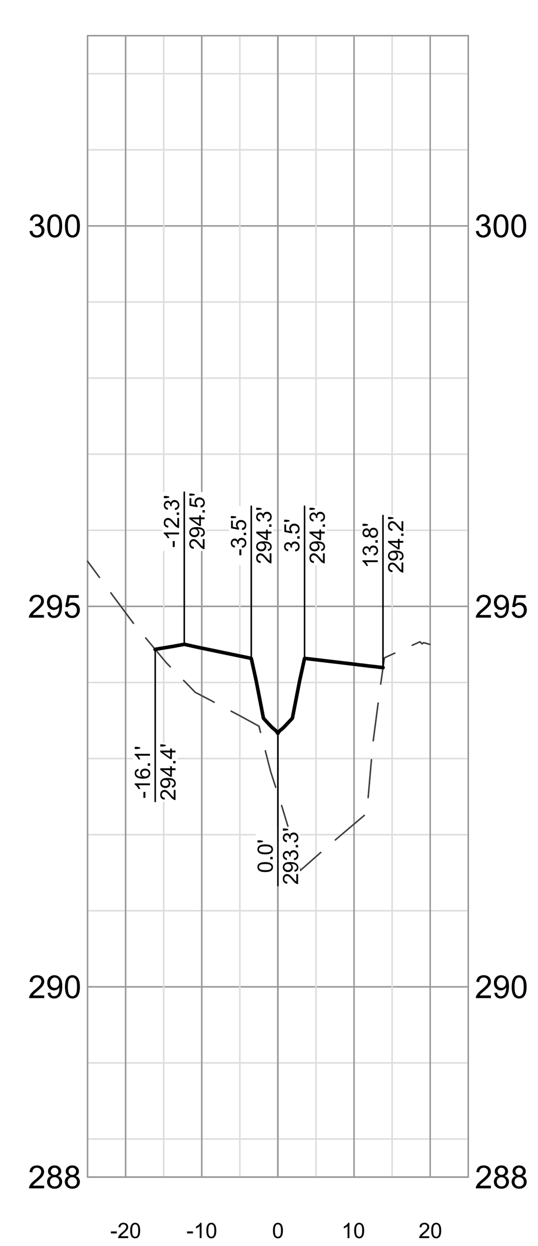
PR T1R2 #5, STATION 12+68.2



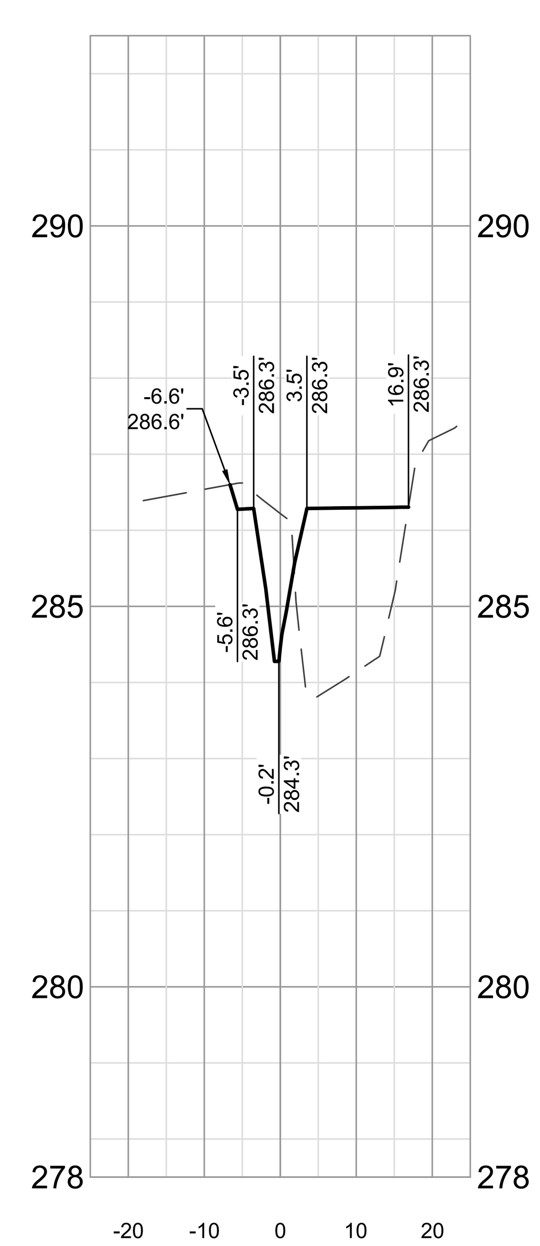
PR T1R2 DS #1, STATION 15+21.5



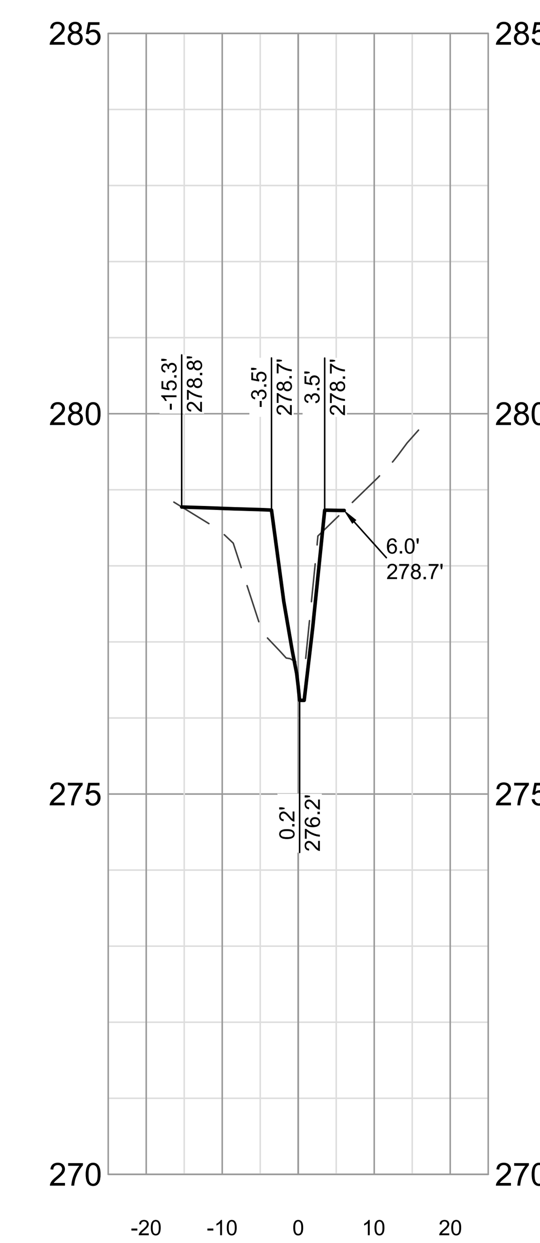
PR T1R2 #2, STATION 6+54.5



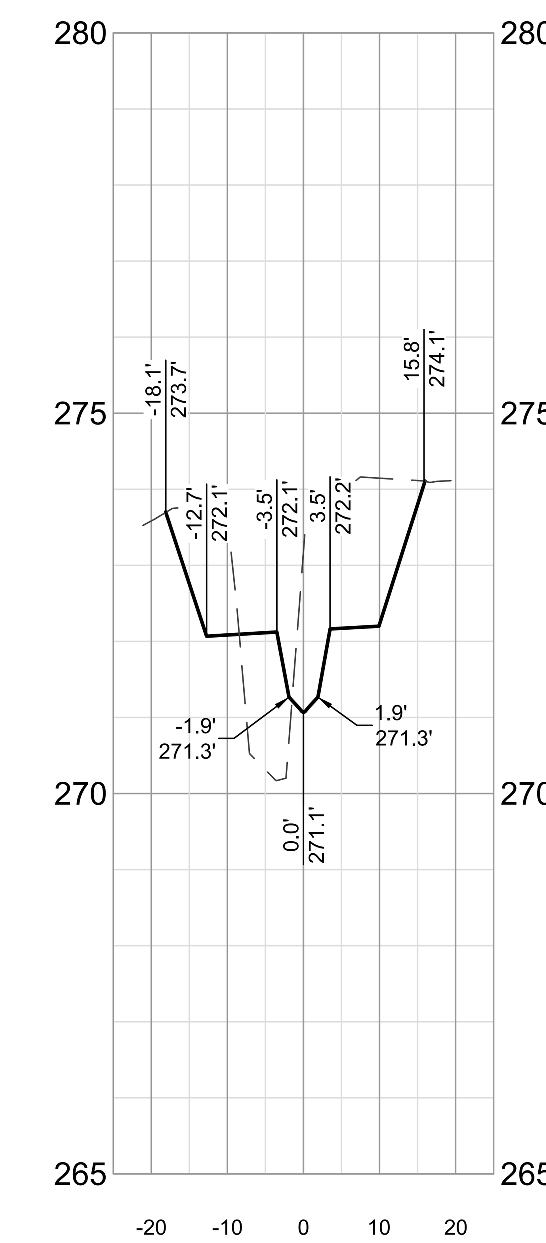
PR T1R2 #4, STATION 10+04.4



PR T1R2 #6, STATION 12+91.2



PR T1R2 DS #2, STATION 15+75.3



VERTICAL SCALE: 1" = 2'
0' 2' 4' 6'

HORIZONTAL SCALE: 1" = 20'
0' 20' 40' 60'

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PRINCE WILLIAM COUNTY

T1R2 CROSS SECTIONS

PRINCE WILLIAM COUNTY, VA

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COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

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REVISIONS:

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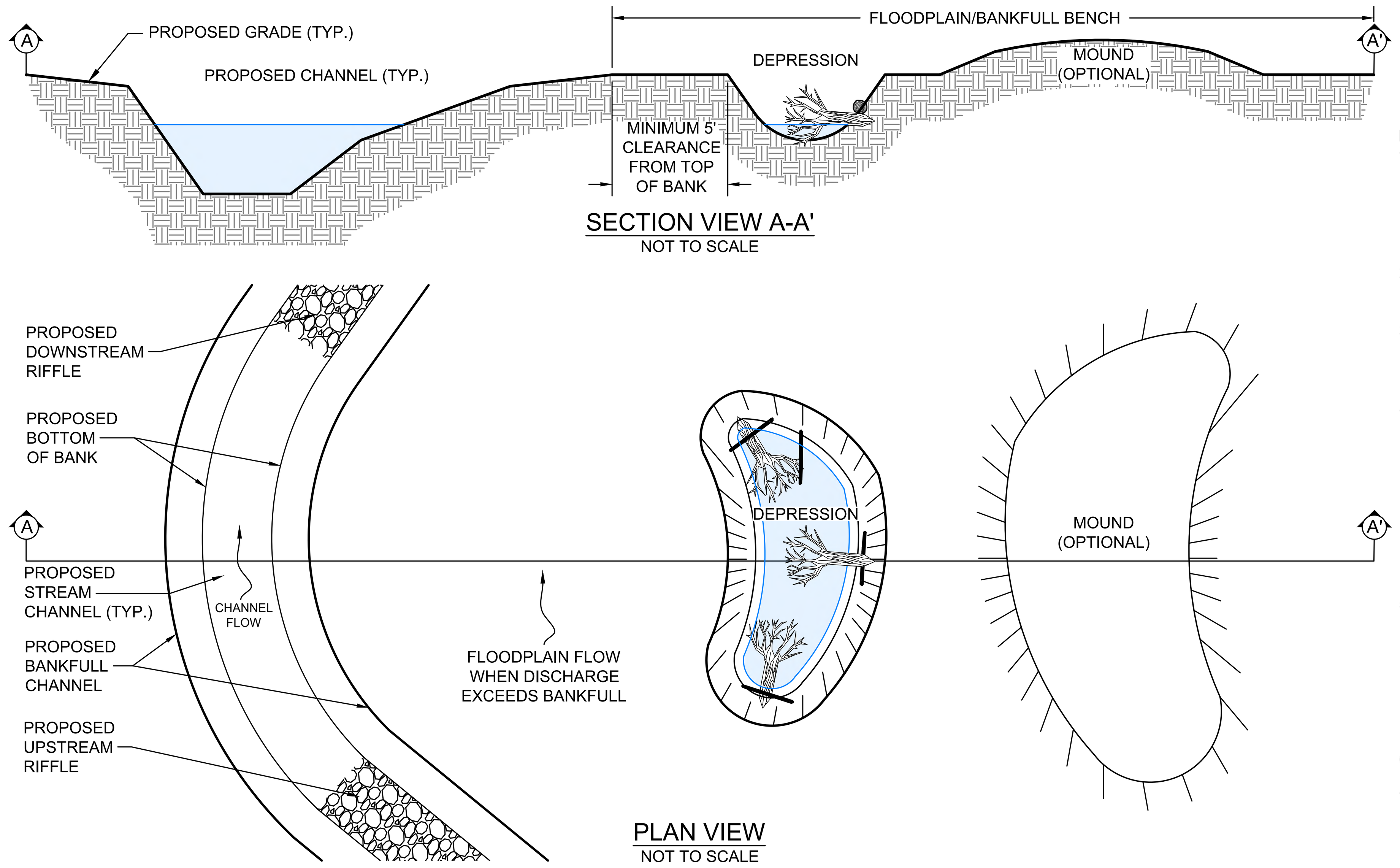
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	27 OF 48

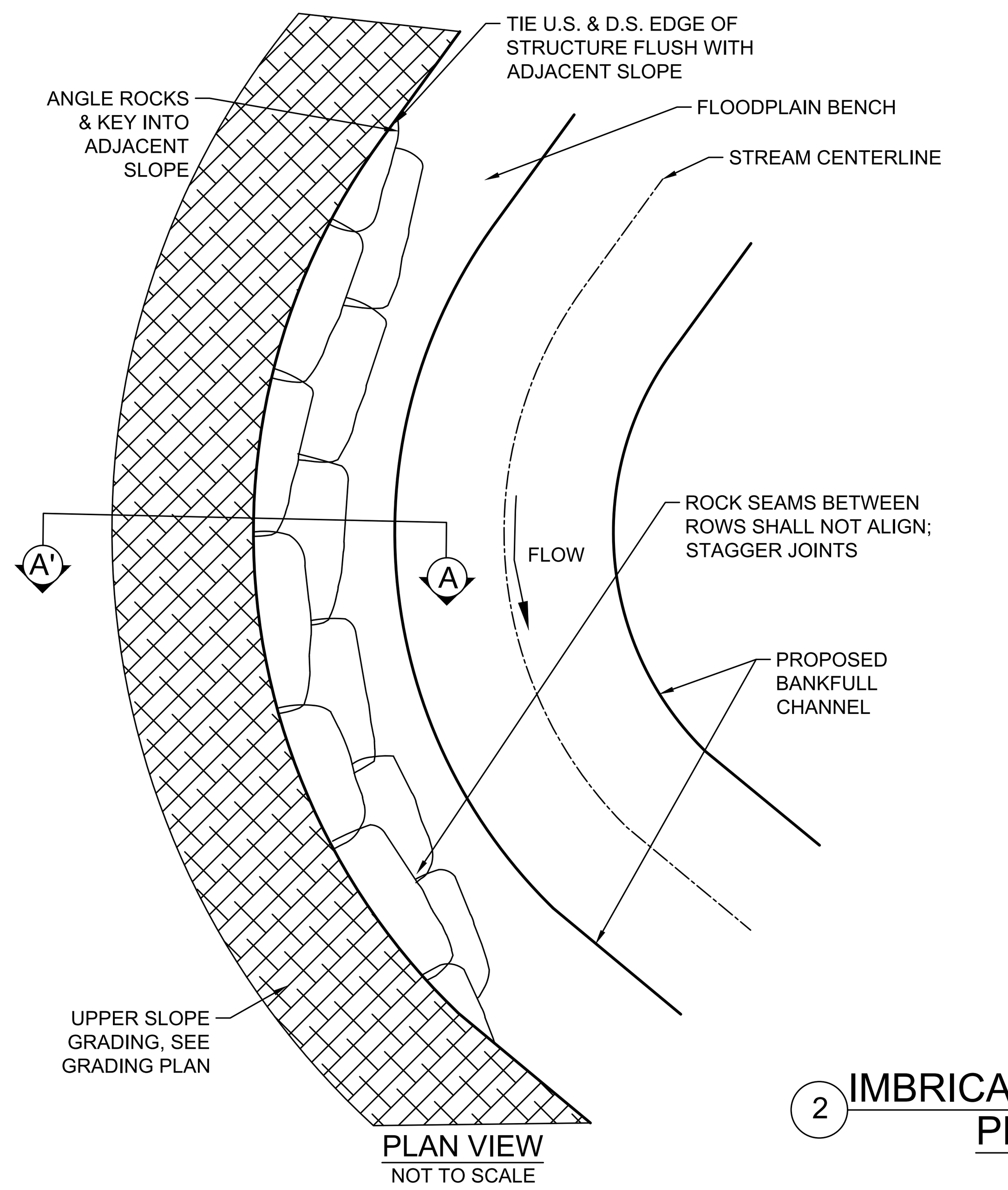


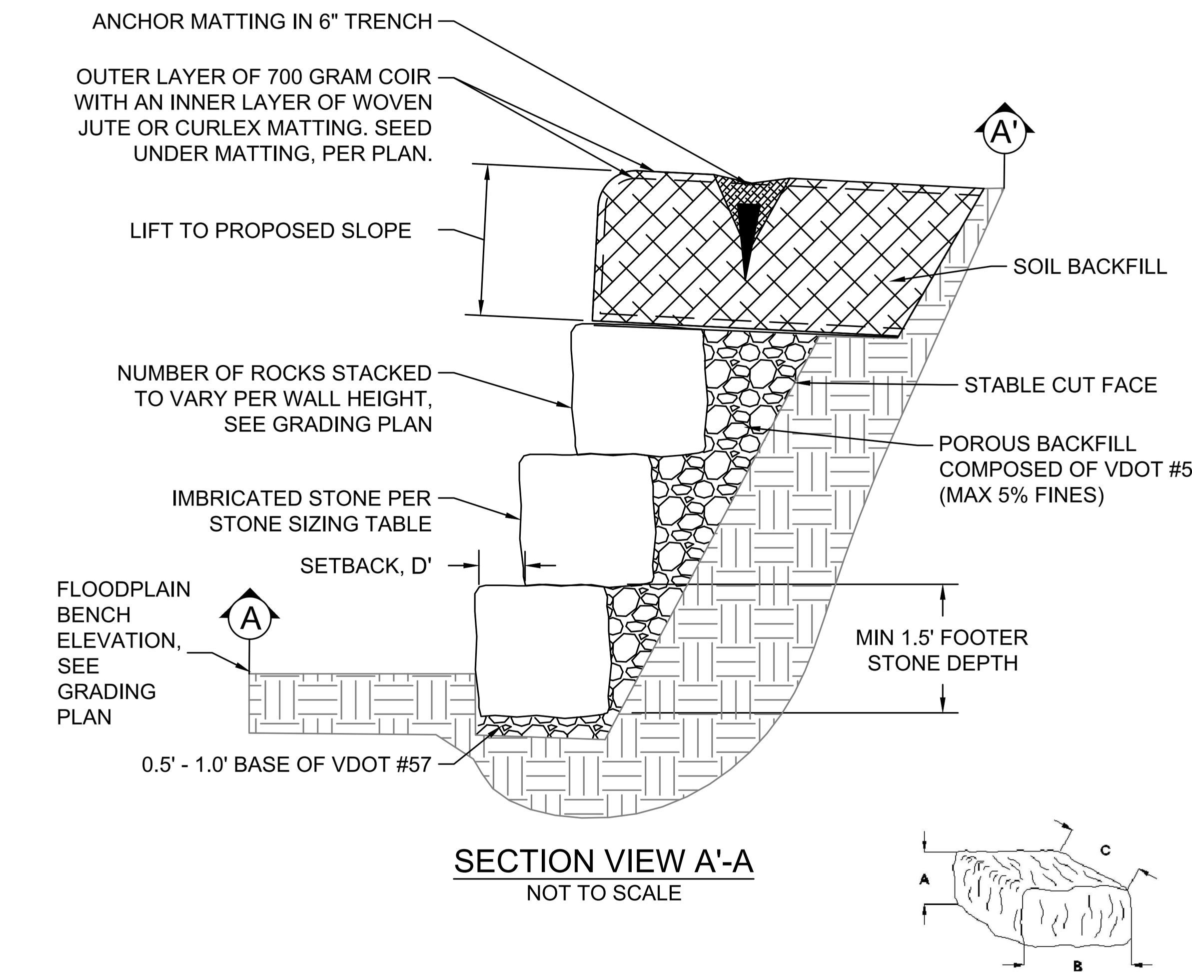
NOTES:

1. FLOODPLAIN DEPRESSIONS WILL BE CONSTRUCTED PER PLAN IN LOW GRADIENT FLOODPLAIN AREAS ADJACENT TO THE STREAM CHANNEL TO PROVIDE HABITAT FOR REPTILES AND AMPHIBIANS, WATERFOWL, AND INVERTEBRATES.
2. FLOODPLAIN DEPRESSIONS SHALL BE EXCAVATED 0.5' - 1.0' BELOW PROPOSED FLOODPLAIN GRADE.
3. IF NEEDED TO PROVIDE CONTRASTING MICROTOPOGRAPHY, AN ADJACENT MOUND CAN ALSO BE FORMED USING CUT FROM DEPRESSION.
4. LARGE WOODY DEBRIS SHALL BE USED FOR ENHANCEMENT OF HABITAT WITHIN THE FLOODPLAIN DEPRESSION FEATURES. THE WOODY DEBRIS WILL PROVIDE SUNNING AREAS FOR REPTILES AND AMPHIBIANS, LOAFING SITES FOR WATERFOWL, ADDITIONAL VERTICAL AND HORIZONTAL HABITAT, FLOODPLAIN ROUGHNESS, AND SUBSTRATE FOR INVERTEBRATES.
5. TREES USED FOR LARGE WOODY DEBRIS ENHANCEMENTS SHALL HAVE A MINIMUM TRUNK DIAMETER OF 8 INCHES AND THE MAIN PART OF THE TRUNK SHOULD BE AT LEAST 6 FEET LONG. WOODY DEBRIS WITH ROOT WADS ATTACHED ARE DESIRABLE; HOWEVER, SAW CUT TREES ARE ALSO ACCEPTABLE.
6. KEY STRAIGHT LOGS INTO WALLS TO PIN DOWN THE LOG BASE OF ROOT WADS.
7. REFER TO PLANTING AND/OR ESC PLAN FOR VEGETATION, SEEDING, AND MATTING REQUIREMENTS

1 FLOODPLAIN DEPRESSION

NOT TO SCALE

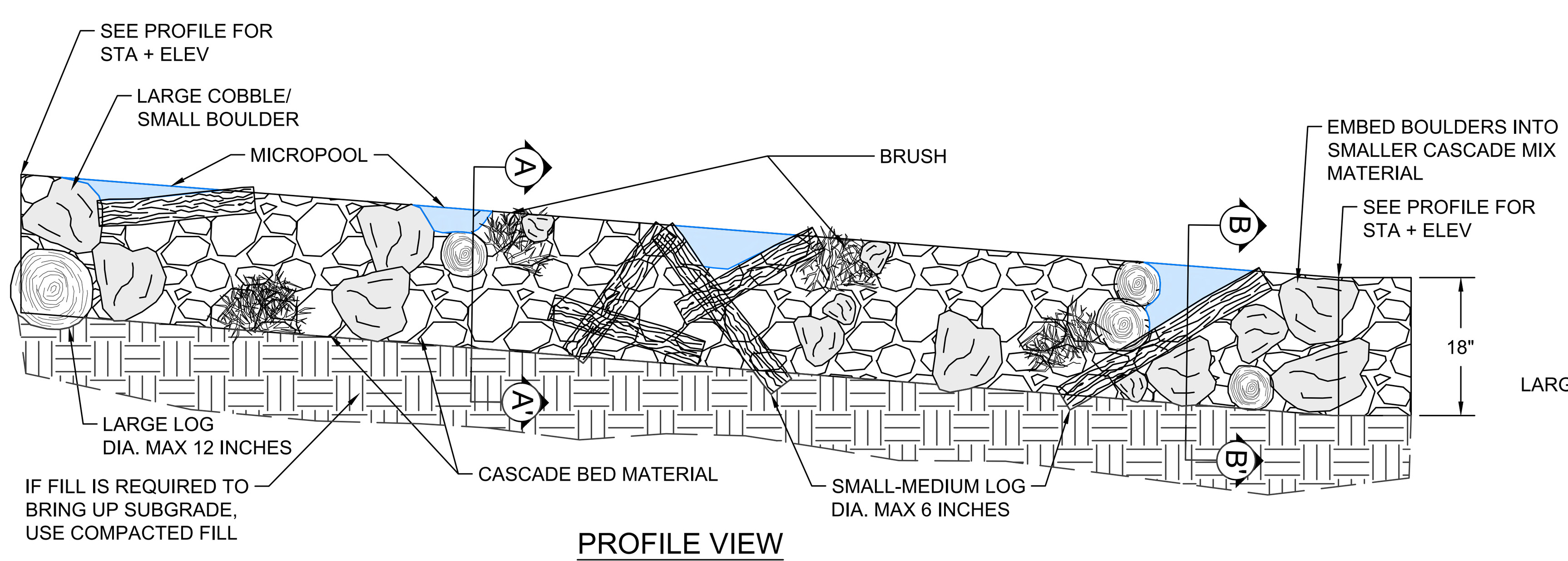


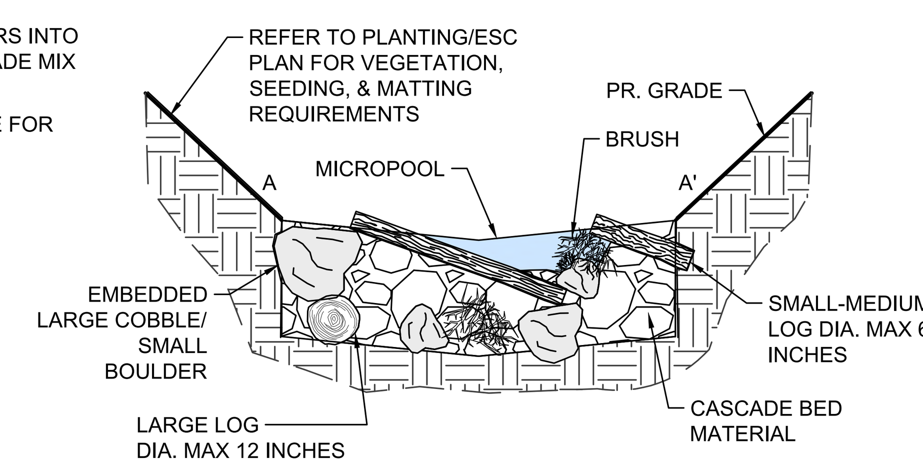


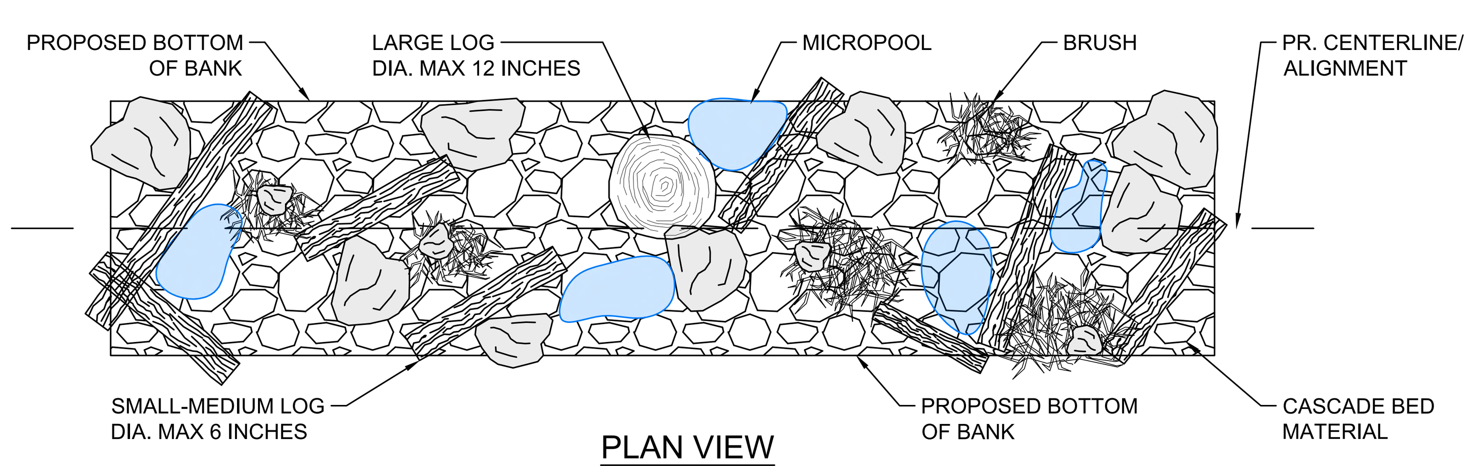
WALL TABLE			
ROCK HEIGHT (A)	ROCK DEPTH (B)	ROCK LENGTH (C)	SETBACK, D'
1' - 1.5'	1.5' - 2'	2' - 2.5'	MIN. 6", FOLLOW PR. SLOPE

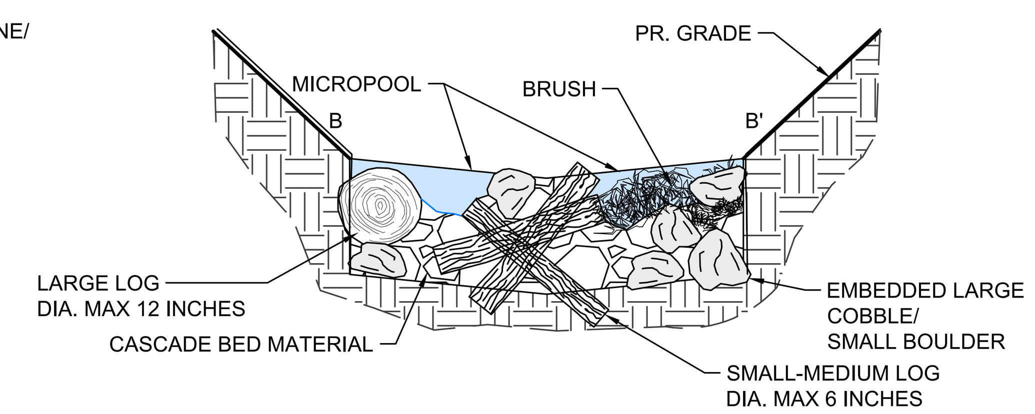
2 IMBRICATED OUTER BEND PROTECTION

NOT TO SCALE









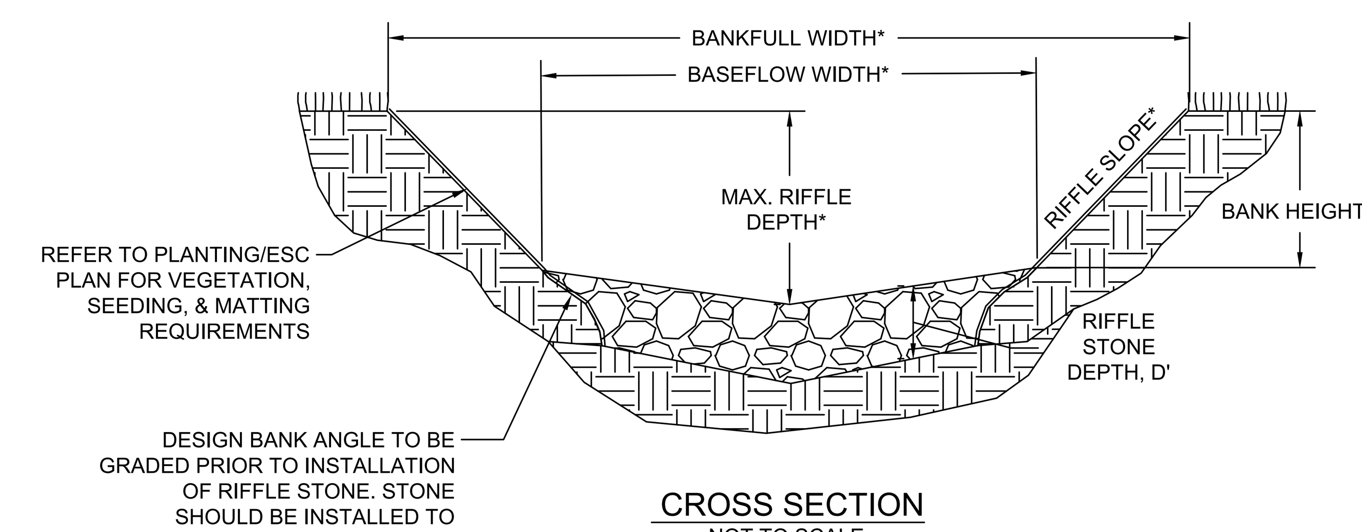
NOTES:

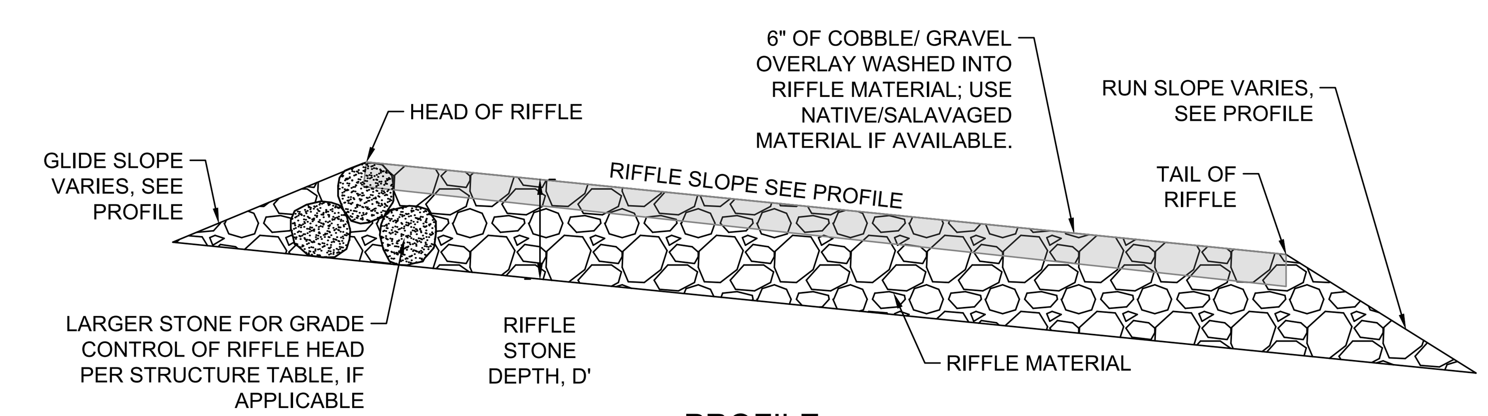
1. THE INTENT OF THIS DETAIL IS TO SHOW VARIABILITY IN HOW CASCADE BED FEATURES CAN BE BUILT, WHILE SHOWING STRUCTURAL GUIDELINES THAT PROVIDE ROUGHNESS AND DYNAMIC STABILITY. TO SHOW DIVERSE WAYS GUIDELINES CAN BE APPLIED, EACH GRAPHIC SHOWS A DIFFERENT VIEW OF A DIFFERENT BUILD, RATHER THAN THE USUAL DIFFERENT VIEW OF THE SAME BUILD.
2. THE CASCADE BED FEATURE SHALL BE UTILIZED WHERE RIFFLE SLOPE EXCEEDS 4% GRADE, PER PLAN.
3. INCORPORATION OF WOOD TO BE DETERMINED BY ONSITE AVAILABILITY. LOGS AND BRUSH SHALL BE SALVAGED FROM ONSITE TREE CLEARING. CONTRACTOR TO REPLACE WOOD WITH STONE IF WOOD IS LIMITED.
4. ALL LOGS SHALL BE PARTIALLY BURIED. ONE THIRD TO ONE HALF THE LOG LENGTH MAY BE VISIBLE FROM ABOVE, AND THE REST SHALL BE ANCHORED UNDER ROCK OR KEYED INTO THE BANK.
5. DEFINITIONS:
   - 5.1. BRUSH: BUNDLE OF INTERTWINED WOODY DEBRIS NO PIECE OF WHICH EXCEEDS 3" DIAMETER, ANCHORED OR PINNED BY STONE OR LOG.
   - 5.2. MICROPOOL: SMALL, SHALLOW BED SURFACE DEPRESSIONS WHERE WATER COLLECTS.

CASCADE BED STONE MIX		
MATERIAL	SIZE (D50)	PERCENT
VDOT CLASS I	1.1'	30
GABIONS	0.5'	55
BANK RUN GRAVEL	0.1'	15

3 CASCADE BED FEATURE

NOT TO SCALE





STRUCTURE TABLE		
REACH	RIFFLE STONE DEPTH, D	MIN. GRADE CONTROL STONE SIZE (L, W, H)
ALL REACHES	1'-0"	N/A

RIFFLE MATERIAL		
MATERIAL	SIZE (D50)	PERCENT
VDOT CLASS A1	0.9'	10
GABIONS	0.5'	70
BANK RUN GRAVEL	0.1'	20

4 CONSTRUCTED RIFFLE

NOT TO SCALE

*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.

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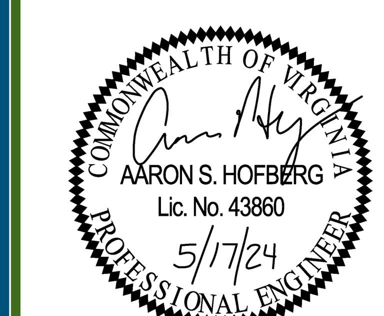
PRINCE WILLIAM COUNTY

STREAM DETAILS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:



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REVISIONS:

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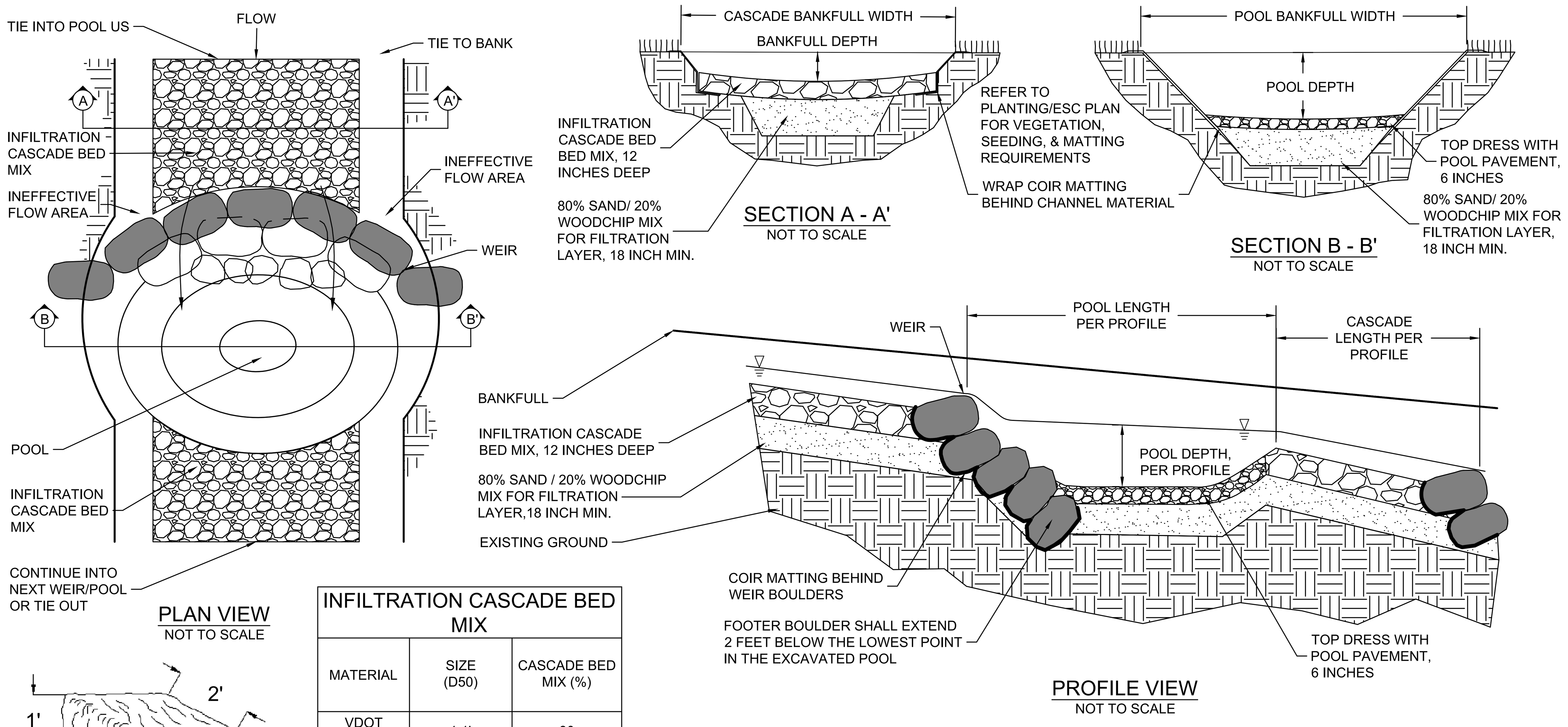
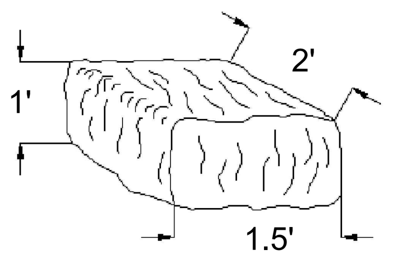
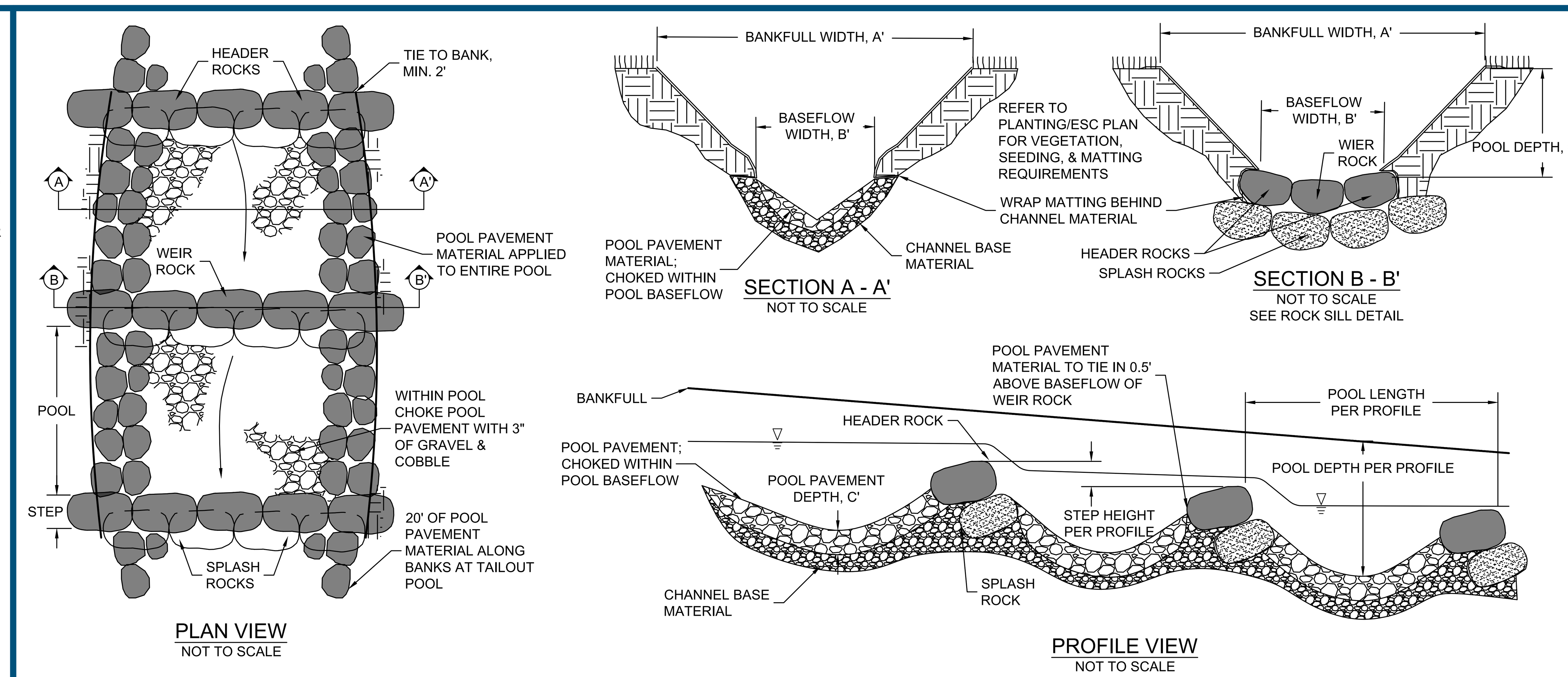
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	28 OF 48

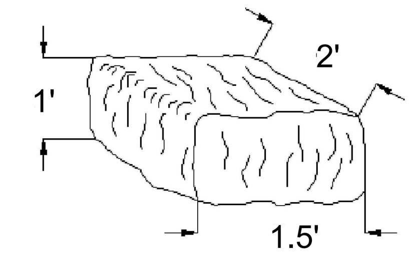




INFILTRATION CASCADE BED MIX		
MATERIAL	SIZE (D50)	CASCADE BED MIX (%)
VDOT CLASS I	1.1'	30
GABIONS	0.5'	55
BANK RUN GRAVEL	0.1'	15

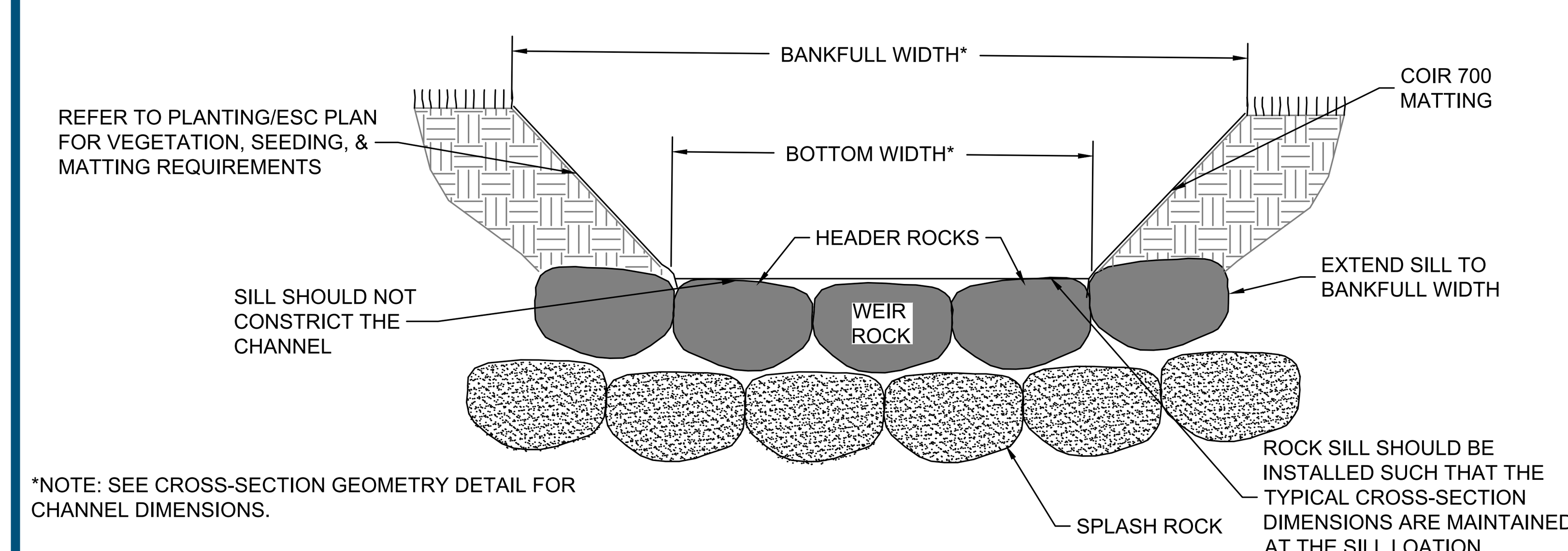
5 INFILTRATION CASCADE/POOL STRUCTURE
NOT TO SCALE



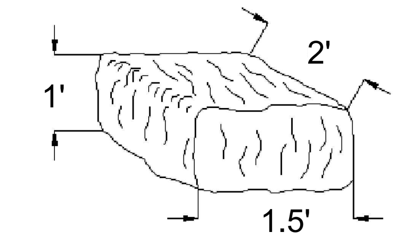


NOTES:
1. RIFFLE MIX TO BE USED AS POOL PAVEMENT MATERIAL (C) AT 12" DEPTH.
2. REFER TO CROSS SECTION GEOMETRY FOR BANKFULL WIDTH (A), BASEFLOW WIDTH (B).

6 STEP POOL WITH ROCK SILLS
NOT TO SCALE

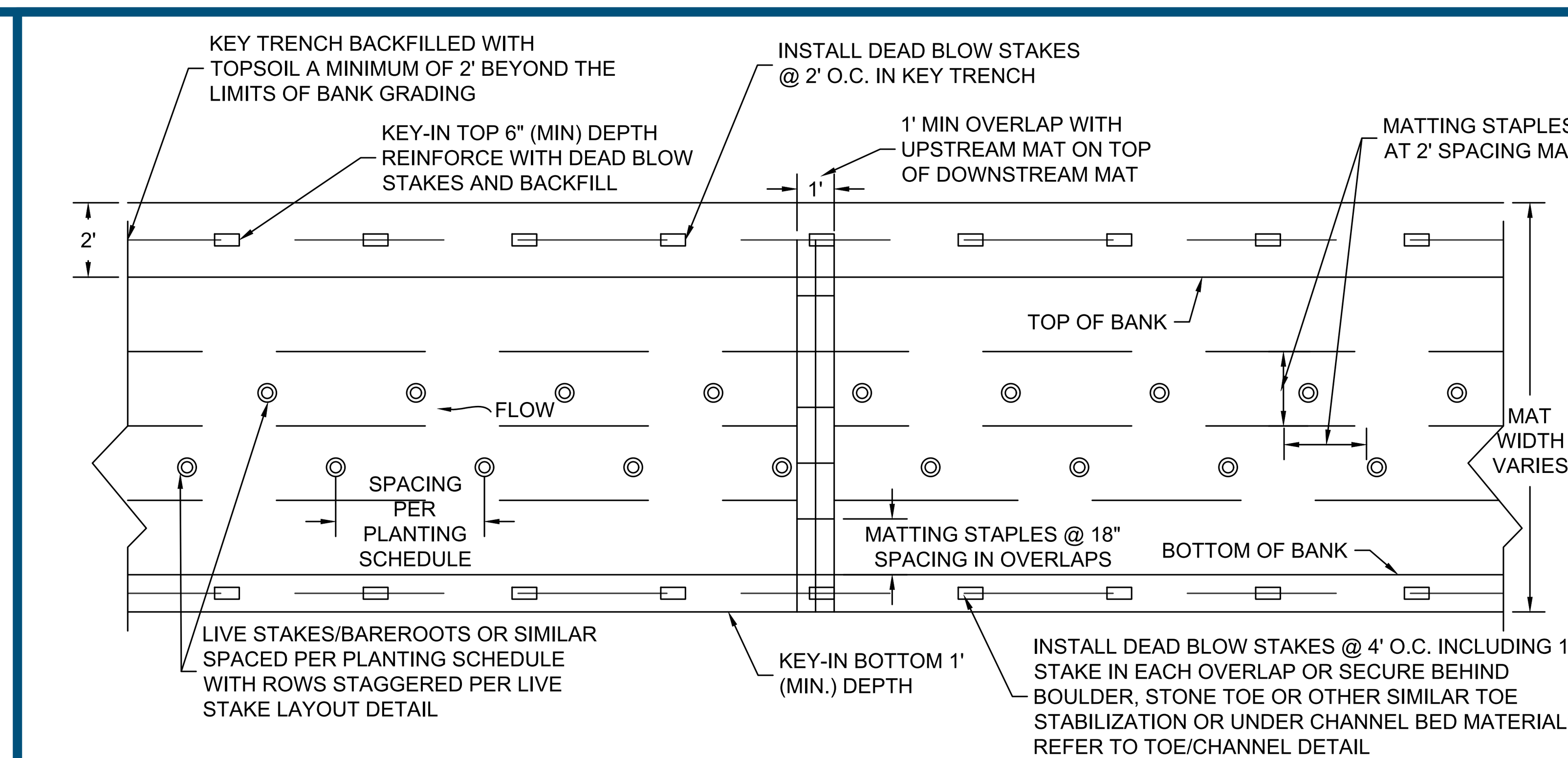


*NOTE: SEE CROSS-SECTION GEOMETRY DETAIL FOR CHANNEL DIMENSIONS.

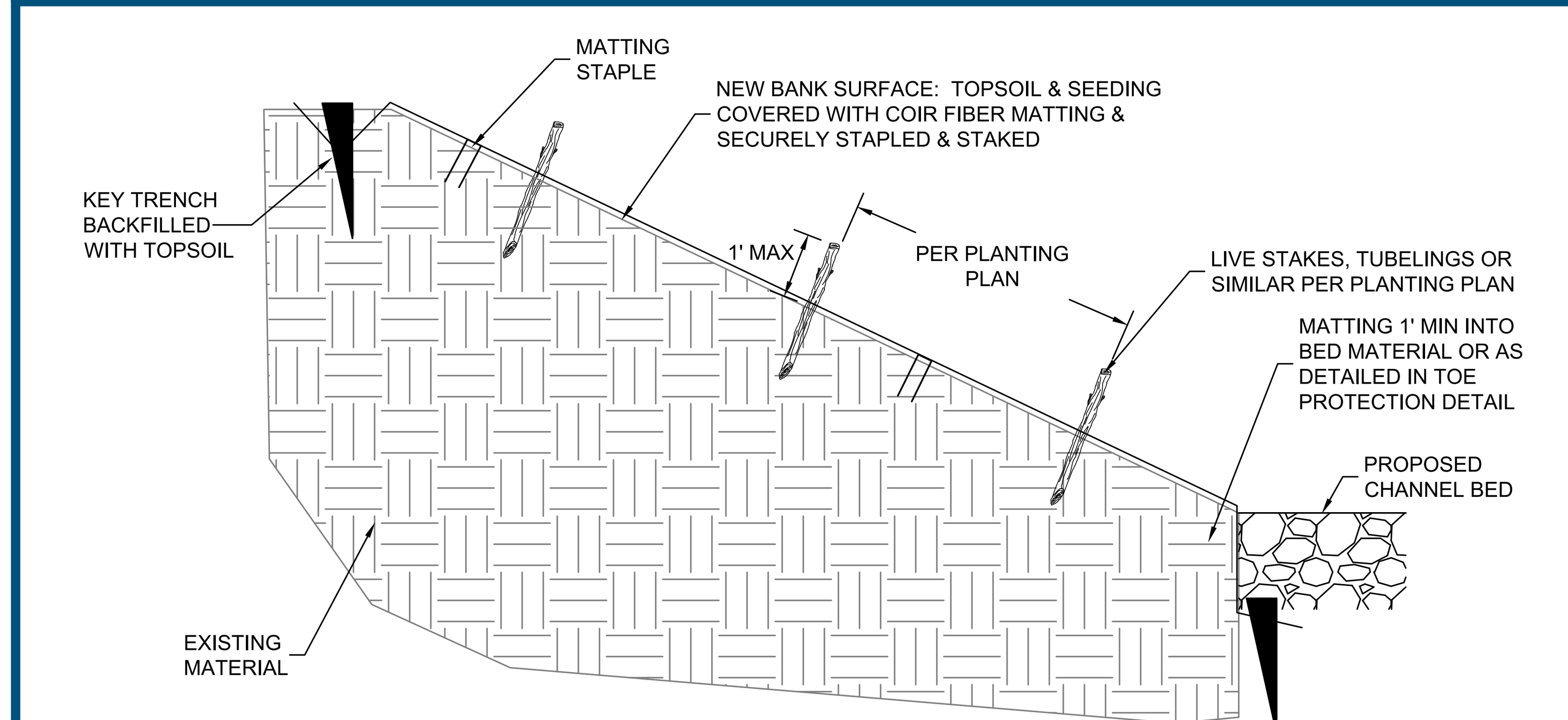


ROCK SILL			
STRUCTURE TABLE		STRUCTURE TABLE	
REACH	START STATION	REACH	START STATION
UT TO HOOES RUN		UT TO HOOES RUN	
R1SP1	1+04.0	REACH 2	8+61.7
	1+13.0		8+78.0
	1+27.0		8+97.0
	1+41.0		9+13.4
	1+52.0		9+30.0
REACH 2	7+63.7	INFILTRATION /	1+86.9
	7+80.0	CASCADE POOL	2+17.0
	7+96.3		2+46.7
	8+12.7		2+77.2
	8+29.0	T1R1	3+67.0
	8+45.4		

7 ROCK SILL
NOT TO SCALE



8 COIR FIBER MATTING DETAIL IN-CHANNEL INSTALLATION
NOT TO SCALE



9 COIR FIBER MATTING WITH LIVE STAKES
NOT TO SCALE

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PRINCE WILLIAM COUNTY

STREAM DETAILS

PRINCE WILLIAM COUNTY, VA

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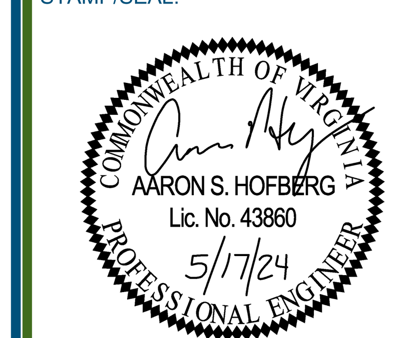

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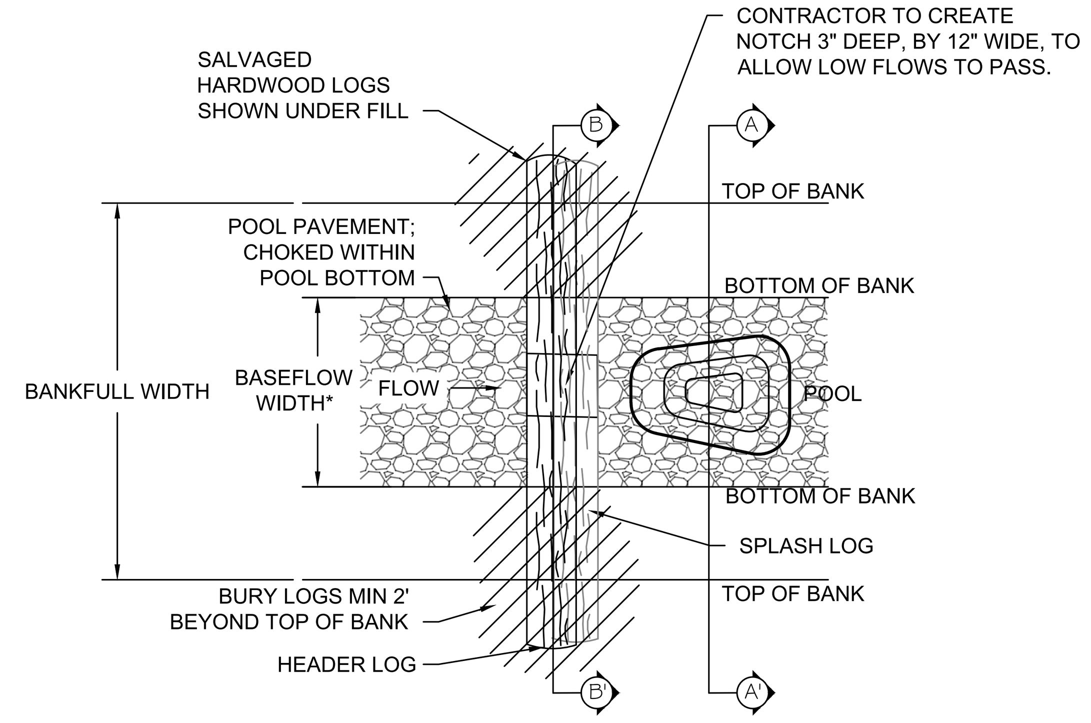
REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	29 OF 48



PLAN VIEW
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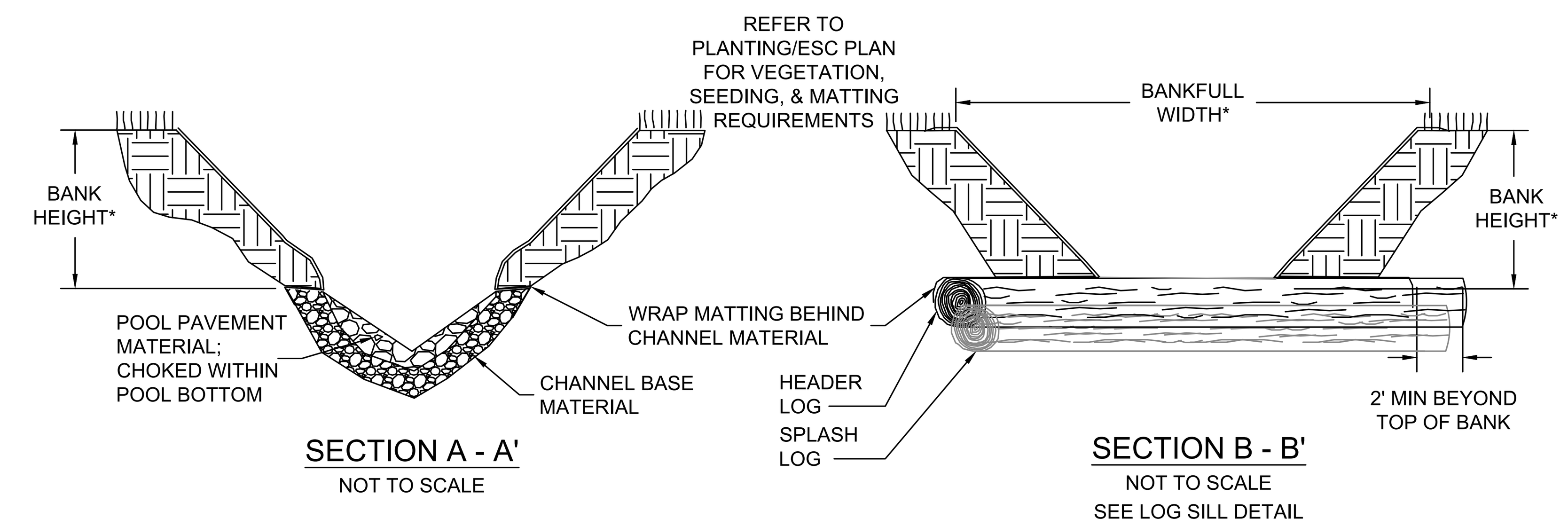
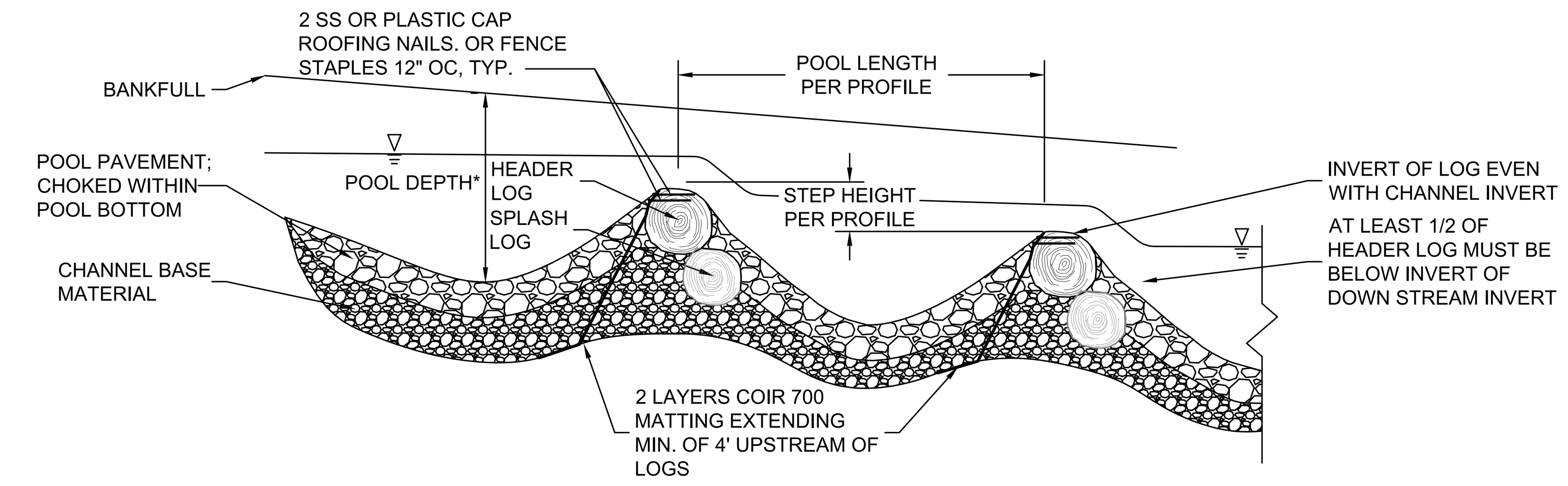


SECTION A - A'
NOT TO SCALE

SECTION B - B'
NOT TO SCALE
SEE LOG SILL DETAIL



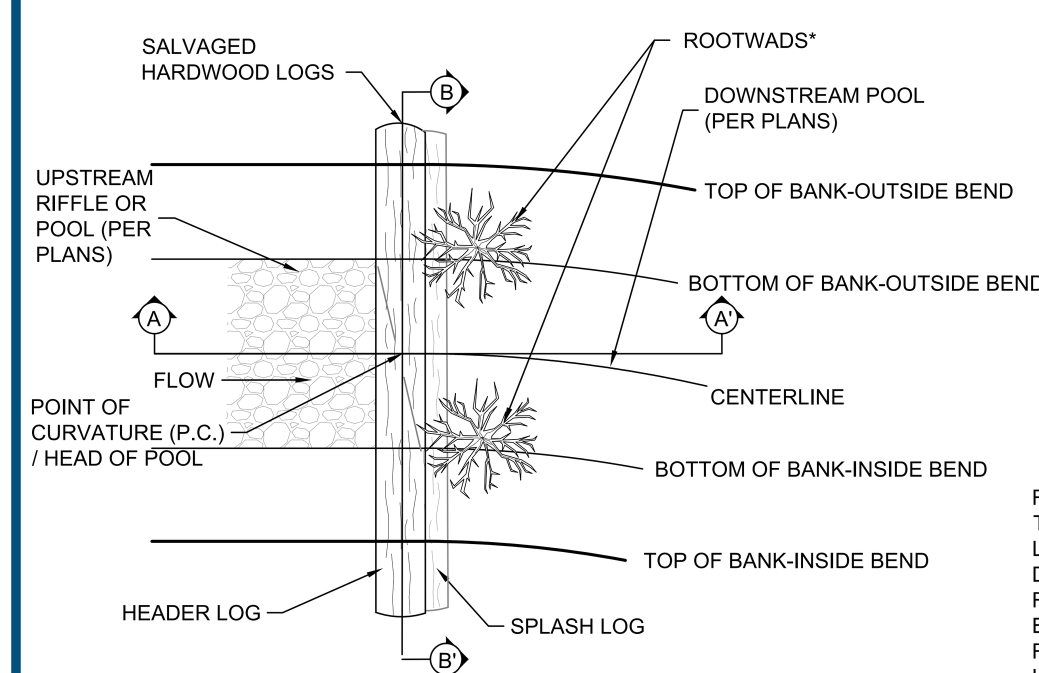
PROFILE VIEW
NOT TO SCALE

*NOTE: SEE CROSS-SECTION GEOMETRY TABLE FOR CHANNEL DIMENSIONS AND SLOPES.

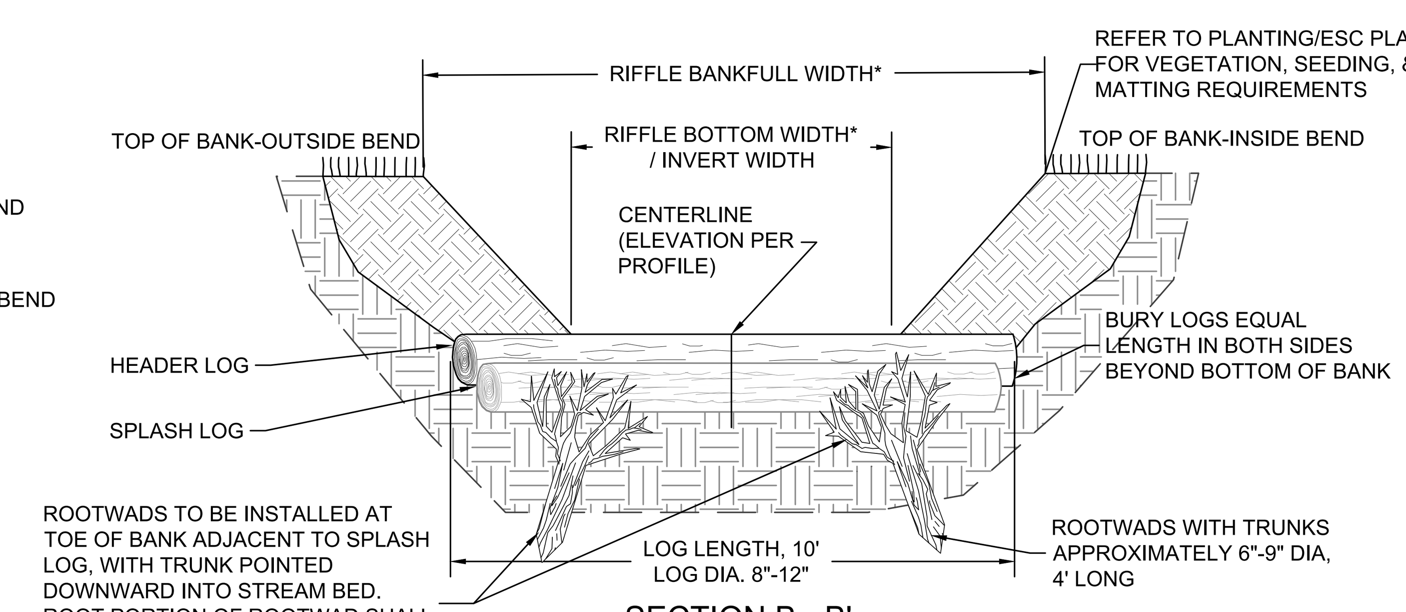
EXAMPLE OF LOG STEP DURING CONSTRUCTION

EXAMPLE OF LOG STEP POST-CONSTRUCTION

10 STEP POOL WITH LOG SILL
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

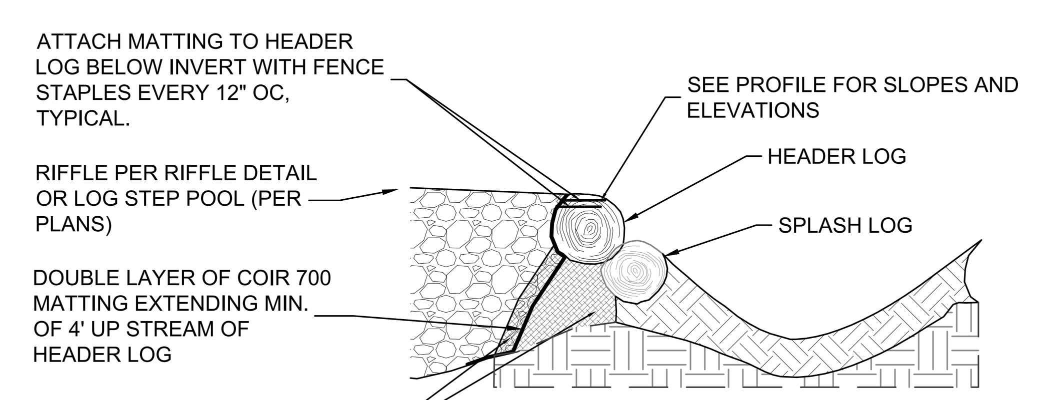


SECTION B - B'
NOT TO SCALE

LOG SILL	
STRUCTURE TABLE	
REACH	START STATION
UT TO HOOES RUN	
R1SP2	2+05.0
	2+18.0
	2+32.0
	2+41.0
	2+51.0
R1SP3	3+02.0
	3+16.0
	3+31.0
	3+43.0
	3+55.0

REACH	START STATION
T1R1	3+77.9
	3+87.9
	3+96.8
	4+31.3
	4+57.8
	4+98.5
	5+19.5
	5+53.1

REACH	START STATION
T1R2	6+21.6
	6+61.9
	7+28.9
	7+64.5
	9+39.8
	10+83.6
	12+01.2
	12+32.8
	12+79.3



SECTION A - A'
NOT TO SCALE

*NOTES:
- SEE CROSS-SECTION GEOMETRY DETAIL FOR CHANNEL DIMENSIONS.
- ROOTWADS MAY BE OMITTED FOR LOG SILLS IN STEP POOLS

11 LOG SILL
NOT TO SCALE

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STREAM DETAILS

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AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

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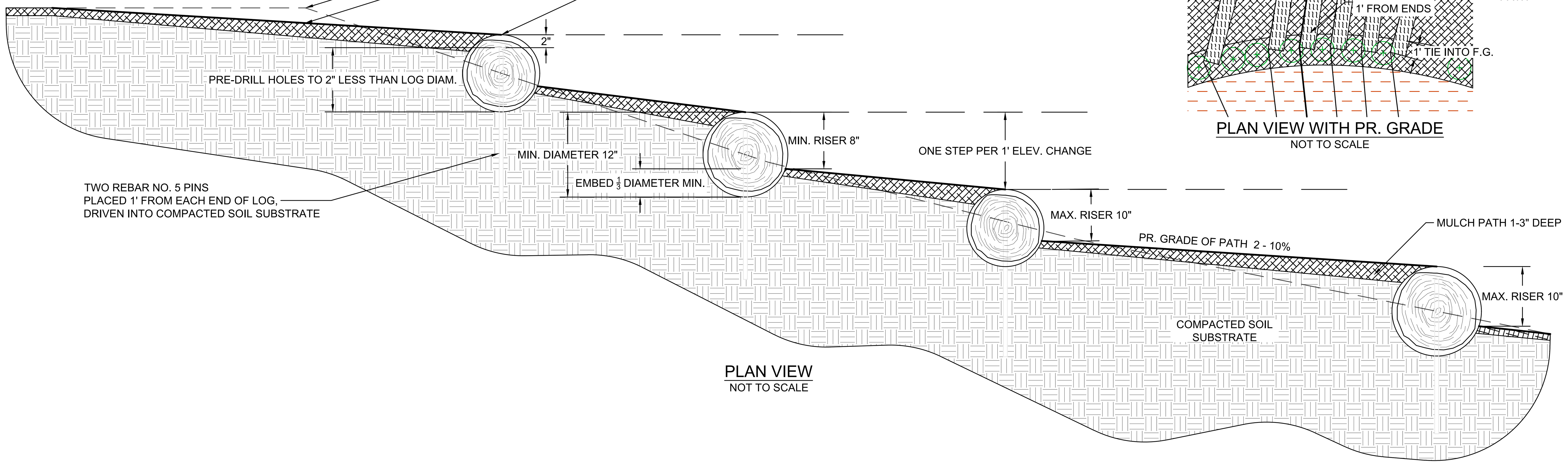
SHEET NO:	30 OF 48



PLAN VIEW
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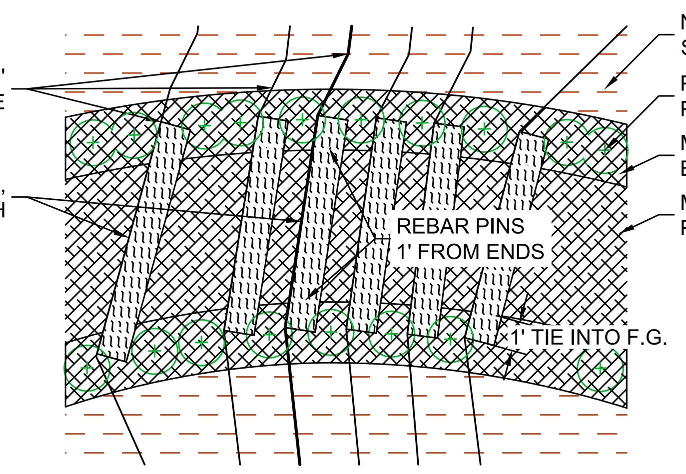
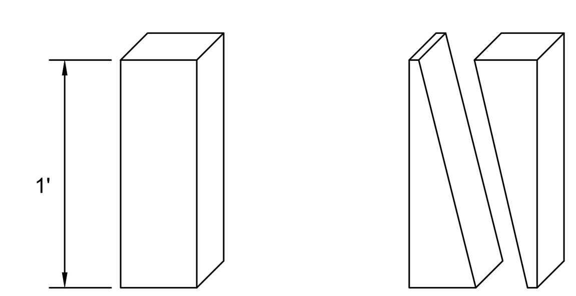
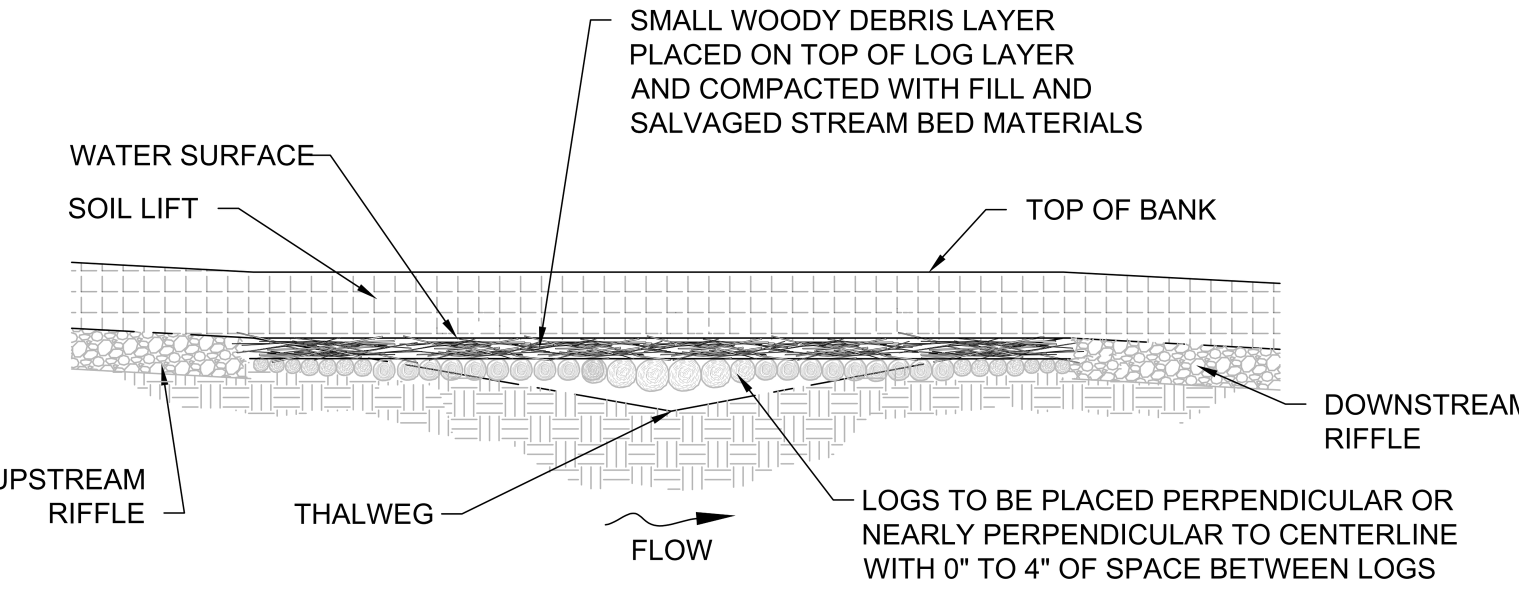


PLAN VIEW WITH PR. GRADE
NOT TO SCALE

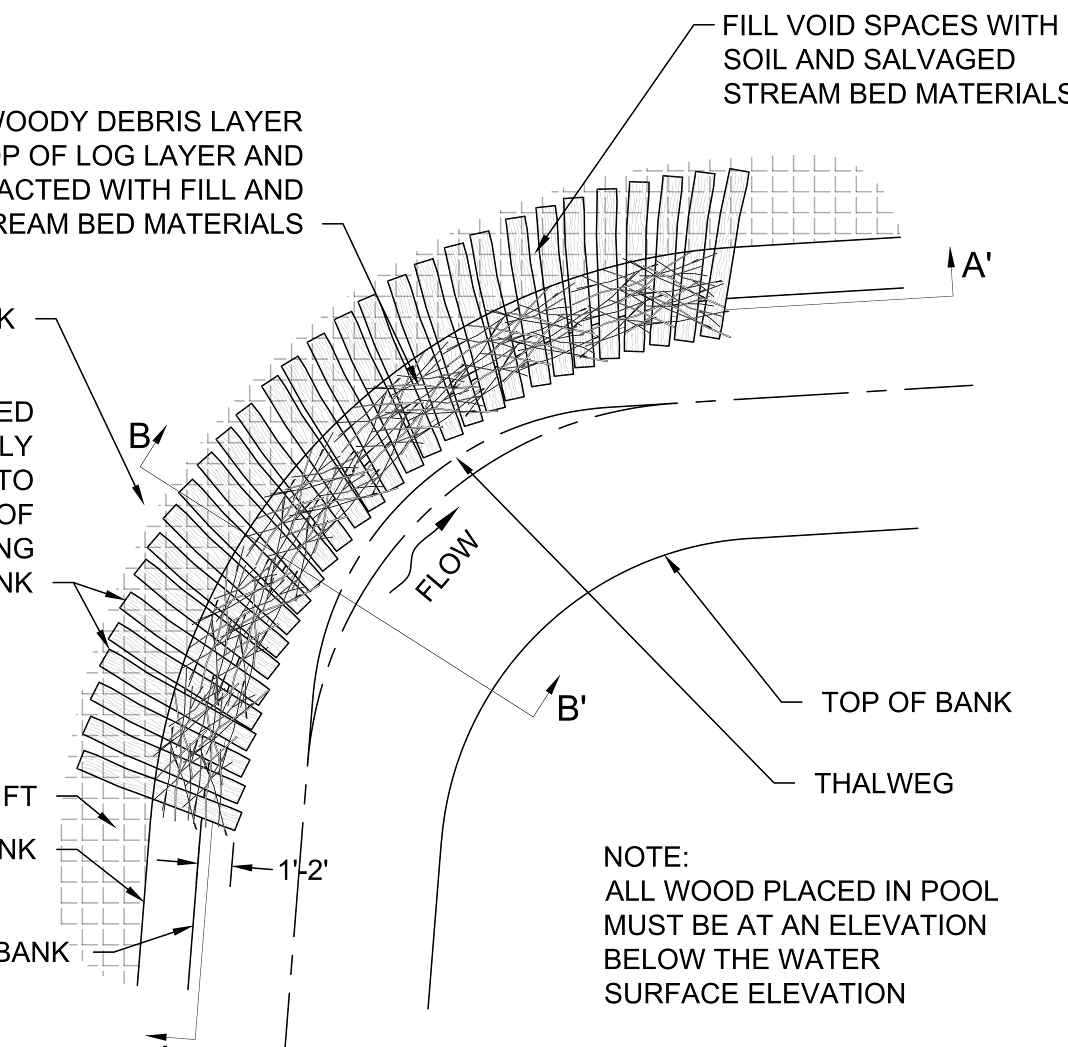
12 INDIVIDUAL PINNED LOG STEPS FOR PATHWAYS
NOT TO SCALE



13 DEAD BLOW STAKE
NOT TO SCALE

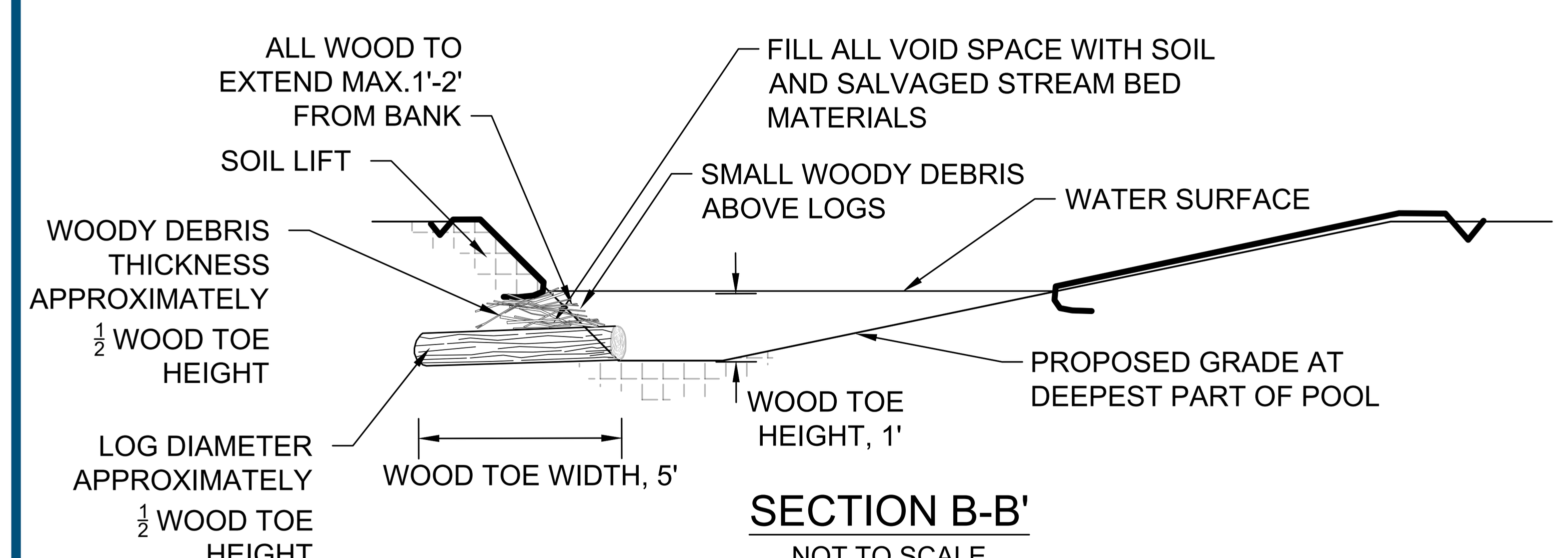


SECTION A-A'
NOT TO SCALE



NOTE:
ALL WOOD PLACED IN POOL
MUST BE AT AN ELEVATION
BELOW THE WATER
SURFACE ELEVATION

PLAN VIEW
NOT TO SCALE



SECTION B-B'
NOT TO SCALE

WOOD TOE REVETMENT			
STRUCTURE TABLE			
REACH	START STATION	END STATION	LENGTH
T1R1	4+32.9	4+50.3	17.4
	4+59.7	4+81.2	21.5
	5+21.2	5+35.1	13.9
T1R2	7+28.9	7+51.0	22.1
	8+17.9	8+44.1	26.2
	8+57.6	8+77.3	19.7
	8+87.3	9+07.5	20.2
	9+19.7	9+29.6	9.9
	10+24.3	10+38.5	14.2
	10+50.4	10+71.0	20.6
	11+20.2	11+37.9	17.7
	12+32.8	12+57.1	24.3
DS OF BRIDGE	15+13.6	15+29.5	15.9

14 WOOD TOE BANK TREATMENT
NOT TO SCALE

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CHINN PARK STREAM RESTORATION &
STORMWATER BMP
PRINCE WILLIAM COUNTY

STREAM DETAILS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

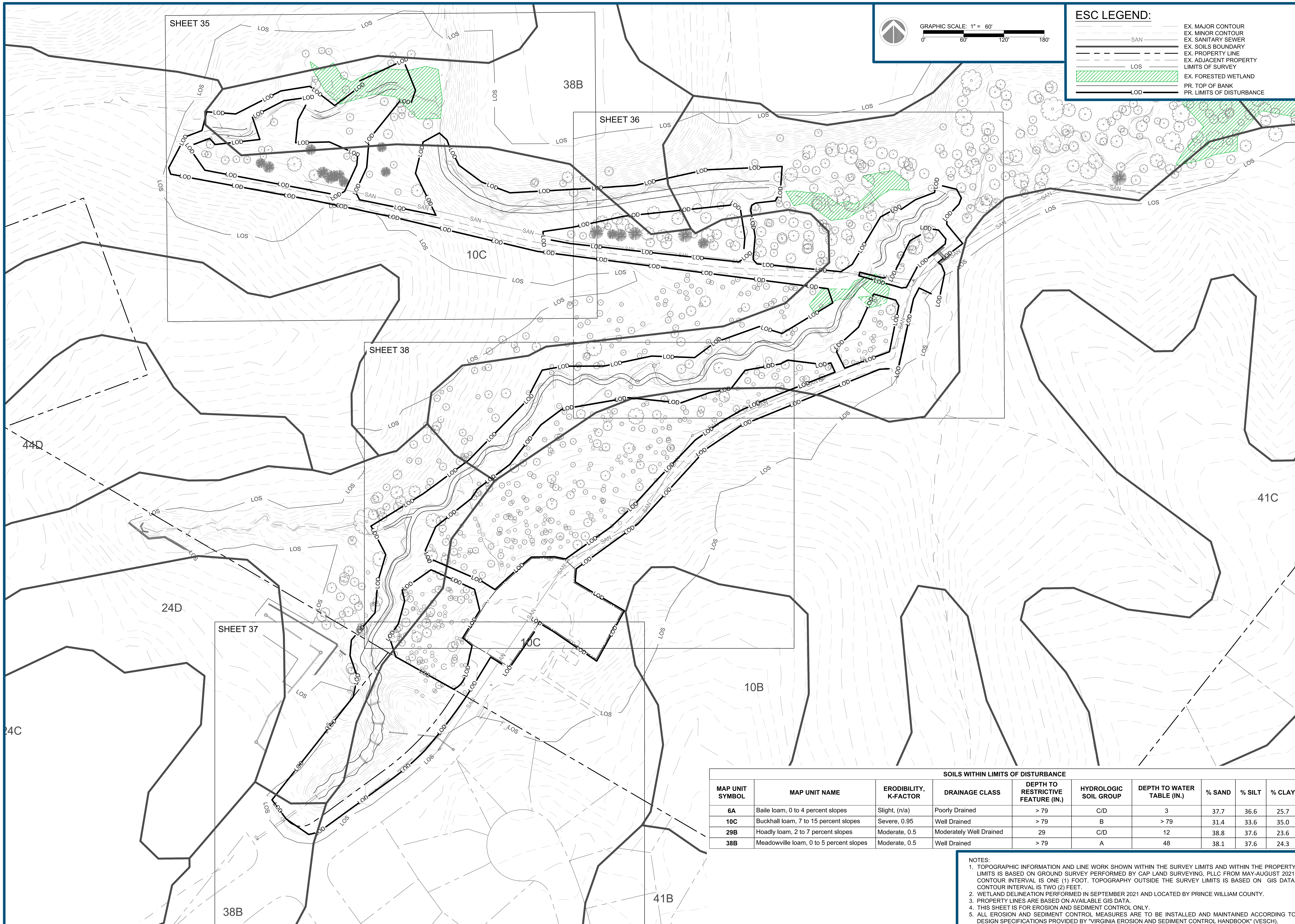
30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x
Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	31OF 48



GRAPHIC SCALE: 1" = 60'
0' 60' 120' 180'

ESC LEGEND:

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. SANITARY SEWER (SAN)
- EX. SOILS BOUNDARY
- EX. PROPERTY LINE
- EX. ADJACENT PROPERTY
- LIMITS OF SURVEY (LOS)
- EX. FORESTED WETLAND
- PR. TOP OF BANK
- PR. LIMITS OF DISTURBANCE (LOD)

SOILS WITHIN LIMITS OF DISTURBANCE

MAP UNIT SYMBOL	MAP UNIT NAME	ERODIBILITY, K-FACTOR	DRAINAGE CLASS	DEPTH TO RESTRICTIVE FEATURE (IN.)	HYDROLOGIC SOIL GROUP	DEPTH TO WATER TABLE (IN.)	% SAND	% SILT	% CLAY
6A	Baile loam, 0 to 4 percent slopes	Slight, (n/a)	Poorly Drained	> 79	C/D	3	37.7	36.6	25.7
10C	Buckhall loam, 7 to 15 percent slopes	Severe, 0.95	Well Drained	> 79	B	> 79	31.4	33.6	35.0
29B	Hoadly loam, 2 to 7 percent slopes	Moderate, 0.5	Moderately Well Drained	29	C/D	12	38.8	37.6	23.6
38B	Meadowville loam, 0 to 5 percent slopes	Moderate, 0.5	Well Drained	> 79	A	48	38.1	37.6	24.3

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EROSION & SEDIMENT CONTROL PLAN KEY SHEET

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x Signature 11/2021 Date

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x Signature ---- Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
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JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
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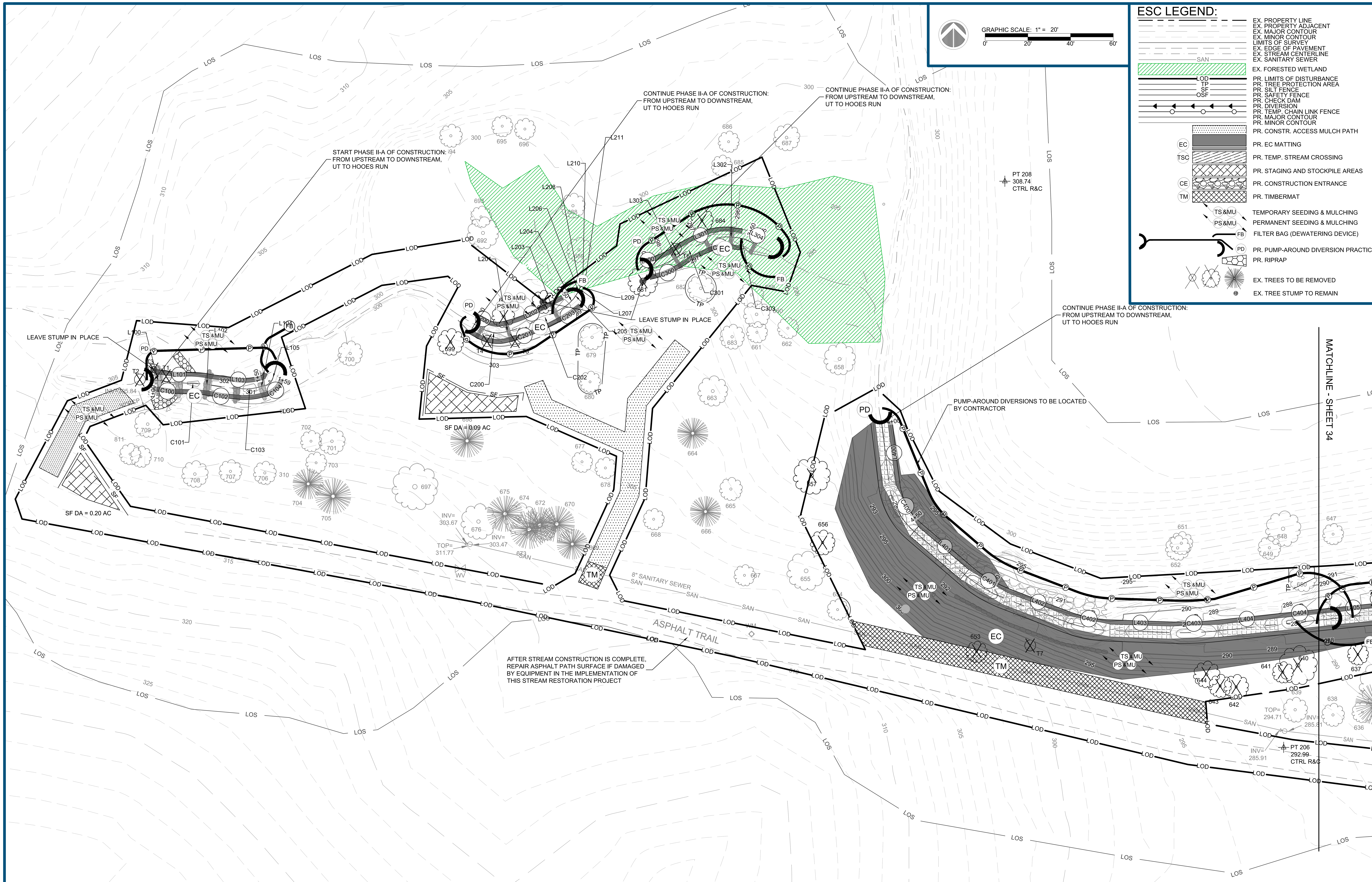

ESC LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- LIMITS OF SURVEY
- EX. EDGE OF PAVEMENT
- EX. STREAM CENTERLINE
- SAN — EX. SANITARY SEWER
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- LOD — PR. LIMITS OF DISTURBANCE
- TP — PR. TREE PROTECTION AREA
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- PR. RIPRAP
- EX. TREES TO BE REMOVED
- EX. TREE STUMP TO REMAIN

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EROSION & SEDIMENT CONTROL PLANS

PRINCE WILLIAM COUNTY, VA

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30% DESIGN REVIEW	
Signature	Date 11/2021

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Signature	Date 11/14/2022

CONSTRUCTION PLAN REVIEW	
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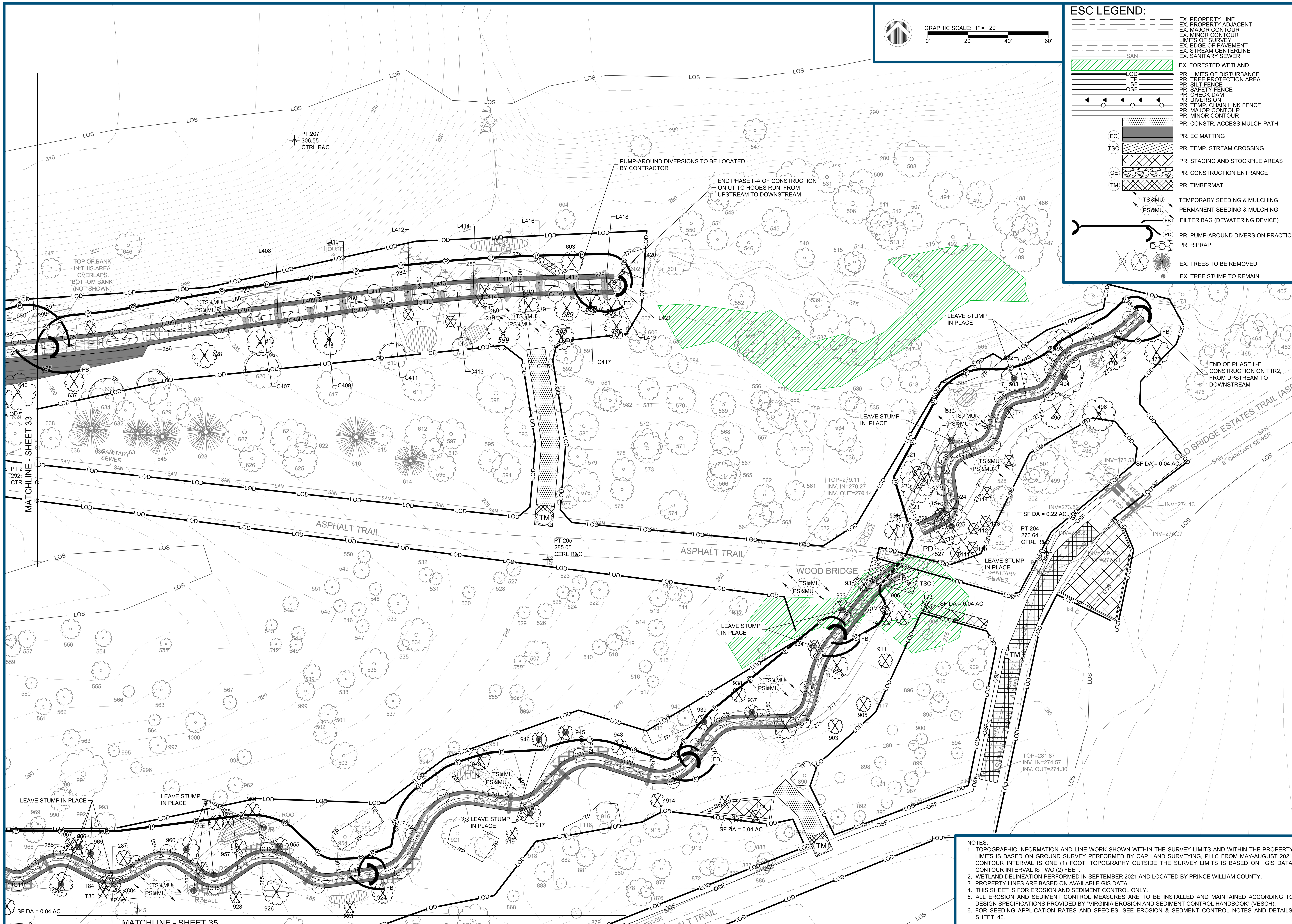

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PRINCE WILLIAM COUNTY

EROSION & SEDIMENT CONTROL PLANS

PRINCE WILLIAM COUNTY, VA

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x	11/2021
Signature	Date

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CONSTRUCTION PLAN REVIEW	
x	----
Signature	Date

REVISIONS:

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DESIGNED:	AH/BS/LS
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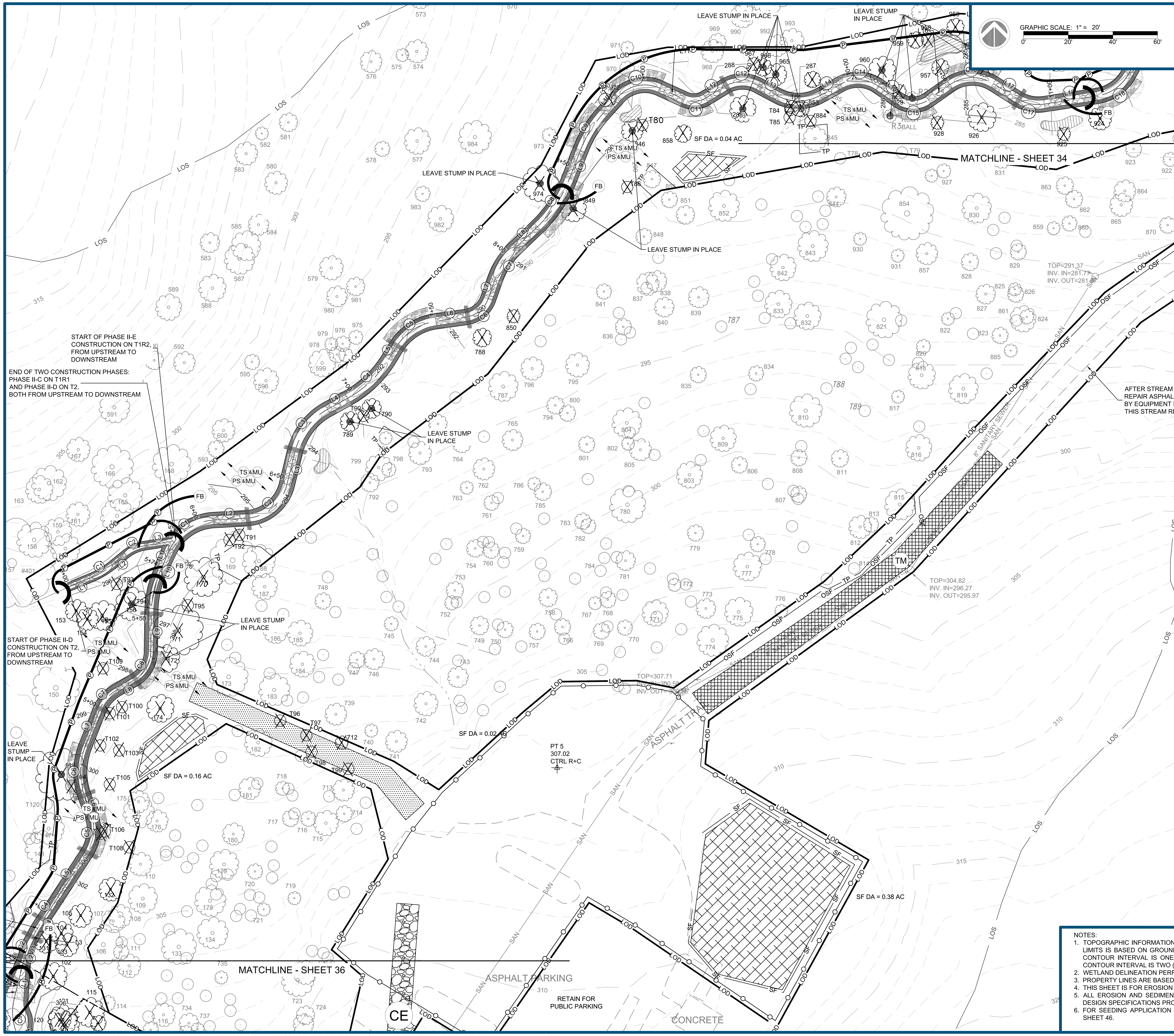
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	34 OF 48



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CHINN PARK STREAM RESTORATION & STORMWATER BMP

PRINCE WILLIAM COUNTY

EROSION & SEDIMENT CONTROL PLANS

PRINCE WILLIAM COUNTY, VA

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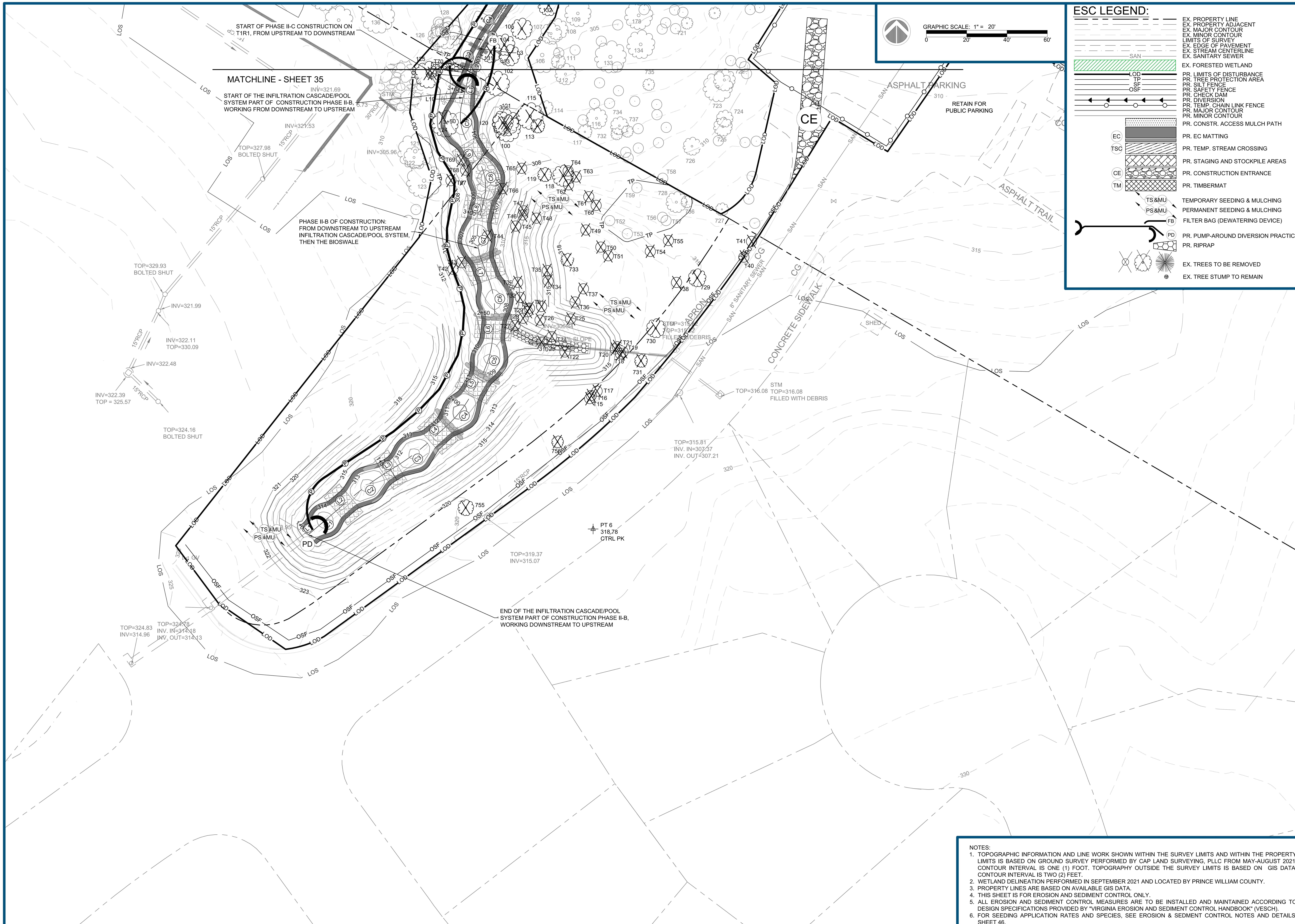
30% DESIGN REVIEW	
x	11/2021
Signature	Date
60% DESIGN REVIEW	
x	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	
x	----
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	35 OF 48



GRAPHIC SCALE: 1" = 20'

0 20' 40' 60'

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DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	36 OF 48

TREE REMOVAL TABLE

Tag ID*	DBH (in.)	*Botanical Name*	Common Name	Note or Condition	Stream
100	16	*Quercus montana*	Chestnut Oak	Healthy	Tributary 1
101	16	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
102	15	*Acer rubrum*	Red Maple	Healthy	Tributary 1
103	10	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
104	11	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
105	13	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
113	10	*Quercus montana*	Chestnut Oak	Healthy	Tributary 1
115	16	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
118	11	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
119	9	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
120	12	*Acer rubrum*	Red Maple	Healthy	Tributary 1
124	13	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
125	15	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
131	11	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
132	12	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
149	28	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
153	12	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 2
154	12	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 2
155	Not noted	*Unidentified tree*	Unidentified tree	Not noted	Tributary 2
156	17	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
170	23	*Quercus alba*	White Oak	Healthy	Tributary 1
171	27	*Quercus alba*	White Oak	Healthy	Tributary 1
172	15	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
174	15	*Carya glabra*	Pignut Hickory	Healthy	Tributary 1
477	Not noted	*Unidentified tree*	Unidentified tree	Not noted	Tributary 1
478	10	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
493	16	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
494	21	*Quercus alba*	White Oak	Healthy	Tributary 1
495	5	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
496	Not noted	*Unidentified tree*	Unidentified tree	Not noted	Tributary 1
503	15	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
520	20	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
521	17	*Quercus alba*	White Oak	Healthy	Tributary 1
522	19	*Quercus alba*	White Oak	Healthy	Tributary 1
523	17	*Acer rubrum*	Red Maple	Healthy	Tributary 1
524	10	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
525	21	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
526	10	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
527	14	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
531	11	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
586	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
587	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
588	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
589	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
590	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
599	17	*Quercus montana*	Chestnut oak	Not noted	UT Hooes Run R2
600	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
603	>12	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
618	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
619	15	*Carya glabra*	Pignut hickory	Not noted	UT Hooes Run R2
628	14	*Liquidambar styraciflua*	Sweetgum	Not noted	UT Hooes Run R2
637	11	*Fagus grandifolia*	American beech	Not noted	UT Hooes Run R2
640	21	*Quercus montana*	Chestnut oak	Not noted	UT Hooes Run R2
641	9	*Fagus grandifolia*	American beech	Not noted	UT Hooes Run R2
642	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
643	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
644	13	*Fagus grandifolia*	American beech	Codominant	UT Hooes Run R2
653	>12	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
656	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
657	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R2
681	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R1
684	12	*Liriodendron tulipifera*	Tulip tree	Not noted	UT Hooes Run R1
690	12	*Carya glabra*	Pignut hickory	Not noted	UT Hooes Run R1
691	11	*Carya glabra*	Pignut hickory	Not noted	UT Hooes Run R1
699	Not noted	*Unidentified tree*	Unidentified tree	Not noted	UT Hooes Run R1
712	12	*Acer rubrum*	Red Maple	Healthy	Tributary 1
729	13	*Pinus virginiana*	Virginia Pine	Healthy	Tributary 1
730	13	*Juniperus virginiana*	Eastern Red Cedar	Healthy, codominant	Tributary 1
731	>12	*Unidentified*	Unidentified	Not noted	Tributary 1
733	12	*Robinia pseudoacacia*	Black Locust	Healthy	Tributary 1
755	>12	*Unidentified*	Unidentified	Not noted	Tributary 1
756	>12	*Unidentified*	Unidentified	Not noted	Tributary 1
788	18	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
789	15	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
790	18	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
846	22	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
849	23	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
850	14	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
853	14	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
856	22	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
858	14	*Acer rubrum*	Red Maple	Healthy	Tributary 1
884	23	*Quercus rubra*	Northern Red Oak	Healthy	Tributary 1
902	23	*Quercus alba*	White Oak	Healthy	Tributary 1
903	12	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
904	21	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
905	13	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
906	13	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
907	15	*Acer rubrum*	Red Maple	Healthy	Tributary 1
911	12	*Acer rubrum*	Red Maple	Healthy	Tributary 1
914	14	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
917	20	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
919	10	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
924	20	*Quercus alba*	White Oak	Healthy	Tributary 1
925	10	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
926	25	*Quercus alba*	White Oak	Sick	Tributary 1
928	9	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
929	10	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
933	11	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
934	13	*Nyssa sylvatica*	Black Gum	Healthy, codominant	Tributary 1
937	14	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
938	17	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
939	14	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
943	13	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
945	15	*Quercus montana*	Chestnut Oak	Healthy	Tributary 1
946	13	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
946	Not noted	*Unidentified tree*	Unidentified tree	Not noted	Tributary 1
949	14	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
951	12	*Quercus alba*	White Oak	Dead	Tributary 1
955	17	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
956	16	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
957	16	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
958	11	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
959	13	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
960	22	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
964	16	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
965	19	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
966	15	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
967	3	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
972	13	*Quercus alba*	White Oak	Healthy	Tributary 1
974	31	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T1	7	*Acer rubrum*	Red maple	Not noted	UT Hooes Run R1
T2	10	*Acer rubrum*	Red maple	Not noted	UT Hooes Run R1
T3	12	*Acer rubrum*	Red maple	Not noted	UT Hooes Run R1
T4	7	*Acer rubrum*	Red maple	Not noted	UT Hooes Run R1
T5	9	*Acer rubrum*	Red maple	Not noted	UT Hooes Run R1
T6	14	*Carya glabra*	Pignut hickory	Codominant	UT Hooes Run R1
T7	11	*Liriodendron tulipifera*	Tulip tree	Codominant	UT Hooes Run R2
T9	7	*Acer rubrum*	Red maple	Not noted	UT Hooes Run R2
T11	6	*Salix nigra*	Black willow	Not noted	UT Hooes Run R2
T12	7	*Platanus occidentalis*	American sycamore	Not noted	UT Hooes Run R2
T13	7	*Platanus occidentalis*	American sycamore	Not noted	UT Hooes Run R2
T14	10	*Liriodendron tulipifera*	Tulip tree	Not noted	UT Hooes Run R2
T15	9	*Picea rubens*	Red Spruce	Healthy	Tributary 1
T16	8	*Picea rubens*	Red Spruce	Healthy	Tributary 1
T17	8	*Picea rubens*	Red Spruce	Healthy	Tributary 1
T18	11	*Betula nigra*	River Birch	Healthy	Tributary 1
T19	7	*Betula nigra*	River Birch	Healthy	Tributary 1
T20	11	*Betula nigra*	River Birch	Healthy	Tributary 1
T21	7	*Betula nigra*	River Birch	Healthy	Tributary 1
T22	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T23	11	*Quercus phellos*	Willow Oak	Healthy	Tributary 1
T24	9	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T25	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T26	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T27	8	*Quercus phellos*	Willow Oak	Healthy	Tributary 1
T28	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T29	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T30	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T31	7	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T32	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T33	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T34	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T35	7	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T36	8	*Acer rubrum*	Red Maple	Healthy	Tributary 1
T37	10	*Acer rubrum*	Red Maple	Healthy	Tributary 1
T38	10	*Juniperus virginiana*	Eastern Red Cedar	Healthy	Tributary 1
T40	11	*Pinus virginiana*	Virginia Pine	Healthy	Tributary 1
T41	10	*Pinus virginiana*	Virginia Pine	Healthy	Tributary 1
T42	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T43	6	*Platanus occidentalis*	American Sycamore	Healthy	Tributary 1
T44	7	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T45	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T46	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T47	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T48	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T49	10	*Prunus serotina*	Black Cherry	Healthy	Tributary 1
T50	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T51	9	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T54	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T55	7	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T60	8	*Liriodendron tulipifera*	Tulip Poplar	Sick	Tributary 1
T61	9	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T62	7	*Platanus occidentalis*	American Sycamore	Healthy	Tributary 1
T63	6	*Liriodendron tulipifera*	Tulip Poplar	Sick	Tributary 1
T64	9	*Liriodendron tulipifera*	Tulip Poplar	Sick	Tributary 1
T65	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T66	7	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T67	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T68	6	*Acer rubrum*	Red Maple	Healthy	Tributary 1
T69	7	*Acer rubrum*	Red Maple	Healthy	Tributary 1
T70	9	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T71	9	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T72	3	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T73	6	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T74	8	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T75	8	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T77	6	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T80	15	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T81	Not noted	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T84	9	*Quercus alba*	White Oak	Healthy	Tributary 1
T85	7	*Quercus alba*	White Oak	Healthy	Tributary 1
T86	8	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T90	8	*Acer rubrum*	Red Maple	Sick	Tributary 1
T91	18	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T92	7	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T93	9	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T94	5	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T95	22	*Quercus alba*	White Oak	Healthy	Tributary 1
T96	6	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T97	9	*Quercus alba*	White Oak	Healthy	Tributary 1
T98	7	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T99	7	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T100	7	*Quercus alba*	White Oak	Healthy	Tributary 1
T101	7	*Ilex opaca*	American Holly	Healthy	Tributary 1
T102	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T103	7	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T104	11	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T105	11	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T106	7	*Fagus grandifolia*	American Beech	Healthy	Tributary 1
T107	11	*Quercus phellos*	Willow Oak	Healthy	Tributary 1
T108	13	*Quercus rubra*	Northern Red Oak	Healthy	Tributary 1
T109	9	*Nyssa sylvatica*	Black Gum	Healthy	Tributary 1
T110	7	*Acer rubrum*	Red Maple	Healthy	Tributary 1
T111	6	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T112	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T113	7	*Acer rubrum*	Red Maple	Healthy	Tributary 1
T114	8	*Liriodendron tulipifera*	Tulip Poplar	Healthy	Tributary 1
T115	7	*Fagus grandifolia*	American Beech	Healthy	Tributary 1

TABLE CONTINUES AT RIGHT.
*TREE TAGS WITH A PREFIX OF "T" WERE SURVEYED BY RES FIELD ECOLOGISTS. TREE TAGS LACKING A PREFIX "T" WERE LOCATED BY SURVEYORS.

Size Class by DBH	Count
0-5"	4
6-12"	120
13-18"	50
19-24"	17
25-30"	3
31-36"	1
>12"	5
Not noted	18
TOTAL TO REMOVE	218

res
HGS, LLC, A RES COMPANY
1408 ROSENEATH ROAD, SUITE B RICHMOND, VIRGINIA 23230
P: 804.353.6017
WWW.RES.US

CHINN PARK STREAM RESTORATION
& STORMWATER BMP
PRINCE WILLIAM COUNTY

TREE REMOVAL TABLE

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER: ASL
DESIGNED: AH/BS/LS
DRAWN: LS
JOB NUMBER: SPR2023-00397 S03
DESIGN TYPE: RESTORATION
DATE: 9/3/2024
SHEET NO: 37 OF 48

EROSION & SEDIMENT CONTROL NOTES:

ES-1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS 9VAC25-840.

ES-2: THE EROSION AND SEDIMENT CONTROL INSPECTOR MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.

ES-3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.

ES-4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.

ES-5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY FOR REVIEW AND APPROVAL.

ES-6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE EROSION AND SEDIMENT CONTROL INSPECTOR.

ES-7: ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.

ES-8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE, AND WILL BE PERFORMED IN ACCORDANCE WITH THE FORT BELVOIR ESC TECHNICAL BULLETIN #1 - DEWATERING OPERATIONS.

ES-9: THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.

VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS, SECTION 9VAC25-840-40, MINIMUM STANDARDS

ALL LAND-DISTURBING ACTIVITIES UNDERTAKEN ON PRIVATE AND PUBLIC LANDS IN THE COMMONWEALTH OF VIRGINIA MUST MEET THE 19 "MINIMUM STANDARDS" FOR EROSION AND SEDIMENT CONTROL (ESC) IN SECTION 9VAC25-840-40 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS. THE APPLICANT WHO SUBMITS THE ESC PLAN TO THE PROGRAM AUTHORITY FOR APPROVAL IS RESPONSIBLE FOR ENSURING COMPLIANCE WITH THE MINIMUM STANDARDS THAT APPLY TO HIS/HER ACTIVITIES.

1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
2. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS BORROW AREAS AND SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.
3. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.
4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
5. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
6. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.

6.1. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.

6.2. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25-YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.

7. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.
8. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.
9. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.
10. ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.
11. BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.
12. WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NONERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.
13. WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY VEHICULAR STREAM CROSSING CONSTRUCTED OF NONERODIBLE MATERIAL SHALL BE PROVIDED.
14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.
15. THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.
16. UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:

16.1. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.

16.2. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

16.3. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.

16.4. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.

16.5. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THIS CHAPTER.

16.6. APPLICABLE SAFETY REQUIREMENTS SHALL BE COMPLIED WITH.

17. WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED OR PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.
18. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE VESCP AUTHORITY. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
19. PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24-HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA. STREAM RESTORATION AND RELOCATION PROJECTS THAT INCORPORATE NATURAL CHANNEL DESIGN CONCEPTS ARE NOT MAN-MADE CHANNELS AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS:

19.1. CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN-MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.

19.2. ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:

19.2.1. THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS ONE HUNDRED TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A BANKFULL DISCHARGE TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.

19.2.1.1. ALL PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A 10-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO-YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND

19.2.1.2. PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A 10-YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.

19.3. IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:

19.3.1. IMPROVE THE CHANNELS TO A CONDITION WHERE A 10-YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO-YEAR STORM WILL NOT CAUSE EROSION TO THE CHANNEL, THE BED, OR THE BANKS; OR

19.3.2. IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE 10-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES;

19.3.3. DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TWO-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A 10-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN-MADE CHANNEL; OR

19.3.4. PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.

19.4. THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.

19.5. ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT CONDITION OF THE SUBJECT PROJECT.

19.6. IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE VESCP OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.

19.7. OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATORS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.

19.8. ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.

19.9. INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE OR PIPE SYSTEM, OR TO A DETENTION FACILITY.

19.10. IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. INSTEAD, THE DEVELOPMENT, AS A WHOLE, SHALL BE CONSIDERED TO BE A SINGLE DEVELOPMENT PROJECT. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.

19.11. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.

19.12. ANY PLAN APPROVED PRIOR TO JULY 1, 2014, THAT PROVIDES FOR STORMWATER MANAGEMENT THAT ADDRESSES ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS SHALL SATISFY THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS IF THE PRACTICES ARE DESIGNED TO (I) DETAIN THE WATER QUALITY VOLUME AND TO RELEASE IT OVER 48 HOURS; (II) DETAIN AND RELEASE OVER A 24-HOUR PERIOD THE EXPECTED RAINFALL RESULTING FROM THE ONE YEAR, 24-HOUR STORM; AND (III) REDUCE THE ALLOWABLE PEAK FLOW RATE RESULTING FROM THE 1.5, 2, AND 10-YEAR, 24-HOUR STORMS TO A LEVEL THAT IS LESS THAN OR EQUAL TO THE PEAK FLOW RATE FROM THE SITE ASSUMING IT WAS IN A GOOD FORESTED CONDITION, ACHIEVED THROUGH MULTIPLICATION OF THE FORESTED PEAK FLOW RATE BY A REDUCTION FACTOR THAT IS EQUAL TO THE RUNOFF VOLUME FROM THE SITE WHEN IT WAS IN A GOOD FORESTED CONDITION DIVIDED BY THE RUNOFF VOLUME FROM THE SITE IN ITS PROPOSED CONDITION, AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS AS DEFINED IN ANY REGULATIONS PROMULGATED PURSUANT TO § 62.1-44.15:54 OR 62.1-44.15:65 OF THE ACT.

19.13. FOR PLANS APPROVED ON AND AFTER JULY 1, 2014, THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT AND THIS SUBSECTION SHALL BE SATISFIED BY COMPLIANCE WITH WATER QUANTITY REQUIREMENTS IN THE STORMWATER MANAGEMENT ACT (§ 62.1-44.15:24 ET SEQ. OF THE CODE OF VIRGINIA) AND ATTENDANT REGULATIONS, UNLESS SUCH LAND-DISTURBING ACTIVITIES ARE IN ACCORDANCE WITH 9VAC25-870-48 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION OR ARE EXEMPT PURSUANT TO SUBDIVISION C 7 OF § 62.1-44.15:34 OF THE ACT.

19.14. COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN 9VAC25-870-66 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION SHALL BE DEEMED TO SATISFY THE REQUIREMENTS OF THIS SUBDIVISION 19.

EROSION AND SEDIMENT CONTROL NARRATIVE:

PROJECT DESCRIPTION:

THE PURPOSES OF THIS PROJECT ARE 1) TO RESTORE THE UNNAMED TRIBUTARIES TO HOOES RUN, PROVIDE FUNCTIONAL UPLIFT, CREATE DYNAMICALLY STABLE CHANNELS, AND REDUCE ANNUAL LOADINGS OF SEDIMENT, PHOSPHORUS, AND NITROGEN FROM THIS STREAM; 2) TO RETROFIT A STORMWATER BMP AND INSTALL A NEW BMP TO TREAT RUNOFF TO REMOVE POLLUTANTS. THE PROJECT SITE IS LOCATED AT 13001 CHINN PARK DR, WOODBRIDGE VA. THE CONSTRUCTION OF THIS PROJECT WILL DISTURB 5.02 ACRES.

EXISTING SITE CONDITIONS:

THE EXISTING SITE IS IN A FORESTED AREA WITH AN ADJACENT ASPHALT TRAIL. THE STREAM CHANNELS ARE CONFINED TO NARROW VALLEYS WITH RELATIVELY SLEEP SLOPES AND HAVE DOWNCUT SIGNIFICANTLY LEADING TO VARIED SUDDEN CHANGES IN TOPOGRAPHY. THE MID-SUCCESSIONAL FORESTED AREA IS COMPOSED OF A MINIMALLY INVASIVE UNDERSTORY AND NATIVE TREES.

ADJACENT AREAS:

THE PROJECT SITE IS FORESTED. THE FOREST IS SURROUNDED BY DEVELOPED LAND (INCLUDING AN AQUATICS CENTER, A PARK, A SCHOOL, AND RESIDENCES). AT THE SOUTHERN POINT OF THE PROJECT, A RESIDENTIAL ROAD (TROWBRIDGE DRIVE) BORDERS THE UPSTREAM END OF T1.

OFFSITE AREAS:

NO OFFSITE AREAS SHALL BE USED AS PART OF THIS PROJECT (EX: BORROW SITES, WASTE AREAS, SURPLUS AREAS, OR LAYDOWN YARDS).

SOILS:

REFER TO ESC KEY SHEET 32 FOR SOILS MAP AND SOILS SUMMARY CHART.

CRITICAL AREAS:

THERE ARE CRITICAL ENVIRONMENTAL AREAS LOCATED WITHIN THE PROJECT AREA. THESE AREAS INCLUDE STEEP SLOPES, STREAM CHANNELS, FLOODPLAINS, AND FORESTED WETLANDS FORMED IN THE STREAM FLOODPLAIN. THESE AREAS WILL EXPERIENCE SERIOUS DEGRADATION IF SEDIMENT DRAINS INTO THESE FEATURES. EXTRA CARE WILL BE TAKEN TO MINIMIZE THE EXPOSURE OF THESE WATER FEATURES TO SEDIMENT AND TO PREVENT EROSION OF THE ADJACENT BANK. ADDITIONALLY, THESE AREAS SHOULD BE INSPECTED MORE FREQUENTLY FOR SIGNS OF EROSION.

EROSION & SEDIMENT CONTROL MEASURES:

UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE 1992 VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). THE MINIMUM STANDARD OF THE VESCH SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE. THE E&S INSPECTOR HAS THE AUTHORITY TO ADD OR DELETE E&S CONTROLS AS NECESSARY IN THE FIELD AS SITE CONDITIONS CHANGE. IN ADDITION, NO E&S CONTROLS, INCLUDING SEDIMENT BASINS OR TRAPS, CAN BE REMOVED WITHOUT WRITTEN AUTHORIZATION. ADDITIONALLY, NO EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED UNTIL ALL UPSLOPE AREAS HAVE BEEN STABILIZED.

SAFETY FENCE (VESCH 3.01):

SAFETY FENCING SHALL BE INSTALLED AS SHOWN ON THE PLANS. MATERIAL SHALL BE POLYETHYLENE SECURED TO CONVENTIONAL METAL T OR U POSTS. SIGNS NOTING POTENTIAL HAZARDS SHALL BE USED AND POSTED SUCH THAT THEY ARE EASILY VISIBLE TO ANYONE APPROACHING THE PROTECTED AREA. FENCES AND GATES SHOULD BE CHECKED REGULARLY TO ENSURE STABILITY AND LOCKS USED WHEN THE SITE IS CLOSED.

TEMPORARY CONSTRUCTION ENTRANCE (VESCH 3.02):

A CONSTRUCTION ENTRANCE SHALL BE INSTALLED WHERE INDICATED ON THE PLANS. IT WILL BE NEEDED TO CLEAN THE TIRES OF VEHICLES AND EQUIPMENT DURING WET CONDITIONS IN ORDER TO PREVENT MUD/ROCKS/DEBRIS FROM BEING TRACKED OFF SITE OR INTO PUBLIC ROADWAYS.

TIMBER MAT ACCESS PATHS (SEE PROVIDED DETAIL):

TIMBER MATS SHOULD BE UTILIZED WHERE SHOWN ON THE PLANS TO PROVIDE ACCESS FOR EQUIPMENT AND CONSTRUCTION ACTIVITIES TO PLACES WERE THE EXISTING GROUND NEEDS TO BE PROTECTED FROM THE EQUIPMENT. APPLICATIONS OF TIMBER MATS CAN INCLUDE UTILITY CROSSINGS, ASPHALT PROTECTION, WETLAND CROSSINGS ETC. TIMBER MATS SHOULD BE PUT IN FOR THE LEAST AMOUNT OF TIME NECESSARY AND REMOVED WHEN NO LONGER NEEDED. MULCH SHOULD BE USED TO FILL GAPS BETWEEN MATS AT TURNS. IF NECESSARY, TO PROVIDE DRAINAGE CONNECTIVITY, PVC PIPES CAN BE LAID BENEATH THE MATS.

MULCH ACCESS PATHS (SEE PROVIDED DETAIL):

MULCH ACCESS PATHS SHOULD BE UTILIZED WHERE SHOWN ON THE PLANS TO PROVIDE ACCESS FOR EQUIPMENT TO PLACES WERE THE EXISTING GROUND NEEDS TO BE PROTECTED FROM THE EQUIPMENT AND COMPACTION. APPLICATIONS CAN INCLUDE DIRT ROADS THROUGH FOREST, ASPHALT PROTECTION, ETC. IF NECESSARY TO CONNECT DRAINAGE, PVC PIPES CAN BE LAID BENEATH MULCH. WHEN NO LONGER NEEDED, MULCH SHALL BE DISPOSED OF OFF-SITE UNLESS APPROVED BY COUNTY AUTHORITY. WHERE MULCH IS APPROVED TO REMAIN: FILTER FABRIC SHALL BE A BIODEGRADABLE TYPE; MULCH CAN BE SPREAD OVER ADJACENT AREAS TO BE PLANTED WITH TREES, TO A 1-INCH MAXIMUM THICKNESS; MULCH SHALL NOT BE SPREAD OVER AREAS THAT WILL ONLY BE SEEDED.

SILT FENCE BARRIER (VESCH 3.05):

SILT FENCE SEDIMENT BARRIERS SHALL BE INSTALLED ON THE DOWNHILL SIDE OF AREAS WITH MINIMAL GRADES TO FILTER SEDIMENT-LADEN RUNOFF FROM SHEET FLOW.

PUMP-AROUND DIVERSION (VIRGINIA STREAM RESTORATION & STABILIZATION BMP GUIDE; DETAIL 5.1):

THE PUMP-AROUND DIVERSION (PD) ALLOWS FOR CLEAR WATER DIVERSION AROUND THE DESIGNATED WORK AREA DURING STREAM RESTORATION PROJECTS. THIS FORM OF DIVERSION IS NECESSARY WHEN RESTORATION PRACTICES SPAN THE ENTIRE WIDTH OF THE STREAM CHANNEL AND/OR A LINEAR REACH OF STREAM SEGMENT IS TO BE SIMULTANEOUSLY WORKED ON. THIS PRACTICE ALSO LIMITS POTENTIAL FOR DOWNSTREAM SEDIMENTATION BECAUSE IN-STREAM WORK WILL BE COMPLETED IN THE DRY AND ALL DENUDED AREAS WILL BE STABILIZED BEFORE RE-INTRODUCTION OF WATER INTO CHANNEL. THE TOTAL WORK AREA OF THE PUMP AROUND SHOULD NOT EXCEED LENGTH OF AREA THAT CAN BE COMPLETED AND STABILIZED IN ONE (1) WORKING DAY. THE PUMP AROUND SHOULD BE COMPLETED AND REMOVED AT THE END OF EACH DAY; IF TIME TO COMPLETE WORK AREA WILL EXCEED ONE (1) DAY ALTERNATIVE PRACTICES SHOULD BE USED. THIS PRACTICE SHOULD ALSO BE LIMITED TO BASE OR LOW FLOW CONDITIONS WHERE APPLICABLE TO ENSURE ADEQUACY OF PUMP EQUIPMENT. PRACTICE IS BEST IN SMALL TO MEDIUM WATERSHEDS WITH RELATIVELY SMALL BASE FLOW DISCHARGES. THIS ALLOWS FOR MULTIPLE PUMPING OPTIONS AND EQUIPMENT TO SUFFICIENTLY HANDLE NECESSARY PUMP CAPACITY. A DEWATERING PUMP TO AN APPROVED DEWATERING DEVICE PER VESCH 3.26, SHALL BE USED TO REMOVE ANY SEEPAGE OR WATER THAT COLLECTS IN THE WORK AREA. REFER TO ESC DETAILS FOR A DETAIL OF THIS PRACTICE. WE PROPOSE THE FOLLOWING MODIFICATIONS TO DETAIL 5.1:

- USE OF PRACTICE NOT LIMITED TO WATERSHED SIZE BUT BY CAPACITY OF PUMP AND HEIGHT OF IN-STREAM BARRIERS.
- PUMP SELECTION SHALL BE SIZED TO ADEQUATELY PUMP BASE FLOW AT A HEAD GREATER THAN THE IN-STREAM BARRIER HEIGHT.
- DOWNSTREAM GEOTEXTILE-LINED FLOW TRANSITION POINT MAY BE USED. THIS FEATURE ALLOWS FOR DISPERSION OF PUMP DISCHARGE TO A NON-EROSIVE VELOCITY WITHIN THE EXISTING STREAM CHANNEL. ALL OTHER APPLICABLE ESC MEASURES SHALL BE USED IN CONJUNCTION WITH PUMP AROUND.

ROCK CHECK DAMS (VESCH 3.20):

THIS PRACTICE UTILIZES A COMBINATION OF STONE SIZES AND IS LIMITED TO USE IN SMALL OPEN CHANNEL WHICH DRAIN 10 ACRES OR LESS. IT SHOULD NOT BE USED IN A LIVE STREAM. APPLICATIONS:

1. TEMPORARY DITCHES OR SWALES WHICH, BECAUSE OF THEIR SHORT LENGTH OF SERVICE, CANNOT RECEIVE A NON-ERODIBLE LINING BUT STILL NEED PROTECTION TO REDUCE EROSION.
2. PERMANENT DITCHES OR SWALES WHICH, CANNOT RECEIVE A PERMANENT NON-ERODIBLE LINING FOR AN EXTENDED PERIOD OF TIME.
3. EITHER TEMPORARY OR PERMANENT DITCHES OR SWALES WHICH NEED PROTECTION DURING THE ESTABLISHMENT OF GRASS LININGS.

TEMPORARY STREAM CROSSING (VESCH 3.24):

TEMPORARY STREAM CROSSINGS SHOULD BE INSTALLED WHEN IT IS NECESSARY FOR CONSTRUCTION TRAFFIC TO CROSS A WATERCOURSE. A STRUCTURAL CROSSING IS NECESSARY TO PREVENT VEHICLES FROM DAMAGING STREAMBANKS AND CONTINUALLY TRACKING SEDIMENT AND OTHER POLLUTANTS INTO THE FLOW REGIME. HOWEVER, THESE STRUCTURES ARE CONSIDERED CHANNEL CONSTRICTIONS AND SHOULD BE PLANNED TO BE IN SERVICE FOR THE SHORTEST PRACTICAL PERIOD OF TIME AND REMOVED AS SOON AS THEIR FUNCTION IS COMPLETED. IF POSSIBLE A TEMPORARY BRIDGE CROSSING SHALL BE INSTALLED, IT TYPICALLY CAUSES THE LEAST AMOUNT OF DISTURBANCE TO THE BED AND BANKS WHEN COMPARED TO OTHER CROSSINGS.

TEMPORARY SEEDING (VESCH 3.31) AND MULCHING (VESCH 3.35):

ALL DENUDED AREAS AND STOCKPILE LOCATIONS WHICH WILL BE LEFT DORMANT FOR LONGER THAN 7 DAYS SHALL BE SEEDED WITH FAST GERMINATING TEMPORARY VEGETATION IMMEDIATELY FOLLOWING GRADING. SELECTION OF THE SEED MIXTURE WILL DEPEND ON THE TIME OF YEAR IT IS APPLIED AND SHALL BE PER TABLE 3.31-B OF SPECIFICATION 3.31 TEMPORARY SEEDING, OF THE VESCH HANDBOOK (SEE SHEET 48). MULCH (STRAW OR FIBER) WILL BE USED TO PROTECT THE SEEDED AREAS FROM EROSION AND DRYING.

PERMANENT SEEDING (VESCH 3.32) AND MULCHING (VESCH 3.35):

ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE STABILIZED WITH PERMANENT SEEDING & MULCHING IMMEDIATELY FOLLOWING FINISH GRADING. SEEDING SHALL BE DONE PER THE PLANTING PLAN, OTHER AREAS NOT SPECIFIED ON THE PLANTING PLAN SHOULD BE SEEDED WITH A GENERAL SLOPE (3:1 OR LESS) MIX AS APPLICABLE FOR THE COASTAL PLAIN AREA AS SPECIFIED IN TABLE 3.32D OF SPECIFICATION 3.32 PERMANENT SEEDING, OF THE VESCH HANDBOOK. MULCH (STRAW OR FIBER) WILL BE USED TO PROTECT THE SEEDED AREAS FROM EROSION AND DRYING. PERMANENT MULCHING CAN BE USED IN LANDSCAPED AREAS. MULCH IS TO BE EITHER WOOD CHIPS OR SHREDDED HARDWOOD. PERMANENT MULCHING IS TO BE INSTALLED TO STANDARD AND SPECIFICATION 3.35 MULCHING, OF THE VESCH HANDBOOK. SEE PLANTING PLANS (SHEETS 38-42) FOR PERMANENT SEEDING DETAILS.

SOIL STABILIZATION BLANKETS & MATTING (VESCH 3.36): SOIL STABILIZATION BLANKETS/MATTING, SUCH AS COIR 700, SHALL BE INSTALLED WHERE INDICATED ON THE PLANS TO AID IN CONTROLLING EROSION IN CRITICAL AREAS AS WELL AS AIDING IN THE ESTABLISHMENT OF VEGETATION FOR PERMANENT STABILIZATION ON PREVIOUSLY DISTURBED SLOPES. BLANKETS/MATTING SHALL BE INSTALLED PER SPECIFICATION 3.36.

TREE PROTECTION (VESCH 3.38): A FENCE BARRIER IS TO BE PLACED AROUND THE TREES AND VEGETATED AREAS WHICH WILL NOT BE DISTURBED, PER PLANS, TO PROTECT THE TREES AND OTHER VEGETATION FROM CONSTRUCTION EQUIPMENT AND SOIL COMPACTION.

MANAGEMENT STRATEGIES:

1. SEQUENCE CONSTRUCTION SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE
2. SEDIMENT TRAPPING / DIVERTING MEASURES WILL BE INSTALLED AS A FIRST STEP IN GRADING AND WILL BE SEEDED & MULCHED IMMEDIATELY FOLLOWING INSTALLATION.
3. TEMPORARY SEEDING OR OTHER STABILIZATION WILL FOLLOW IMMEDIATELY AFTER GRADING.
4. AREAS WHICH ARE NOT TO BE DISTURBED WILL BE CLEARLY MARKED BY FLAGS, SIGNS, ETC.
5. THE JOB SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL PRACTICES.
6. AFTER ACHIEVING ADEQUATE STABILIZATION OF PERMANENT SEEDING, THE TEMPORARY E&S CONTROLS WILL BE CLEANED UP AND REMOVED.

PERMANENT STABILIZATION: DISTURBED AREAS ARE TO BE STABILIZED WITH PERMANENT SEEDING & MULCHING IN ACCORDANCE WITH VESCH HANDBOOK AFTER LAND DISTURBING ACTIVITIES ARE DONE.

STORMWATER RUNOFF CONSIDERATIONS: NO PERMANENT LAND CONVERSIONS OR IMPERVIOUS SURFACES ARE PROPOSED AS PART OF THIS PROJECT; STORMWATER MANAGEMENT IS NOT REQUIRED.

MAINTENANCE: IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH SIGNIFICANT RAINFALL. SILT FENCE BARRIERS WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES HALF WAY TO THE TOP OF THE BARRIER. FILTERING DEVICES WILL BE INSPECTED FREQUENTLY AND REPAIRED/REPLACED ONCE THE SEDIMENT BUILD-UP PREVENTS THE STRUCTURE FROM FUNCTIONING AS DESIGNED. ALL SOIL STABILIZATION MATTING SHOULD BE INSPECTED PERIODICALLY FOLLOWING INSTALLATION, PARTICULARLY AFTER RAINSTORMS TO CHECK FOR EROSION AND UNDERMINING. ANY DISLOCATION OR FAILURE SHOULD BE REPAIRED IMMEDIATELY. IF WASHOUTS OR BREAKAGE OCCURS, REINSTALL THE MATERIAL AFTER REPAIRING THE DAMAGE TO THE SLOPE OR DITCH. SEEDED AREAS WILL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RESEEDED AS NEEDED.

STREAM RESTORATION CONSTRUCTION SEQUENCE

GENERAL NOTES/METHODS:

ALL WORK MUST BE PERFORMED IN THE DRY USING PUMP AROUND PRACTICES AS FOLLOWS:

a. PERFORM DAILY PUMP AROUND OPERATIONS. STABILIZE ALL DISTURBED AREAS AT THE END OF EACH DAY AND REMOVE PUMP AROUND PRACTICES OVER NIGHT TO RESTORE FLOW THROUGH THE STREAM AND STABILIZED WORK AREA. ONLY CONSTRUCT THE AMOUNT OF AREA BETWEEN THE SANDBAG DIVERSIONS (SBD) THAT CAN BE STABILIZED AT THE END OF EACH WORK DAY, WHICH IS TYPICALLY LIMITED TO APPROXIMATELY 500 FEET OF STREAM LENGTH.

b. PERFORM CONTINUOUS PUMP AROUND OPERATIONS. PERFORM WORK USING A ROLLING THREE-DAY NOAA DRY WEATHER PERIOD, CHECKING THE THREE-DAY FORECAST ON A DAILY BASIS. IF WET WEATHER IS PREDICTED WITHIN 3-DAY WINDOW, STABILIZE ALL DISTURBED AREAS PRIOR TO THE START OF THE WEATHER EVENT AND REMOVE THE CENTRAL PORTION OF THE SANDBAG DIVERSIONS TO ALLOW FLOW THROUGH THE STABILIZED AREAS PRIOR TO THE STORM. IF CONTINUOUS DRY WEATHER IS PREDICTED, AT A MINIMUM, TEMPORARILY STABILIZE ALL THE DISTURBED AREA IN ACCORDANCE WITH THE STANDARD STABILIZATION NOTE (PERMANENT OR TEMPORARY STABILIZATION MUST BE COMPLETED WITH 3 DAYS TO ALL SLOPES STEEPER THAN 3:1 AND 7 DAYS FOR ALL OTHER DISTURBED AREAS NOT UNDER ACTIVE GRADING). DURING A 3-DAY DRY WEATHER PERIOD, SANDBAG DIVERSIONS CAN BE SET UP TO ALLOW A LENGTH OF WORK ZONE THAT YOU CAN STABILIZE PRIOR TO A STORM EVENT.

2. PUMP ANY SEDIMENT LADEN WATER WITHIN THE WORK AREA THROUGH A FILTER BAG. DISCHARGE DOWNSTREAM OF THE UN-STABILIZED CONSTRUCTION AREA.
3. EROSION AND SEDIMENT CONTROL MEASURES MUST BE PLACED BEFORE ANY DISTURBANCE WITHIN THE PROJECT AREA.
4. PERMANENTLY STABILIZE ALL DISTURBED AREAS BEFORE REMOVAL OF EROSION AND SEDIMENT CONTROLS.

PRE-CONSTRUCTION

1. STAKEOUT THE PROPOSED STREAM CENTERLINE, BANKFULL BENCH, TOP OF STREAMBANKS, AND LIMITS OF DISTURBANCE (LOD).
2. IDENTIFY AND ESTABLISH STABILIZED CONSTRUCTION ACCESS, STAGING AND STOCKPILE AREAS, AND EROSION AND SEDIMENT CONTROL PRACTICES. ALL CONSTRUCTION TRAFFIC WILL ENTER THE SITE FROM THE CONSTRUCTION ENTRANCE(S) SHOWN ON THE PLANS ON TROWBRIDGE DR.
3. IDENTIFY TREES TO BE PROTECTED WITHIN THE LOD AND INSTALL TREE PROTECTION (TP) FENCING AS SHOWN ON PLANS AND DIRECTED AND SPECIFIED IN THE SPECIAL PROVISIONS. ADJUST GRADING LIMITS AND ELEVATIONS WHERE PRACTICABLE TO SALVAGE EXISTING TREES IDENTIFIED FOR PROTECTION. THE ENGINEER WILL DETERMINE THE FEASIBILITY OF ADJUSTING GRADING LIMITS FOR PURPOSES OF SAVING EXISTING TREES.
4. MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.
5. INSTALL PERIMETER EROSION AND SEDIMENT CONTROL DEVICES AS INDICATED ON THE PLANS.
6. REQUEST PRE-CONSTRUCTION MEETING WITH LOCAL EROSION & SEDIMENT CONTROL INSPECTOR.

PHASE I - MOBILIZATION/SITE PREPARATION

1. INSTALL STABILIZED CONSTRUCTION ENTRANCES AT ENTRANCE TO PARK FROM TROWBRIDGE DR.
2. USE PUMP AROUNDS AND SBDS TO DIVERT BASEFLOW AROUND WORK ZONE. USE PUMPS AND FILTER BAGS TO DEWATER THE CONSTRUCTION AREA AND REMOVE ANY SEDIMENT LADEN WATER WITHIN THE UN-STABILIZED WORK ZONE. PUMP TO A FILTER BAG TO REMOVE SEDIMENT BEFORE DISCHARGING INTO A STABLE AREA DOWNSTREAM OF THE UN-STABILIZED CONSTRUCTION AREA. PUMP AROUND LOCATIONS TO BE DIRECTED BY CONTRACTOR TO FIT SITE CONDITIONS.
3. MARK THE LIMITS OF DISTURBANCE PRIOR TO CLEARING AND GRUBBING.
4. CLEAR AND GRUB THE MINIMUM AREA NECESSARY TO INSTALL PERIMETER SEDIMENT CONTROL MEASURES AND ESTABLISH STOCKPILE/STAGING AREAS AS SHOWN ON THE PLANS.
5. PERFORM CLEARING AND GRUBBING.
6. SALVAGE AND STOCKPILE ALL LOGS AND ROOT WADS TO BE UTILIZED AS PART OF THE RESTORATION EFFORTS.
7. CONTACT THE PRINCE WILLIAM COUNTY SEDIMENT CONTROL INSPECTOR. ONCE PHASE I - SITE ACCESS AND PERIMETER CONTROLS ARE APPROVED, COMMENCE STREAM CONSTRUCTION WORK.

PHASE II - STREAM CONSTRUCTION

A) UT TO HOOES RUN - EXISTING STREAM LENGTH WITHIN THIS SUB-PHASE IS APPROXIMATELY 700 FEET

1. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES.
2. STAKE THE RESTORED STREAM CHANNEL CENTERLINE AND STRUCTURES WITH OFFSETS.
3. PHASE II CONSTRUCTION REQUIRES STREAM DIVERSION AND IN-STREAM GRADING.
4. WORKING UPSTREAM TO DOWNSTREAM, CONSTRUCT PROPOSED CHANNEL FOR UT TO HOOES RUN UNTIL REACHING THE TIE-IN WITH T1R2.
5. USE PUMP AROUNDS AND SBDS TO DIVERT BASEFLOW AROUND THE WORK ZONE, AS DESCRIBED ABOVE. WORK IN THIS PHASE WILL TIE INTO THE EXCAVATION WORK FROM PHASE II FOR EACH REACH. PUMP AROUND LOCATIONS TO BE DIRECTED BY CONTRACTOR TO FIT SITE CONDITIONS.
6. AS FINAL GRADES ARE ACHIEVED IN EACH WORK AREA, INSTALL WOODY DEBRIS MATERIALS AND PERMANENTLY STABILIZE ALL DISTURBED AREAS WITH FLEXIBLE GROWTH MEDIUM MATERIAL BLENDED WITH PERMANENT AND TEMPORARY SEED MIXES USING HYDROSEEDING OPERATION.

B) INFILTRATION CASCADE / POOL LENGTH WITHIN THIS SUB-PHASE IS APPROXIMATELY 264 FEET

1. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES.
2. STAKE THE RESTORED STREAM CHANNEL CENTERLINE WITH OFFSETS.
3. PHASE II CONSTRUCTION REQUIRES STREAM DIVERSION AND IN-STREAM GRADING.
4. WORKING DOWNSTREAM TO UPSTREAM, EXCAVATE SUBGRADE FOR INSTALLATION OF FOOTER BOULDER AT THE END OF THE PROPOSED ALIGNMENT. USE PUMP AROUNDS AND SBDS TO DIVERT BASEFLOW AROUND THE WORK ZONE, AS DESCRIBED ABOVE. PUMP AROUND LOCATIONS TO BE DIRECTED BY CONTRACTOR TO FIT SITE CONDITIONS.
5. AS FINAL GRADES ARE ACHIEVED IN EACH WORK AREA, INSTALL WOODY DEBRIS MATERIALS AND PERMANENTLY STABILIZE ALL DISTURBED AREAS WITH FLEXIBLE GROWTH MEDIUM MATERIAL BLENDED WITH PERMANENT AND TEMPORARY SEED MIXES USING HYDROSEEDING OPERATION.

C) T1R1 -EXISTING STREAM LENGTH WITHIN THIS SUB-PHASE IS APPROXIMATELY 474 FEET

1. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES.
2. STAKE THE RESTORED STREAM CHANNEL CENTERLINE WITH OFFSETS.
3. PHASE II CONSTRUCTION REQUIRES IN-STREAM GRADING.
4. WORKING UPSTREAM TO DOWNSTREAM, CONSTRUCT PROPOSED CHANNEL FOR T1R1 UNTIL REACHING THE CONFLUENCE AT T2. USE PUMP AROUNDS AND SBDS TO DIVERT BASEFLOW AROUND THE WORK ZONE, AS DESCRIBED ABOVE. PUMP AROUND LOCATIONS TO BE DIRECTED BY CONTRACTOR TO FIT SITE CONDITIONS.
5. AS FINAL GRADES ARE ACHIEVED IN EACH WORK AREA, INSTALL WOODY DEBRIS MATERIALS AND PERMANENTLY STABILIZE ALL DISTURBED AREAS WITH FLEXIBLE GROWTH MEDIUM MATERIAL BLENDED WITH PERMANENT AND TEMPORARY SEED MIXES USING HYDROSEEDING OPERATION.

**WORK AT CONFLUENCE OF T1R1, T2 AND T1R2 WILL ALL OCCUR IN CONJUNCTION

D) T2 -EXISTING STREAM LENGTH WITHIN THIS SUB-PHASE IS APPROXIMATELY 50 FEET

1. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES.
2. STAKE THE RESTORED STREAM CHANNEL CENTERLINE WITH OFFSETS.
3. PHASE II CONSTRUCTION REQUIRES IN-STREAM GRADING.
4. WORKING UPSTREAM TO DOWNSTREAM, CONSTRUCT PROPOSED CHANNEL FOR T2 UNTIL REACHING THE CONFLUENCE AT T1R1 AND T1R2. USE PUMP-AROUNDS AND SBDS TO DIVERT BASEFLOW AROUND THE WORK ZONE, AS DESCRIBED ABOVE. PUMP AROUND LOCATIONS TO BE DIRECTED BY CONTRACTOR TO FIT SITE CONDITIONS.
5. AS FINAL GRADES ARE ACHIEVED IN EACH WORK AREA, INSTALL WOODY DEBRIS MATERIALS AND PERMANENTLY STABILIZE ALL DISTURBED AREAS WITH FLEXIBLE GROWTH MEDIUM MATERIAL BLENDED WITH PERMANENT AND TEMPORARY SEED MIXES USING HYDROSEEDING OPERATION.

E) T1R2-EXISTING STREAM LENGTH WITHIN THIS SUB-PHASE IS APPROXIMATELY 1,075 FEET

1. THE LIMITS OF DISTURBANCE MUST BE FIELD MARKED PRIOR TO CLEARING OF TREES.
2. WORK WITHIN THE EXISTING CHANNEL. WORK UNDERNEATH THE FOOTBRIDGE WILL BE EXCLUDED FROM CONSTRUCTION.
3. STAKE THE RESTORED STREAM CHANNEL CENTERLINE WITH OFFSETS.
4. PHASE II CONSTRUCTION REQUIRES IN-STREAM GRADING.
5. WORKING UPSTREAM TO DOWNSTREAM, CONSTRUCT PROPOSED CHANNEL T1R2 UNTIL REACHING THE TIE-IN AT UT HOOES RUN. USE PUMP AROUNDS AND SBDS TO DIVERT BASEFLOW AROUND THE WORK ZONE, AS DESCRIBED ABOVE. WORK IN THIS PHASE WILL TIE INTO THE EXCAVATION WORK FROM PHASE II FOR EACH REACH. PUMP AROUND LOCATIONS TO BE DIRECTED BY CONTRACTOR TO FIT SITE CONDITIONS.
6. AS FINAL GRADES ARE ACHIEVED IN EACH WORK AREA, INSTALL WOODY DEBRIS MATERIALS AND PERMANENTLY STABILIZE ALL DISTURBED AREAS WITH FLEXIBLE GROWTH MEDIUM MATERIAL BLENDED WITH PERMANENT AND TEMPORARY SEED MIXES USING HYDROSEEDING OPERATION.

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

EROSION & SEDIMENT CONTROL NOTES

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x Signature 11/2021 Date

60% DESIGN REVIEW
x Signature 11/14/2022 Date

CONSTRUCTION PLAN REVIEW
x Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
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DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
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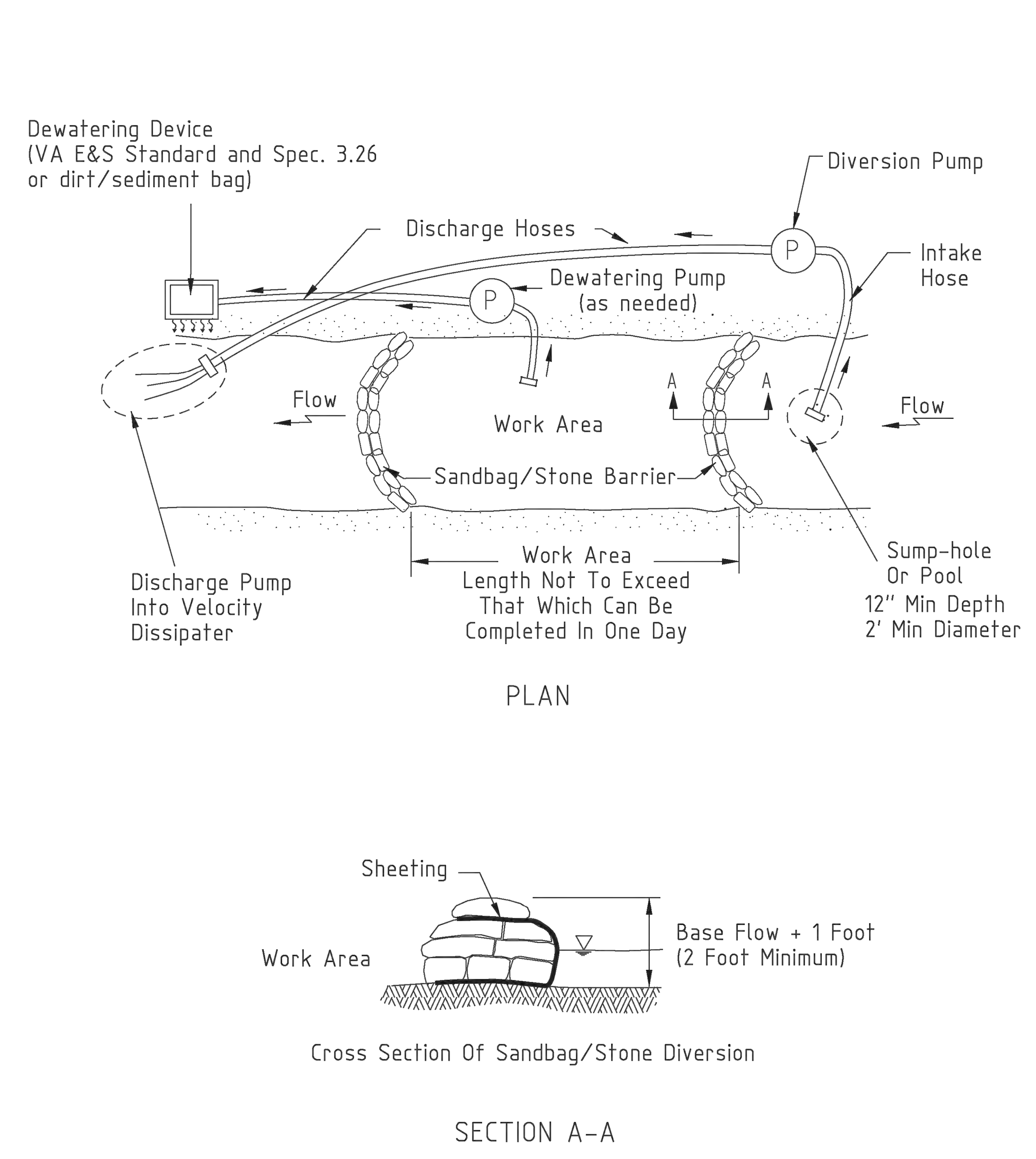
DATE:	9/3/2024
SHEET NO:	38 OF 48

The Virginia Stream Restoration & Stabilization Best Management Practices Guide
DETAIL 5.1: PUMP-AROUND PRACTICE

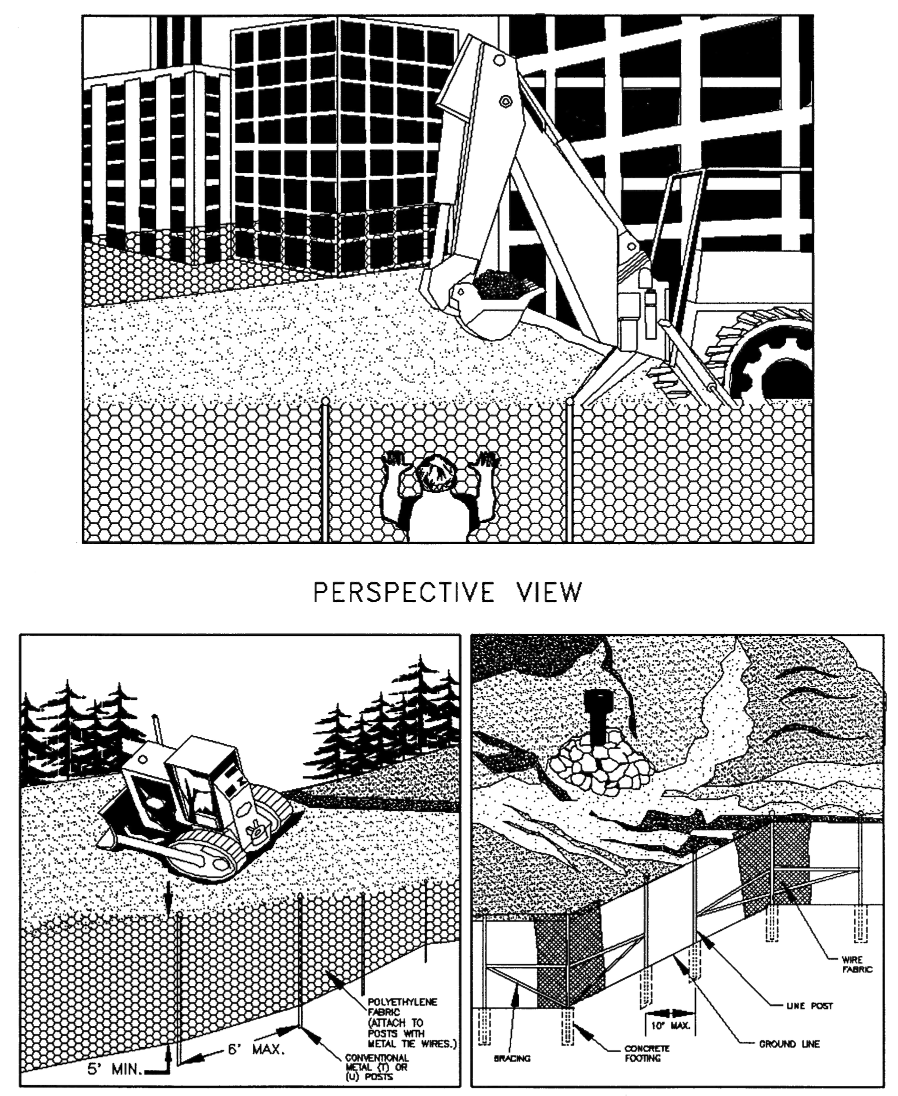


Adapted From Maryland's Waterway Construction Guidelines

TEMPORARY INSTREAM CONSTRUCTION MEASURES	DECEMBER 2003	VIRGINIA DEPARTMENT OF CONSERVATION RECREATION

1992 3.01

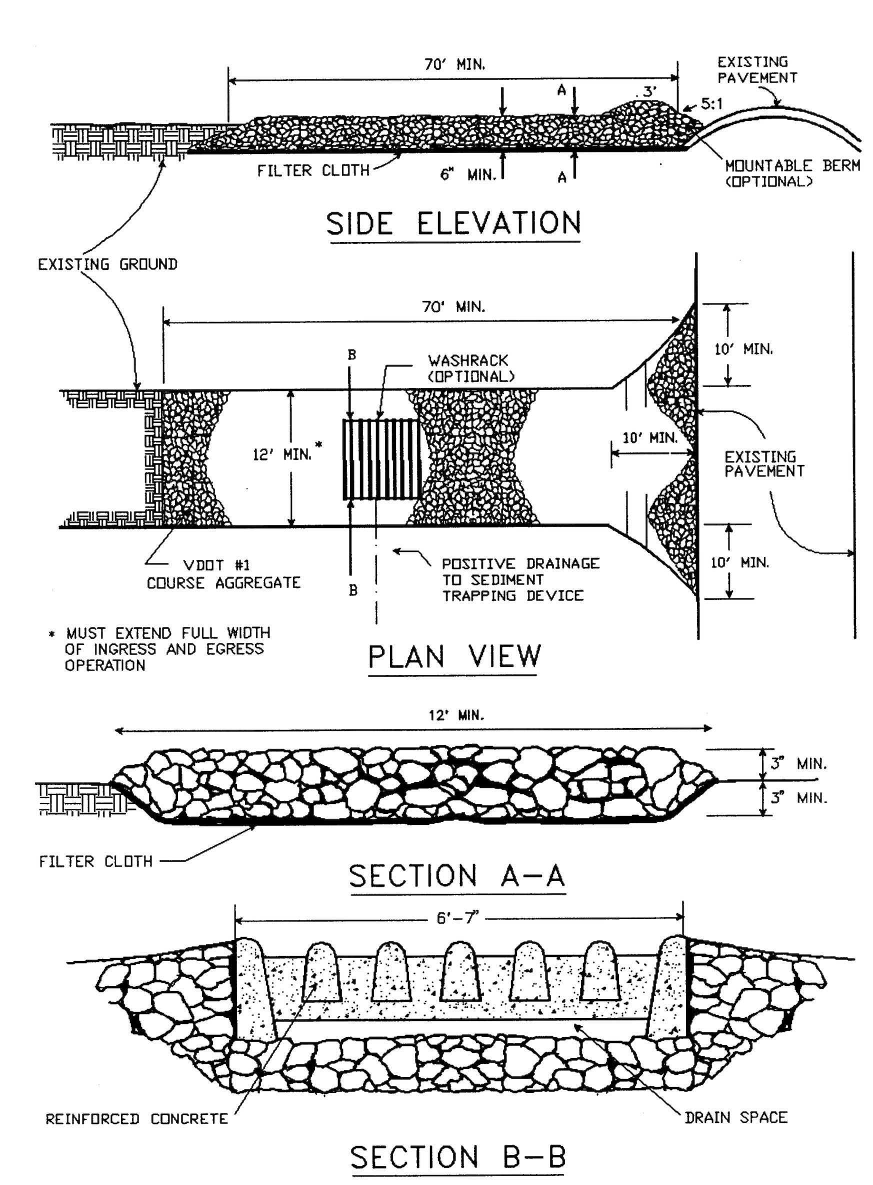
SAFETY FENCE



Source: Adapted from Conwed Plastics and VDOT Road and Bridge Standards — Plate 3.01-1

1992 3.02

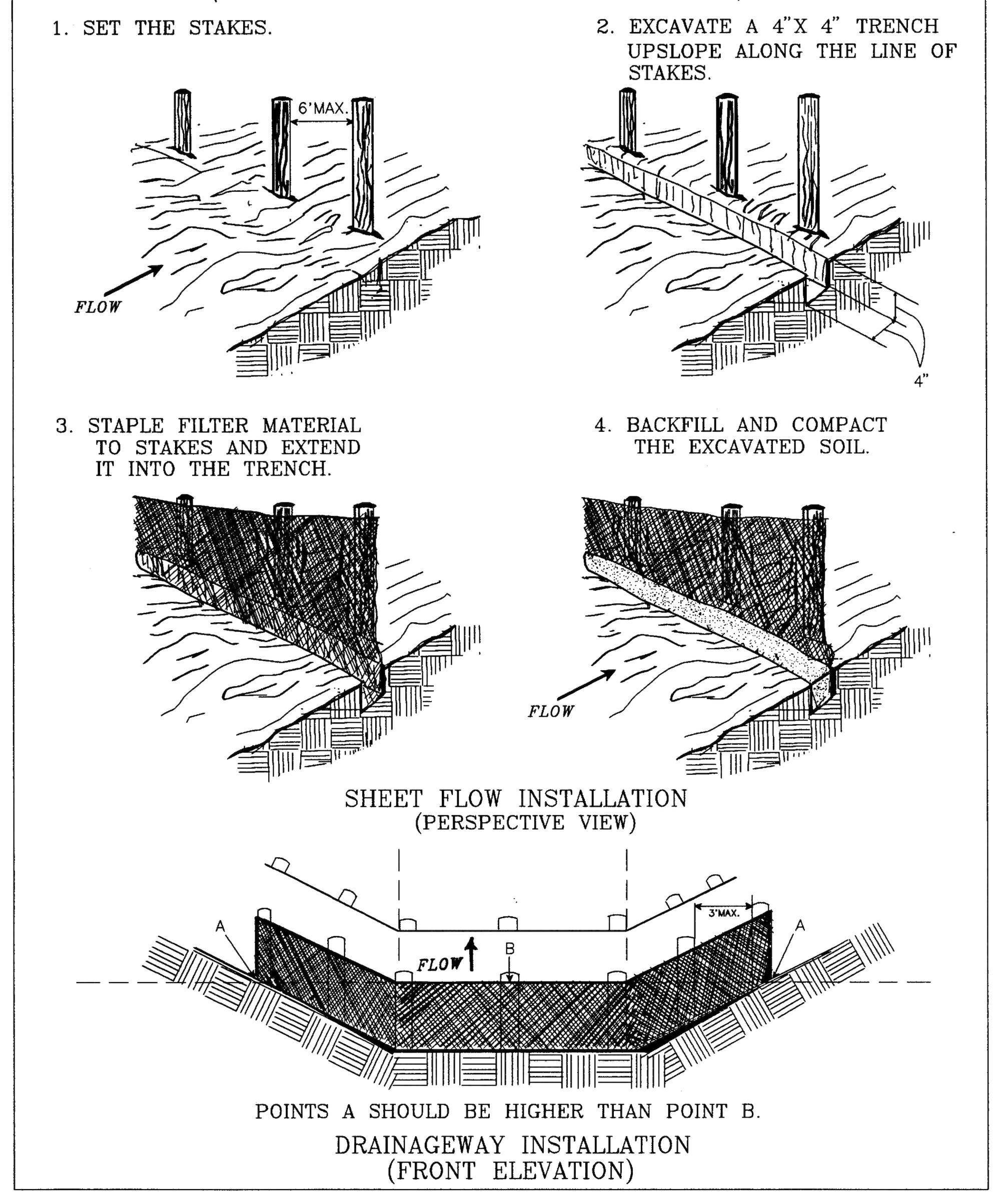
STONE CONSTRUCTION ENTRANCE



Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC — Plate 3.02-1

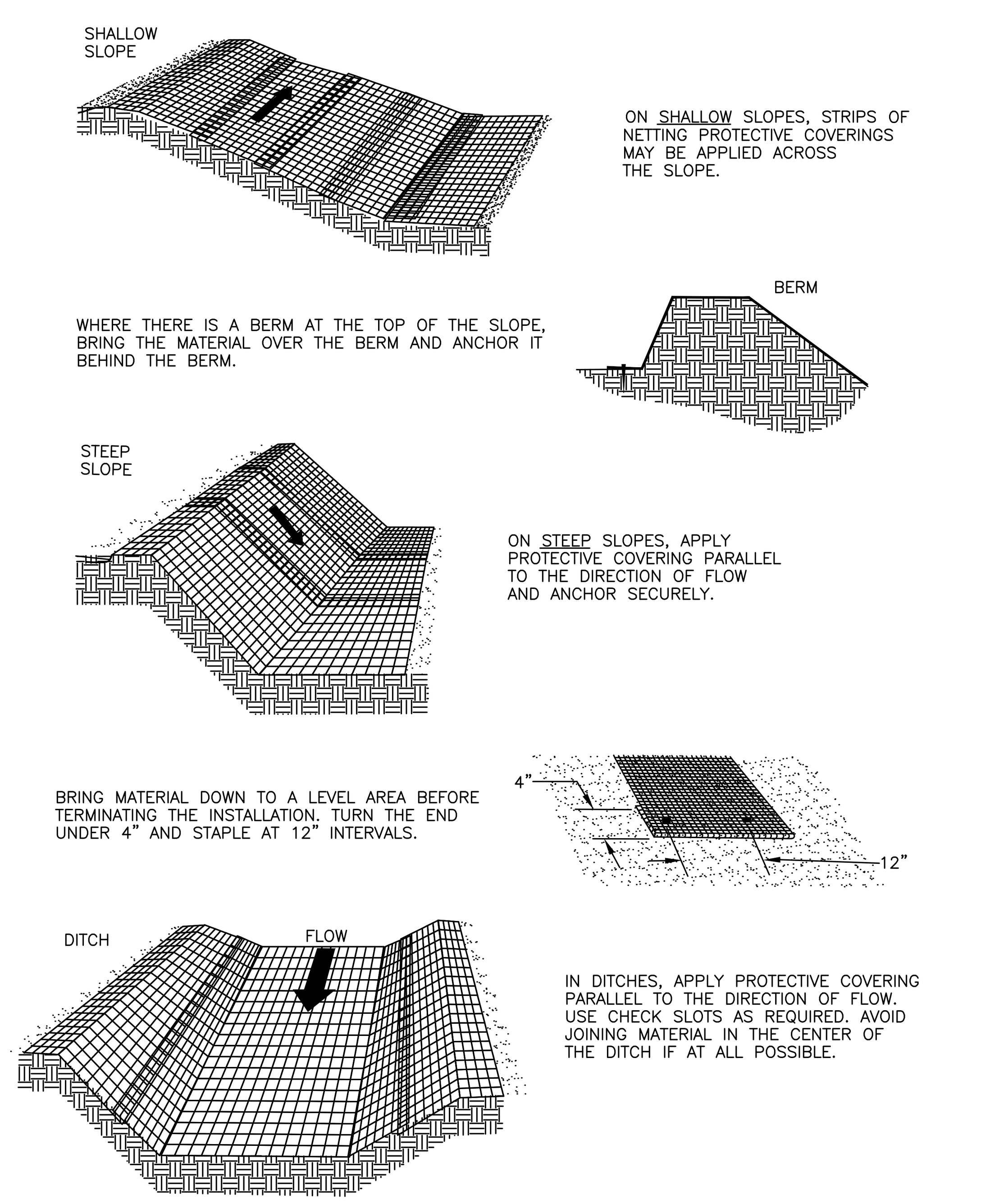
1992 3.05

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant — Plate 3.05-2

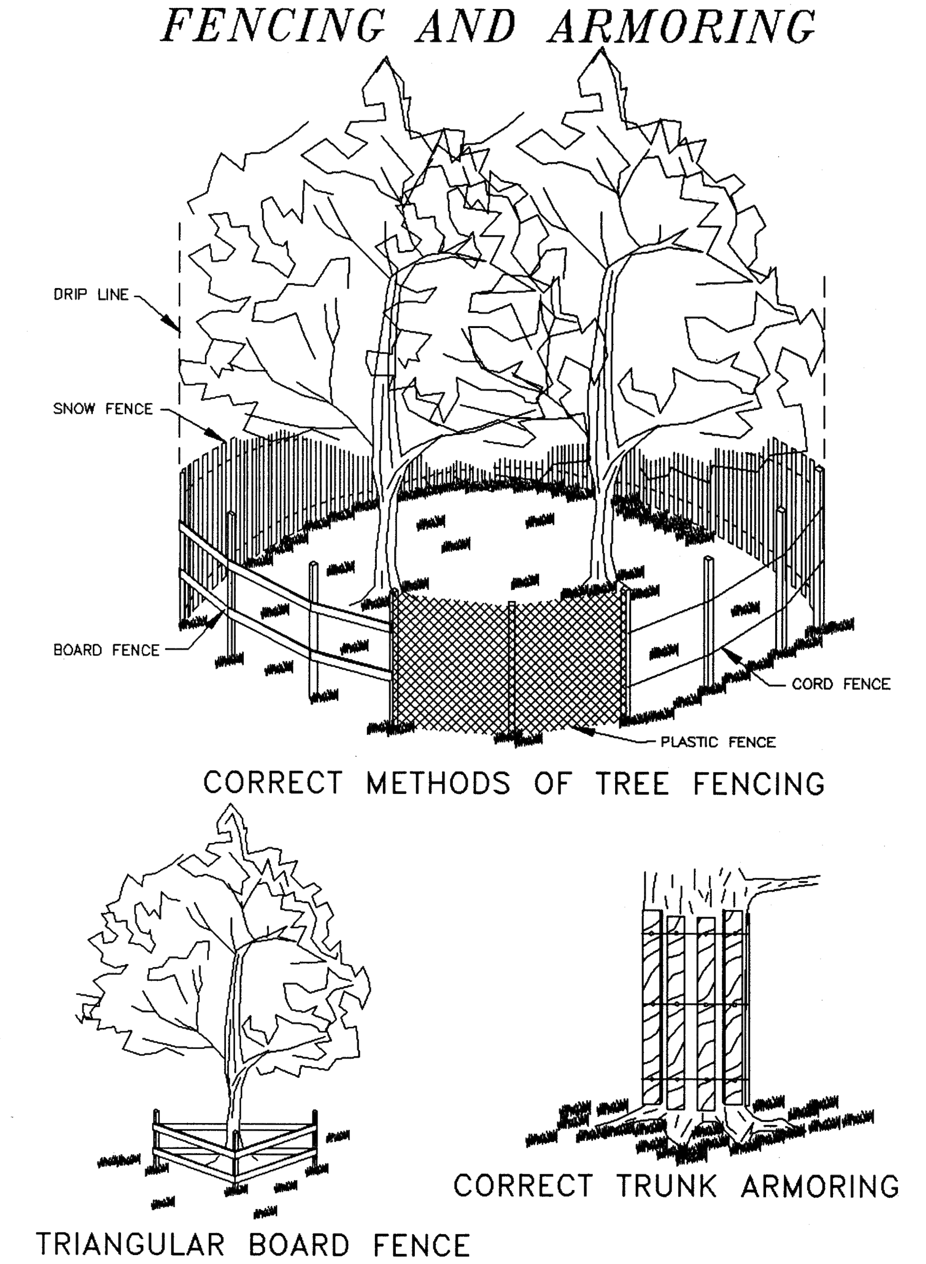
TYPICAL ORIENTATION OF TREATMENT – 1 (SOIL STABILIZATION BLANKET)



SOURCE: ADAPTED FROM LUDLOW PRODUCTS BROCHURE — PLATE: 3.36-1

1992 3.38

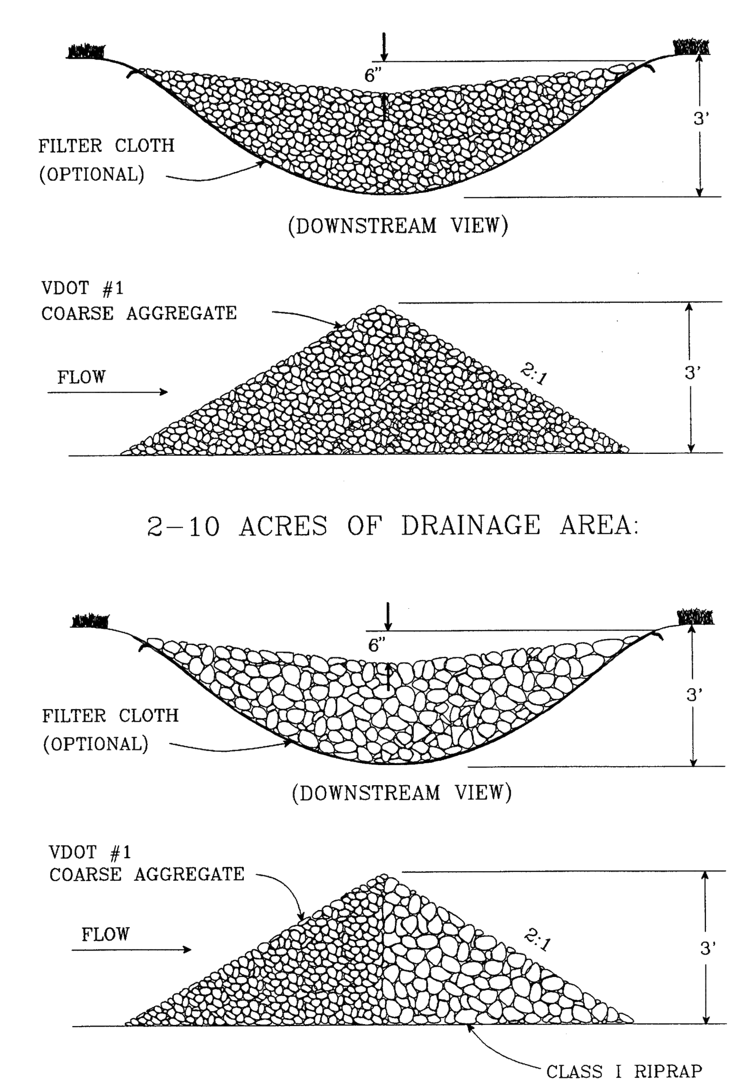
FENCING AND ARMORING



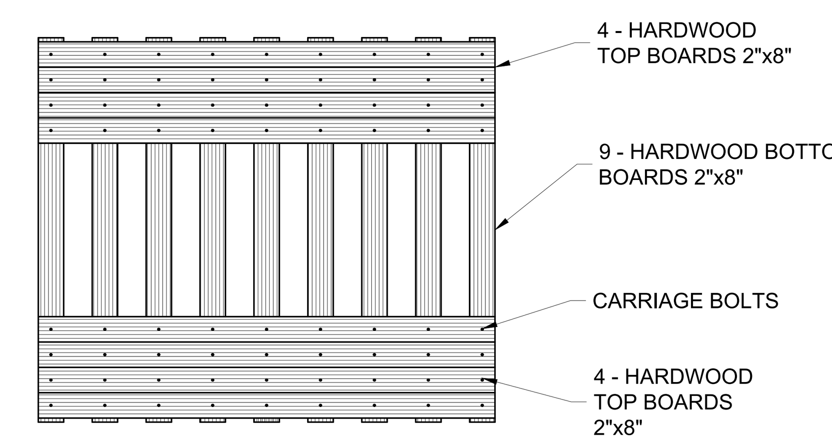
Source: Va. DSWC — Plate 3.38-2

1992 3.20

ROCK CHECK DAM

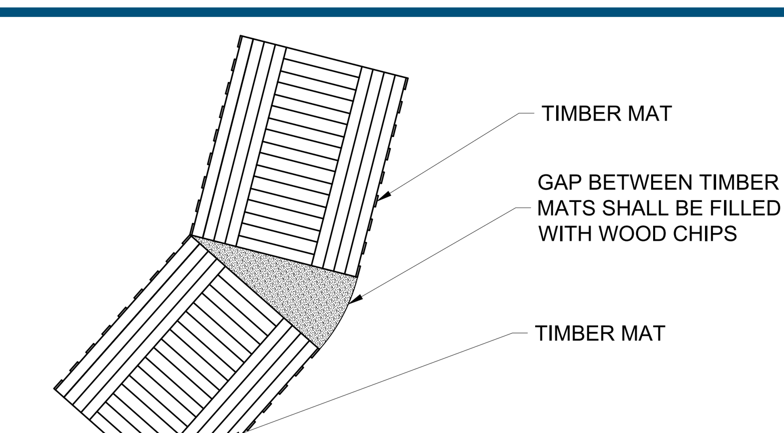


Source: Va. DSWC — Plate 3.20-1

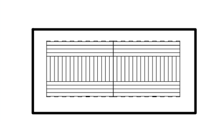


TIMBER MAT
NOT TO SCALE

TYPE:	LAMINATED 2 PLY MAT
MATERIAL:	HARDWOOD
APPLICATION:	STRAIGHT ROADS WITH MODERATE TURNS ON SANDY AND MUDDY ROADS
WEIGHT:	1,600 LBS EACH
WEIGHT CAPACITY:	40 TONS



TIMBER MAT
TREATMENT OF ROAD TURNS
NOT TO SCALE



TIMBER MAT
TEMPORARY ACCESS ROAD

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PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x — 11/2021
Signature — Date

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Signature — Date

CONSTRUCTION PLAN REVIEW
x
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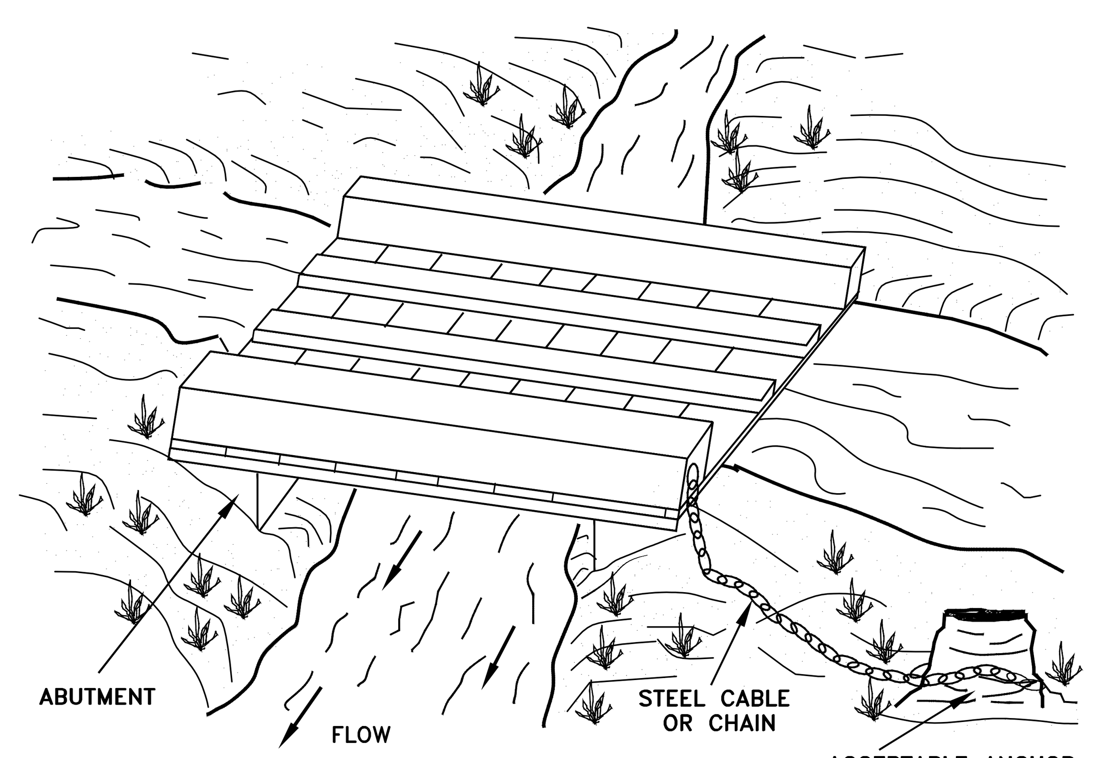
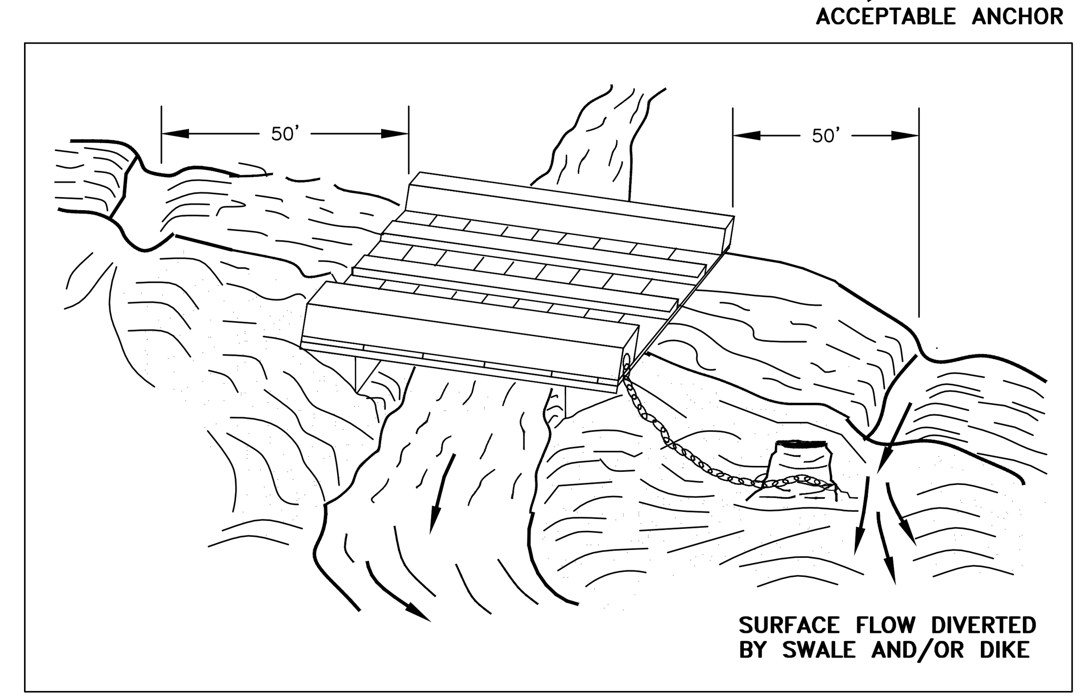
SHEET NO:	39 OF 48

TEMPORARY BRIDGE CROSSING

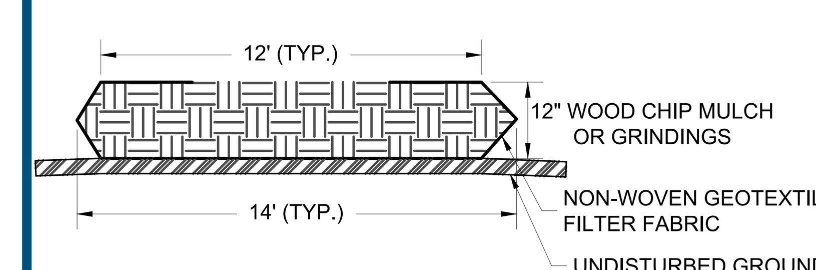




1983 Maryland Standards and Specifications for Soil Erosion and Sediment Control

PLATE. 3.24-1

TYPICAL MULCH CONSTRUCTION ACCESS PATH SECTION VIEW



NOTES:
1. WHEREVER PATHS MUST BE REMOVED, NON-WOVEN GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED OVER UNDISTURBED GROUND AND WRAPPED AROUND MULCH AS A CONTAINMENT.
2. ACCESS ROUTES SHOWN ON PLANS MAY BE FIELD ADJUSTED BY ENGINEER OR CONTRACTOR, WITHIN THE LIMIT OF DISTURBANCE.
3. CONTRACTOR SHALL SEQUENCE CONSTRUCTION SUCH THAT NO EQUIPMENT IMPACTS AN AREA TO BE PROTECTED PRIOR TO MULCH PLACEMENT.
4. FILTER FABRIC SHALL BE A SINGLE PIECE ACROSS WIDTH. OVERLAP FABRIC BY 18" MIN. ALONG LENGTH OF ROUTE.
5. CONTRACTOR SHALL MAINTAIN MULCH CONSTRUCTION ACCESS ROAD THROUGHOUT CONSTRUCTION PERIOD. MULCH SHALL BE REPLENISHED AS NEEDED DURING THE CONSTRUCTION PERIOD.
6. MULCH SHALL BE DISPOSED OF OFF-SITE UNLESS APPROVED BY COUNTY AUTHORITY. WHERE MULCH IS TO REMAIN, FILTER FABRIC SHALL BE AN APPROVED BIODEGRADEABLE TYPE.

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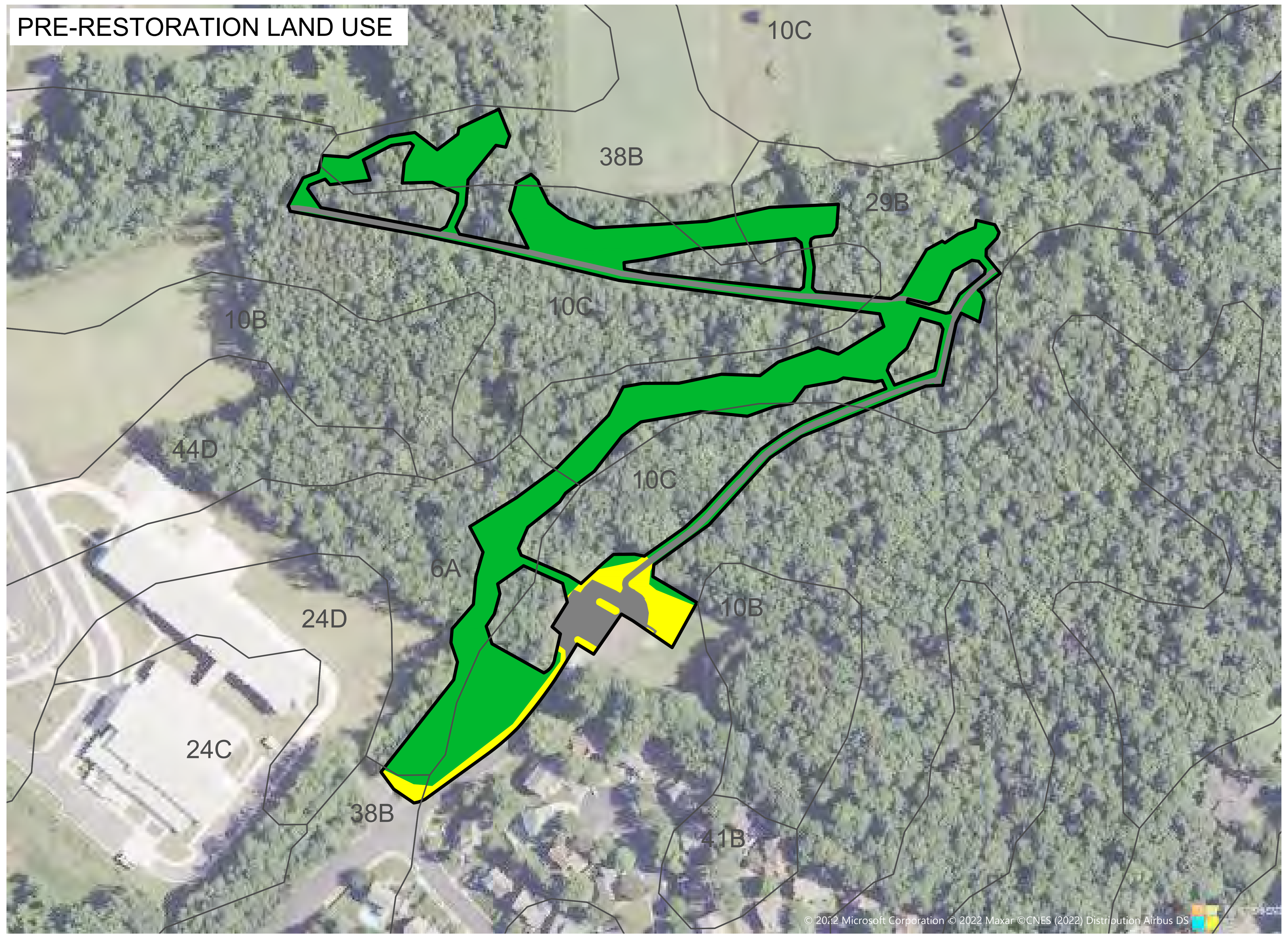
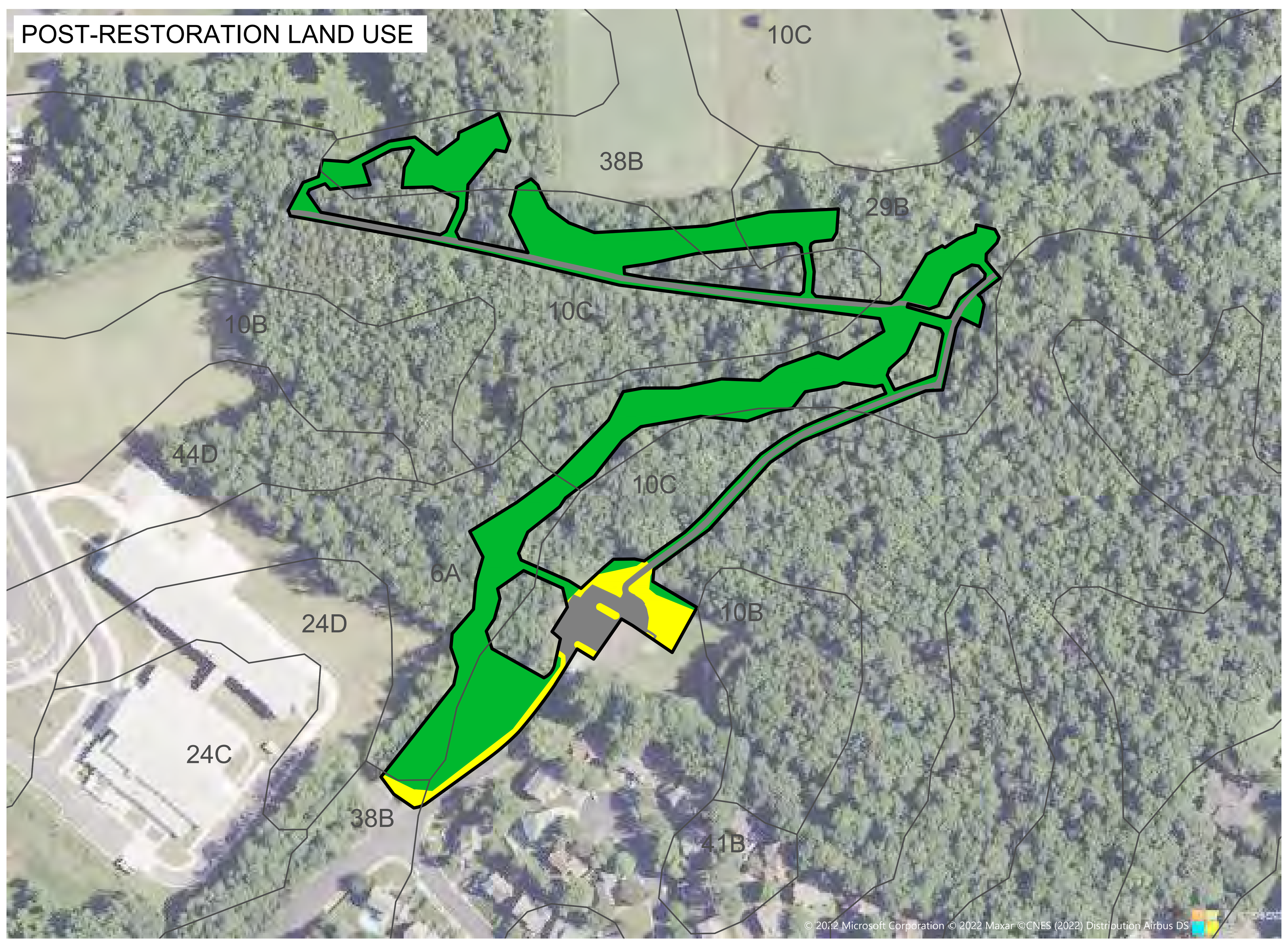
SHEET NO:	40 OF 48

PRE-RESTORATION LAND USE



POST-RESTORATION LAND USE



GRAPHIC SCALE: 1" = 150'

0' 150' 300' 450'

SWM MANAGEMENT LEGEND:

- EX. SOIL BOUNDARY
- PR. LIMITS OF DISTURBANCE
- FOREST/OPEN SPACE
- MANAGED TURF
- IMPERVIOUS COVER

DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

☐ 2011 BMP Standards and Specifications ☒ 2013 Draft BMP Standards and Specifications

CLEAR ALL

Project Name:	Chinn Park
Date:	5/9/2024
Linear Development Project?	Yes

Legend: data input cells; constant values; calculation cells; final results

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area *(acres)* →	5.02	Check:	TRUE
		BMP Design Specifications List:	2013 Draft Stds & Specs
Maximum reduction required:	20%	Linear project?	Yes
The site's net increase in impervious cover (acres) is:	0	Land cover areas entered correctly?	✓
Post-Development TP Load Reduction for Site (lb/yr):	-0.23	Total disturbed area entered?	✓

TP LOAD REDUCTION NOT REQUIRED

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed forest/open space	0.50	1.42	2.10		4.02
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.32	0.06		0.38
Impervious Cover (acres)	0.00	0.53	0.09		0.62
					5.02

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.50	1.42	2.10		4.02 *
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.32	0.06		0.38
Impervious Cover (acres)	0.00	0.53	0.09		0.62
Area Check	OK.	OK.	OK.	OK.	5.02

** Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method*

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Total Phosphorus (TP) EMC (mg/L)	0.26
Total Nitrogen (TN) EMC (mg/L)	1.86
Target TP Load (lb/acre/yr)	0.41
Pj (unitless correction factor)	0.90

Runoff Coefficients (Rv)

	A Soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

LAND COVER SUMMARY -- PRE-REDEVELOPMENT

Land Cover Summary-Pre

Pre-ReDevelopment	Listed	Adjusted[1]
Forest/Open Space Cover (acres)	4.02	4.02
Weighted Rv(forest)	0.03	0.03
% Forest	80%	80%
Managed Turf Cover (acres)	0.38	0.38
Weighted Rv(turf)	0.20	0.20
% Managed Turf	8%	8%
Impervious Cover (acres)	0.62	0.62
Rv(impervious)	0.95	0.95
% Impervious	12%	12%
Total Site Area (acres)	**5.02**	**5.02**
Site Rv	**0.16**	**0.16**

LAND COVER SUMMARY -- POST DEVELOPMENT

Land Cover Summary-Post (Final)

Post ReDev. & New Impervious	
Forest/Open Space Cover (acres)	4.02
Weighted Rv(forest)	0.03
% Forest	80%
Managed Turf Cover (acres)	0.38
Weighted Rv (turf)	0.20
% Managed Turf	8%
Impervious Cover (acres)	0.62
Rv(impervious)	0.95
% Impervious	12%
Final Site Area (acres)	**5.02**
Final Post Dev Site Rv	**0.16**

Land Cover Summary-Post

Post-ReDevelopment	
Forest/Open Space Cover (acres)	4.02
Weighted Rv(forest)	0.03
% Forest	80%
Managed Turf Cover (acres)	0.38
Weighted Rv (turf)	0.20
% Managed Turf	8%
ReDev. Impervious Cover (acres)	0.62
Rv(impervious)	0.95
% Impervious	12%
Total ReDev. Site Area (acres)	**5.02**
ReDev Site Rv	**0.16**

Land Cover Summary-Post

Post-Development New Impervious	
New Impervious Cover (acres)	0.00
Rv(impervious)	--

Treatment Volume and Nutrient Load

Pre-ReDevelopment Treatment Volume (acre-ft)	0.0669	0.0669
Pre-ReDevelopment Treatment Volume (cubic feet)	2,914	2,914
Pre-ReDevelopment TP Load (lb/yr)	**1.83**	**1.83** *
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	0.36	0.36 *
Baseline TP Load (lb/yr) (**0.41 lbs/acre/yr** applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		*2.06*

[1] *Adjusted Land Cover Summary:*
Pre ReDevelopment land cover minus pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover.

Adjusted total acreage is consistent with Post-ReDevelopment acreage (minus acreage of new impervious cover).

Column I shows load reduction requirement for new impervious cover (based on new development load limit, 0.41 lbs/acre/year).

Treatment Volume and Nutrient Load

Final Post-Development Treatment Volume (acre-ft)	0.0669
Final Post-Development Treatment Volume (cubic feet)	2,914
Final Post-Development TP Load (lb/yr)	**1.83**
Final Post-Development TP Load per acre **(lb/acre/yr)**	0.36

Post-ReDevelopment Treatment Volume (acre-ft)	0.0669
Post-ReDevelopment Treatment Volume (cubic feet)	2,914
* **Post-ReDevelopment Load (TP) (lb/yr)***	1.83
Post-ReDevelopment TP Load per acre **(lb/acre/yr)**	0.36
Max. Reduction Required (Below Pre-ReDevelopment Load)	20%
* **TP Load Reduction Required for Redeveloped Area (lb/yr)**	-0.23

** Reduction below new development load limitation not required*

Post-Development Treatment Volume (acre-ft)	--
Post-Development Treatment Volume (cubic feet)	--
Post-Development TP Load (lb/yr)	--
TP Load Reduction Required for New Impervious Area (lb/yr)	0

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	-0.23	**	*TP LOAD REDUCTION NOT REQUIRED*
Linear Project TP Load Reduction Required (lb/yr):	-0.23	**	*TP LOAD REDUCTION NOT REQUIRED*

Nitrogen Loads (Informational Purposes Only)

Pre-ReDevelopment TN Load (lb/yr)	13.10	Final Post-Development TN Load (Post-ReDevelopment & New Impervious) (lb/yr)	13.10

NO CONSERVATION EASEMENT IS PROPOSED.

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STORMWATER MANAGEMENT

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30% DESIGN REVIEW	
x Robert C. Siegfried IV	11/2021
Signature	Date
60% DESIGN REVIEW	
x Dalen Wilfong	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	
x	
Signature	Date

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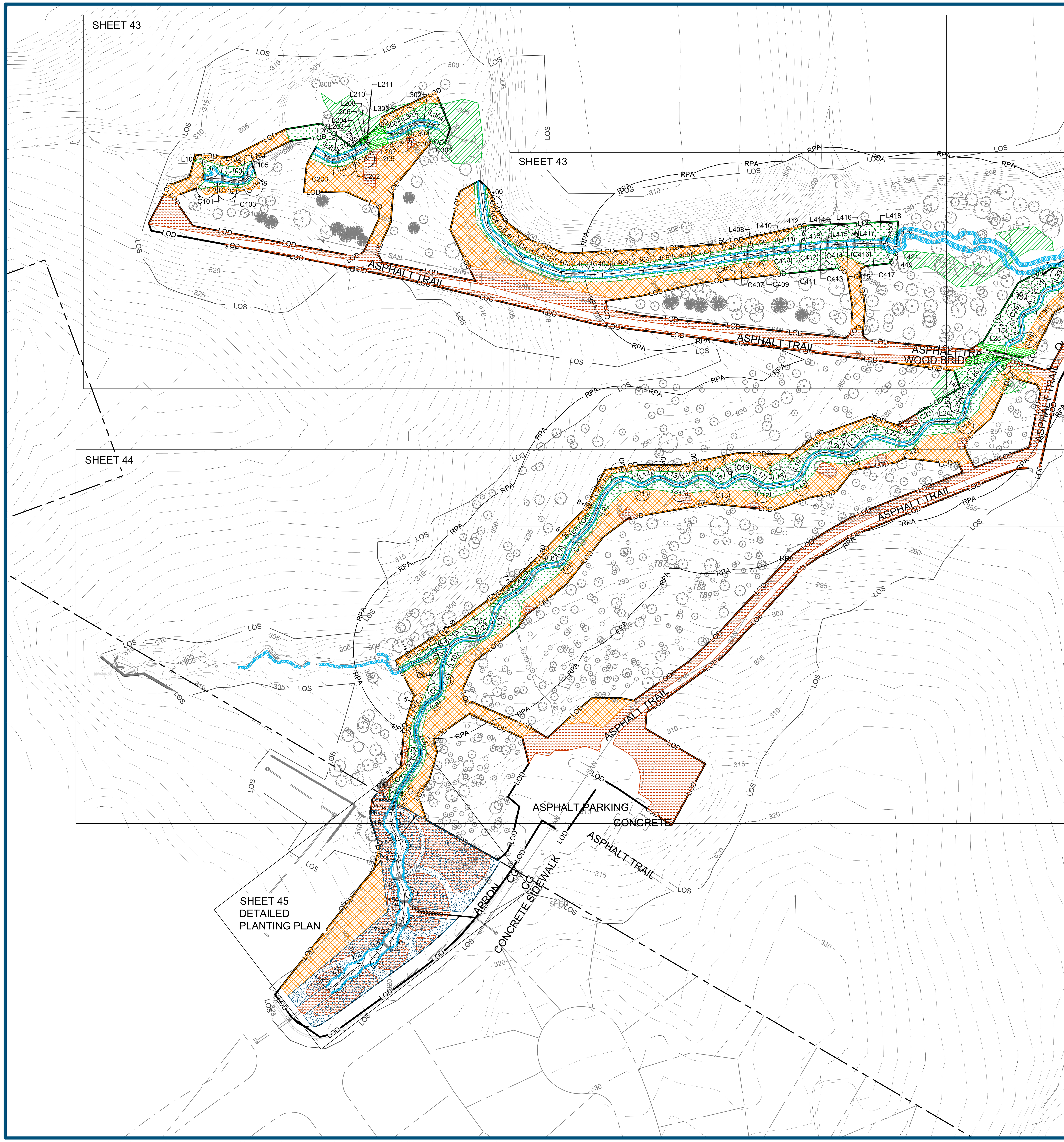

PLANTING PLAN LEGEND:

- EX. PROPERTY LINE
- LIMITS OF SURVEY
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CONTOUR MAJOR
- EX. CONTOUR MINOR
- EX. FORESTED WETLAND
- EX. TREES TO REMAIN
- EX. TREE STUMP TO REMAIN
- PR. CONTOUR MAJOR
- PR. CONTOUR MINOR
- PR. STREAM CENTERLINE
- PR. LIMITS OF DISTURBANCE
- PR. FLOODPLAIN PLANTING AND SEEDING (0.86 AC.)
- PR. UPLAND PLANTING AND SEEDING (1.49 AC.)
- PR. UPLAND SEEDING ONLY (1.22 AC.)
- PR. FLOODPLAIN SEEDING ONLY (0.038 AC.)
- PR. STREAM BANK PLANTING (6,126 L.F.)
- PR. DETAILED LANDSCAPE PLANTING AREA (0.46 AC.)
- DETAIL CALLOUT (DETAIL #, SHEET #)
- PR. LOG SILL
- PR. ROCK SILL

PLANTING SPECIFICATIONS

THE PLANTING SHALL BE COMPLETED ACCORDING TO THE PLANS AND SPECIFICATIONS PROVIDED. PLANTS AND SEEDS SHALL BE OBTAINED FROM A COMMERCIAL SUPPLIER. THE CONTRACTOR SHALL MAKE ARRANGEMENTS WITH RELIABLE SOURCES TO ENSURE THAT AN ADEQUATE SUPPLY OF THE REQUIRED PLANT AND SEED MATERIAL IS AVAILABLE. IN THE EVENT THAT A PLANT OR SEED SPECIFIED IS NOT COMMERCIALLY AVAILABLE, THE CONTRACTOR MAY REQUEST A SUBSTITUTION IN WRITING, ALL REQUESTS FOR SUBSTITUTIONS MUST BE MADE AT LEAST ONE (1) MONTH PRIOR TO INSTALLATION AND BE APPROVED BY THE ENGINEER OF RECORD, THE LANDSCAPE DESIGNER, AND THE OWNER.

QUALITY:
PLANTS SHOULD BE OBTAINED FROM NURSERIES IN HARDINESS ZONES SIMILAR TO THOSE FOUND AT THE PROJECT SITE (USDA ZONE 7). ALL PLANT MATERIAL RECEIVED FROM COMMERCIAL SUPPLIERS SHALL CONFORM TO THE CURRENT ISSUE OF THE AMERICAN STANDARD FOR NURSERY STOCK, PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.

PLANTS DELIVERED TO THE SITE SHOULD BE BASED ON THE PLANTING SCHEDULE PROVIDED IN THE PLANS. UNAPPROVED SUBSTITUTIONS WILL BE REJECTED.

ALL PLANT MATERIAL SHALL BE UNIFORMLY SHAPED AND HAVE A VIGOROUS ROOT SYSTEM. THE PLANT MATERIAL SHALL BE HEALTHY--FREE OF DEFECTS, DECAY, BARK ABRASIONS, DISEASE, PEST EGGS/LARVAE AND ALL FORMS OF INFESTATIONS. THE PLANT MATERIALS MUST BE FREE OF TRANSPLANT SHOCK AND VISIBLE WILT. ALL CONTAINER-GROWN STOCK SHALL HAVE BEEN PROPAGATED IN A CONTAINER LARGE ENOUGH FOR THE ROOTS TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL WHEN REMOVED FROM THE CONTAINER. CONTAINER STOCK WITH POORLY DEVELOPED OR POT-BOUND (CIRCLING) ROOTS WILL BE REJECTED.

PRODUCT HANDLING, STORAGE, AND DELIVERY:
AT ALL TIMES HANDLE PLANTS SO THAT THE ROOTS, BUDS, AND LEAVES ARE ADEQUATELY PROTECTED FROM BREAKAGE, DIRECT SUN, WARM AIR, AND DRYING WINDS. UNLESS THEY ARE BOXED OR OTHERWISE ENCLOSED, ALL PLANTS MUST BE COVERED WITH HEAVY DUTY MESH TARP DURING TRANSPORTATION (>15 MPH) TO PREVENT DESSICCATION. POTTED PLANTS SHOULD BE WATERED ENOUGH TO KEEP SOIL MOIST. PLANTS WITH DRIED-OUT TOPS OR ROOTS SHALL BE REJECTED. ALL PLANT MATERIAL SHALL BE TRANSPORTED AND STORED TO PREVENT ANY PHYSICAL DAMAGE, AND AT THE NECESSARY INTERVALS TO MINIMIZE STORAGE AND TO MAINTAIN PLANT HEALTH AND VIGOR.

INSTALLATION/PLANTING:
LOCATION: SHRUBS AND TREES SHOULD BE PLANTED IN THE LOCATIONS SHOWN ON THE PLANTING PLAN. QUANTITY AND TYPES OF PLANTS SHALL BE PLANTED PER THE PLANTING SCHEDULE & PLAN. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL PLANT MATERIAL IN THE APPROPRIATE PLANTING SEASON, NO SEEDING OR PLANTING SHALL OCCUR WHEN THE SOIL IS FROZEN, OR THE SITE IS FLOODED.

TIMING: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL PLANT MATERIAL IN THE APPROPRIATE SEASON FOR EACH PLANT TYPE. THE PLANTING SEASON FOR THE TREES AND SHRUBS SHALL EITHER BE FROM NOVEMBER 15 THROUGH DECEMBER 31 OR FEBRUARY 1 THROUGH APRIL 15. FOR LIVE STAKES THE INSTALLATION PERIOD SHALL EITHER BE NOVEMBER 15 THROUGH DECEMBER 15 OR FEBRUARY 1 THROUGH APRIL 1. THE PLANTING SEASON FOR THE HERBACEOUS PLANTS SHALL EITHER BE APRIL 15 THROUGH JUNE 15 OR SEPTEMBER 1 THROUGH OCTOBER 15.

METHOD: FOLLOW INSTRUCTIONS IN PLANTING DETAILS. ALL CONTAINERIZED AND BAREROOT PLANTS SHALL BE SET STRAIGHT OR PLUMB FOR AN UPRIGHT GROWTH PATTERN. THE PLANTING HOLES SHALL BE TWICE THE WIDTH OF THE ROOTS / ROOT BALLS. HOLES SHALL BE BACKFILLED WITH THE NATIVE SOIL AFTER REMOVING STONES, ROOTS, TRASH, AND OTHER DEBRIS GREATER THAN 1.5 INCHES IN DIAMETER. AFTER BACKFILLING THE HOLE, ALL PLANTED SPECIES SHOULD BE WATERED TO THE POINT OF SOIL SATURATION IF NOT PLANTED IN AN EXISTING WET CONDITION.

PLANTS INSTALLED IN THE LANDSCAPED AREA AROUND THE INFILTRATION CASCADE/POOL SYSTEM SHALL BE MULCHED WITH DOUBLE SHREDDED HARDWOOD. TREES AND SHRUBS SHALL HAVE A 2-FT RADIUS MULCH RING, AND HERBACEOUS PERENNIALS SHALL BE IN MULCHED AREAS OR STRIPS PER PLAN. FOLLOW INSTRUCTIONS IN PLANTING PLAN AND DETAIL.

LIVESTAKES SHALL BE SET PERPENDICULAR TO BANK SLOPE, AND AT 45 DEGREES LEANING DOWNSTREAM. SEE DETAILS FOR LIVE STAKE LAYOUT AND INSTALLATION.

DURING PLANTING THE CONTRACTOR SHALL WATER EACH PLANT WITH THE FOLLOWING MINIMUM QUANTITIES OF WATER, UNLESS OWNER DETERMINES THERE IS SUFFICIENT SOIL MOISTURE ON SITE:

TREES	2 GALLONS OF WATER
SHRUBS	1 GALLON OF WATER
PLUGS AND PERENNIALS	1 PINT OF WATER
BAREROOTS	NOT NECESSARY UNLESS SOIL IS DRY

THE CONTRACTOR SHALL GUARANTEE AND MAINTAIN ALL PLANT MATERIALS FOR A PERIOD OF ONE YEAR AFTER DATE OF ACCEPTANCE OF FINISHED PLANTING. MAINTENANCE SHALL INCLUDE (BUT NOT BE LIMITED TO) WATERING AS NEEDED TO PROVIDE SUFFICIENT MOISTURE FOR PLANT ESTABLISHMENT.

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

PLANTING PLAN KEY SHEET & NOTES

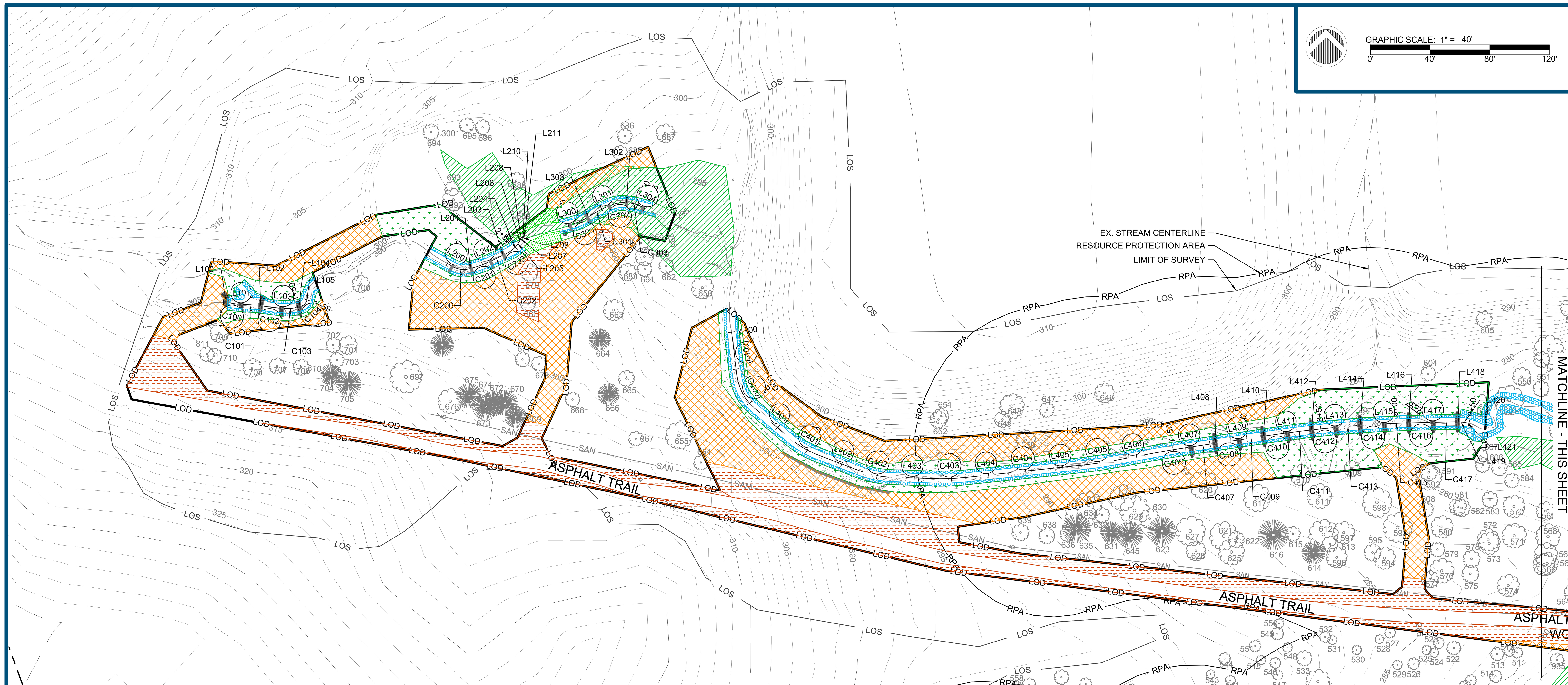
PRINCE WILLIAM COUNTY, VA

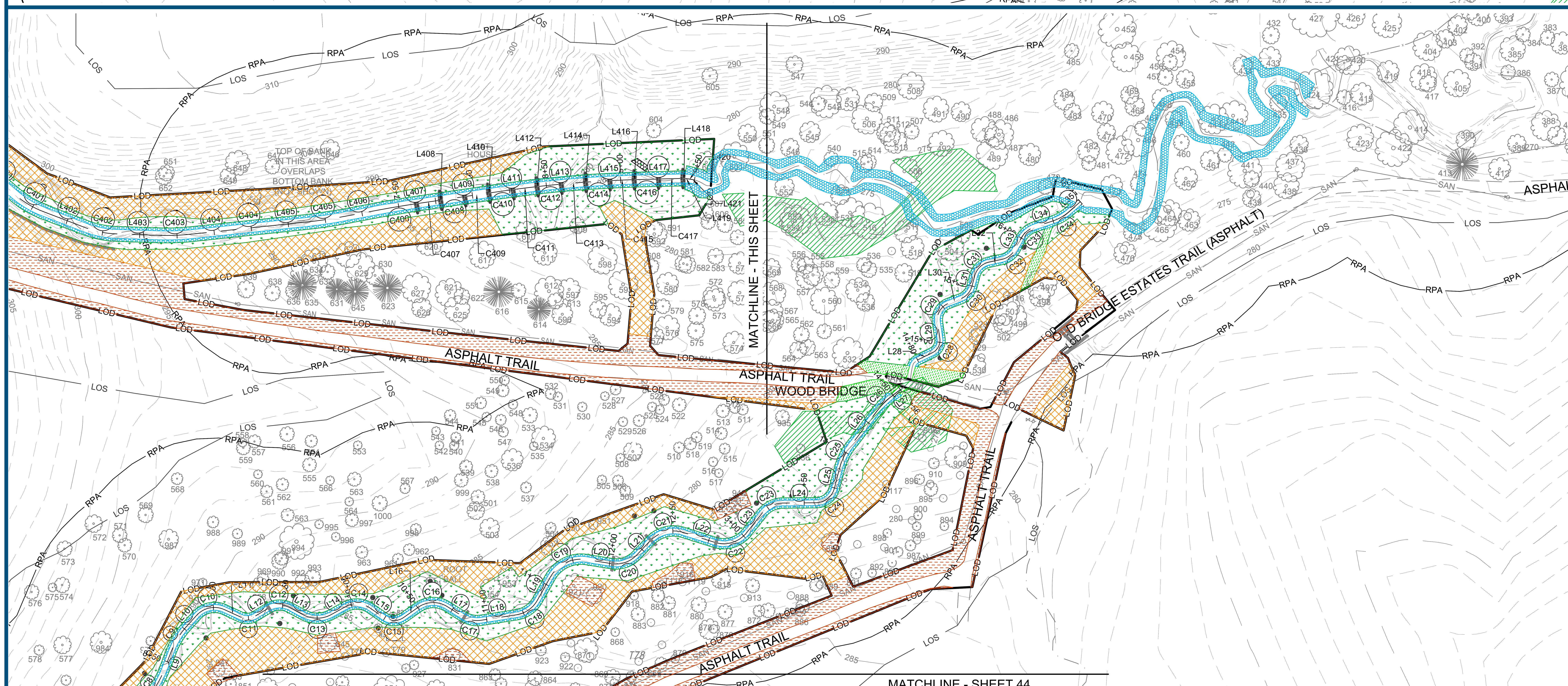
STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	
Signature	Date: 11/2021
60% DESIGN REVIEW	
Signature	Date: 11/14/2022
CONSTRUCTION PLAN REVIEW	
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	42 OF 48





GRAPHIC SCALE: 1" = 40'
0' 40' 80' 120'

PLANTING PLAN LEGEND:

- EX. PROPERTY LINE
- LOS — LIMITS OF SURVEY
- RPA — EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CONTOUR MAJOR
- EX. CONTOUR MINOR
- EX. FORESTED WETLAND
- EX. TREES TO REMAIN
- EX. TREE STUMP TO REMAIN
- PR. CONTOUR MAJOR
- PR. CONTOUR MINOR
- PR. STREAM CENTERLINE
- LOD — PR. LIMITS OF DISTURBANCE
- PR. FLOODPLAIN PLANTING AND SEEDING (0.86 AC.)
- PR. UPLAND PLANTING AND SEEDING (1.49 AC.)
- PR. UPLAND SEEDING ONLY (1.22 AC.)
- PR. FLOODPLAIN SEEDING ONLY (0.038 AC.)
- PR. STREAM BANK PLANTING (6,126 L.F.)
- DETAIL # / SHEET # — DETAIL CALLOUT
- PR. LOG SILL
- PR. ROCK SILL

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA. SEE SHEET 2 FOR SURVEY NOTES.

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CHINN PARK STREAM RESTORATION & STORMWATER BMP PRINCE WILLIAM COUNTY

PLANTING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

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x [signature] 11/2021
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Signature Date

CONSTRUCTION PLAN REVIEW
x
Signature Date

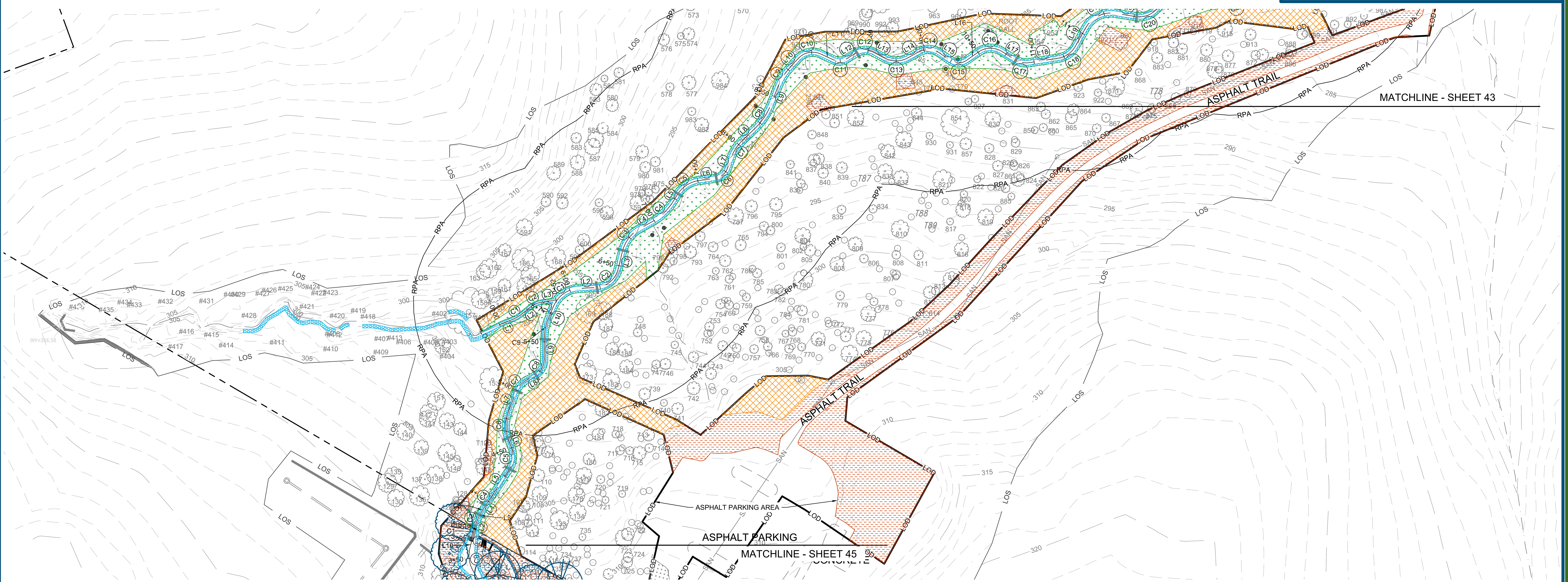
REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	43 OF 48

GRAPHIC SCALE: 1" = 40'
0' 40' 80' 120'

PLANTING PLAN LEGEND:

- EX. PROPERTY LINE
- LIMITS OF SURVEY (LOS)
- EX. RESOURCE PROTECTION AREA (RPA)
- EX. STREAM CENTERLINE
- EX. CONTOUR MAJOR
- EX. CONTOUR MINOR
- EX. FORESTED WETLAND
- EX. TREES TO REMAIN
- EX. TREE STUMP TO REMAIN
- PR. CONTOUR MAJOR
- PR. CONTOUR MINOR
- PR. STREAM CENTERLINE
- PR. LIMITS OF DISTURBANCE (LOD)
- PR. FLOODPLAIN PLANTING AND SEEDING (0.86 AC.)
- PR. UPLAND PLANTING AND SEEDING (1.49 AC.)
- PR. UPLAND SEEDING ONLY (1.22 AC.)
- PR. FLOODPLAIN SEEDING ONLY (0.038 AC.)
- PR. STREAM BANK PLANTING (6,126 L.F.)
- PR. DETAILED LANDSCAPE PLANTING AREA (0.46 AC.)
- PR. TURF GRASS (0.163 AC. SEED)
- DETAIL # / SHEET # — DETAIL CALLOUT
- PR. LOG SILL
- PR. ROCK SILL



NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON GROUND SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC FROM MAY-AUGUST 2021. CONTOUR INTERVAL IS ONE (1) FOOT. TOPOGRAPHY OUTSIDE THE SURVEY LIMITS IS BASED ON GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
2. WETLAND DELINEATION PERFORMED IN SEPTEMBER 2021 AND LOCATED BY PRINCE WILLIAM COUNTY.
3. PROPERTY LINES ARE BASED ON AVAILABLE GIS DATA. SEE SHEET 2 FOR SURVEY NOTES.

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

PLANTING PLAN

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:
COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
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5/17/24
PROFESSIONAL ENGINEER

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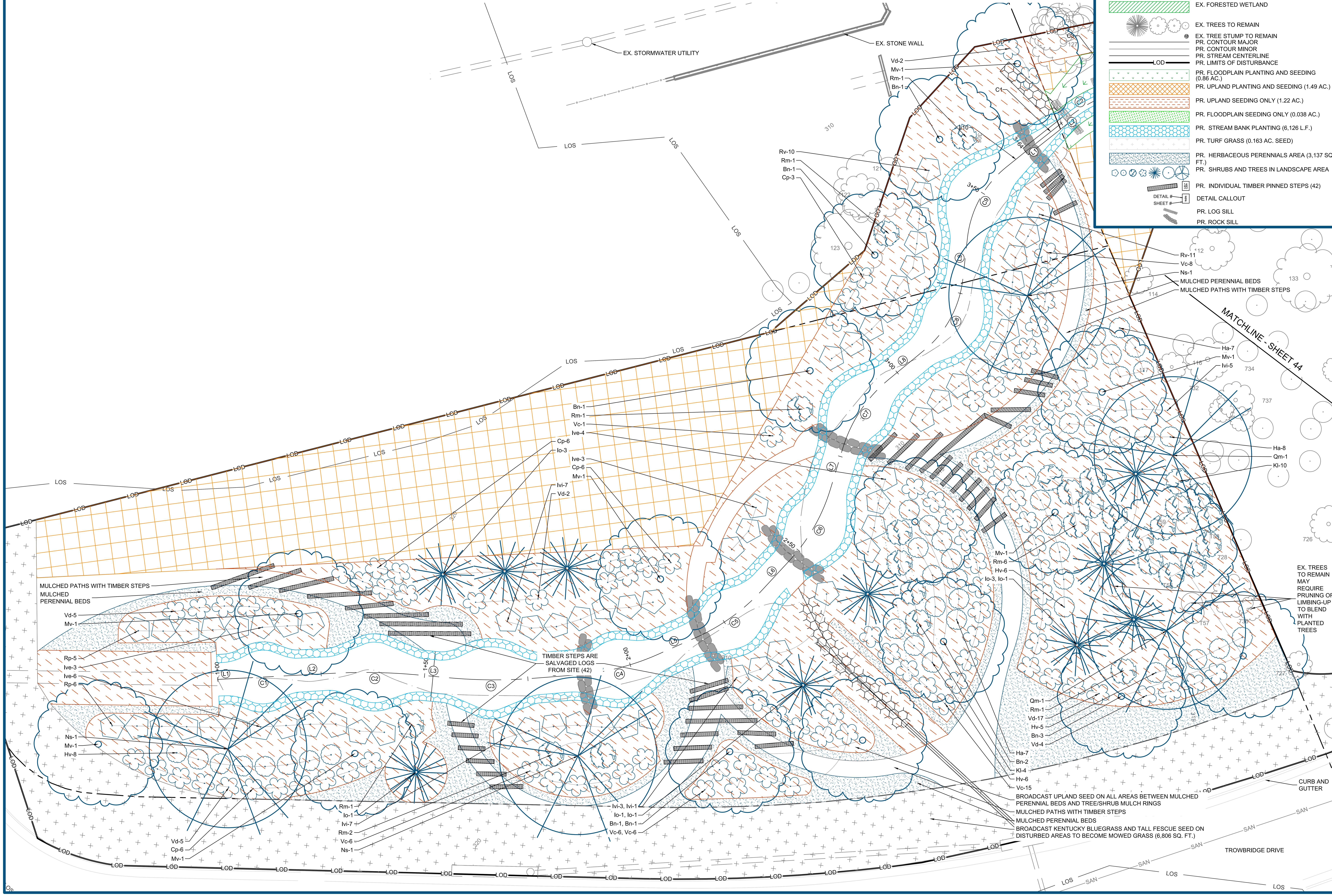
x Signature	11/14/2022 Date
CONSTRUCTION PLAN REVIEW	
x Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	44 OF 48

PLANTING PLAN FOR LANDSCAPED AREA SURROUNDING THE INFILTRATION CASCADE/POOL SYSTEM

GRAPHIC SCALE: 1" = 10'
0' 10' 20' 30'



PLANTING PLAN LEGEND:

- EX. PROPERTY LINE
- LIMITS OF SURVEY
- EX. RESOURCE PROTECTION AREA
- EX. STREAM CENTERLINE
- EX. CONTOUR MAJOR
- EX. CONTOUR MINOR
- EX. FORESTED WETLAND
- EX. TREES TO REMAIN
- EX. TREE STUMP TO REMAIN
- PR. CONTOUR MAJOR
- PR. CONTOUR MINOR
- PR. STREAM CENTERLINE
- PR. LIMITS OF DISTURBANCE
- PR. FLOODPLAIN PLANTING AND SEEDING (0.86 AC.)
- PR. UPLAND PLANTING AND SEEDING (1.49 AC.)
- PR. UPLAND SEEDING ONLY (1.22 AC.)
- PR. FLOODPLAIN SEEDING ONLY (0.038 AC.)
- PR. STREAM BANK PLANTING (6,126 L.F.)
- PR. TURF GRASS (0.163 AC. SEED)
- PR. HERBACEOUS PERENNIALS AREA (3,137 SQ. FT.)
- PR. SHRUBS AND TREES IN LANDSCAPE AREA
- PR. INDIVIDUAL TIMBER PINNED STEPS (42)
- DETAIL CALLOUT
- PR. LOG SILL
- PR. ROCK SILL

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

PLANTING PLAN - ENLARGEMENT

PRINCE WILLIAM COUNTY, VA

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Lic. No. 43860
5/17/24
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Signature	11/2021	Date
60% DESIGN REVIEW		
Signature	11/14/2022	Date
CONSTRUCTION PLAN REVIEW		
Signature		Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AKB/AH/BS/LS
DRAWN:	AKB/LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	45 OF 48

TABLE 3.31-B

ACCEPTABLE TEMPORARY SEEDING PLANT MATERIALS

"QUICK REFERENCE FOR ALL REGIONS"

Planting Dates	Species	Rate (lbs./acre)
Sept. 1 - Feb. 15	~~50/50 Mix of Annual Ryegrass (Lolium multi-florum)~~ & Cereal (Winter) Rye (Secale cereale) OR OATS	10* ~~50 - 100~~
Feb. 16 - Apr. 30	~~Annual Ryegrass (Lolium multi-florum)~~ OR OATS	10* ~~60 - 100~~
May 1 - Aug 31	German Millet (Setaria italica)	10* ~~50~~

Source: Va. DSWC

*WHEN USED IN COMBINATION WITH NATIVE SEEDING

FLOODPLAIN SEED MIX

ACRES	0.90
POUNDS PER ACRE	25
TOTAL POUND	22.5

SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS	%
Grasses (42.1%)/Sedges (46.9%)			
Scirpus cyperinus	*Woolgrass*	*OBL*	*0.1%*
Carex lurida	*Lurid Sedge*	*OBL*	*5.0%*
Carex vulpinoidea	*Fox Sedge*	*OBL*	*16.9%*
Carex frankii	*Franks sedge*	*OBL*	*5.0%*
Elymus virginicus	*Va Wildrye*	*FACW*	*20.0%*
Juncus effusus	*Common Sedge*	*FACW*	*20.0%*
Dichanthelium clandestinum	*Deer Tongue*	*FACW*	*20.0%*
Cinna arundinacea	*Wood reedgrass*	*FACW*	*2.0%*
Forbs (11%)			
Helianthus angustifolius	*Swamp Sunflower*	*FACW*	*1.0%*
Persicaria pensylvanicum	*PA Smartweed*	*FACW*	*5.0%*
Bidens aristosa	*Showy Tickseed (NC)*	*FACW*	*5.0%*
			100.0%

FLOODPLAIN PLANTING SCHEDULE

ACRES	0.86
PLANTS PER ACRE	400
TOTAL PLANTS	345

SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS	SIZE	STOCK	%	QUANTITY
CANOPY						
Acer rubrum	Red maple	FAC	1" caliper *	Container	8.3%	29
Carpinus caroliniana	American hornbeam	FAC	1" caliper *	Container	8.3%	29
Diospiros virginiana	Common persimmon	FAC	1" caliper *	Container	8.3%	29
Magnolia virginiana	Sweetbay magnolia	FACW	1" caliper *	Container	5.0%	18
Nyssa sylvatica	Black gum	FAC	1" caliper *	Container	8.3%	29
Platanus occidentalis	American sycamore	FACW	1" caliper *	Container	16.6%	57
Quercus phellos	Willow oak	FAC	1" caliper *	Container	8.3%	29
UNDERSTORY/SHRUB						
Aronia arbutifolia	Red chokeberry	FACW	12-24"	1 G **	7.7%	27
Cephalanthus ocidentalis	Buttonbush	OBL	12-24"	1 G **	8.0%	28
Itea virginica	Virginia sweetspire	FACW	12-24"	1 G **	8.0%	28
Lindera benzoin	Spicebush	FACW	12-24"	1 G **	8.0%	28
Viburnum dentatum	Southern arrowwood	FACW	12-24"	1 G **	5.0%	17
					100%	**345**

** Trees shall be 1" caliper. Container size is less important.*
*** Shrubs shall be in 1 G containers. Shrub size is less important.*

UPLAND SEED MIX

ACRES	2.71
POUNDS PER ACRE	25
TOTAL POUNDS OF SEED	67.8

SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS	%
Grasses(89.5%)			
Agrostis perennans	*Autumn Bentgrass*	*FACU*	*5.0%*
Andropogon virginicus	*Broomsedge*	*FACU*	*5.0%*
Chasmanthium latifolium	*River Oats*	*FACU*	*15.0%*
Elymus virginicus	*VA Wildrye*	*FACW*	*15.0%*
Dichanthelium clandestinum	*Deertongue*	*FACW*	*14.5%*
Schizachyrium scoparium	*Little Bluestem*	*FACU*	*25.0%*
Tridens flavus	*Purpletop*	*FACU*	*10.0%*
Forbs (10.5%)			
Rubeckia hirta	*Black Eyed Susan*	*FACU*	*0.5%*
Helianthus maximiliani	*Maximilian Sunflower*	*UPL*	*2.0%*
Desmodium paniculatum	*Panicledleaf Ticktrefoil*	*FACU*	*1.0%*
Chamaecrista fasciculata	*Partridge Pea*	*FACU*	*3.0%*
Bidens aristosa	*Showy Tickseed (NC)*	*FACW*	*3.0%*
Baptisia australis	*Blue False Indigo*	*FACU*	*1.0%*
			100.0%

UPLAND PLANTING SCHEDULE

ACRES	1.49
PLANTS PER ACRE	400
TOTAL PLANTS	596

SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS	SIZE	STOCK	%	QUANTITY
CANOPY						
Acer rubrum	Red maple	FAC	1" caliper*	Container	16.6%	99
Carya glabra	Pignut Hickory	FAC	1" caliper*	Container	8.3%	49
Fagus grandifolia	American beech	FACU	1" caliper*	Container	8.3%	49
Nyssa sylvatica	Black gum	FAC	1" caliper*	Container	8.3%	49
Quercus alba	White oak	FACU	1" caliper*	Container	8.3%	49
Quercus montana	Chestnut oak	UPL	1" caliper*	Container	8.3%	49
Quercus phellos	Willow oak	FAC	1" caliper*	Container	16.6%	99
UNDERSTORY/SHRUB						
Carpinus caroliniana	Ironwood	FAC	12-24"	1 G **	8.3%	49
Cornus florida	Flowering dogwood	FACU	12-24"	2 G **	8.3%	49
Hamamelis virginiana	Common witch-hazel	FACU	12-24"	3 G **	8.3%	49
					100%	**596**

** Trees shall be 1" caliper. Container size is less important.*
*** Shrubs shall be in 1 G containers. Shrub size is less important.*

STREAM BANK PLANT SCHEDULE

LINEAR FEET OF LEFT & RIGHT BANKS	*6,126*	***NUMBER OF ROWS BY BANK TYPE:***	
SPACING OF PLANTS IN FEET	*1.5*	*OUTER BEND*	*TWO ROWS, STAGGERED*
PLANTS PER LINEAR FOOT	*0.7*	*INNER BEND*	*NONE*
TOTAL PLANTS MINIMUM	*4,288*	*RIFFLE*	*ONE ROW*
TOTAL PLANTS, ROUNDED	***4,300***		

SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS	SIZE	STOCK	%	QUANTITY
*Cephalanthus occidentalis**	*Buttonbush*	*OBL*	*2-3'*	*Livestakes*	*34.8%*	*1,500*
Cornus amomum	*Silky dogwood*	*FACW*	*2-3'*	*Livestakes*	*32.6%*	*1,400*
Salix sericea	*Silky Willow*	*OBL*	*2-3'*	*Livestakes*	*32.6%*	*1,400*
				TOTAL PLANTS TO ORDER	***100%***	***4,300***

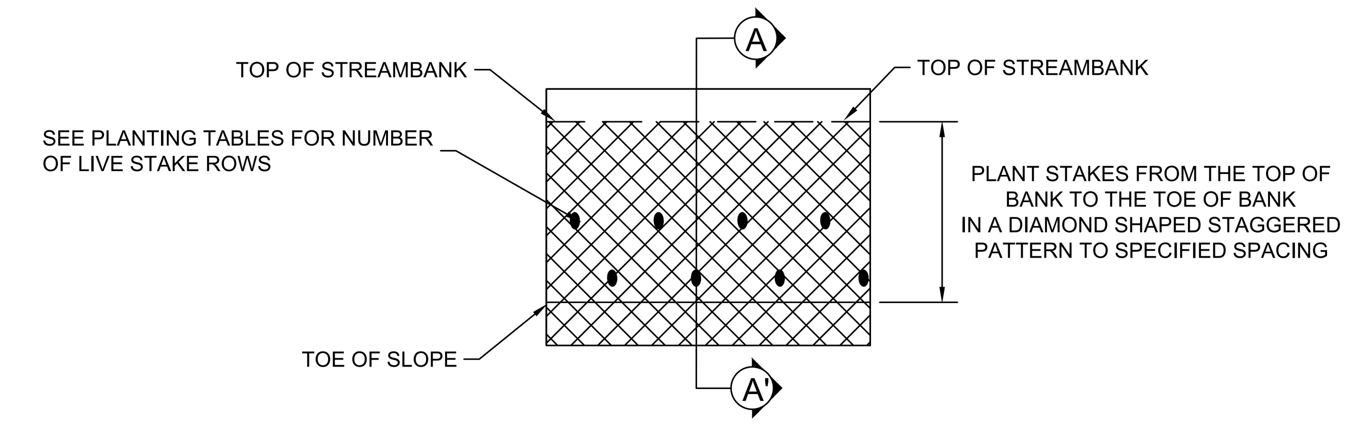
Note: Stream bank plantings shall be installed below top of bank, per planting plan and details.
** Species tolerates more shade than others.*

CASCADE / POOL LANDSCAPE AREA PLANT SCHEDULE

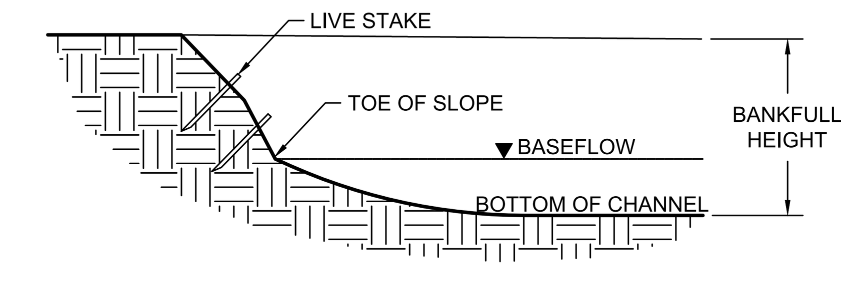
ACRES	0.46
WOODY STEMS PER ACRE	600
TOTAL WOODY STEMS	277
TOTAL PLANTS	1,025

SCIENTIFIC NAME	COMMON NAME	INDICATOR STATUS	CONTAINER SIZE	LABEL ABBREV.	SYMBOL	AREA	QUANTITY
CANOPY TREES							
Betula nigra	River birch	FACW	1" CALIPER	Bn	Small deciduous	RIPARIAN	10
Magnolia virginiana	Sweetbay magnolia	FACW	1" CALIPER	Mv	Small deciduous	RIPARIAN	7
Quercus montana	Chestnut oak	UPL	1" CALIPER	Qm	Large deciduous	UPLAND	2
Nyssa sylvatica	Black gum	FAC	1" CALIPER	Ns	Large deciduous	UPLAND	3
Ilex opaca	American holly	FAC	1" CALIPER	Io	Evergreen	UPLAND	10
							32
UNDERSTORY SHRUBS							
Comptonia peregrina	Sweet fern	UPL	1G	Cp	Five-lobed shrub	UPLAND	21
Hamamelis virginiana	Common witch-hazel	FACU	1G	Hv	Fluffy circle	UPLAND	25
Hydrangea arborescens	Smooth hydrangea	UPL	1G	Ha	Fluffy circle	UPLAND	22
Ilex verticillata	Winterberry holly	FACW	1G	Ive	Pentagon shrub	RIPARIAN	16
Itea virginica	Virginia sweetspire	FACW	1G	Ivi	Pentagon shrub	RIPARIAN	23
Kalmia latifolia	Mountain laurel	FACU	1G	Kl	Angular shrub	UPLAND	14
Rhododendron maximum	Great rhododendron	FAC	1G	Rm	Angular shrub	UPLAND	13
Rhododendron periclymenoides	Pinxterbloom azalea	FAC	1G	Rp	Pentagon shrub	RIPARIAN	11
Rhododendron viscosum	Swamp azalea	OBL	1G	Rv	Pentagon shrub	RIPARIAN	21
Vaccinium fuscatum or corymbosum	Highbush blueberry	FACW	1G	Vc	Five-lobed shrub	UPLAND	42
Viburnum dentatum	Arrowwood	FAC	1G	Vd	Five-lobed shrub	UPLAND	35
							243
HERBACEOUS PERENNIALS							
Amsonia hubrictii	Threadleaf bluestar		1Q	Ah	Hatched area	SUN	150
Baptisia australis	False indigo		1Q	Ba	Hatched area	SUN	75
Heucera americana	Coral bells		1Q	Ham	Hatched area	SHADE	75
Liatris spicata	Dense blazing star		1Q	Ls	Hatched area	SUN	38
Lupinus perennis	Sundial lupine		1Q	Lp	Hatched area	SUN/SHADE	75
Panicum virgatum	Switchgrass		1Q	Pv	Hatched area	SUN	150
Solidago rugosa	Rough stemmed goldenrod		1Q	Sr	Hatched area	SUN	38
Thelypteris noveboracensis	New York fern		1Q	Tn	Hatched area	SHADE	150
							750

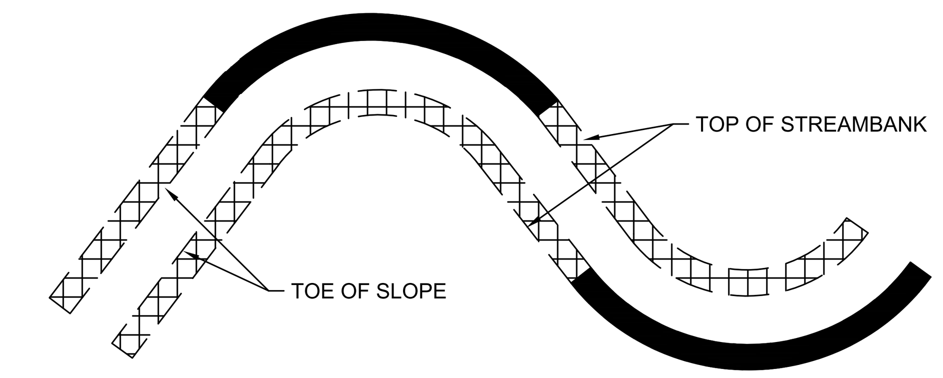
MULCHED AREAS	AREA
HERBACEOUS PERENNIAL STRIPS	3137
MULCHED PATHWAYS	1581
2-FT RADIUS RINGS AROUND TREES	402
2-FT RADIUS RINGS AROUND SHRUBS	3054
TOTAL SQUARE FEET	8174
IN CUBIC YARDS	75.7



PLAN VIEW



SECTION A-A'



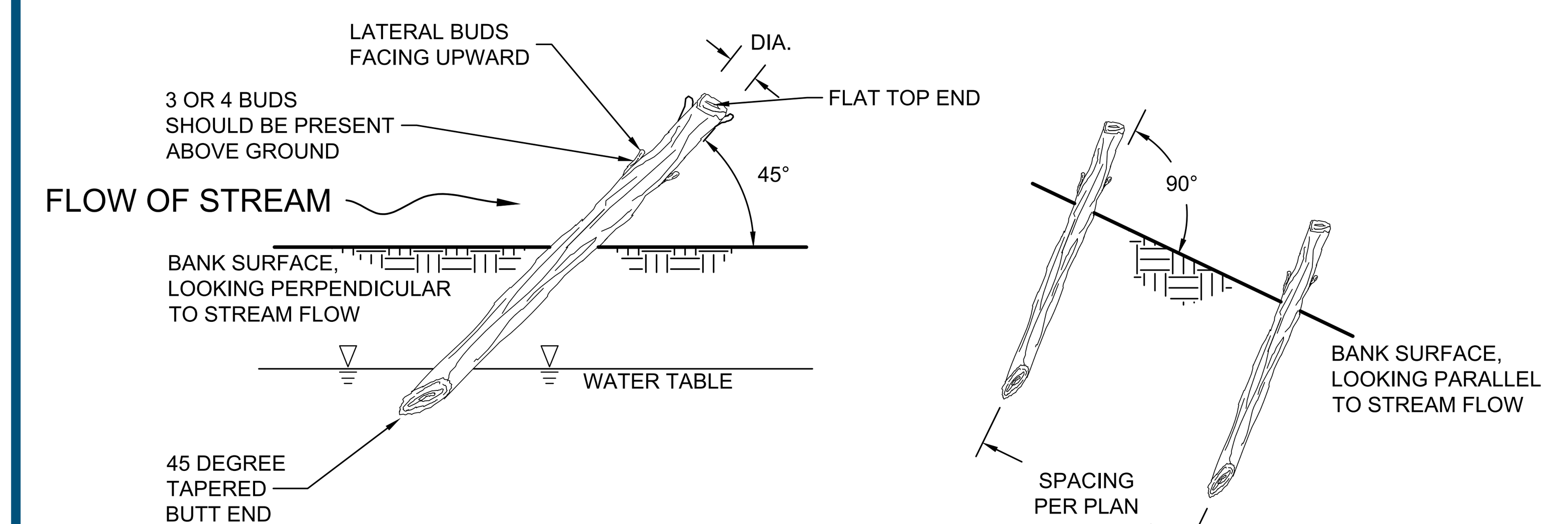
LIVE STAKE SPACING PLAN VIEW

INNER BEND/ RIFFLE SPACING PER PLANTING TABLE

OUTER BEND SPACING PER PLANTING TABLE

16 LIVE STAKE LAYOUT

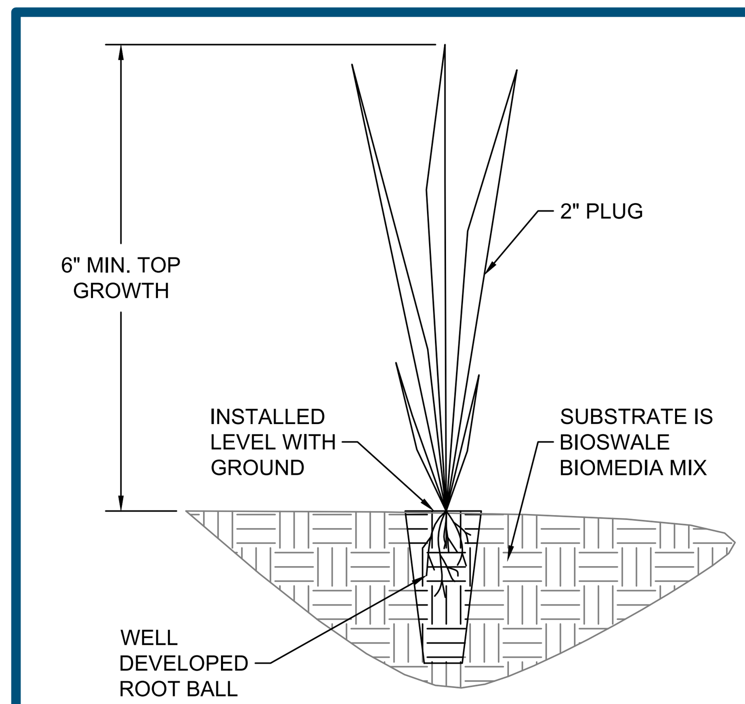
NOT TO SCALE



NOTES:
1. DO NOT INSTALL LIVE STAKES THAT HAVE BEEN SPLIT.
2. LIVE STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
3. LIVE STAKES SHOULD BE 1 TO 2 INCHES IN DIAMETER.
4. LIVE STAKES SHOULD BE LONG ENOUGH TO REACH BELOW THE GROUNDWATER TABLE (2 TO 3 FEET IN LENGTH).
5. LIVE STAKES SHOULD BE INSTALLED LEAVING 4 TO 8 INCHES ABOVE GROUND.
6. LIVE STAKES SHOULD BE INSERTED AT A 45° ANGLE TO THE BANK AND POINTED DOWNSTREAM.

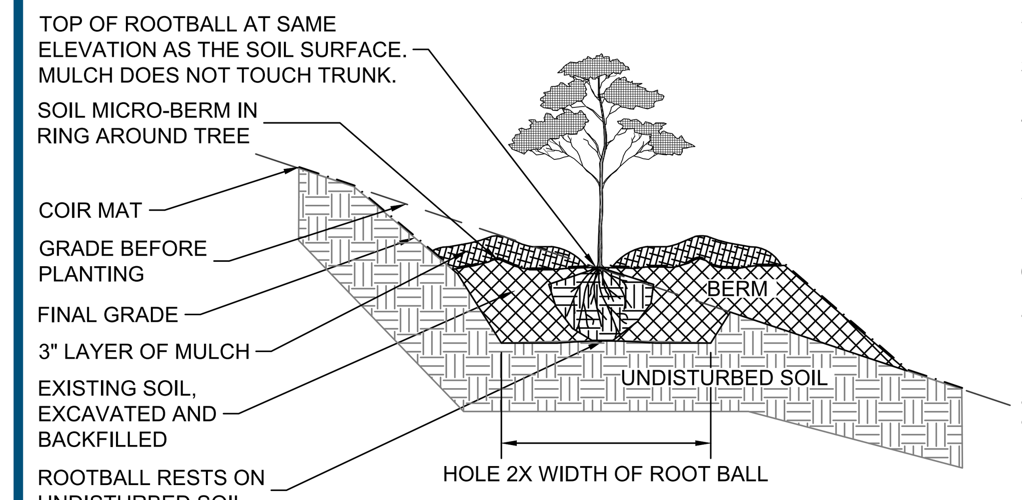
17 LIVE STAKE INSTALLATION

NOT TO SCALE



18 HERBACEOUS PLUG PLANTING

NOT TO SCALE



NOTES:
1. SLICE COIR MATTING AND FOLD BACK TO ACCESS.
2. CUT THE SLOPE UPHILL OF THE TREE. BUILD A CIRCULAR BERM DOWNHILL OF THE TREE (2:1 MAX.)
3. PLANTING HOLE SHALL BE AT LEAST 2X THE WIDTH OF THE POT. SCARIFY THE WALLS OF THE HOLE.
4. PLACE ROOT BALL IN HOLE. TOP OF ROOT BALL SHALL BE FLUSH WITH GRADE, AND BOTTOM SHALL SIT ON UNDISTURBED SOIL.
5. IF PLANT IS POT-BOUND, SCORE THE CIRCLING ROOTS WITH ½" DEEP LINEAR SLITS DOWN SIDES OF ROOT MASS.
6. BACKFILL WITH EXISTING EXCAVATED SOIL. TAMP SOIL FIRMLY WITH FEET.
7. AFTER BACKFILLING PLANTING HOLE, BEFORE MULCHING, APPLY WATER TO SOIL AROUND THE ROOT BALL.
8. REPLACE COIR MATTING AND SECURE IN PLACE.
9. TOPDRESS SOIL WITH A 3-IN THICK RING OF MULCH. LEAVE A 3-IN RADIUS UNCOVERED AROUND TRUNK / STEMS, TO PREVENT MULCH CONTACT AND STEM ROT.

19 CONTAINER PLANT INSTALLATION ON A SLOPE

NOT TO SCALE

res
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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

PLANTING DETAILS & SCHEDULES

PRINCE WILLIAM COUNTY, VA

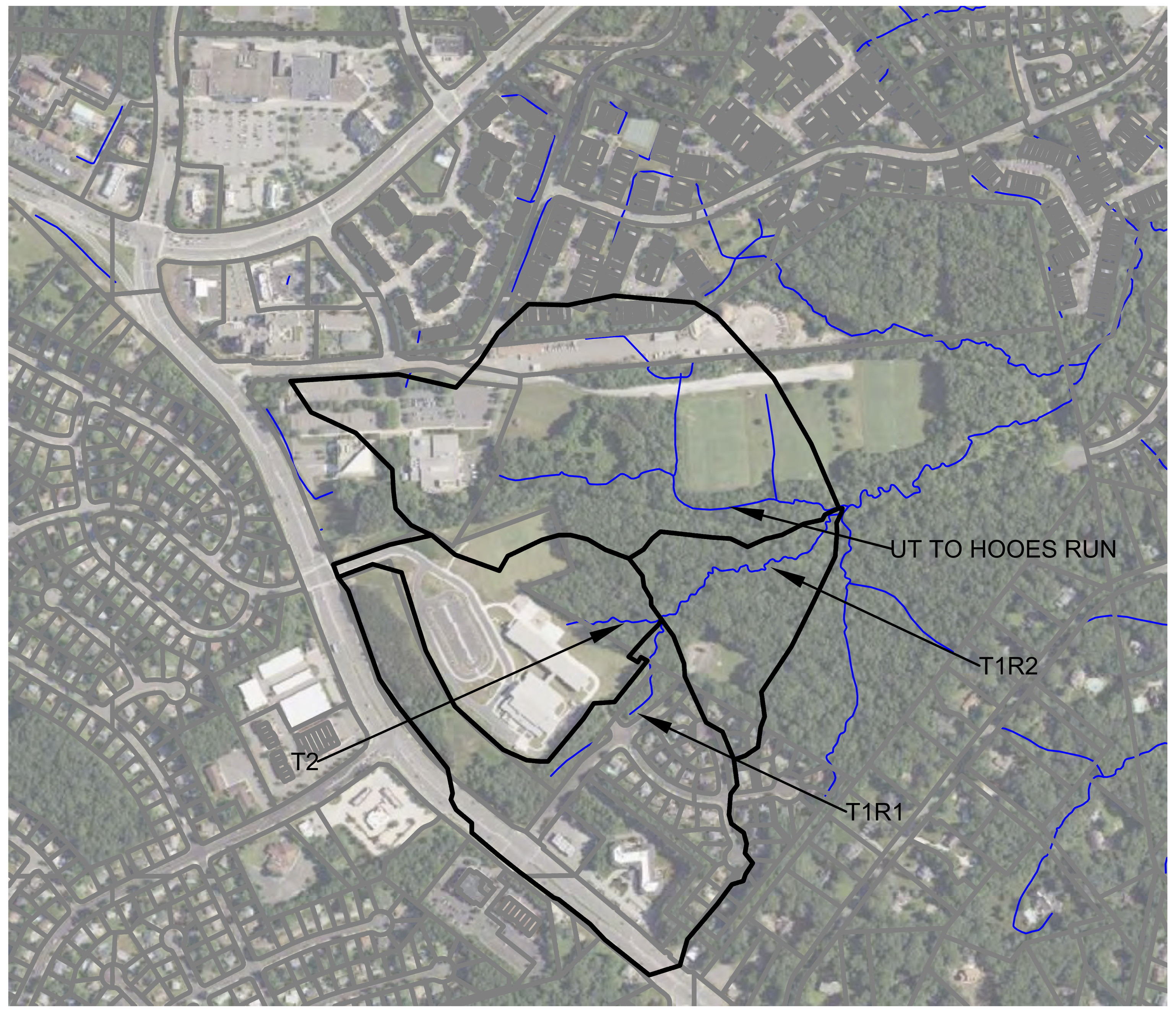
STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW	
x	11/2021
Signature	Date
60% DESIGN REVIEW	
x	11/14/2022
Signature	Date
CONSTRUCTION PLAN REVIEW	
x	
Signature	Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	46 OF 48



GRAPHIC SCALE: 1" = 500'

0' 500' 1000' 1500'

SUMMARY

THE UNNAMED TRIBUTARY (UT) TO HOOES RUN AND ITS TRIBUTARIES (TRIB 1 AND TRIB 2) WILL BE RESTORED USING NATURAL CHANNEL DESIGN (NCD) PRINCIPLES BASED ON APPLIED FLUVIAL GEOMORPHOLOGY. THE GOAL OF NCD IS TO PROVIDE NUTRIENT REDUCTIONS AND FUNCTIONAL UPLIFT TO STREAM CHANNELS BY WORKING WITH EXISTING STREAM PROCESSES TO CREATE A CHANNEL THAT IS DYNAMICALLY STABLE UNDER CURRENT HYDROLOGY AND SEDIMENT CONDITIONS.

1.0 WATERSHED AND GEOMORPHIC ANALYSIS

1.1 WATERSHED ASSESSMENT

A WATERSHED HYDROLOGY ANALYSIS FOR UT TO HOOES RUN AND ITS TRIBUTARIES WAS PERFORMED TO EVALUATE THE HYDROLOGIC CONTRIBUTIONS TO THE STREAMS FROM ON-SITE AND OFF-SITE AREAS. REGIONAL CURVES, TR-20/TR-55 MODELING RESULTS, AND HYDRAULIC ANALYSIS WITHIN EXISTING CROSS-SECTIONS WERE ANALYZED TO DETERMINE THE DESIGN DISCHARGE FOR RESTORATION. THE COMPLETED WATERSHED ASSESSMENT EXAMINED DRAINAGE AREA, IMPERVIOUS AREA, LAND USE, AND HYDROLOGY WITHIN EACH DRAINAGE AREA. WATERSHED BOUNDARIES CAN BE SEEN IN THE PROVIDED DRAINAGE AREA MAP. A SUMMARY OF THE WATERSHED AND LANDUSE DATA IS PRESENTED IN THE TABLE BELOW. CURRENT LAND USE WILL NOT CHANGE BECAUSE OF THIS PROJECT.

DRAINAGE AREA LAND COVER** SUMMARY

REACH	DRAINAGE AREA (MI^2)*	IMPERVIOUS (%)***	WOODS (%)	DEVELOPED/URBAN (%)	TURF (%)
UT TO HOOES RUN	0.060	25.9	48.1	22.3	3.8
T1R1	0.042	25.5	37.9	13.0	23.5
T1R2	0.086	24.9	42.5	19.3	13.2
T2	0.026	39.3	21.9	38.8	0.0

*Drainage areas are based upon the downstream terminus of restoration.
**Landcover based on Bing Aerial Imagery, 2021 . Percentages may overlap (eg. urban and impervious.)
*** Precentages may not add up to 100%, some overlap expected with urban lands and impervious cover

1.2 BASEMAPPING

ONE FOOT CONTOUR INTERVAL TOPOGRAPHY WAS OBTAINED FOR THE PROJECT AREA IN MAY THROUGH AUGUST OF 2021. OUTSIDE OF THE PROJECT AREA, TWO FOOT CONTOUR INTERVAL TOPOGRAPHY WAS OBTAINED FROM COUNTY GIS CONTOURS.

1.3 HYDRAULIC ASSESSMENT

A ONE-DIMENSIONAL HYDRAULIC ANALYSIS WAS COMPLETED FOR EACH EXISTING RIFFLE CROSS-SECTION TO VERIFY BANKFULL DISCHARGE, ANALYZE REFERENCE GEOMORPHOLOGY, AND TO COMPUTE CHANNEL SHEAR STRESS FOR SEDIMENT COMPETENCY DETERMINATION. A SUMMARY FOR EACH EXISTING CROSS-SECTION IS FOUND IN SECTION 1.5.

1.4 BANKFULL VERIFICATION

A TOTAL OF FOUR EXISTING CROSS-SECTIONS WERE SURVEYED TO DETERMINE SITE SPECIFIC BANKFULL CHARACTERISTICS. DATA OBTAINED FROM THE EXISTING BANKFULL CHANNEL DIMENSIONS WERE USED AS GUIDANCE FOR DESIGN CROSS-SECTIONS. A "CONVERGENCE OF EVIDENCE" APPROACH WAS USED TO IDENTIFY THE DESIGN DISCHARGE AND TO VERIFY BANKFULL FOR DESIGN. REGIONAL CURVE INFORMATION, TR-20/TR-55 MODELING RESULTS, AND HYDRAULIC ANALYSIS OF EXISTING CROSS-SECTIONS WERE ANALYZED TO DETERMINE TRENDS FOR THE MOST APPROPRIATE DISCHARGE FOR THE PROJECT REACHES.

1.4.1 REGIONAL CURVES FOR BANKFULL FLOW DISCHARGE ESTIMATES

THE PROJECT LOCATION FALLS WITHIN THE TRANSITIONAL ZONE BETWEEN THE COASTAL PLAIN AND THE PIEDMONT PHYSIOGRAPHIC PROVINCES. THE CHANNEL SLOPE AND BED MATERIAL ALIGN MORE CLOSELY WITH THE PIEDMONT REGION, THEREFORE REGIONAL CURVES DEVELOPED IN THE PIEDMONT PHYSIOGRAPHIC REGION WERE REVIEWED FOR THIS PROJECT. THE MARYLAND PIEDMONT NON-URBAN CURVE MOST CLOSELY RESEMBLES THE CONDITIONS OF THE SITE, THOUGH THE STUDIED STREAMS FOR THE CURVE HAVE A LOWER PERCENTAGE IMPERVIOUS SURFACES COMPARED TO THIS PROJECT'S URBAN DRAINAGE AREAS. BASED ON THE DRAINAGE AREA OF UT TO HOOES RUN AND ITS TRIBUTARIES, THE MARYLAND PIEDMONT REGIONAL CURVE WAS USED AS ONE PREDICTOR FOR THE DISCHARGE AND DIMENSIONS OF THE DESIGN CHANNEL. RESULTS FROM THE REGIONAL CURVE ANALYSIS ARE PROVIDED IN THE TABLE BELOW.

REGIONAL CURVE SUMMARY*

REACH	DRAINAGE AREA (MI^2)	Q_{bkf} (cfs)	A_{bkf} (sf)	W_{bkf} (ft)	D_{bkf} (ft)
UT TO HOOES RUN	0.060	9.97	2.23	4.93	0.45
T1R1	0.042	7.60	1.72	4.29	0.40
T1R2	0.086	13.10	2.91	5.68	0.51
T2	0.026	5.28	1.21	3.56	0.34

*Selected the USFWS Maryland Piedmont published regional curves.

1.4.2 TR-20/TR-55 PEAK FLOW MODELING

PEAK FLOWS WERE CALCULATED WITH HYDROCAD USING SCS TR-20 METHODOLOGY. FLOW RESULTS FOR T2 INCLUDE DISCHARGE FROM THE 42" PIPE OUTFALL OF AN UNDERGROUND STORAGE FACILITY INSTALLED (COLLECTING ~ 12 AC OF DRAINAGE) AT THE PRINCE WILLIAM PARKWAY ELEMENTARY SCHOOL. THIS FACILITY SREDUCES STORM FLOWS UP TO THE 10-YR FLOW EVENT. FLOW RESULTS FOR T1R2 COMBINE DISCHARGE FROM T1R1 AND T2 AS WELL AS ~ 11 AC. OF ADDITIONAL DRAINAGE DOWNSTREAM OF THEIR CONFLUENCE. SOILS WERE PREDOMINANTLY HYDROLOGIC GROUP B WITH SOME C SOILS FOR T1R1, T1R2, T2, AND THE UT TO HOOES RUN WITH STEEP SLOPES PRESENT IN SOME AREAS. TIME OF CONCENTRATION (TC) VALUES WERE CALCULATED USING SHEET FLOW FOR A MAXIMUM OF 100 FEET FOLLOWED BY SHALLOW CONCENTRATED FLOW AND FINALLY CHANNEL FLOW USING TR-55 METHODOLOGY. FOR T1R1'S TC, PIPE FLOW WAS ALSO UTILIZED IN ORDER TO CAPTURE THE EXISTING STORMWATER MANAGEMENT (SWM) NETWORK ALONG PRINCE WILLIAM PARKWAY. LAND USE TYPES FOR EACH DRAINAGE AREA (DA) WERE DIVIDED INTO GRASS IN GOOD CONDITION, FORESTED IN GOOD CONDITION, IMPERVIOUS AND RESIDENTIAL LOTS RANGING FROM 0.1 AC TO 1.0 AC. THESE DA VALUES WERE OBTAINED USING BING MAPS AERIAL IMAGERY.

TR-20/TR-55 RESULTS

REACH	DRAINAGE AREA (MI^2)	1-YR (CFS)	2-YR (CFS)	10-YR (CFS)	100-YR (CFS)
UT TO HOOES RUN	0.060	13.40	22.85	62.25	153.09
T1R1	0.042	14.50	23.29	58.80	138.33
T1R2	0.086	16.65	27.91	85.93	297.60
T2	0.026	1.41	2.49	16.49	125.56

1.5 PROJECT REACH GEOMORPHIC ASSESSMENT

A DETAILED GEOMORPHIC SURVEY WAS CONDUCTED FOR UT TO HOOES RUN AND ITS TRIBUTARIES, INCLUDING WATER SURFACE AND BED SLOPES, CROSS-SECTION DIMENSIONS, BANKFULL DIMENSIONS, AND BED MATERIAL SIZE. THE GEOMORPHIC SURVEY DATA WAS ANALYZED TO DETERMINE EXISTING HYDRAULIC VARIABLES AND BANKFULL FLOWS. THE CROSS-SECTIONS CHOSEN ARE REPRESENTATIVE OF EXISTING CONDITIONS ONSITE. THESE SECTIONS INCLUDE BANKFULL FORMING FEATURES WHERE THEY WERE APPARENT. A BANK ASSESSMENT FOR NON-POINT SOURCE CONSEQUENCES OF SEDIMENT (BANCS) ANALYSIS WAS COMPLETED TO DETERMINE LATERAL STABILITY AND WAS USED TO HELP DETERMINE RESTORATION REACHES. GEOMORPHIC SURVEY HYDRAULIC MODELING RESULTS CAN BE FOUND IN THE TABLE BELOW.

GEOMORPHIC XS ASSESSMENT SUMMARY

REACH	DRAINAGE AREA (MI^2)	Q_{bkf} (cfs)	A_{bkf} (sf)	W_{bkf} (ft)	D_{bkf} (ft)	W/D	SLOPE (%)	n	VELOCITY (FPS)	SHEAR STRESS (lb/ft^2)	D50 (mm)	D85 (mm)	THRESHOLD GRAIN SIZE (mm)
UT TO HOOES RUN	0.060	19.5	6.0	11.9	0.5	23.7	2.7	0.047	3.3	0.84	37	76	41
T1R1	0.042	20.4	3.3	4.8	0.7	7.1	4.3	0.032	6.2	1.37	37	76	68
T1R2	0.086	23.8	4.5	11.8	0.6	31.5	5.2	0.038	1.5	0.12	6	76	37
T2	0.026	1.3	1.3	2.7	0.5	5.4	1.3	0.050	1.9	0.33	37	76	16

DURING THE GEOMORPHIC SURVEY AND SUBSEQUENT SITE WALK, THE SOURCE OF INSTABILITY WAS IDENTIFIED AS BEING LINKED TO URBANIZATION IN THE WATERSHED, WITH FORCED STREAM REALIGNMENTS AND FLASHY URBAN FLOWS DESTABILIZING THE STREAMS. UT TO HOOES RUN WAS REALIGNED TO THE TOE OF AN EMBANKMENT WHEN THE SOCCER FIELDS WERE CONSTRUCTED. THE STREAM WAS PLACED IN A NARROW VALLEY WITH A RELATIVELY STEEP SLOPE, RESULTING IN THE CHANNEL CUTTING INTO THE EMBANKMENT SLOPE. THE INSTABILITY IN TRIB 1 STEMS FROM INADEQUATE STORMWATER MANAGEMENT OF FLOWS DRAINING FROM THE NEIGHBORHOOD EAST OF TROWBRIDGE DRIVE. CASCADING STORMFLOWS DOWN THE HILLSLOPE HAVE LED TO DOWNCUTTING IN T1R1, LEADING TO SYSTEMIC INSTABILITY DOWNSTREAM. THERE ARE MANY FALLEN TREES ALONG THE STREAM CORRIDOR, FURTHER DESTABILIZING BANKS. TRIB 2 IS MOSTLY STABLE, THOUGH INCISION IN TRIB 1 HAS LED TO SOME BED LEVEL LOWERING WITHIN TRIB 2. UNDERSTORY SHRUBS ARE LACKING ALONG THE STREAM CHANNEL AND THERE ARE SEVERAL UNDERCUT BANKS WITH THE POTENTIAL TO DESTABILIZE FURTHER. UT TO HOOES RUN AND ITS TRIBUTARIES ARE IN STAGE 4 OF THE CHANNEL EVOLUTION MODEL, DEGRADATION AND WIDENING. IT IS ANTICIPATED THAT UT TO HOOES RUN WILL CONTINUE TO DESTABILIZE THE SOCCER FIELD EMBANKMENT AND TRIB 1 WILL CONTINUE TO DOWNCUT WITHOUT INTERVENTION, RESULTING IN MASSIVE QUANTITIES OF SEDIMENT BEING TRANSPORTED DOWNSTREAM. DUE TO THE ADDITIONAL DEGRADATION AND RECOVERY ANTICIPATED FOR SELF-RECONSTRUCTION, RESTORATION IS NECESSARY TO ESTABLISH STABILITY.

2.0 DESIGN DISCHARGE AND DESIGN METHODOLOGY

THE OVERALL GOAL OF THE PROJECT IS TO RESTORE, TO THE GREATEST EXTENT POSSIBLE, THE HYDRAULIC AND GEOMORPHIC COMPETENCY OF THE CHANNEL AND REDUCE THE SEDIMENT AND NUTRIENT LOAD PRODUCED BY STREAM BANK EROSION. ACHIEVING THIS GOAL WILL GENERATE NUTRIENT REDUCTION CREDITS WHICH WILL CONTRIBUTE TO THE OVERALL LONG-TERM ECOLOGICAL HEALTH OF THE POTOMAC RIVER WATERSHED. THE PROJECT WILL ACCOMPLISH THIS OBJECTIVE THROUGH THE IMPLEMENTATION OF VARIOUS MITIGATION MEASURES, INCLUDING STREAM RESTORATION AND ENHANCEMENT AND RIPARIAN BUFFER PLANTING. THE PROPOSED RESTORATION WILL REDUCE ANNUAL LOADINGS OF SEDIMENT, PHOSPHORUS, AND NITROGEN FROM THESE REACHES BY GREATER THAN 50%. UT TO HOOES RUN AND TRIB 1 REQUIRE SIGNIFICANT RESTORATION TO PROVIDE A FRAMEWORK FOR LONG-TERM STABILITY. THIS WILL BE ACCOMPLISHED PRIMARILY THROUGH PROFILE AND CROSS-SECTION ALTERATIONS TO MEET THE NECESSARY DESIGN REQUIREMENTS, WITH MINOR ADJUSTMENTS TO THE PLANFORM WHERE APPROPRIATE. ENTRENCHMENT RATIO CHANGES IN SPECIFIC AREAS WILL BE USED TO CREATE B, BC, OR C CHANNELS DEPENDING ON LATERAL CONSTRAINTS SUCH AS EXISTING TREES AND SPECIFIC REACH CHARACTERISTICS. TRIB 1 WILL BE REALIGNED AT THE DOWNSTREAM EXTENT (T1R2) TO PROVIDE A BETTER CONVEYANCE INTO UT TO HOOES RUN. THE UPSTREAM REACH OF TRIB 1 (T1R1) WILL BE ENHANCED USING BIOREMEDIATION TECHNIQUES.

ALL COLLECTED AND COMPUTED DATA WAS INTEGRATED TO DEVELOP A MITIGATION PLAN FOR THE IDENTIFIED STREAM RESTORATION REACHES. THE PRIMARY RESTORATION OBJECTIVE OF SELF-SUSTAINING PLANFORM, CROSS-SECTION, AND PROFILE REQUIRED MULTIPLE DESIGN ITERATIONS. CRUCIAL DESIGN FACTORS INCLUDED BANKFULL DISCHARGE COMPUTATIONS AND VERIFICATION BASED ON SITE SPECIFIC DATA AND WATERSHED INFORMATION, SEDIMENT CONTINUITY AND TRANSPORT, CHANNEL DEPENDENT VARIABLES SUCH AS WIDTH, DEPTH, SLOPE, ETC., AND DESIGN COMPUTATIONS SUCH AS SHEAR STRESS AND HYDRAULIC RESISTANCE. THEREFORE, A MYRIAD OF DESIGN METHODS WERE USED UNTIL CONVERGING EVIDENCE POINTED TO SPECIFIC DESIGN PARAMETERS.

THE DESIGN DISCHARGES AND CROSS-SECTION DESIGNS WERE SELECTED BASED ON A REVIEW OF THE ABOVE REFERENCED HYDROLOGY DATA AND EXISTING BANKFULL DISCHARGE AND CROSS-SECTION DIMENSIONS. THE DESIGN DISCHARGE ANALYSIS SHOWED A TREND IN VALUES, WITH THE MD PIEDMONT REGIONAL CURVE, THE TR-20/TR-55 MODELING RESULTS, AND THE EXISTING BANKFULL DISCHARGES RESULTING IN SIMILAR DISCHARGE VALUES. THE DESIGN DISCHARGE FOR UT TO HOOES RUN IS ROUGHLY THE 2-YEAR DISCHARGE FROM THE TR-20/TR-55 MODELING. BECAUSE OF THE FLASHINESS OF THIS STREAM, A LARGER DESIGN DISCHARGE WAS CHOSEN TO PROVIDE MORE CAPACITY FOR FREQUENT FLOWS WITHIN THE CHANNEL. UT TO HOOES RUN WILL BE REALIGNED MODERATELY TO REDUCE PRESSURE ON THE TOE OF THE EMBANKMENT. CASCADES AND STEP POOLS WILL BE USED TO TRANSITION GRADE WITHIN STEEPER SEGMENTS. AN IMBRICATED BOULDER WALL WILL PROTECT THE RIGHT EMBANKMENT TOE. THE DESIGN DISCHARGES FOR TRIB 1 AND TRIB 2 WERE CHOSEN TO BE BETWEEN THE 1- AND 2-YEAR DISCHARGES FROM THE TR-20/TR-55 MODELING. THESE DISCHARGES ALSO CORRESPOND TO THE DESIRED BANKFULL WIDTH AND DEPTH, AS DICTATED BY THE AVERAGE EXISTING CHANNEL WIDTH AND A WIDTH-TO-DEPTH RATIO BETWEEN 10 AND 12. THE DESIGN FOR TRIB 1 IS MOSTLY STAYING ON THE EXISTING ALIGNMENT, WITH MINOR ADJUSTMENTS IN PLANFORM TO REMOVE TIGHTER RADII OF CURVATURE. THE PROFILE WILL BE ADJUSTED TO PROVIDE A MORE SUSTAINABLE PATTERN, WITH RIFFLE OR CASCADE STRUCTURES BUILT IN THE TANGENTS AND EXCAVATED POOLS IN THE CURVES, MINIMIZING TREE LOSS IN THE SURROUNDING RIPARIAN AREA BY LIFTING THE CHANNEL INSTEAD OF GRADING DOWN THE FLOODPLAIN. FROM THE OUTFALL AT THE TOP OF THE REACH UNTIL THE PARK PROPERTY BOUNDARY, A LARGER CAPACITY/STORAGE CASCADE/POOL SEQUENCE WITH A SAND AND WOODCHIP FILTRATION BASE WILL BE USED TO PROVIDE BETTER STORMWATER DISPERSION AND FILTERING. TRIB 2 SIMILARLY USES THE EXISTING WIDTH TO PROVIDE A BETTER TIE OUT OF THE EXISTING CHANNEL UPSTREAM AND HAS BUILT UP RIFFLES TO LIFT THE CHANNEL. THESE DISCHARGES AND CROSS-SECTION DESIGNS WILL PROMOTE MORE FREQUENT FLOODPLAIN ACCESS, REDUCING SHEAR STRESS AND EROSIVE FORCES WITHIN THE CHANNEL AND DISSIPATING ENERGY ACROSS THE FLOODPLAIN, PROVIDING STORAGE FOR STORM FLOWS. DESIGN DISCHARGES CAN BE FOUND WITHIN THE DESIGN DISCHARGE HYDRAULIC SUMMARY TABLE BELOW.

DESIGN DISCHARGE HYDRAULIC SUMMARY

REACH	DRAINAGE AREA (MI^2)	Qbkf (cfs)	Abkf (sf)	Wbkf (ft)	Dbkf (ft)	W/D	SLOPE (%)	N	VELOCITY (FPS)	SHEAR STRESS (lb/ft^2)	THRESHOLD GRAIN SIZE (mm)
UT TO HOOES RUN	0.060	23	8.0	10.0	0.8	12.5	2.6	0.070	2.9	1.26	62
T1R1 CASCADES	0.036	14	9.6	14.0	0.7	20.4	4.2	0.070	2.6	1.21	59
T1R1	0.042	14	3.4	6.0	0.6	10.6	3.7	0.045	4.2	1.23	60
T1R2	0.086	18	4.7	7.0	0.7	10.4	2.5	0.045	3.9	0.99	49
T2	0.026	3	1.4	4.0	0.4	11.4	2.3	0.045	2.4	0.49	24

3.0 FINAL DESIGN

3.1 NATURAL CHANNEL DESIGN

ALL PROPOSED ALIGNMENTS, PROFILES, DIMENSIONS, AND MATERIALS CAN BE FOUND IN THE FOLLOWING CONSTRUCTION DRAWINGS.

3.2 SEDIMENT TRANSPORT ANALYSIS OF PROPOSED DESIGN

DIMENSIONAL ANALYSIS FOR DESIGN CROSS-SECTIONS WAS COMPLETED AND THE DATA WAS PROVIDED IN SECTION 1.3 ABOVE. BANKFULL SHEAR STRESS VALUES WERE THE USED TO DETERMINE MOVEABLE PARTICLE SIZES USING SHIELDS EQUATION. BASED UPON THIS ANALYSIS PREDICTED SEDIMENT TRANSPORT IS INDICATIVE OF THE SIZE OF MATERIAL PRESENT WITHIN THE EXISTING STREAM CHANNEL. BASED ON THIS ANALYSIS, THE EXISTING D100 IS MOBILE WITHIN TRIB 1 REACH 1. THE BED MATERIAL PROPOSED FOR THE PROPOSED RESTORATION DOES NOT MOVE PARTICLES GREATER THAN THE D100 OF THE BED. SEDIMENT COMPETENCY DATA IS PROVIDED IN THE TABLE BELOW.

SEDIMENT TRANSPORT ANALYSIS

REACH	Q_{bkf} (cfs)	BANKFULL AVG. SHEAR (LB/SQ. FT)	MOVEABLE PARTICLE SIZE - SHIELDS (mm)	EXISTING D100 (mm)	PROPOSED D100 (mm)
UT TO HOOES RUN	23	1.26	99	128	362
T1R1 CASCADES	14	1.21	95	128	362
T1R1	14	1.23	97	128	362
T1R2	18	0.99	77	128	362
T2	3	0.49	37	128	362

3.3 INSTREAM STRUCTURES

INSTREAM STRUCTURES ARE BEING UTILIZED AS NECESSARY TO PROMOTE LATERAL AND VERTICAL STABILITY. STREAM CONFLUENCES, HIGH GRADIENT AREAS, AND OTHER POINTS OF HIGHER SHEAR STRESS WERE CHOSEN FOR STRUCTURE LOCATIONS. LOCATIONS AND STRUCTURE DETAILS CAN BE FOUND IN THE FOLLOWING CONSTRUCTION PLANS.

3.4 VEGETATION DESIGN

HERBACEOUS AND WOODY VEGETATION PROPOSED FOR PLANTING WERE CHOSEN BASED ON EXISTING SITE CONDITIONS AND KNOWLEDGE OF STREAM RESTORATION PROJECTS. DETAILS RELATED TO PERMANENT VEGETATION ESTABLISHMENT CAN BE FOUND ON THE FOLLOWING CONSTRUCTION PLANTING PLAN.

4.0 MONITORING AND MAINTENANCE PLANS

MAINTENANCE AND MONITORING (M&M) WILL BE PERFORMED IN ACCORDANCE WITH THE M&M PLAN SUBMITTED AND APPROVED AS PART OF THE NWP.

5.0 OVERALL DESIGN REVIEW AND FUNCTIONAL UPLIFT GOALS/OBJECTIVES

THE PROPOSED RESTORATION OF UT TO HOOES RUN AND ITS TRIBUTARIES WILL RESULT IN SIGNIFICANT FUNCTIONAL UPLIFT, INCLUDING HYDRAULIC, GEOMORPHIC, AND PHYSICOCHEMICAL PROPERTIES. ADJUSTMENTS TO THE STREAM CHANNEL DIMENSIONS WILL REDUCE EROSION AND DECREASE SEDIMENT AND NUTRIENT LOADS. THE ADDITION OF THE FLOODPLAIN REDUCES IN-CHANNEL HYDRAULIC STRESSES CURRENTLY CAUSING BANK EROSION.

UT TO HOOES RUN AND TRIBUTARIES
FUNCTIONAL UPLIFT (GOALS AND OBJECTIVES) TABLE

LEVEL, CATEGORY & GOAL	PARAMETER & OBJECTIVE	MEASUREMENT METHOD	PERFORMANCE STANDARD			PRE RESTORATION CONDITION		POST RESTORATION CONDITION (DESIGN)	
			FUNCTIONING	AT-RISK	NOT FUNCTIONING	VALUE	RATING	VALUE	RATING
LEVEL 1 - HYDROLOGY									
	NOT APPLICABLE	NO CHANGES							
LEVEL 2 - HYDRAULICS									
IMPROVE FLOODPLAIN ACCESS	IMPROVE FLOODPLAIN CONNECTIVITY	PREDICTED WITH BANK HEIGHT RATIO (BHR)	1.0-1.2	1.3-1.5	>1.5	>1.5	NOT FUNCTIONING	1-1.2	FUNCTIONING
IMPROVE FLOODPLAIN ACCESS	INCREASE ANNUAL FREQUENCE OF FLOODPLAIN ACCESS	CONFIRMED WITH STREAMGAGE OR PHOTO MONITORING, MODELED DISCHARGE	3+	1-2	<1	< 1	NOT FUNCTIONING	>3	FUNCTIONING
LEVEL 3 - GEOMORPHOLOGY									
REDUCE BANK EROSION	REDUCE BANK EROSION	DOMINATE BEHI	LOW-MOD	MODERATE	HIGH- EXT	HIGH	NOT FUNCTIONING	LOW-MOD	FUNCTIONING
REDUCE LATERAL INSTABILITY	REDUCE LATERAL EROSION RATES	PREDICTED WITH BEHI/NBS	<0.3 FT/YR	0.3-0.6 FT/YR	>0.6 FT/YR	>0.6 FT/YR	NOT FUNCTIONING	<0.3 FT/YR	FUNCTIONING
IMPROVE SHELTER FOR FISH AND MACROINVERTEBRATES	IMPROVE HABITAT DIVERSITY FOR AQUATIC ORGANISMS	OBSERVATIONAL AND STRUCTURE ASSESSMENT	GREATER THAN 70% SUBSTRATE FAVORABLE FOR EPIFAUNAL COVER AND FISH COVER	20-70% MIX OF STABLE HABITAT SUITED FOR FULL COLONIZATION	LESS THAN 20% MIX OF STANLE HABITAT	LESS THAN 20% MIX OF STABLE HABITAT	NOT FUNCTIONING	GREATER THAN 70% SUBSTRATE FAVORABLE FOR EPIFAUNAL COVER AND FISH COVER	FUNCTIONING
LEVEL 4 - PHYSICOCHEMICAL									
REDUCE SEDIMENT LOADS	REDUCE TOTAL SUSPENDED SEDIMENT (TSS) ANNUAL LOAD	ANNUAL PREDICTED LOAD	<0.030 TONS/YR/LF	0.030-0.100 TONS/YR/LF	>0.100 TONS/YR/LF	>0.100 TONS/YR/LF	NOT FUNCTIONING	<0.030 TONS/YR/LF	FUNCTIONING
REDUCE NUTRIENTS LOADS	REDUCE TOTAL PHOSPHORUS (TP) ANNUAL LOAD	ANNUAL PREDICTED LOAD	<0.030 LBS/YR/LF	0.030-0.100 LBS/YR/LF	>0.100 LBS/YR/LF	>0.100 LBS/YR/LF	NOT FUNCTIONING	<0.030 LBS/YR/LF	FUNCTIONING
LEVEL 5 - BIOLOGY									
	NOT APPLICABLE	NO CHANGES							

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CHINN PARK STREAM RESTORATION &
STORMWATER BMP
PRINCE WILLIAM COUNTY

STREAM DESIGN NARRATIVE

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x | 11/2021
Signature | Date

60% DESIGN REVIEW
x | 11/14/2022
Signature | Date

CONSTRUCTION PLAN REVIEW
x | ----
Signature | Date

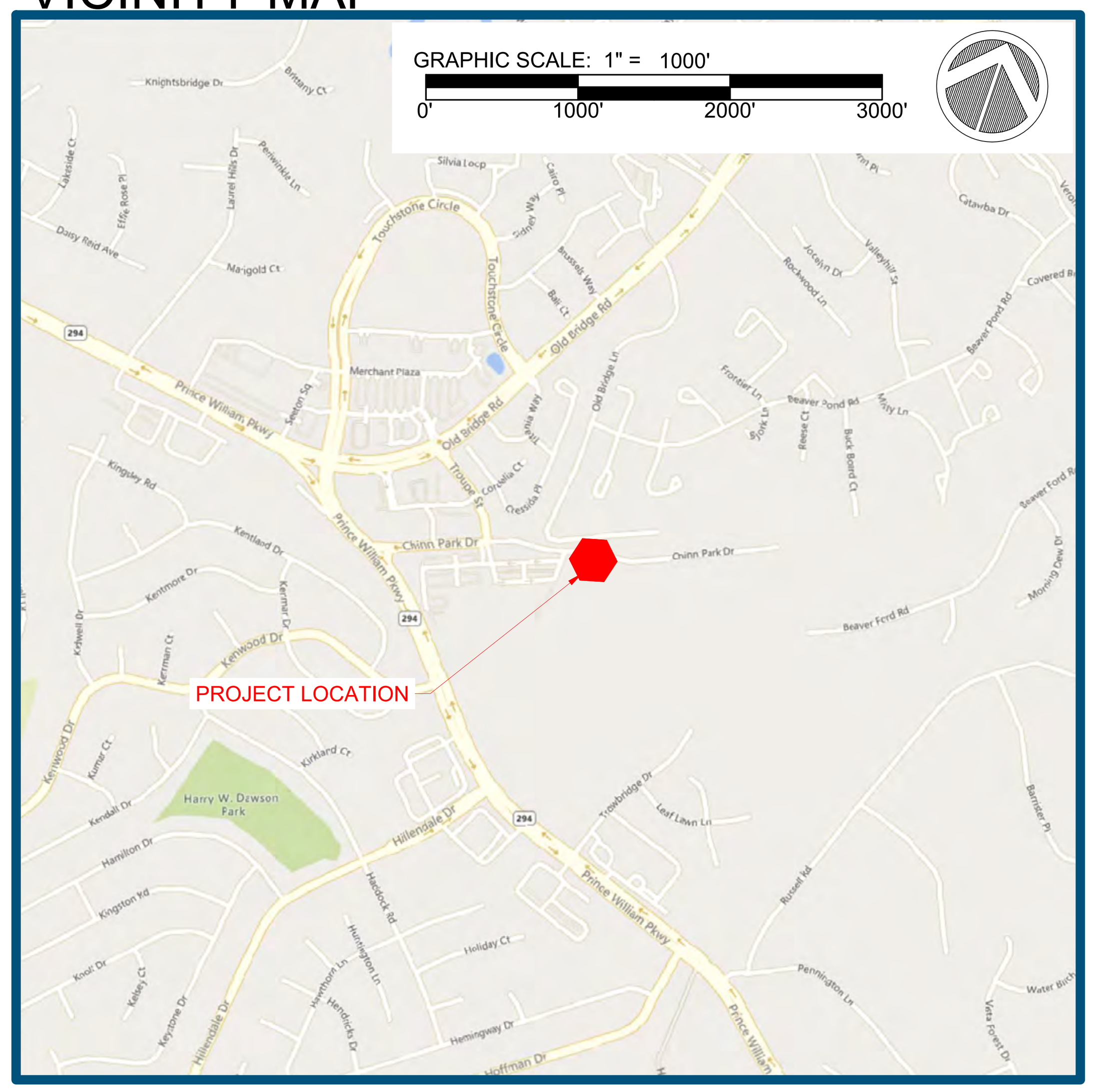
REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	47 OF 48

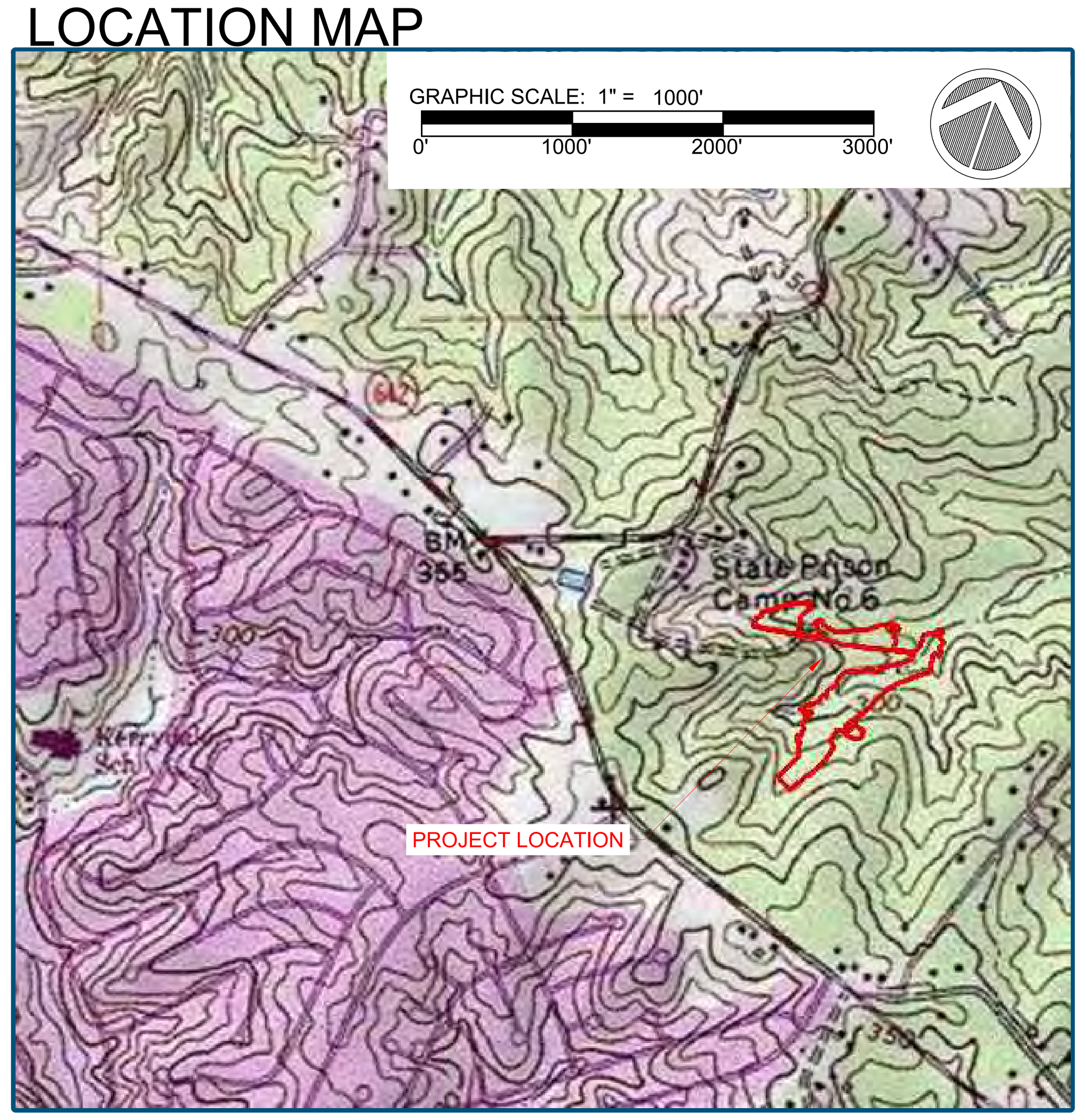
CHINN PARK BMP RETROFIT

PRINCE WILLIAM COUNTY, VA

VICINITY MAP

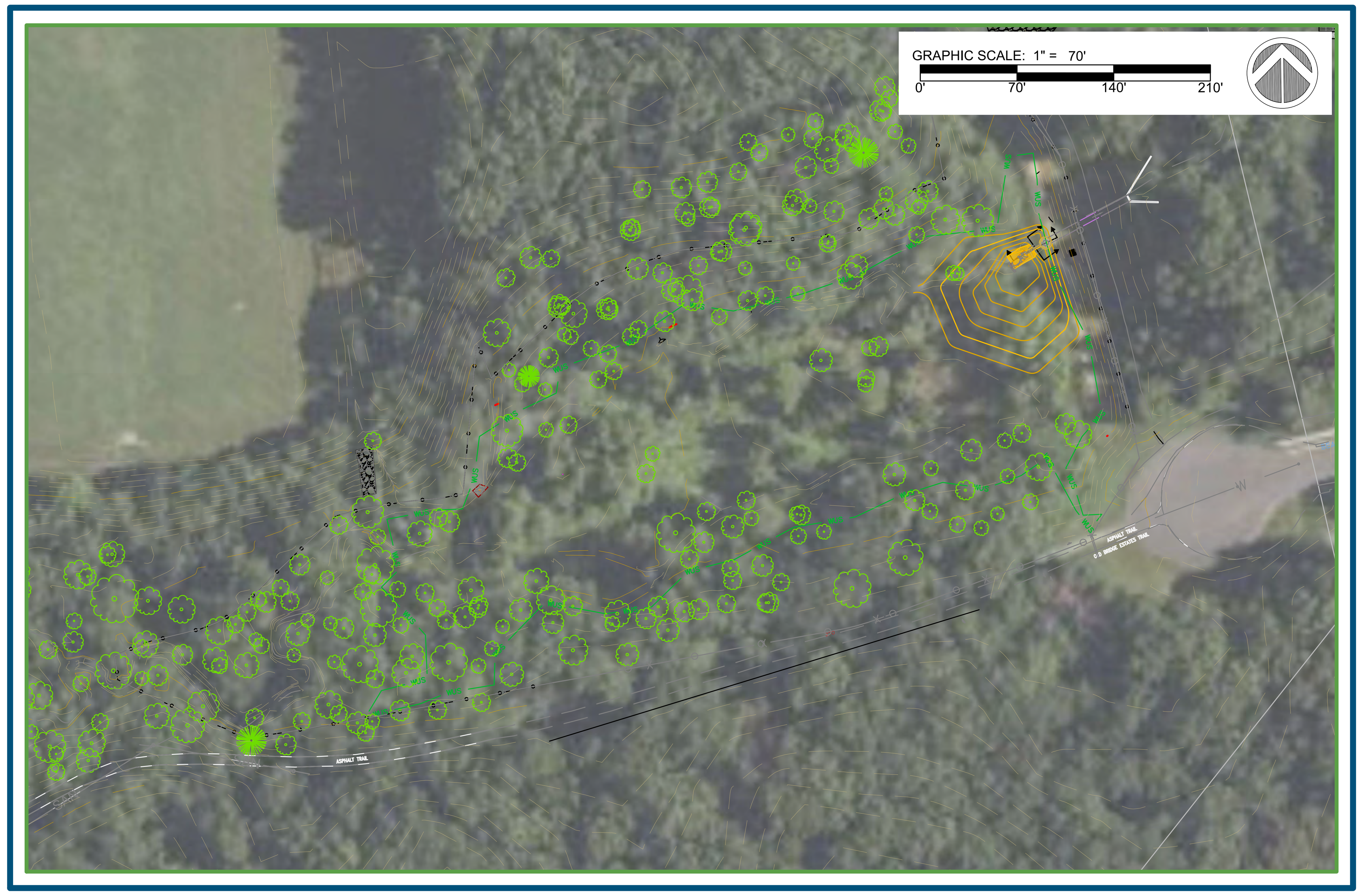


LOCATION MAP



LATITUDE: N 38° 40' 14.7"
LONGITUDE: W -77° 19' 23.0"

AERIAL PHOTOGRAPH-PROJECT OVERVIEW



SHEET INDEX:

1. COVER SHEET
2. EX WATERSHED MAP
3. EXISTING CONDITIONS
4. BMP RETROFIT DESIGN
5. BMP REPAIRS
6. OPTI DESIGN DETAILS
7. DESIGN DETAILS AND SECTIONS
8. EROSION AND SEDIMENT CONTROL NOTES
9. EROSION AND SEDIMENT CONTROL DETAILS
10. NARRATIVE, NOTES AND CREDITING SUMMARY

OWNER:
NAME: PWC BOARD OF COUNTY SUPERVISORS
ADDRESS: 5 COUNTY COMPLEX, SUITE 170,
PRINCE WILLIAM, VA 22192
CONTACT: THOMAS DOMBROWSKI
PHONE NUMBER: (703) 792-5534
EMAIL: tdombrowski@pwcgov.org

CLIENT/APPLICANT:
NAME: PWC BOARD OF COUNTY SUPERVISORS
ADDRESS: 5 COUNTY COMPLEX, SUITE 170,
PRINCE WILLIAM, VA 22192
PHONE NUMBER: (703) 792-5534
CONTACT: THOMAS DOMBROWSKI

PROPERTY INFO:
SITE ADDRESS: 13001 CHINN PARK DRIVE,
WOODBRIDGE, VA 22192
GPIN: 8192-79-9203
ZONING: A-1
ACREAGE: 151.1 AC

SITE DATA:
TOTAL DISTURBED AREA: 1.5 AC
HUC CODE: 02070010

JOB NUMBER: 102215

CHINN PARK BMP RETROFIT

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

CHINN PARK BMP RETROFIT
PRINCE WILLIAM COUNTY, VA

PROJECT MANAGER:	BS	JOB NUMBER:	102215
DESIGNED:	JL	DESIGN TYPE:	BMP
DRAWN:	JL	INITIAL PLAN DATE:	4/11/2023

REVISIONS

res
HGS, LLC. A RES COMPANY
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COVER SHEET

B1 OF 10

DRAINAGE AREA MAP LEGEND:

- EX. PROPERTY LINE
- EX. PROPERTY ADJACENT
- EX. SOILS BOUNDARY
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. EDGE OF PAVEMENT
- EX. FLOODPLAIN
- EX. DRAINAGE DIVIDE
- EX. SUB-DRAINAGE DIVIDE
- EX. TIME OF CONCENTRATION
- EX. STREAM

Soils

Map Unit Name	Map Unit Description	HSG
6A	Baile loam, 0 to 4% slopes	C/D
10B	Buckhall loam, 2 to 7% slopes	B
10C	Buckhall loam, 7 to 15% slopes	B
21B	Fairfax loam, 2 to 7% slopes	B
23C	Gaila sandy loam, 7 to 15% slopes	B
24C	Glenelg-Buckhall complex, 7 to 15% slopes	B
24D	Glenelg-Buckhall complex, 15 to 25% slopes	B
25A	Glenville loam, 0 to 4% slopes	C/D
29B	Hoadly loam, 2 to 7% slopes	C/D
38B	Meadowville loam, 0 to 5% slopes	A
41B	Nebasco loam, 0 to 7% slopes	D
41C	Nebasco loam, 7 to 15% slopes	D
44D	Occoquan sandy loam, 7 to 25% slopes	A
54B	Urban land-Udorthents complex, 0 to 7% slopes	~

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CHINN PARK BMP RETROFIT

EX WATERSHED MAP

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
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PROJECT MANAGER:	BS
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DRAWN:	JL
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	12/8/2021
SHEET NO:	B2 OF10

NOTES:
1. TOPOGRAPHIC INFORMATION AND LINE WORK SHOWN WITHIN THE SURVEY LIMITS IS BASED ON SURVEY PERFORMED BY CAP LAND SURVEYING, PLLC IN AUGUST 2021. SURVEYED TOPOGRAPHICAL CONTOUR INTERVALS ARE ONE FOOT
2. LINEWORK OUTSIDE THE SURVEY LIMITS IS BASED ON AVAILABLE PWC GIS DATA. CONTOUR INTERVAL IS TWO (2) FEET.
3. SEE SHEET 2 FOR SURVEY NOTES.


PHOTO LOCATION 1


PHOTO LOCATION 2


PHOTO LOCATION 4

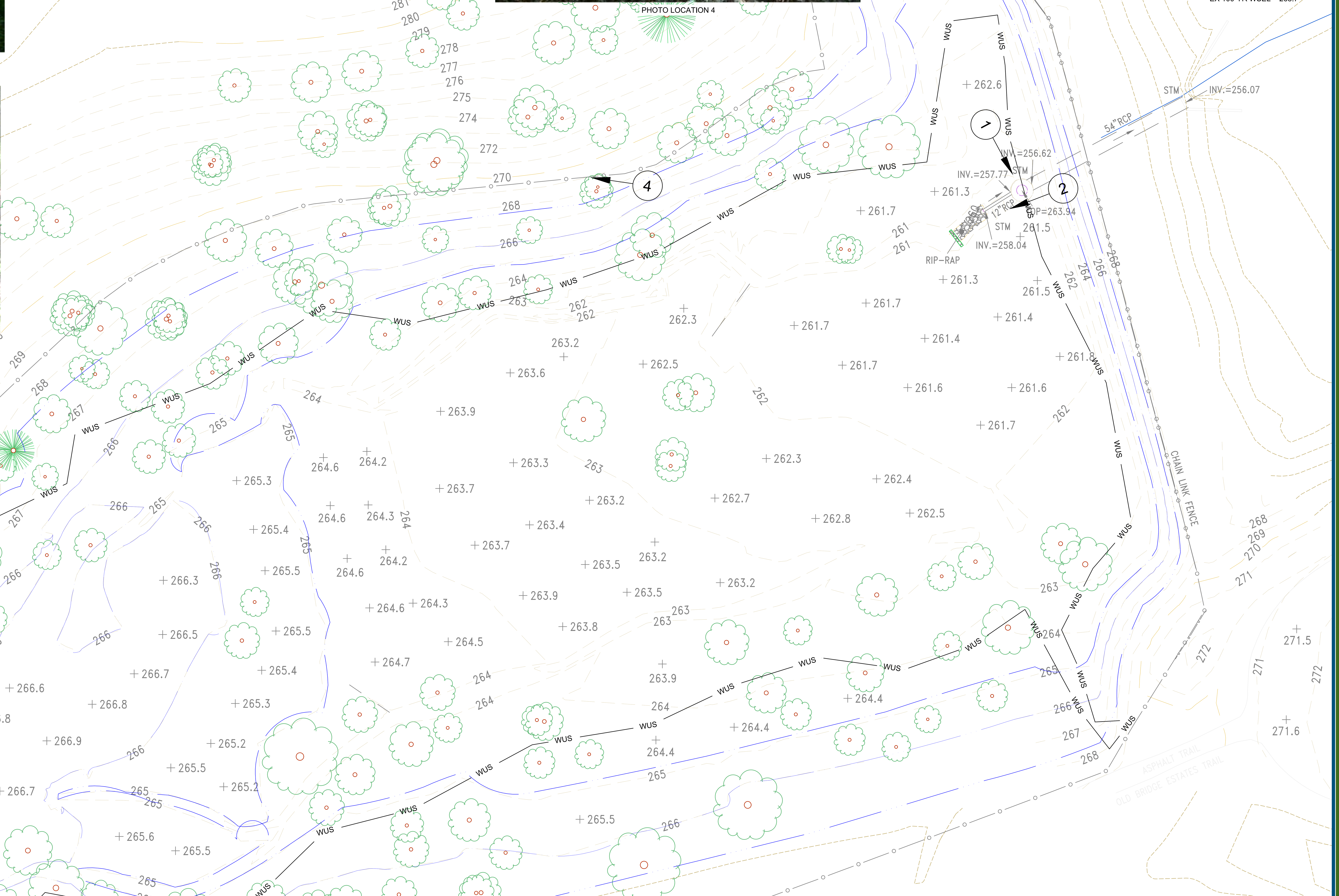

PHOTO LOCATION 3

GRAPHIC SCALE: 1" = 20'
0' 20' 40' 60'

EX. CONDITIONS LEGEND:

- EX. PROPERTY LINE
- EX. EASEMENT
- EX. SOILS BOUNDARY
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- HYDRIC SOIL BOUNDARY
- EX. EDGE OF PAVEMENT
- EX. FENCE
- EX. TREELINE
- EX. OVERHEAD ELECTRIC
- EX. CULVERT
- EX. 2YR WSE
- EX. 10YR WSE
- EX. 100 YR WSE
- EX. NORMAL POOL
- EX. WATERS OF THE US
- EX. STREAM
- EX. TREE >12" DBH
- PHOTO LOCATION

EX 2-YR WSEL = 264.4'
EX 10-YR WSEL = 266.0
EX 100-YR WSEL = 268.7'



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CHINN PARK BMP RETROFIT

EXISTING CONDITIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

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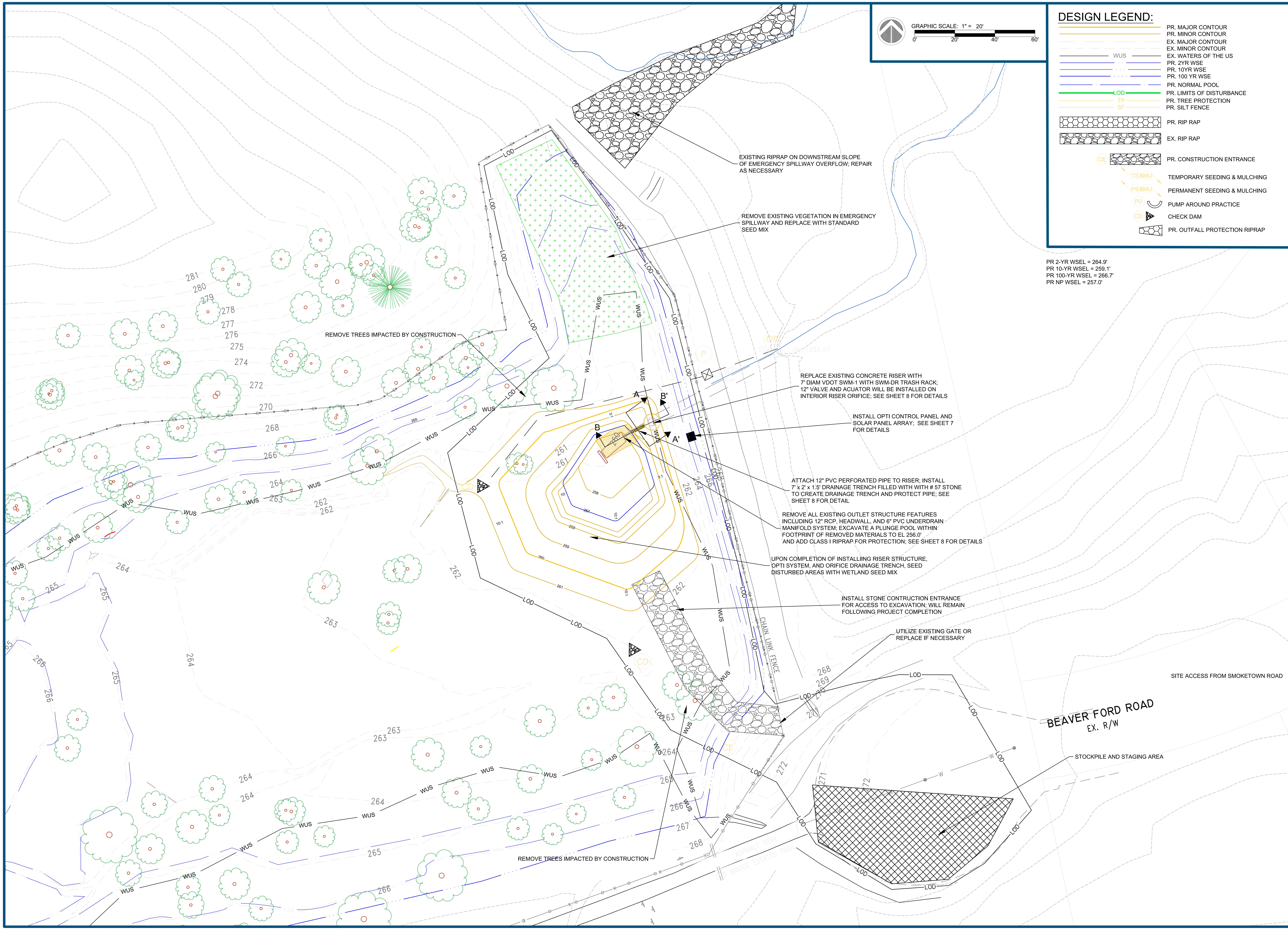
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	12/1/2021
SHEET NO:	B3 OF 10



DESIGN LEGEND:

- PR. MAJOR CONTOUR
- PR. MINOR CONTOUR
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- WUS — EX. WATERS OF THE US
- PR. 2YR WSE
- PR. 10YR WSE
- PR. 100 YR WSE
- PR. NORMAL POOL
- LOD — PR. LIMITS OF DISTURBANCE
- TP — PR. TREE PROTECTION
- SF — PR. SILT FENCE
- PR. RIP RAP
- EX. RIP RAP
- CE — PR. CONSTRUCTION ENTRANCE
- TS&MU — TEMPORARY SEEDING & MULCHING
- PS&MU — PERMANENT SEEDING & MULCHING
- PD — PUMP AROUND PRACTICE
- CD — CHECK DAM
- PR. OUTFALL PROTECTION RIPRAP

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CHINN PARK BMP RETROFIT

BMP RETROFIT DESIGN

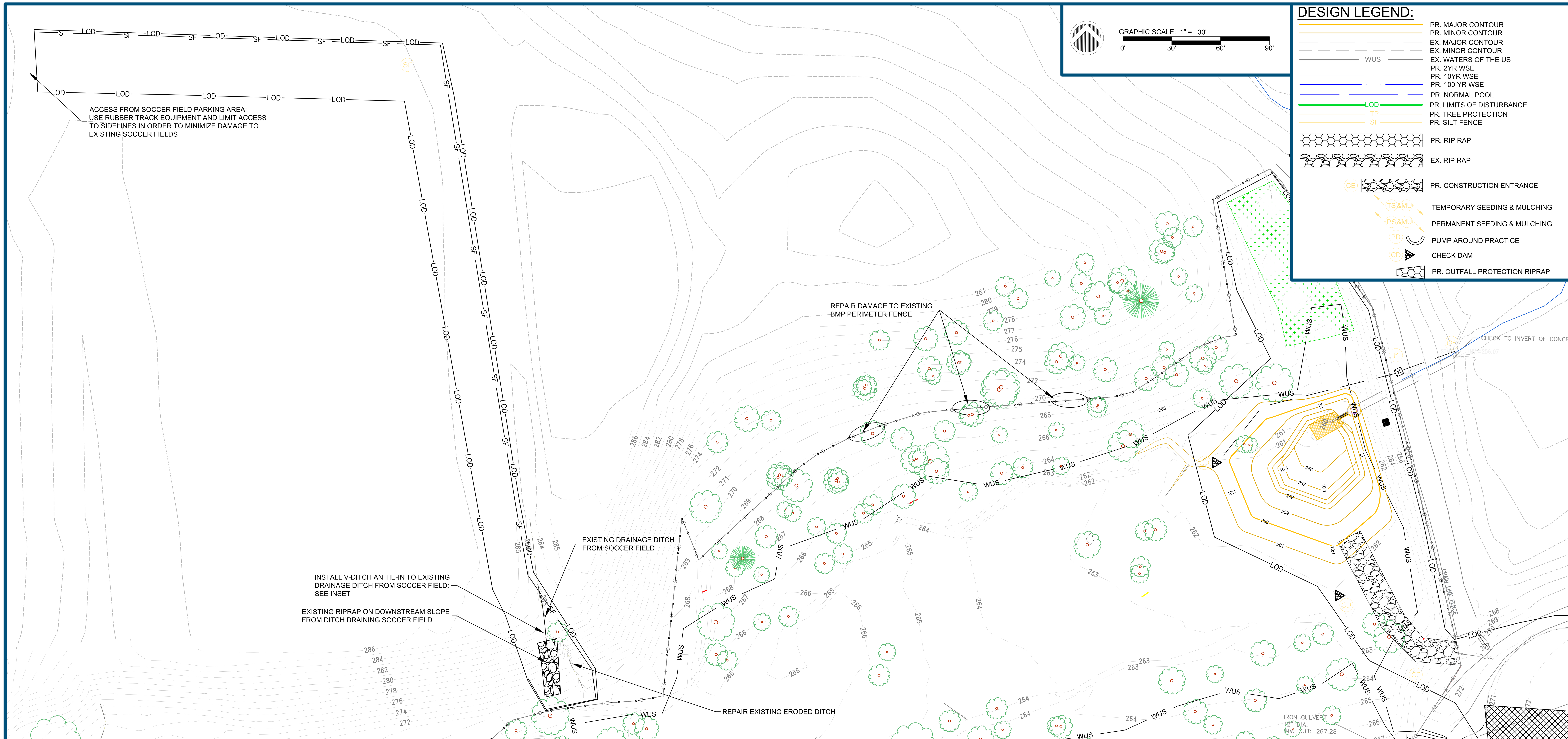
PRINCE WILLIAM COUNTY, VA

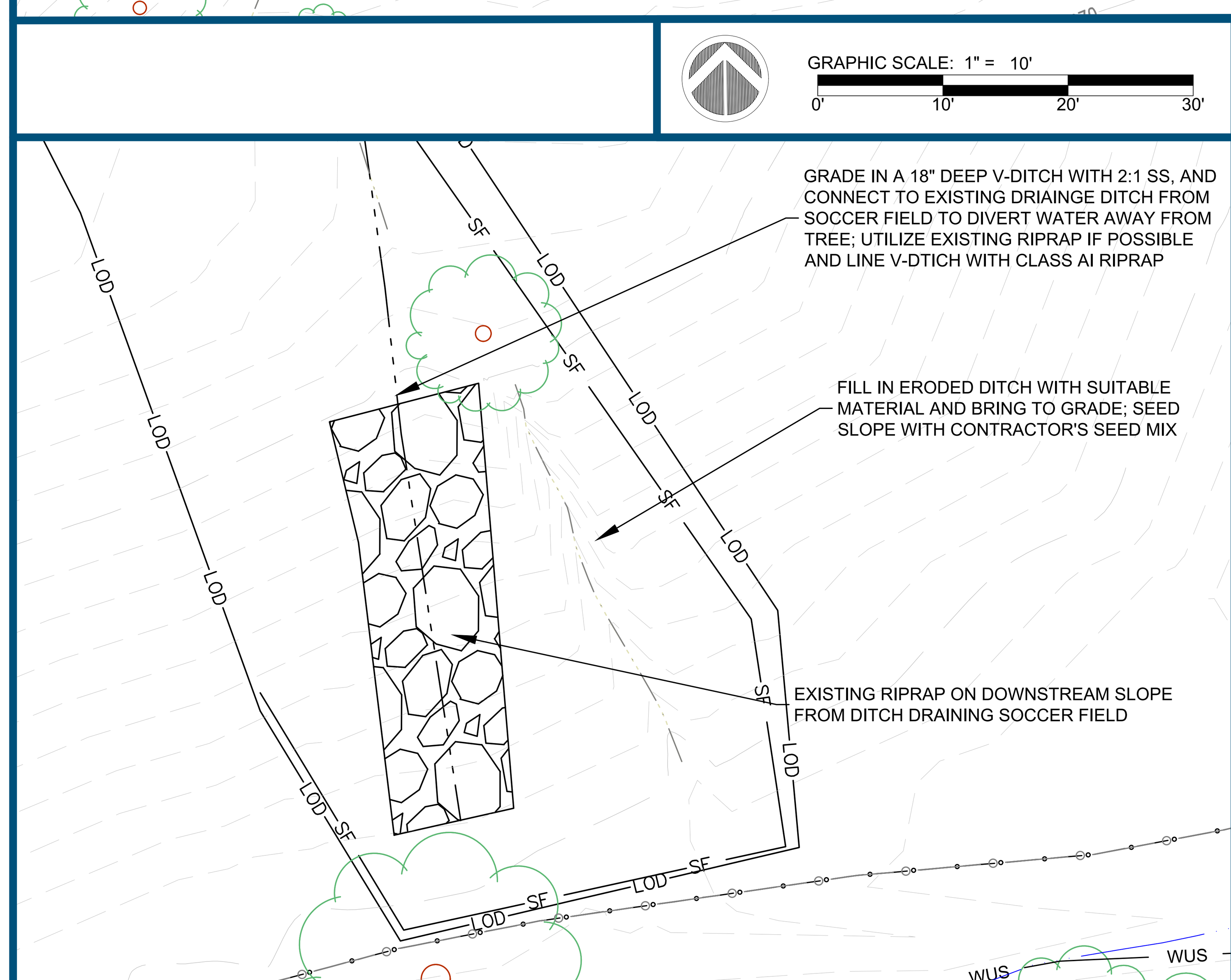
STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

REVISIONS:

PROJECT MANAGER:	BS
DESIGNED:	JL
DRAWN:	JL
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	12/2/2021
SHEET NO:	B4 OF10





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CHINN PARK BMP RETROFIT

BMP REPAIRS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

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5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
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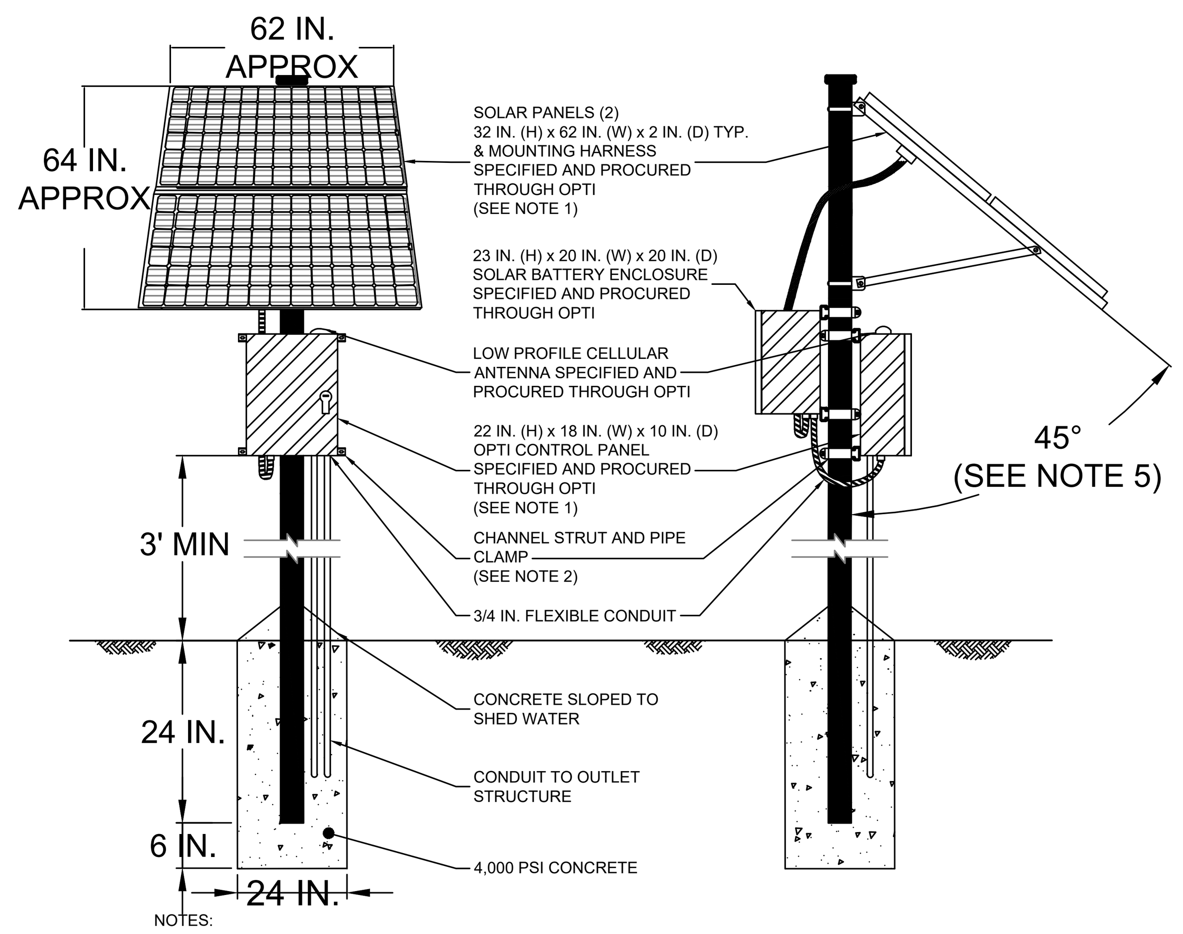
DESIGN TYPE:	BMP
DATE:	12/2/2021
SHEET NO:	

B5 OF10

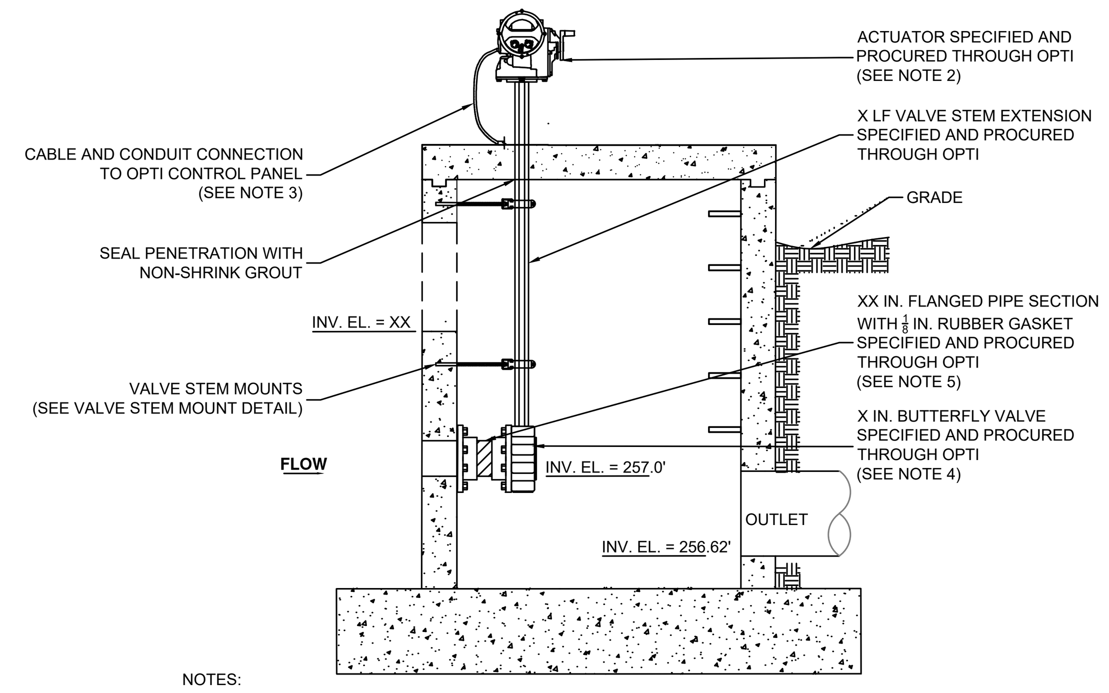
FILENAME:R:\Rescad\Projects\102215-Chinn Park Stream And BMP Design\CADD\Plan Sheets\BMP Retrofit\5 BMP RETROFIT DESIGN.dwgDATE:12/6/2021 9:58 AM BY:Jleibensperger



NOTES:

1. OPTI SPECIFIED EQUIPMENT (TO BE PROCURED THROUGH OPTI):
   - 1.1. 22 IN. X 18 IN. X 10 IN. NEMA 4X CABINET WITH CELLULAR ANTENNA AND CHANNEL STRUT MOUNTING CLIPS
   - 1.2. SOLAR PANEL KIT AND MOUNTING HARNESS
   - 1.3. POLYWATER FOAM DUCT SEALANT (SENT WITH OPTI CONTROL PANEL)
2. GALVANIZED STEEL CHANNEL STRUT TO BE BOLTED TO SUPPORT POLE USING GALVANIZED STEEL CHANNEL STRUT PIPE CLAMPS. CONTROL PANEL TO BE BOLTED TO CHANNEL STRUT (CHANNEL STRUT MOUNTING CLIP SHIPPED WITH CONTROL PANEL). PANEL TO BE MOUNTED MINIMUM 3 FT. FROM GROUND.
3. ALL CONDUIT PENETRATIONS ARE TO BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. SEE ELECTRICAL DIAGRAM FOR CABLE AND CONDUIT SPECIFICATION.
4. ALL EQUIPMENT TO BE GROUNDED TO CONTROL PANEL GROUNDING LUGS. OPTI CONTROL PANEL TO BE GROUNDED TO A GROUNDING ROD, GALVANIZED STEEL POLE, OR CONCRETE-ENCASED GROUNDING ELECTRODE. (SEE ELECTRICAL DIAGRAM AND GROUNDING ROD DETAIL).
5. SOLAR PANELS TO BE MOUNTED FACING SOUTH AT 45° FROM THE MOUNTING POLE.

2/1 OPTI CONTROL PANEL DETAIL
SOLAR POWER (POLE MOUNTED)

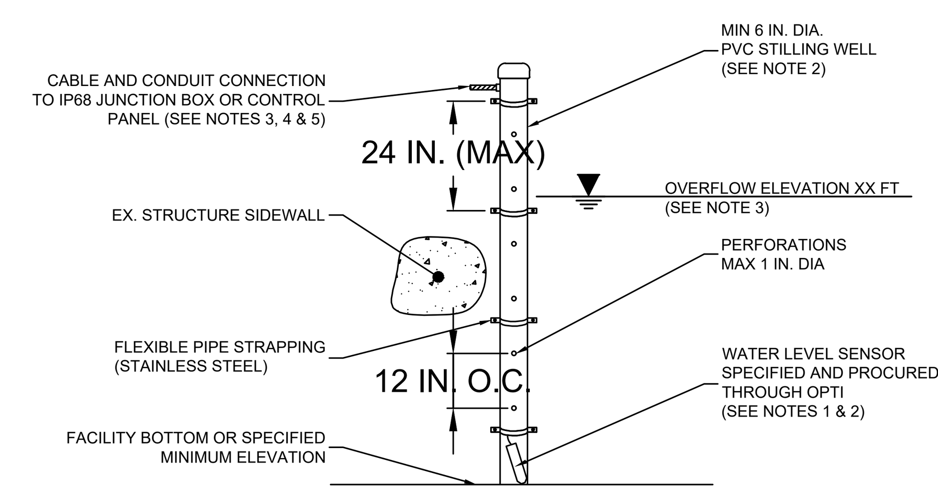


NOTES:

1. OPTI SPECIFIED EQUIPMENT (TO BE PROCURED THROUGH OPTI):
   - 1.1. ACTUATOR, BUTTERFLY VALVE, AND VALVE STEM EXTENSION (DELIVERED PRE-ASSEMBLED ON PALLET)
   - 1.2. FLANGED PIPE SECTION AND RUBBER GASKET
   - 1.3. POLYWATER FOAM DUCT SEALANT (SENT WITH OPTI CONTROL PANEL)

   ALL OTHER EQUIPMENT TO BE PROCURED BY INSTALLATION CONTRACTOR.
2. ACTUATOR TO BE ORIENTED WITH WHEEL FACING AWAY FROM WALL. VALVES SHALL REST ON ONE OF THE FOLLOWING: POURED CONCRETE PAD (4000 PSI), APPROVED CONCRETE BLOCKS, OR APPROVED STRUCTURE FIT TO BEAR 600LB LOAD.
3. IP68 CORD GRIP REQUIRED FOR CONNECTION BETWEEN WIRE AND CONTROL PANEL. ALL CONDUIT CONNECTIONS TO BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. CONDUIT TO BE SIZED BY CONTRACTOR. ACTUATOR CONDUIT PORT IS $\frac{3}{4}$ IN. INTERNAL THREADED, DOWNSIZE CONDUIT IF NEEDED. CONDUIT ALONG WALL TO BE SECURED WITH #304 SS CLIPS (3' SPACING MAXIMUM).
4. FLANGE TO VALVE CONNECTION: XX UNC FLANGE CONNECTOR BOLTS SHALL BE TIGHTENED TO XX LB-FT TORQUE. ALL HARDWARE TO BE #304 SS.
5. FLANGE TO WALL CONNECTION: BOLT CAVITIES TO BE CLEANED OF DEBRIS USING AUTO CLEANING DRILL BIT OR COMPRESSED AIR PRIOR TO ANCHORING. BOLT CAVITIES TO BE FILLED WITH INJECTABLE ADHESIVE ANCHOR (HILTI HIT SERIES EPOXY #2123401 OR EQUIVALENT). BOLTS TO BE EMBEDDED TO MINIMUM DEPTH SPECIFIED BY MANUFACTURER, 1 IN. CLEARANCE FROM REBAR.

1/1 ACTUATED VALVE DETAIL
WALL ABOVE OUTLET STRUCTURE

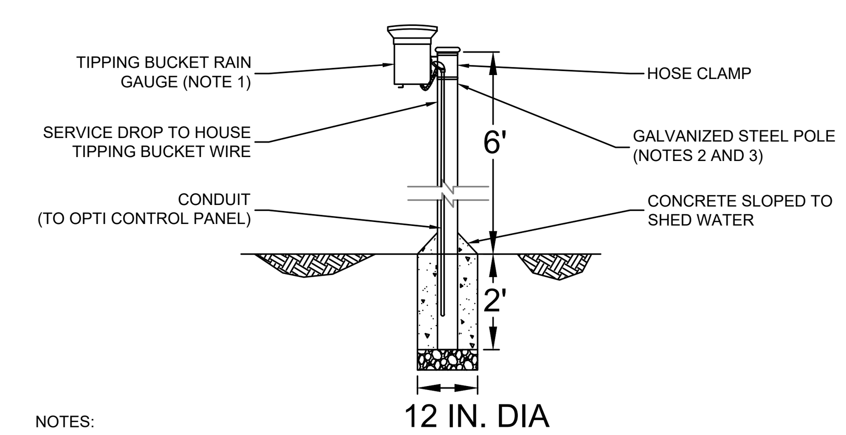


NOTES:

1. OPTI SPECIFIED EQUIPMENT (TO BE PROCURED THROUGH OPTI):
   - 1.1. WATER LEVEL SENSOR
   - 1.2. POLYWATER FOAM DUCT SEALANT (SENT WITH OPTI CONTROL PANEL)

   ALL OTHER EQUIPMENT TO BE PROCURED BY INSTALLATION CONTRACTOR.
2. WATER LEVEL SENSOR TO REST WITHIN PVC STILLING WELL. SENSOR TO REST AT BOTTOM OF FACILITY OR AT SPECIFIED MINIMUM ELEVATION.
3. OPTI-SPECIFIED JUNCTION BOX REQUIRED IF CABLE LENGTH EXCEEDS 100 FT. JUNCTION BOX LOCATION TO BE SPECIFIED BY OPTI. BOTTOM OF JUNCTION BOX TO BE MOUNTED AT LEAST 4 IN. ABOVE OVERFLOW ELEVATION.
4. PENETRATIONS INTO ALL EQUIPMENT AND CONNECTIONS WITHIN JUNCTION BOXES SHALL BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. SEE ELECTRICAL DIAGRAM FOR CABLE AND CONDUIT SPECIFICATION.
5. CONDUIT SECURED ON WALL WITH STAINLESS STEEL CLIPS (3' MAX SPACING). PVC STILLING WELL TO BE SECURED WITH STAINLESS STEEL PIPE STRAPPING (24 IN. MAX SPACING).
6. PRESSURE REFERENCE DEVICE TO BE LOCATED IN OPTI CONTROL PANEL. DO NOT SPLICE WATER LEVEL SENSOR CABLE.
7. MINIMUM 1 FOOT SPARE CABLING TO BE NEATLY COILED IN CONTROL PANEL FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.

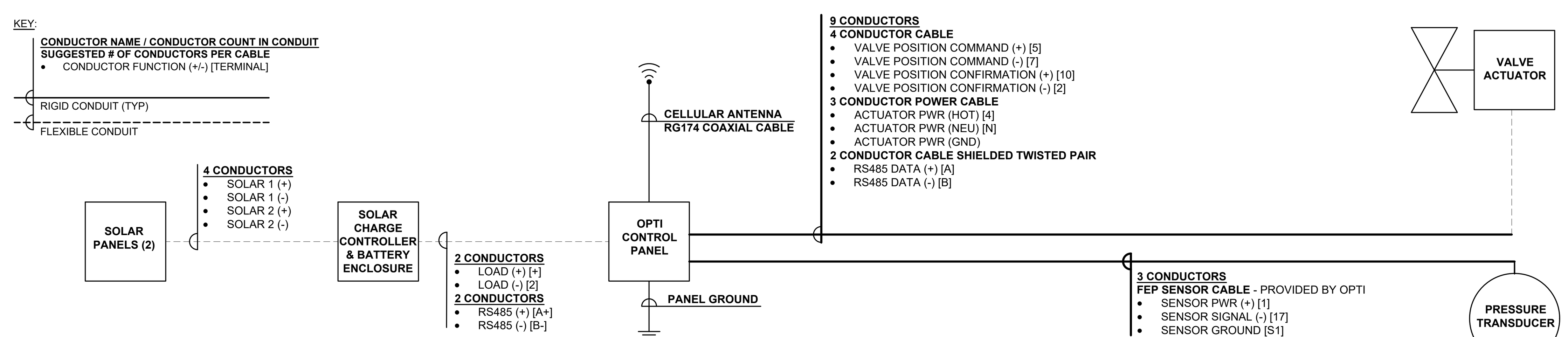
2/2 WATER LEVEL SENSOR DETAIL (PRESSURE TRANSDUCER)
WALL-MOUNTED WATER LEVEL SENSOR



NOTES:

1. MOUNT TIPPING BUCKET RAIN GAUGE PER MANUFACTURERS INSTRUCTIONS.
2. TIPPING BUCKET CAN BE MOUNTED WITH WORM-DRIVE HOSE CLAMPS TO FIT ANY SIZE POLE. ALTERNATIVELY, CHANNEL STRUT OR 90 DEGREE METAL BRACKET CAN SUPPORT THE BUCKET FROM UNDERNEATH. THE BUCKET MUST BE MOUNTED LEVEL.
3. TIPPING BUCKET CAN BE MOUNTED ON ANY EXPOSED FREE STANDING POLE OR SURFACE ON SITE.
4. RAIN GAUGE TO BE SITED SUCH THAT SURROUNDING OBJECTS ARE NO CLOSER THAN TWO TIMES THEIR HEIGHT ABOVE THE GAUGE.
5. ALL CONDUIT PENETRATIONS ARE TO BE IP68 RATED.

1/1 GENERIC DETAIL
RAIN GAUGE



24VDC WIRING GUIDE - V 2.0.4

CONTROL PANEL TERMINAL	EXTERNAL DEVICE TERMINAL	WIRE COLOR/CABLE LOCATION	PURPOSE	PROCURED BY
SOLAR LOAD CONNECTION				
+	L+	RED (+), LOAD WIRE FROM CHARGE CONTROLLER	SOLAR BATTERY POSITIVE (+) POWER	OPTI
2	L-	BLACK (-), LOAD WIRE FROM CHARGE CONTROLLER	SOLAR BATTERY NEGATIVE (-) POWER	OPTI
A+	A	2 CONDUCTOR CABLE, TWISTED PAIR	SOLAR CHARGE CONTROLLER DATA (+)	INSTALLER
B-	B	2 CONDUCTOR CABLE, TWISTED PAIR	SOLAR CHARGE CONTROLLER DATA (-)	INSTALLER
ACTUATOR - ROTORK IQT & IQD SERIES (IQT: 303M2000, IQD: 143M2000)				
4	1	3 CONDUCTOR CABLE	ACTUATOR POWER (+)	INSTALLER
2	2	3 CONDUCTOR CABLE	ACTUATOR POWER (-)	INSTALLER
GROUND LUG	GND SYMBOL	3 CONDUCTOR CABLE	ACTUATOR GROUND	INSTALLER
5	16	4 CONDUCTOR CABLE	VALVE POSITION COMMAND SIGNAL (+)	INSTALLER
7	17	4 CONDUCTOR CABLE	VALVE POSITION COMMAND SIGNAL (-)	INSTALLER
10	15	4 CONDUCTOR CABLE	VALVE POSITION CONFIRMATION SIGNAL (+)	INSTALLER
2	14	4 CONDUCTOR CABLE	VALVE POSITION CONFIRMATION SIGNAL (-)	INSTALLER
A +	27	2 CONDUCTOR CABLE, SHIELDED TWISTED PAIR	RS485 DATA (+)	INSTALLER
B -	28	2 CONDUCTOR CABLE, SHIELDED TWISTED PAIR	RS485 DATA (-)	INSTALLER
PRESSURE TRANSDUCER (4-20mA) - PMC VL2000 SERIES				
1	-------------------	RED (+), PMC	PRESSURE TRANSDUCER, POWER	OPTI
17	-------------------	BLACK (-), PMC	PRESSURE TRANSDUCER, SIGNAL	OPTI
S1	-------------------	GREEN (GND), PMC	PRESSURE TRANSDUCER, GROUNDING	OPTI

ACTUATOR POWER CABLE AWG SPECIFICATIONS

ROTORK IQT500	
WIRE GAUGE	MAX. LENGTH (FT)
8	147
10	92
12	58
14	37
16	23
18	14

MINIMUM CONDUIT SIZE SPECIFICATIONS

NO. CONDUCTORS	MIN. CONDUIT SIZE (IN)
2	½
3 - 6	¾
7 - 9	1
10 - 12	1- ¼

ELECTRICAL INSTALLATION NOTES

1. DETERMINE IF THERE ARE UNDERGROUND UTILITIES IN THE WORK AREA PRIOR TO EXCAVATION, BY CALLING DIG SAFE AT LEAST 48 HOURS PRIOR TO STARTING WORK. CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE TO UNDERGROUND UTILITIES CAUSED BY TRENCHING OR EXCAVATION.
2. INSTALLATION OF THE CONTROL PANEL AND ASSOCIATED COMPONENTS (E.G., CABLING, CONDUIT, SENSORS) MUST BE PERFORMED BY A LICENSED ELECTRICIAN. ELECTRICIAN SHALL BE RESPONSIBLE FOR ENSURING THAT THE CONTROL PANEL AND ASSOCIATED COMPONENTS ARE PROPERLY CONNECTED TO THE SOLAR POWER SYSTEM AND THAT CONDUIT AND CABLING IS SIZED AND INSTALLED PER THE NEC.
3. ALL CONDUCTORS SHALL BE IDENTIFIED AT EACH END (LABELED OR COLOR CODED) AND THE IDENTIFIED CONDUCTORS DOCUMENTED IN THE SITE LAYOUT MAP.
4. PENETRATIONS INTO CONTROL PANEL MUST BE IP68 RATED (NO WATER SHALL PENETRATE ANY SEALS). SUBSURFACE TERMINATIONS SHALL BE SEALED WITH POLYWATER CLOSED-CELL FOAM DUCT SEALANT (PROCURED THROUGH OPTI WITH CONTROL PANEL).
5. REFERENCE "ACTUATOR POWER CABLE AWG SPECIFICATIONS" TABLE FOR THE CORRECT CONDUCTOR GAUGE FOR ACTUATOR POWER CONNECTIONS. ALL OTHER CONDUCTORS MUST BE AT LEAST 16AWG.
6. ALL BURIED CONDUIT RUNS SHALL BE RIGID SCH 40 PVC CONDUIT. ALL EXPOSED CONDUIT SHALL BE RIGID SCH 40 PVC OR FLEXIBLE TYPE-UA PVC. BURIED RIGID SCHEDULE 40 CONDUIT SHALL BE INSTALLED WITH A MINIMUM COVER OF AT LEAST 18" IN ACCORDANCE WITH TABLE 300.5 OF THE NEC.
7. CONDUIT SHALL BE SIZED PER THE NEC TO HAVE AN ADEQUATE CROSS-SECTIONAL AREA FOR INSTALLED CABLES. REFERENCE OPTI PROVIDED TABLE FOR MINIMUM CONDUIT SIZE. ACTUATOR HAS ¾" PORTS FOR CONDUIT, USE REDUCING FITTING IF NEEDED.
8. LEAVE A MINIMUM OF 1 FOOT SPARE CABLING NEATLY COILED IN CONTROL PANEL FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.
9. LEAVE A MINIMUM 3 FEET LOOP OF FLEXIBLE CONDUIT IN OUTLET STRUCTURE FOR EASE OF FUTURE MAINTENANCE. FLEXIBLE CONDUIT SHALL RUN FROM ACTUATOR TO JUNCTION BOX LOCATED IN OUTLET STRUCTURE. RIGID CONDUIT SHALL RUN FROM JUNCTION BOX TO OPTI CONTROL PANEL.
10. ALL SUBMERGED/SATURATED METAL HARDWARE SHALL BE STAINLESS STEEL. GALVANIZED STEEL MAY BE USED ABOVEGROUND OR IN DRY LOCATIONS.
11. PRESSURE REFERENCE DEVICE (COMPONENT OF LEVEL SENSOR AT CABLE TERMINATION) TO BE LOCATED IN OPTI CONTROL PANEL. USE LABELING SCHEME DICTATED ON ELECTRICAL SCHEDULE.
12. CONNECT ALL EQUIPMENT GROUNDING CONDUCTORS TO THE OPTI CONTROL PANEL GROUNDING LUGS. GROUND THE OPTI CONTROL PANEL TO A GROUNDING ROD, GALVANIZED STEEL POLE, OR A CONCRETE-ENCASED GROUNDING ELECTRODE.
13. AFTER INSTALLATION, COMPLETE CONTRACTOR INSTALLATION CHECKLIST PROVIDED BY OPTI AND PROVIDE PHOTOS OF ALL INSTALLED EQUIPMENT. SEND SIGNED CHECKLIST AND PHOTOS TO OPTI.
14. OPTI WILL INSPECT INSTALLED COMPONENTS PRIOR TO ENERGIZING THE SYSTEM. FINAL COMPLETION SHALL BE REACHED WHEN: (1) CONSTRUCTION OF THE SYSTEM PER THE PLANS IS COMPLETE; (2) THE ENGINEER OF RECORD HAS COMPLETED FINAL INSPECTION OF WORK AND ALL NOTED DEFICIENCIES HAVE BEEN CORRECTED TO THE SATISFACTION OF THE ENGINEER OF RECORD, OPTI, AND THE SITE OWNER; AND (3) AN AS-BUILT SKETCH HAS BEEN PROVIDED OF ALL INSTALLED COMPONENTS IF FINAL INSTALL LOCATIONS HAVE VARIED FROM PLANSET.

Table 1: Equipment for Opti CMAC Retrofit

Equipment Item	Description
Actuated Valve Assembly	12-inch butterfly valve to be mounted to the existing low flow orifice (using a curved flange), controlled by an electric actuator.
Trash Rack	Trash rack mounted to the inlet of the low flow orifice will prevent debris from clogging the butterfly valve.
Level Sensor	Pressure transducer level sensor to be installed in a perforated PVC stilling well and mounted to the outer face of the outlet control structure.
Control Panel	Opti Control Panel with Opti Cellular Gateway to be pole-mounted.
Solar Power System	Two solar panels and a metal enclosure containing the solar charge controller and batteries to be pole-mounted next to the control panel.
Rain Gauge	Tipping bucket rain gauge directly measures site rainfall

Control logic at Chinn Aquatics will be implemented to retain stormwater runoff in the wetland during and after storm events in order to achieve a longer post-event retention time and maximize nutrient removal (Figure 2). Predictive controls, based on the rainfall forecast, would draw down volume in the wetland before the storm event (if needed). Once rainfall begins, discharge from the wetland would be controlled to minimize outflow from the wetland during and after the storm event, until the post-event retention period has passed. If the predicted runoff volume exceeds the total storage capacity of the system, the controls would aim to mitigate flood risk by discharging the minimum flow rate necessary to prevent basin overtopping. The post-event retention and post-retention drawdown periods are configurable parameters of the CMAC logic. Initially, the post-event retention period would be set at 24-hours, followed by a 24-hour post-retention drawdown period. These time periods could be adjusted at any point if the County desires.

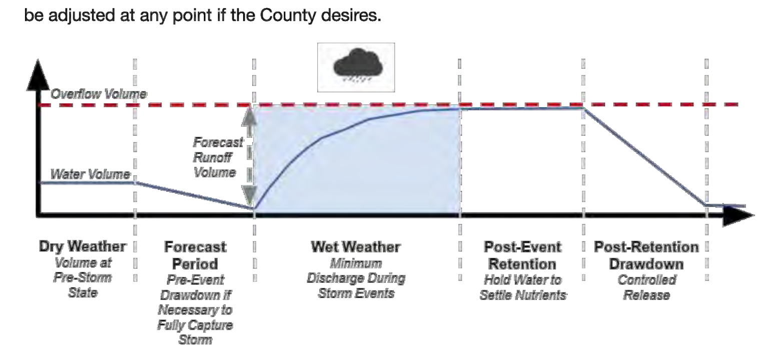


Figure 2: Example Opti CMAC Control logic for Chinn Aquatics Center Wetland retrofit

Proposed Solution Benefits

Under the proposed retrofit, the CMAC system would manage approximately 85,800 cubic feet of controllable storage volume. This is approximately 0.88 inches of rainfall over the impervious drainage area (26.89 acres).

Opti CMAC has been approved by the Chesapeake Bay Program (CBP) as a retrofitting technique for existing stormwater BMPs. Using Opti CMAC along with the additional proposed improvements is considered an enhancement of an existing BMP according to CBP guidance. As a result, the CBP Pollutant Removal Adjustor curves may be used to determine pollutant load reduction resulting from the retrofit. Expected results of the CMAC retrofit include reduced volume of discharge during wet weather and increased pollutant removal. Annual load

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CHINN PARK BMP RETROFIT

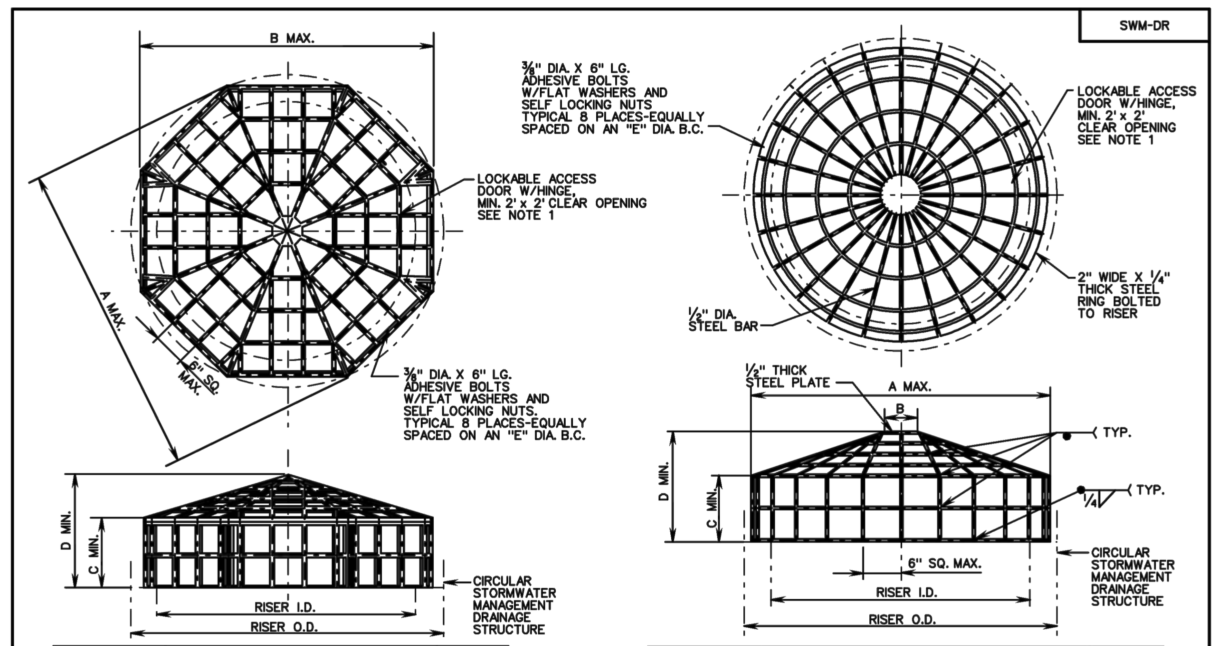
OPTI DESIGN DETAILS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

REVISIONS:

PROJECT MANAGER:	BSBS
DESIGNED:	JLJL
DRAWN:	JLJL
JOB NUMBER:	102215102215
DESIGN TYPE:	BMPBMP
DATE:	11/19/2021
SHEET NO:	B6 OF10



RISER		DIMENSION					APPROX.
I.D.	O.D.	A	B	C	D	E	WT. (LBS.)
24	30	31	28⅝	7	11	27	24
36	44	45	41½	13	19	40	58
48	58	59	54½	13	21	53	86
60	72	73	67½	17	28	66	135
72	86	87	80⅜	23	35	79	204
84	100	101	93¼	25	39	92	266
96	114	115	106¼	22	38	105	305

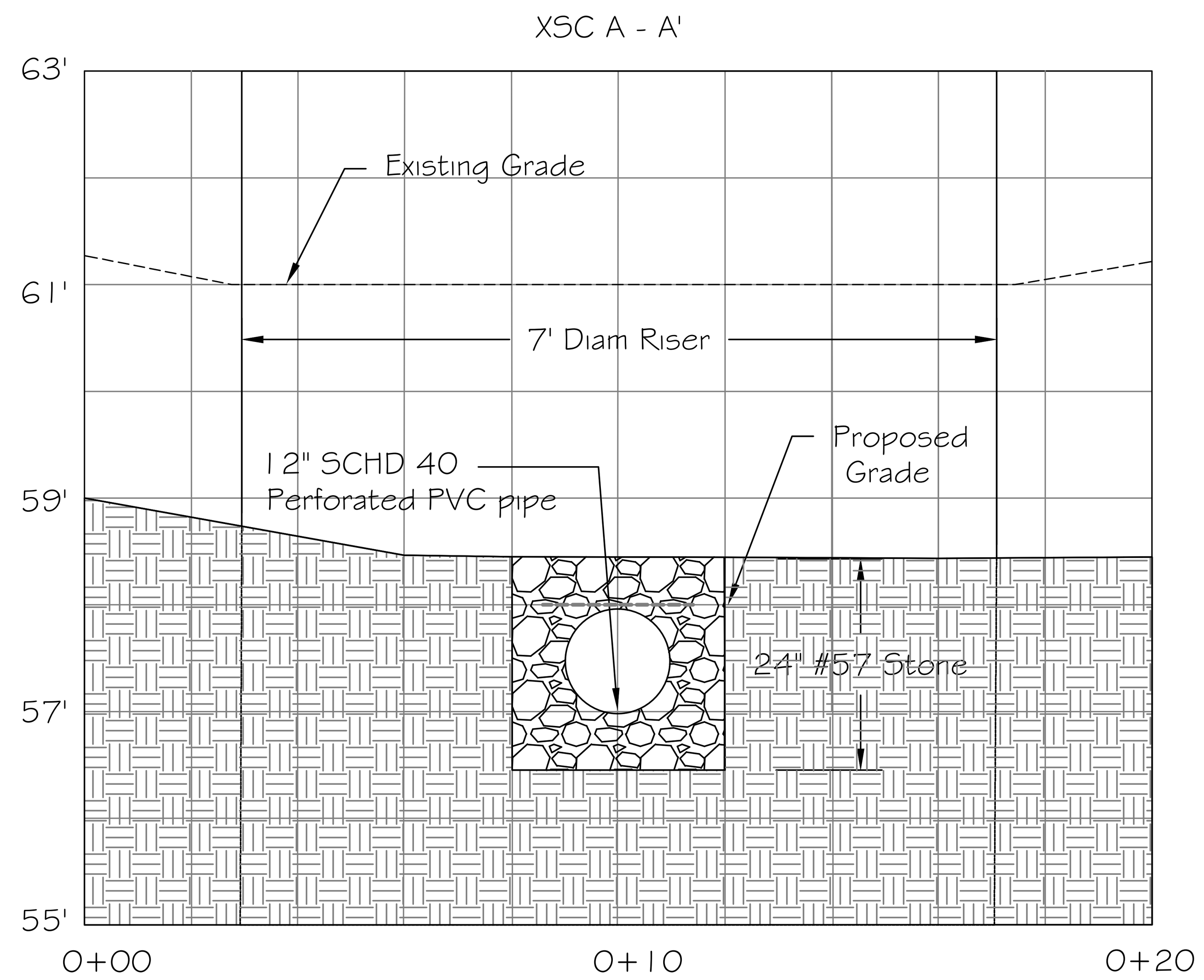
HIGH DENSITY POLYETHYLENE

RISER		DIMENSION						APPROX.
I.D.	O.D.	A	B	C	D	E	SEGMENT	WT. (LBS.)
24	30	30	6	7	10	27	15	46
36	44	42	6	13	18	40	22	82
48	58	55	9	13	20	53	29	120
60	72	68	9	17	26	66	36	169
72	86	81	9	23	34	79	42	227
84	100	94	12	25	37	92	49	290
96	114	107	12	22	36	105	56	341

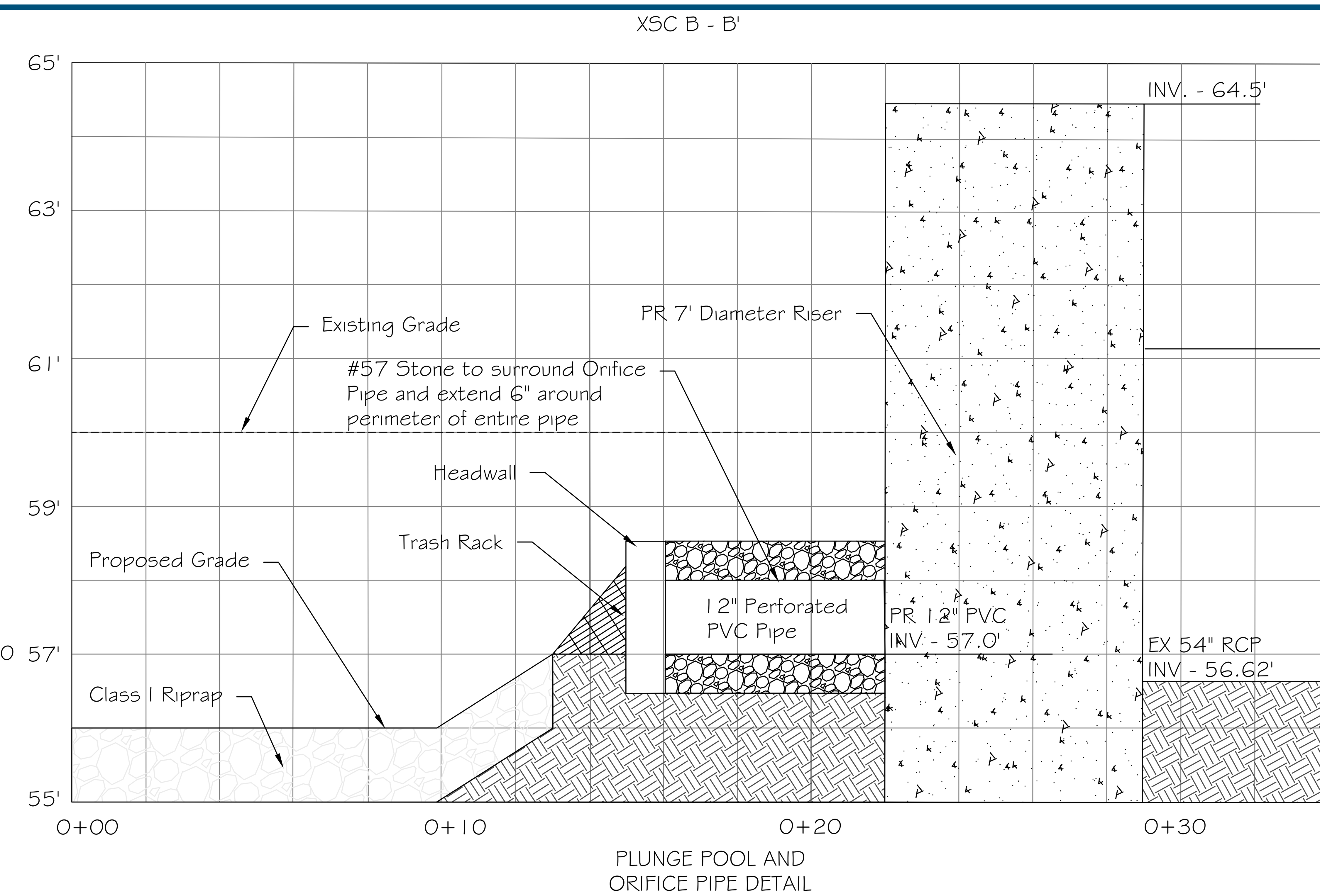
METAL

NOTES:
1. A HINGED, LOCKABLE ACCESS DOOR SHALL BE PROVIDED ON ALL TRASH RACKS IF THE TOTAL WEIGHT OF THE TRASH RACK IS GREATER THAN 75 LBS OR IF THE TRASH RACK IS TO BE PLACED ON A SWM-1 WITH AN "H" DIMENSION GREATER THAN 7'-2".
2. ANTI-VORTEX PLATE IS TO BE USED WHEN SPECIFIED ON THE PLANS. COST OF FURNISHING AND PLACING THE ANTI-VORTEX PLATE IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.

SPECIFICATION REFERENCE 302
STORMWATER MANAGEMENT DETAILS TRASH RACK FOR SWM DRAINAGE STRUCTURES
VIRGINIA DEPARTMENT OF TRANSPORTATION
VDOT ROAD AND BRIDGE STANDARDS
REVISION DATE | SHEET 4 OF 5 | 114.07

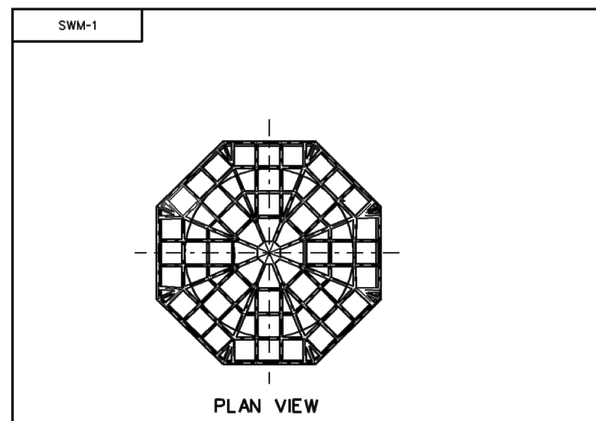


ORIFICE PIPE DETAIL

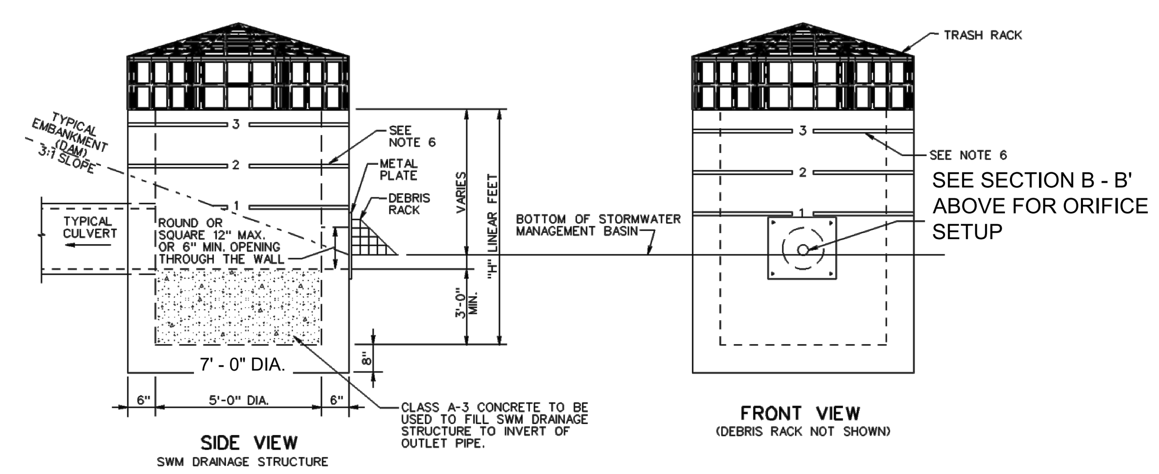


PLUNGE POOL AND ORIFICE PIPE DETAIL

SWM-1

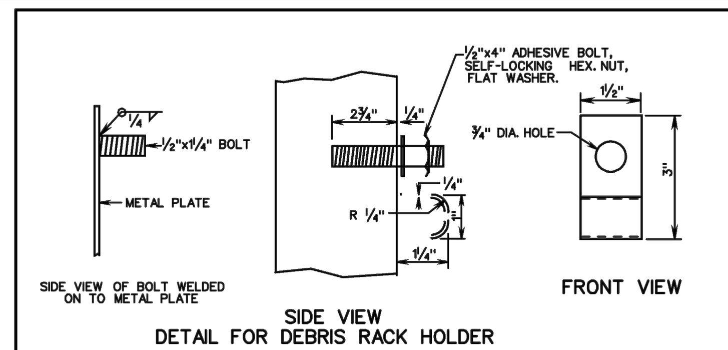


NOTES:
1. COST OF TRASH RACK AND DEBRIS RACK ARE TO BE INCLUDED IN THE PRICE BID FOR THE STORMWATER MANAGEMENT DRAINAGE STRUCTURE.
2. STRUCTURE MAY BE PRECAST OR CAST IN PLACE. SEE SHEET 1 OF 3 FOR DETAILS ON CAST IN PLACE STRUCTURE.
3. WEEP HOLES SHALL NOT BE PROVIDED. ANY LIFT HOLES SHALL BE PLUGGED.
4. STEPS ARE TO BE PROVIDED WHEN HEIGHT OF STRUCTURE IS 4'-0" OR GREATER ABOVE INVERT OF OUTLET PIPE. FOR STEP DETAILS SEE STANDARD ST-1.
5. SEE STANDARD SWM-DR FOR DETAILS ON PLATE, DEBRIS RACK AND TRASH RACK.
6. MARK HEIGHT OF STRUCTURE, IN BLACK, WITH 4" HIGH NUMERALS AND 1" WIDE HORIZONTAL STRIPES AT 1' INTERVALS FROM INVERT OF WATER QUALITY ORIFICE (ALL VISIBLE SIDES).
7. THE PERMANENT STORMWATER MANAGEMENT DRAINAGE STRUCTURE, STANDARD SWM-1 MAY BE MODIFIED WHERE THE STORMWATER MANAGEMENT BASIN IS TO BE USED AS A TEMPORARY SEDIMENT BASIN DURING PROJECT CONSTRUCTION. SEE STANDARD SWM-DR, SHEET 1 OF 5 FOR TEMPORARY MODIFICATION DETAILS.
8. THE SIZE OF THE WATER QUALITY ORIFICE SHALL BE SPECIFIED ON THE PLANS. ADDITIONAL OPENINGS IN THE STORMWATER MANAGEMENT DRAINAGE STRUCTURE TO BE PROVIDED WHEN SPECIFIED ON THE PLANS.

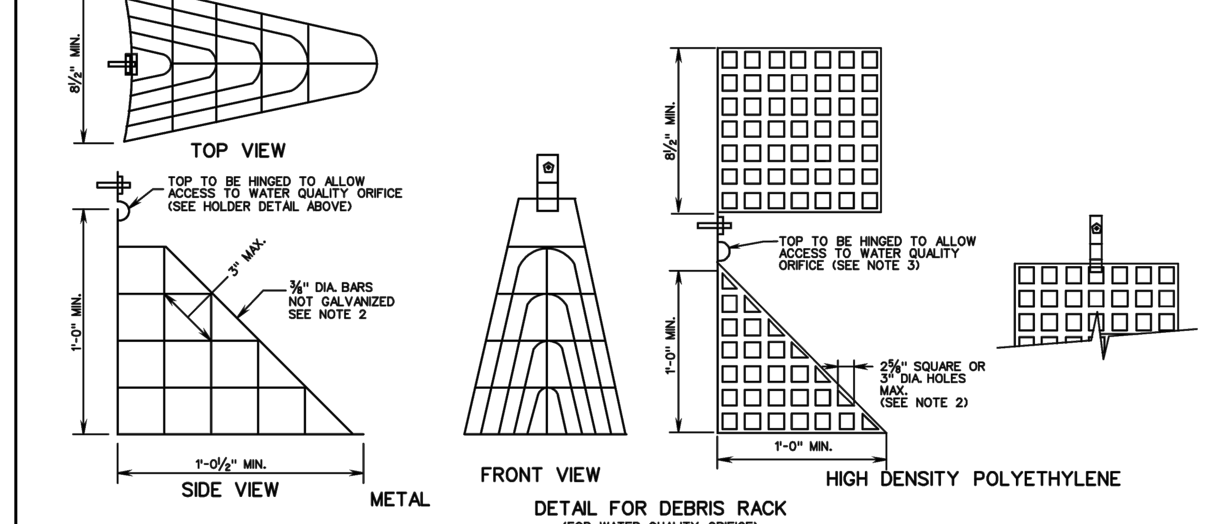


VDOT ROAD AND BRIDGE STANDARDS
SHEET 2 OF 3 | REVISION DATE 08/10 | 114.02
PRECAST STORMWATER MANAGEMENT DRAINAGE STRUCTURE
VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIFICATION REFERENCE 105 302

SWM-DR

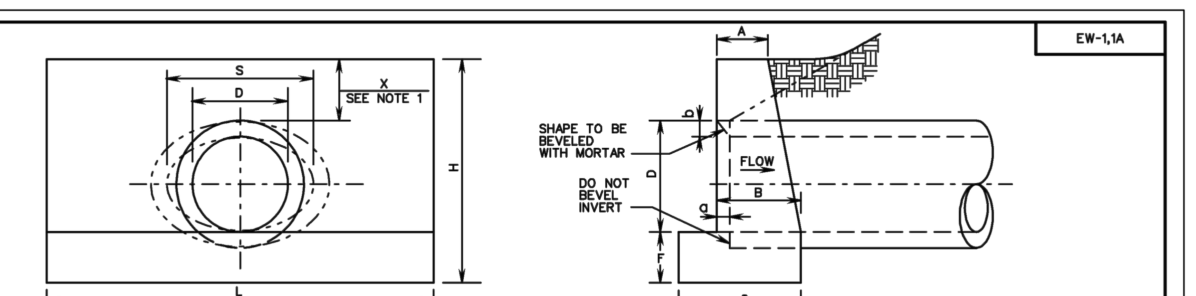


1. COST OF DEBRIS RACK, METAL PLATE, AND DEBRIS RACK HOLDER TO BE INCLUDED IN THE BID PRICE FOR THE SWM DRAINAGE STRUCTURE.
2. DEBRIS RACK MAY BE FABRICATED FROM WELDED ⅜" DIAMETER BARS OR ½" THICK HIGH DENSITY POLYETHYLENE. METAL COMPONENTS OF DEBRIS RACK MUST NOT BE GALVANIZED.
3. DEBRIS RACK TO BE HINGED AS SHOWN OR CONTRACTOR MAY SUBSTITUTE A COMPARABLE DESIGN AS APPROVED BY THE ENGINEER.
4. THE LOCATION OF THE DEBRIS RACK HOLDER MAY BE ADJUSTED FOR VARIABLE CONDITIONS. WHEN HOLDER BOLT IS LOCATED ON THE METAL PLATE THE ½" DIA. BOLT LENGTH IS TO BE REDUCED ¼ LG. AND WELDED TO THE PLATE. DEBRIS RACK HOLDER AND ALL HARDWARE IS TO BE GALVINIZED.



SPECIFICATION REFERENCE 302
STORMWATER MANAGEMENT (SWM) DETAILS
DEBRIS RACK, METAL PLATE, WATER QUALITY ORIFICE, CONCRETE CRADLE (FOR SWM DRAINAGE STRUCTURES, SWM RISER PIPES AND SWM DAMS)
VIRGINIA DEPARTMENT OF TRANSPORTATION
VDOT ROAD AND BRIDGE STANDARDS
REVISION DATE | SHEET 2 OF 5 | 114.05

EW-1, 1A



NOTES:
1. "H" MAY BE REDUCED UNTIL "X" REACHES A MINIMUM OF 4" WHERE ENDWALL WOULD PROTRUDE ABOVE SHOULDER LINE. IN NO CASE SHALL TOP OF ENDWALL PROJECT ABOVE FILL SLOPE, DITCH SLOPE, OR SHOULDER.
2. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
3. ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR PRECAST SEE SHEET 101.02.
4. THIS STANDARD TO BE USED WITH STRAIGHT CROSSINGS AND ALL SKEWS(0° TO 45°).
5. HEADWALL TO BE BEVELED IN ALL AREAS EXCEPT WHERE A CONFLICT WITH INVERT OR WINGWALLS OCCUR
6. BEVEL EDGE IS REQUIRED ON THE HEADWALL AT THE INLET END OF THE CULVERT (WHERE THE FLOW ENTERS THE CULVERT).
7. HEADWALL AT THE OUTLET END OF THE CULVERT MAY BE EITHER SQUARE EDGE OR BEVEL EDGE.
8. ON SHALLOW FILLS, WHERE ENDWALLS ARE 1' OR LESS BELOW SHOULDER LINE, THE TOP OF THE ENDWALL SHALL BE CONSTRUCTED PARALLEL TO THE GRADE OF THE ROAD.
9. ¾" CHAMFER MAY BE PROVIDED ON ALL EDGES AT MANUFACTURER'S OPTION.

EW-1

ENDWALL FOR CIRCULAR PIPE

	DIAMETER OF PIPE CULVERT					
	12"	15"	18"	21" OR 24"	27" OR 30"	33" OR 36"
A	0'-6"	0'-8"	0'-9"	0'-11"	1'-0"	1'-0"
B	0'-11"	1'-1"	1'-3"	1'-6"	1'-9"	2'-0"
C	1'-4"	1'-7"	1'-9"	2'-2"	2'-6"	2'-9"
D	1'-0"	1'-3"	1'-6"	2'-0"	2'-6"	3'-0"
F	0'-6"	0'-8"	0'-8"	0'-9"	0'-9"	0'-9"
H	2'-3"	2'-11"	3'-2"	3'-9"	4'-3"	4'-9"
L	4'-0"	5'-0"	6'-0"	8'-0"	10'-0"	12'-0"
a	0'-1¼"	0'-1¾"	0'-2"	0'-2½"	0'-3¼"	0'-3¾"
b	0'-1"	0'-1¼"	0'-1½"	0'-2"	0'-2½"	0'-3"
	CUBIC YARDS OF CONCRETE					
CONC. PIPE	0.241	0.492	0.697	1.319	2.067	2.947
C.M. PIPE	0.257	0.521	0.739	1.398	2.198	3.145

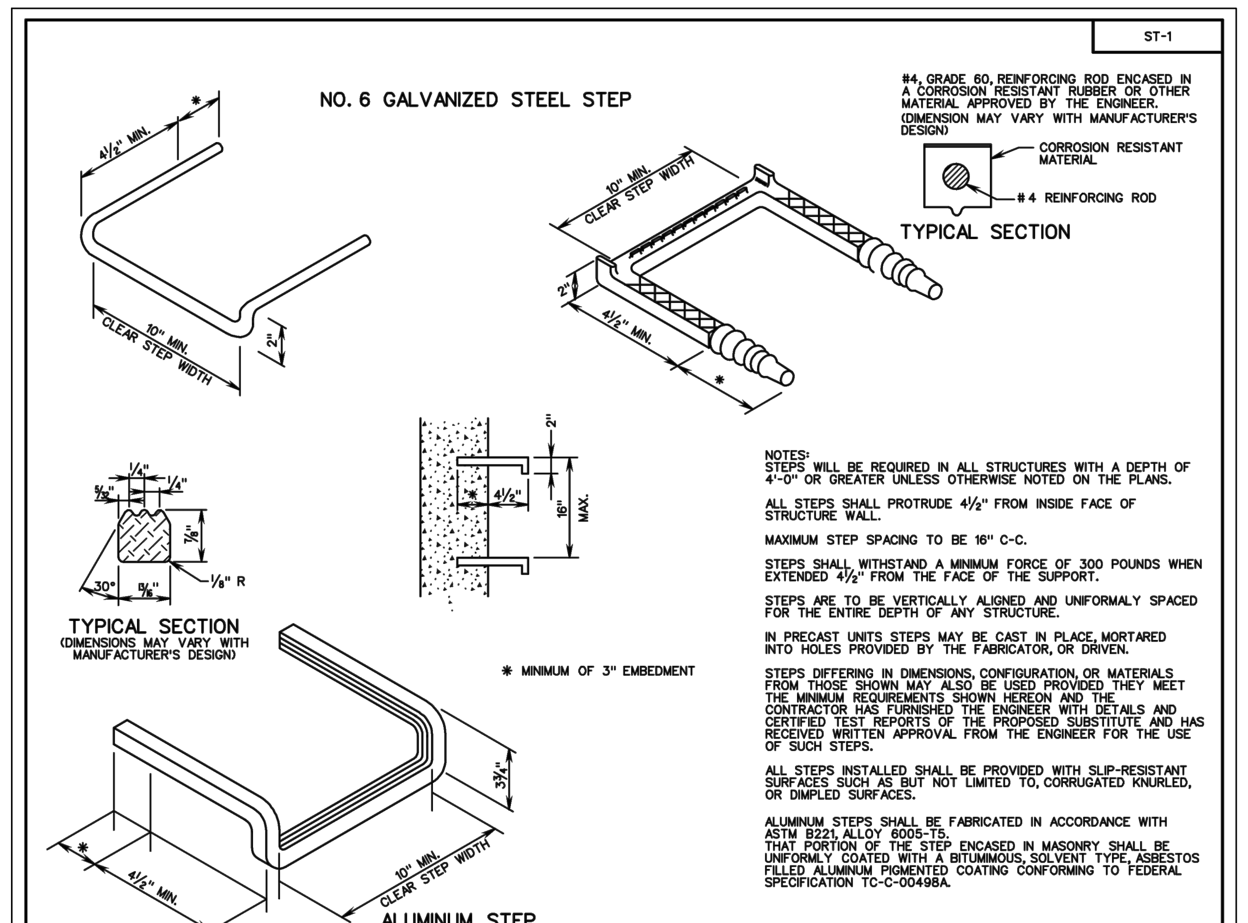
EW-1A

ENDWALL FOR ELLIPTICAL PIPE

	SIZE OF ELLIPTICAL PIPE CULVERT (SPAN x RISE)							
	23"x14"	30"x19"	34"x22"	38"x24"	42"x27"	45"x29"	49"x32"	53"x34"
A	0'-8"	0'-9"	0'-10"	0'-11"	0'-11"	1'-0"	1'-0"	1'-0"
B	1'-2"	1'-5"	1'-6"	1'-8"	1'-9"	1'-10"	1'-11"	1'-11"
C	1'-8"	1'-11"	2'-1"	2'-4"	2'-5"	2'-7"	2'-8"	2'-9"
D	1'-2"	1'-7"	1'-10"	2'-0"	2'-3"	2'-5"	2'-8"	2'-10"
F	0'-8"	0'-8"	0'-9"	0'-9"	0'-9"	0'-9"	0'-9"	0'-9"
H	2'-10"	3'-3"	3'-7"	3'-9"	4'-0"	4'-2"	4'-5"	4'-7"
L	5'-5"	7'-2"	8'-6"	9'-2"	10'-2"	10'-11"	12'-1"	12'-11"
S	1'-11"	2'-6"	2'-10"	3'-2"	3'-6"	3'-9"	4'-1"	4'-5"
a	0'-2½"	0'-3¼"	0'-3½"	0'-4"	0'-4½"	0'-4¾"	0'-5"	0'-5½"
b	0'-2"	0'-2½"	0'-2¾"	0'-3"	0'-3½"	0'-3¾"	0'-4"	0'-4½"
	CUBIC YARDS OF CONCRETE							
CONC.PIPE	0.502	0.855	1.236	1.500	1.811	2.101	2.512	2.801

SPECIFICATION REFERENCE 105 302
STANDARD ENDWALL FOR PIPE CULVERTS
12" - 36" CIRCULAR AND 23" x 14" - 53" x 34" ELLIPTICAL PIPES
VIRGINIA DEPARTMENT OF TRANSPORTATION
VDOT ROAD AND BRIDGE STANDARDS
REVISION DATE | SHEET 1 OF 1 | 101.01

ST-1



NOTES:
STEPS WILL BE REQUIRED IN ALL STRUCTURES WITH A DEPTH OF 4'-0" OR GREATER UNLESS OTHERWISE NOTED ON THE PLANS.

ALL STEPS SHALL PROTRUDE 4½" FROM INSIDE FACE OF STRUCTURE WALL.

MAXIMUM STEP SPACING TO BE 16" C-C.

STEPS SHALL WITHSTAND A MINIMUM FORCE OF 300 POUNDS WHEN EXTENDED 4½" FROM THE FACE OF THE SUPPORT.

STEPS ARE TO BE VERTICALLY ALIGNED AND UNIFORMALY SPACED FOR THE ENTIRE DEPTH OF ANY STRUCTURE.

IN PRECAST UNITS STEPS MAY BE CAST IN PLACE, MORTARED INTO HOLES PROVIDED BY THE FABRICATOR, OR DRIVEN.

STEPS DIFFERING IN DIMENSIONS, CONFIGURATION, OR MATERIALS FROM THOSE SHOWN MAY ALSO BE USED PROVIDED THEY MEET THE MINIMUM REQUIREMENTS SHOWN HEREON AND THE CONTRACTOR HAS FURNISHED THE ENGINEER WITH DETAILS AND CERTIFIED TEST REPORTS OF THE PROPOSED SUBSTITUTE AND HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER FOR THE USE OF SUCH STEPS.

ALL STEPS INSTALLED SHALL BE PROVIDED WITH SLIP-RESISTANT SURFACES SUCH AS BUT NOT LIMITED TO, CORRUGATED KNURLED, OR DIMPLED SURFACES.

ALUMINUM STEPS SHALL BE FABRICATED IN ACCORDANCE WITH ASTM B221, ALLOY 6005-T5.
THAT PORTION OF THE STEP ENCASED IN MASONRY SHALL BE UNIFORMLY COATED WITH A BITUMIMOUS, SOLVENT TYPE, ASBESTOS FILLED ALUMINUM PIGMENTED COATING CONFORMING TO FEDERAL SPECIFICATION TC-C-00498A.

SPECIFICATION REFERENCE
STANDARD STEP
VIRGINIA DEPARTMENT OF TRANSPORTATION
VDOT ROAD AND BRIDGE STANDARDS
REVISION DATE | SHEET 1 OF 1 | 106.09

res
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CHINN PARK BMP RETROFIT

DESIGN DETAILS AND SECTIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

REVISIONS:

PROJECT MANAGER:	BS
DESIGNED:	JL
DRAWN:	JL
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	4/11/2023
SHEET NO:	

B7 OF10

EROSION & SEDIMENT CONTROL NOTES: (THESE NOTES ARE BASED ON TABLE 6–1 OF THE VESCH)

ES–1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS 9VAC25–840.

ES–2: THE EROSION AND SEDIMENT CONTROL INSPECTOR MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE–CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.

ES–3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.

ES–4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.

ES–5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF–SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY FOR REVIEW AND APPROVAL.

ES–6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE EROSION AND SEDIMENT CONTROL INSPECTOR.

ES–7: ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.

ES–8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE, AND WILL BE PERFORMED IN ACCORDANCE WITH THE FORT BELVOIR ESC TECHNICAL BULLETIN ⊲⊳1 – DEWATERING OPERATIONS.

ES–9: THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF–PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.

VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS, SECTION 9VAC25–840–40, MINIMUM STANDARDS

ALL LAND–DISTURBING ACTIVITIES UNDERTAKEN ON PRIVATE AND PUBLIC LANDS IN THE COMMONWEALTH OF VIRGINIA MUST MEET THE 19 "MINIMUM STANDARDS" FOR EROSION AND SEDIMENT CONTROL (ESC) IN SECTION 9VAC25–840–40 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS. THE APPLICANT WHO SUBMITS THE ESC PLAN TO THE PROGRAM AUTHORITY FOR APPROVAL IS RESPONSIBLE FOR ENSURING COMPLIANCE WITH THE MINIMUM STANDARDS THAT APPLY TO HIS/HER ACTIVITIES.

1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

2. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS BORROW AREAS AND SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.

3. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.

4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND–DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

5. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.

6. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.

6.1. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.

6.2. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25–YEAR STORM OF 24–HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.

7. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.

8. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.

9. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.

10. ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT–LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.

11. BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.

12. WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NONERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.

13. WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX–MONTH PERIOD, A TEMPORARY VEHICULAR STREAM CROSSING CONSTRUCTED OF NONERODIBLE MATERIAL SHALL BE PROVIDED.

14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.

15. THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.

16. UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:

16.1. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.

16.2. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

16.3. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF–SITE PROPERTY.

16.4. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.

16.5. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THIS CHAPTER.

16.6. APPLICABLE SAFETY REQUIREMENTS SHALL BE COMPLIED WITH.

17. WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED OR PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND–DISTURBING ACTIVITIES.

18. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE VESCP AUTHORITY. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

19. PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24–HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA. STREAM RESTORATION AND RELOCATION PROJECTS THAT INCORPORATE NATURAL CHANNEL DESIGN CONCEPTS ARE NOT MAN–MADE CHANNELS AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN–MADE CHANNELS:

19.1. CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN–MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.

19.2. ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:

19.2.1. THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS ONE HUNDRED TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR

19.2.2.

19.2.2.1. NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A BANKFULL DISCHARGE TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.

19.2.2.2. ALL PREVIOUSLY CONSTRUCTED MAN–MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A 10–YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO–YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND

19.2.2.3. PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A 10–YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.

19.3. IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN–MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:

19.3.1. IMPROVE THE CHANNELS TO A CONDITION WHERE A 10–YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO–YEAR STORM WILL NOT CAUSE EROSION TO THE CHANNEL, THE BED, OR THE BANKS; OR

19.3.2. IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE 10–YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES;

19.3.3. DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE–DEVELOPMENT PEAK RUNOFF RATE FROM A TWO–YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE–DEVELOPMENT PEAK RUNOFF RATE FROM A 10–YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN–MADE CHANNEL; OR

19.3.4. PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.

19.4. THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.

19.5. ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT CONDITION OF THE SUBJECT PROJECT.

19.6. IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE VESCP OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.

19.7. OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATORS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.

19.8. ALL ON–SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.

19.9. INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE OR PIPE SYSTEM, OR TO A DETENTION FACILITY.

19.10. IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. INSTEAD, THE DEVELOPMENT, AS A WHOLE, SHALL BE CONSIDERED TO BE A SINGLE DEVELOPMENT PROJECT. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.

19.11. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.

19.12. ANY PLAN APPROVED PRIOR TO JULY 1, 2014, THAT PROVIDES FOR STORMWATER MANAGEMENT THAT ADDRESSES ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN–MADE CHANNELS SHALL SATISFY THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN–MADE CHANNELS IF THE PRACTICES ARE DESIGNED TO (I) DETAIN THE WATER QUALITY VOLUME AND TO RELEASE IT OVER 48 HOURS; (II) DETAIN AND RELEASE OVER A 24–HOUR PERIOD THE EXPECTED RAINFALL RESULTING FROM THE ONE YEAR, 24–HOUR STORM; AND (III) REDUCE THE ALLOWABLE PEAK FLOW RATE RESULTING FROM THE 1.5, 2, AND 10–YEAR, 24–HOUR STORMS TO A LEVEL THAT IS LESS THAN OR EQUAL TO THE PEAK FLOW RATE FROM THE SITE ASSUMING IT WAS IN A GOOD FORESTED CONDITION, ACHIEVED THROUGH MULTIPLICATION OF THE FORESTED PEAK FLOW RATE BY A REDUCTION FACTOR THAT IS EQUAL TO THE RUNOFF VOLUME FROM THE SITE WHEN IT WAS IN A GOOD FORESTED CONDITION DIVIDED BY THE RUNOFF VOLUME FROM THE SITE IN ITS PROPOSED CONDITION, AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN–MADE CHANNELS AS DEFINED IN ANY REGULATIONS PROMULGATED PURSUANT TO § 62.1–44.15:54 OR 62.1–44.15:65 OF THE ACT.

19.13. FOR PLANS APPROVED ON AND AFTER JULY 1, 2014, THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1–44.15:52 A OF THE ACT AND THIS SUBSECTION SHALL BE SATISFIED BY COMPLIANCE WITH WATER QUANTITY REQUIREMENTS IN THE STORMWATER MANAGEMENT ACT (§ 62.1–44.15:24 ET SEQ. OF THE CODE OF VIRGINIA) AND ATTENDANT REGULATIONS, UNLESS SUCH LAND–DISTURBING ACTIVITIES ARE IN ACCORDANCE WITH 9VAC25–870–48 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION OR ARE EXEMPT PURSUANT TO SUBDIVISION C 7 OF § 62.1–44.15:34 OF THE ACT.

19.14. COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN 9VAC25–870–66 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION SHALL BE DEEMED TO SATISFY THE REQUIREMENTS OF THIS SUBDIVISION 19.

EROSION & SEDIMENT CONTROL MEASURES:
UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE 1992 VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). THE MINIMUM STANDARD OF THE VESCH SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE. THE E&S INSPECTOR HAS THE AUTHORITY TO ADD OR DELETE E&S CONTROLS AS NECESSARY IN THE FIELD AS SITE CONDITIONS CHANGE. IN ADDITION, NO E&S CONTROLS, INCLUDING SEDIMENT BASINS OR TRAPS, CAN BE REMOVED WITHOUT WRITTEN AUTHORIZATION. ADDITIONALLY, NO EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED UNTIL ALL UPSLOPE AREAS HAVE BEEN STABILIZED.

TEMPORARY CONSTRUCTION ENTRANCE (VESCH 3.02): A CONSTRUCTION ENTRANCE SHALL BE INSTALLED WHERE INDICATED ON THE PLANS. IT WILL BE NEEDED TO CLEAN THE TIRES OF VEHICLES AND EQUIPMENT DURING WET CONDITIONS IN ORDER TO PREVENT MUD/ROCKS/DEBRIS FROM BEING TRACKED OFF SITE OR INTO PUBLIC ROADWAYS.

SILT FENCE BARRIER (VESCH 3.05): SILT FENCE SEDIMENT BARRIERS SHALL BE INSTALLED ON THE DOWNSLOPE SIDE OF AREAS WITH MINIMAL GRADES TO FILTER SEDIMENT–LADEN RUNOFF FROM SHEET FLOW.

PUMP–AROUND DIVERSION (THE VIRGINIA STREAM RESTORATION & STABILIZATION BMP GUIDE; DETAIL 5.1):
THE PUMP–AROUND DIVERSION (PD) ALLOWS FOR CLEAR WATER DIVERSION AROUND THE DESIGNATED WORK AREA DURING STREAM RESTORATION PROJECTS. THIS FORM OF DIVERSION IS NECESSARY WHEN RESTORATION PRACTICES SPAN THE ENTIRE WIDTH OF THE STREAM CHANNEL AND/OR A LINEAR REACH OF STREAM SEGMENT IS TO BE SIMULTANEOUSLY WORKED ON. THIS PRACTICE ALSO LIMITS POTENTIAL FOR DOWNSTREAM SEDIMENTATION BECAUSE IN–STREAM WORK WILL BE COMPLETED IN THE DRY AND ALL DENUDED AREAS WILL BE STABILIZED BEFORE RE–INTRODUCTION OF WATER BACK INTO STREAM CHANNEL. THE TOTAL WORK AREA OF THE PUMP AROUND SHOULD NOT EXCEED LENGTH OF AREA THAT CAN BE COMPLETED AND STABILIZED IN ONE (1) WORKING DAY. THE PUMP AROUND SHOULD BE COMPLETED AND REMOVED AT THE END OF EACH DAY; IF TIME TO COMPLETE WORK AREA WILL EXCEED ONE (1) DAY ALTERNATIVE PRACTICES SHOULD BE USED. THIS PRACTICE SHOULD ALSO BE LIMITED TO BASE OR LOW FLOW CONDITIONS WERE APPLICABLE TO ENSURE ADEQUACY OF PUMP EQUIPMENT. PRACTICE IS MOST APPLICABLE IN SMALL TO MEDIUM WATERSHEDS WITH RELATIVELY SMALL BASE FLOW DISCHARGES. THIS ALLOWS FOR MULTIPLE PUMPING OPTIONS AND EQUIPMENT TO SUFFICIENTLY HANDLE NECESSARY PUMP CAPACITY. A DEWATERING PUMP TO AN APPROVED DEWATERING DEVICE PER VESCH 3.26, SHALL BE USED TO REMOVE ANY SEEPAGE OR WATER THAT COLLECTS SIDE THE WORK AREA. REFER TO ESC DETAILS FOR A DETAIL OF THIS PRACTICE. BASED ON THESE CONSIDERATIONS WE PROPOSE THE FOLLOWING MODIFICATIONS TO PRACTICE 5.1:

USE OF PRACTICE NOT LIMITED TO WATERSHED SIZE BUT BY CAPACITY OF PUMP AND HEIGHT OF IN–STREAM BARRIERS.

PUMP SELECTION SHALL BE SIZED TO ADEQUATELY PUMP BASE FLOW AT A HEAD GREATER THAN THE IN–STREAM BARRIER HEIGHT.

DOWN STREAM GEOTEXTILE LINED FLOW TRANSITION POINT MAY BE USED. THIS FEATURE ALLOWS FOR DISPERSION OF PUMP DISCHARGE TO A NON–EROSIVE VELOCITY WITHIN THE EXISTING STREAM CHANNEL. ALL OTHER APPLICABLE ESC MEASURES SHALL BE USED IN CONJUNCTION WITH PUMP AROUND

TEMPORARY SEEDING (VESCH 3.31) AND MULCHING (VESCH 3.35):
ALL DENUDED AREAS AND STOCKPILE LOCATIONS, WHICH WILL BE LEFT DORMANT FOR LONGER THAN 7 DAYS, SHALL BE SEEDED WITH FAST GERMINATING TEMPORARY VEGETATION IMMEDIATELY FOLLOWING GRADING. SELECTION OF THE SEED MIXTURE WILL DEPEND ON THE TIME OF YEAR IT IS APPLIED AND SHALL BE PER TABLE 3.31–B OF SPECIFICATION 3.31 TEMPORARY SEEDING, OF THE VESCH HANDBOOK. MULCH (STRAW OR FIBER) WILL BE USED TO PROTECT THE SEEDED AREAS FROM EROSION AND TO ALLOW SEEDS TO GERMINATE PROPERLY.

PERMANENT SEEDING (VESCH 3.32) AND MULCHING (VESCH 3.35):
ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE STABILIZED WITH PERMANENT SEEDING & MULCHING IMMEDIATELY FOLLOWING FINISH GRADING. SEEDING SHALL BE DONE PER THE PLANTING PLAN, OTHER AREAS NOT SPECIFIED ON THE PLANTING PLAN SHOULD BE SEEDED WITH A GENERAL SLOPE (3:1 OR LESS) MIX AS APPLICABLE FOR THE COASTAL PLAIN AREA AS SPECIFIED IN TABLE 3.32D OF SPECIFICATION 3.32 PERMANENT SEEDING, OF THE VESCH HANDBOOK. MULCH (STRAW OR FIBER) WILL BE USED TO PROTECT THE SEEDED AREAS FROM EROSION AND TO ALLOW SEEDS TO GERMINATE PROPERLY. PERMANENT MULCHING CAN BE USED IN LANDSCAPED AREAS. MULCH IS TO BE EITHER WOOD CHIPS OR BARK CHIPS/SHREDDED BARK. ALL PERMANENT MULCHING IS TO BE INSTALLED TO STANDARD AND SPECIFICATION 3.35 MULCHING, OF THE VESCH HANDBOOK.

SOIL STABILIZATION BLANKETS & MATTING (VESCH 3.36): SOIL STABILIZATION BLANKETS/MATTING, SUCH AS COIR 700, SHALL BE INSTALLED WHERE INDICATED ON THE PLANS TO AID IN CONTROLLING EROSION IN CRITICAL AREAS AS WELL AS AIDING IN THE ESTABLISHMENT OF VEGETATION FOR PERMANENT STABILIZATION ON PREVIOUSLY DISTURBED SLOPES. BLANKETS/MATTING SHALL BE INSTALLED PER SPECIFICATION 3.36 SOIL STABILIZATION BLANKETS & MATTING.

TREE PROTECTION (VESCH 3.38): A FENCE BARRIER IS TO BE PLACED AROUND THE TREES AND VEGETATED AREAS WHICH WILL NOT BE DISTURBED TO PROTECT THE TREES AND OTHER VEGETATION FROM CONSTRUCTION EQUIPMENT AND SOIL COMPACTION.

MANAGEMENT STRATEGIES:
1. CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE
2. SEDIMENT TRAPPING / DIVERTING MEASURES WILL BE INSTALLED AS A FIRST STEP IN GRADING AND WILL BE SEEDED & MULCHED IMMEDIATELY FOLLOWING INSTALLATION.
3. TEMPORARY SEEDING OR OTHER STABILIZATION WILL FOLLOW IMMEDIATELY AFTER GRADING.
4. AREAS WHICH ARE NOT TO BE DISTURBED WILL BE CLEARLY MARKED BY FLAGS, SIGNS, ETC.
5. THE JOB SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL PRACTICES.
6. AFTER ACHIEVING ADEQUATE STABILIZATION OF PERMANENT SEEDING, THE TEMPORARY E&S CONTROLS WILL BE CLEANED UP AND REMOVED.

PERMANENT STABILIZATION:
ALL DISTURBED AREAS ARE TO BE STABILIZED WITH PERMANENT SEEDING & MULCHING IN ACCORDANCE WITH VESCH HANDBOOK AFTER LAND DISTURBING ACTIVITIES ARE COMPLETED.

STORMWATER RUNOFF CONSIDERATIONS:
NO PERMANENT LAND CONVERSIONS OR IMPERVIOUS SURFACES ARE PROPOSED AS PART OF THIS PROJECT, THEREFORE STORMWATER MANAGEMENT IS NOT REQUIRED.

CALCULATIONS:
NOT APPLICABLE, SEE ABOVE.

MAINTENANCE:
IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH SIGNIFICANT RAINFALL. THE SILT FENCE BARRIERS WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES HALF WAY TO THE TOP OF THE BARRIER. FILTERING DEVICES WILL BE INSPECTED FREQUENTLY AND REPAIRED/REPLACED ONCE THE SEDIMENT BUILD–UP PREVENTS THE STRUCTURE FROM FUNCTIONING AS DESIGNED. ALL SOIL STABILIZATION MATTING SHOULD BE INSPECTED PERIODICALLY FOLLOWING INSTALLATION, PARTICULARLY AFTER RAINSTORMS TO CHECK FOR EROSION AND UNDERMINING. ANY DISLOCATION OR FAILURE SHOULD BE REPAIRED IMMEDIATELY. IF WASHOUTS OR BREAKAGE OCCURS, REINSTALL THE MATERIAL AFTER REPAIRING THE DAMAGE TO THE SLOPE OR DITCH. SEEDED AREAS WILL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RESEEDED AS NEEDED.

CONSTRUCTION SEQUENCE

BMP RETROFIT:

PRE–CONSTRUCTION PHASE 1:

1. STAKEOUT THE PROPOSED LIMITS OF GRADING, STOCKPILE AREA AND LIMITS OF DISTURBANCE (LOD)
2. INSTALL CONSTRUCTION ENTRANCE (CE), SAFETY FENCE (SAF), TREE PROTECTION AND SILT FENCE (SF)

CONSTRUCTION PHASE 2:

1. INSTALL PUMP–AROUND AND DEWATER POND UNTIL AREA OF PROPOSED RISER HAS LITTLE STANDING WATER.
2. CLEAR AND GRUB AS NECESSARY IN AREAS WHERE EMERGENCY SPILLWAY AND PROPOSED GRADING IS TO TAKE PLACE.
3. CUT AND FILL IN ACCORDANCE WITH THE ORIFICE PIPE DETAIL AND GRADING PLAN.
4. INSTALL ORIFICE PIPE DRAINAGE TRENCH AND RISER STRUCTURE IN ACCORDANCE WITH THE GRADING PLAN AND CROSS SECTIONS
5. INSTALL OPTI SYSTEM (REP FROM OPTI WILL BE ONSITE TO ASSIST WITH PROPER SITING AND ORIENTATION OF EQUIPMENT)
6. SEED DISTURBED AREAS AND SLOPES OF FINAL GRADING.
7. REMOVE ALL TEMPORARY E&S CONTROL STRUCTURES IN ACCORDANCE WITH ALL STATE AND LOCAL INSPECTORS. CONSTRUCTION ENTRANCE IS TO REMAIN AS PERMANENT ACCESS PATH.

BMP MAINTENANCE AND SWALE REPAIR:

1. STAKEOUT THE PROPOSED V–DITCH CENTERLINE, AND LIMITS OF DISTURBANCE (LOD).
2. INSTALL SILT FENCE (SF).

CONSTRUCTION PHASE 2:

1. CLEAR AND GRUB AS NECESSARY TO PERFORM WORK.
2. CUT AND FILL IN ACCORADNCE WITH THE TYPICAL CROSS SECTIONS, GRADING PLAN, AND PROFILE.
3. INSTALL RIPRAP IN V–DITCH IN ACCORDANCE WITH GRADING PLAN.
4. REPAIR FENCE SECTIONS IDENTIFIED AS DAMAGED.
5. REMOVE ALL TEMPORARY E&S CONTROL STRUCTURES IN ACCORDANCE WITH ALL STATE AND LOCAL INSPECTORS.

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CHINN PARK BMP RETROFIT

ESC NOTES

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

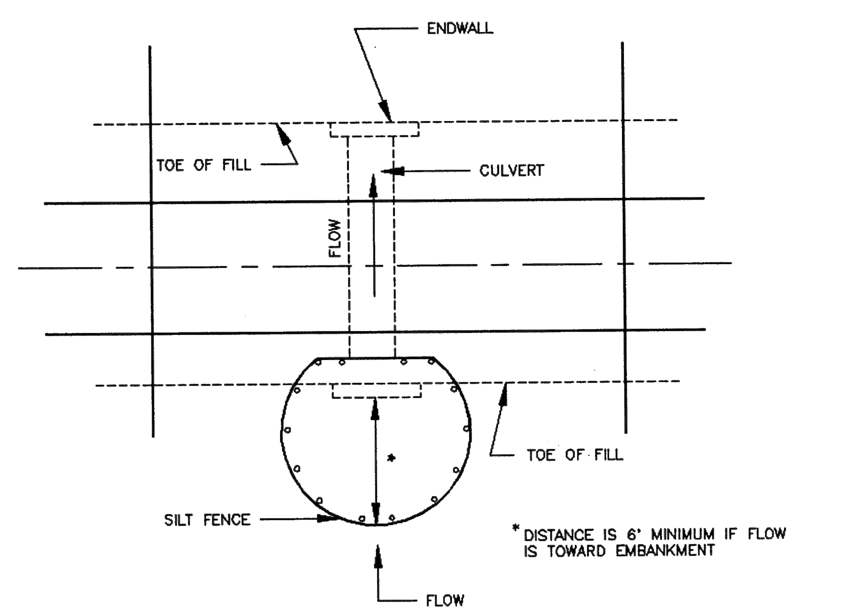
COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

REVISIONS:

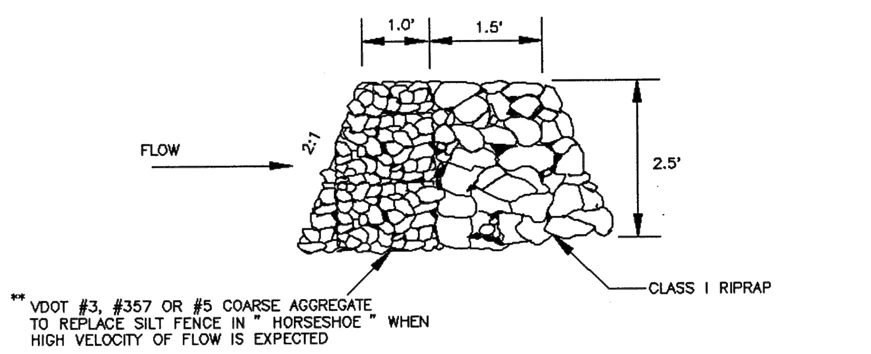
PROJECT MANAGER:	BS
DESIGNED:	JL
DRAWN:	JL
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	11/19/2021
SHEET NO:	B8 OF 10

1992 3.08

SILT FENCE CULVERT INLET PROTECTION



OPTIONAL STONE COMBINATION**

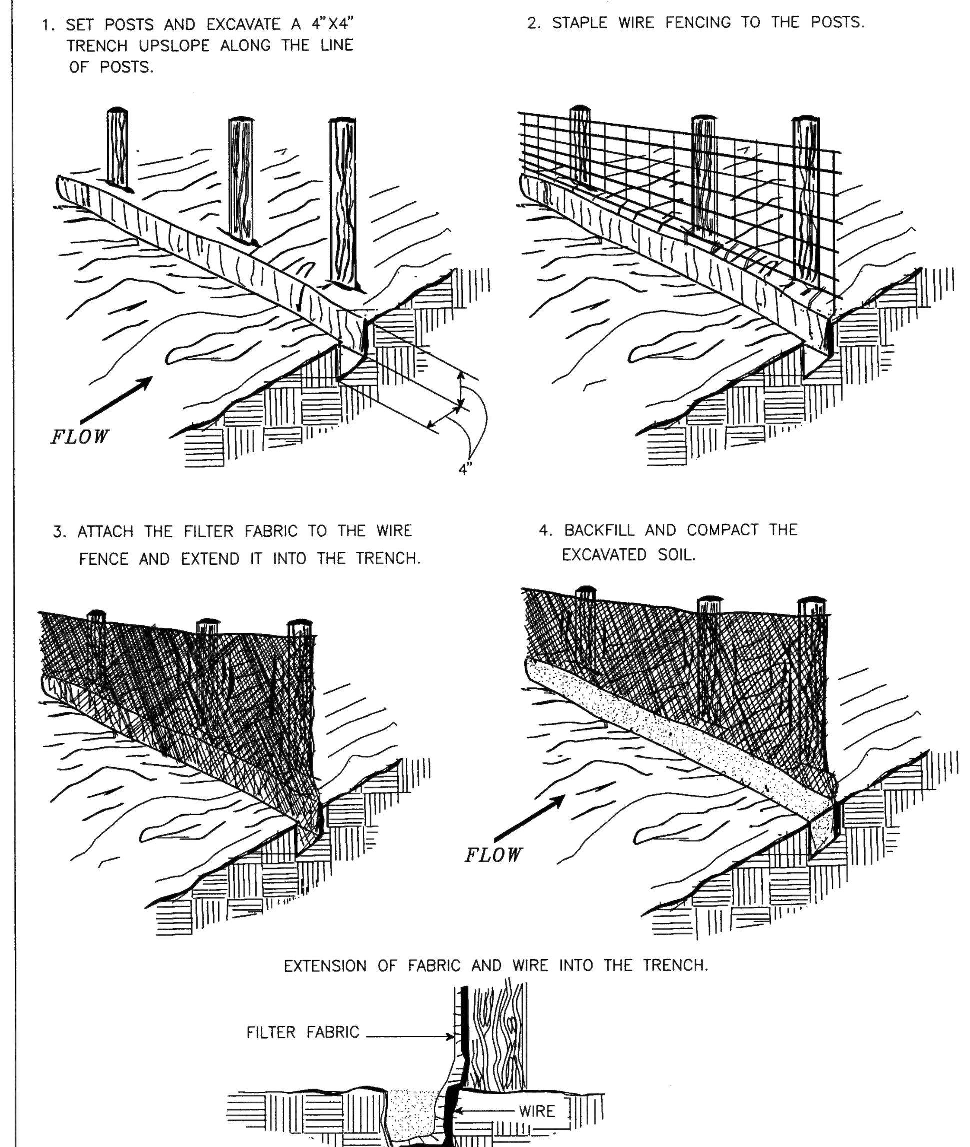


Source: Adapted from VDOT Standard Sheets and Va. DSWC

Plate 3.08-1

1992 3.05

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)

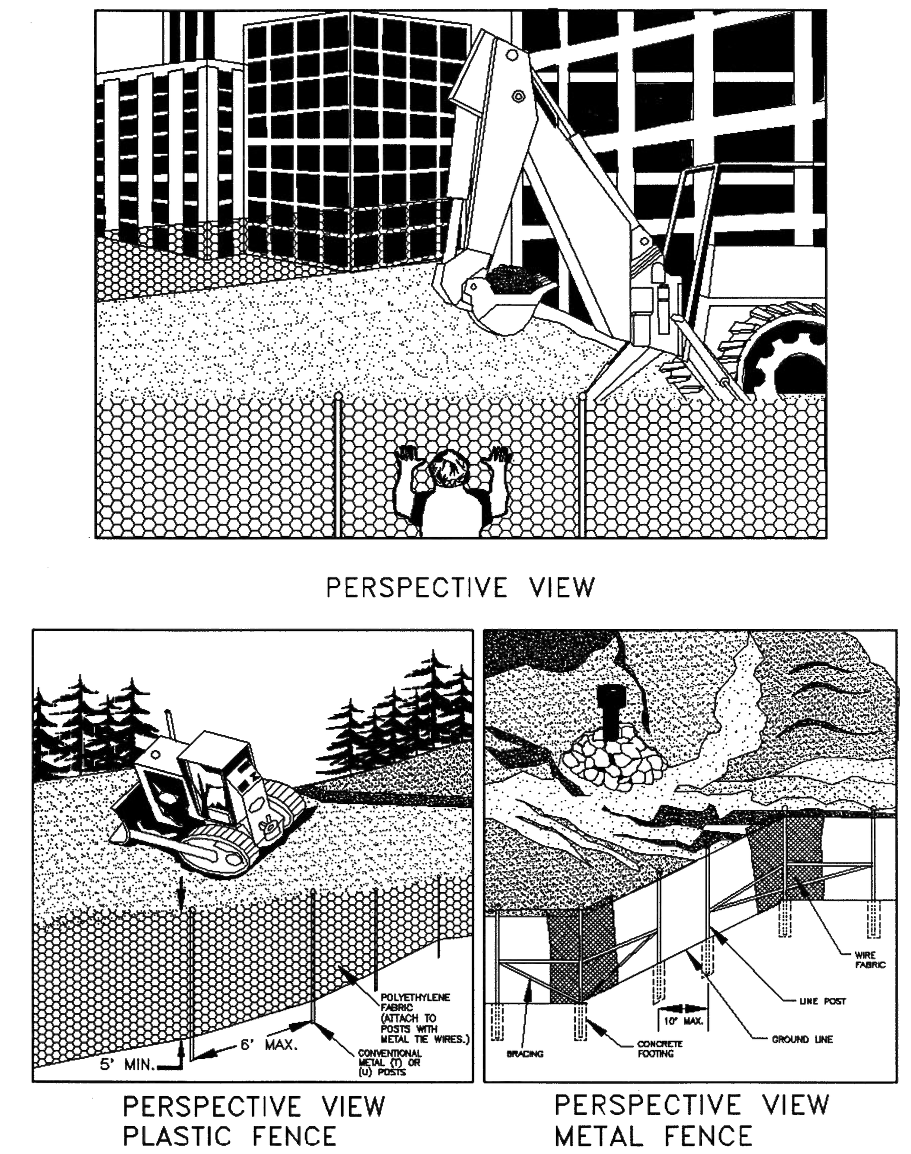


Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-1

1992 3.01

SAFETY FENCE

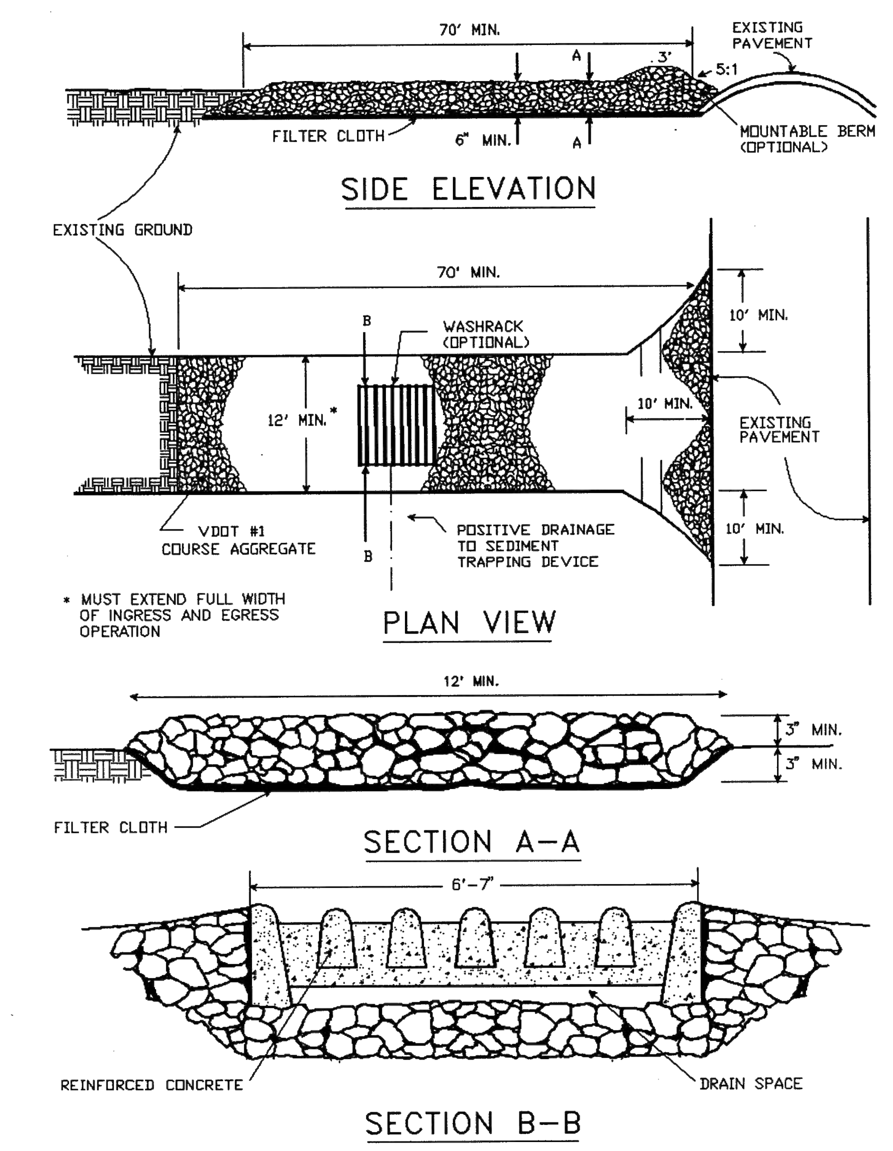


Source: Adapted from Conwed Plastics and VDOT Road and Bridge Standards

Plate 3.01-1

1992 3.02

STONE CONSTRUCTION ENTRANCE

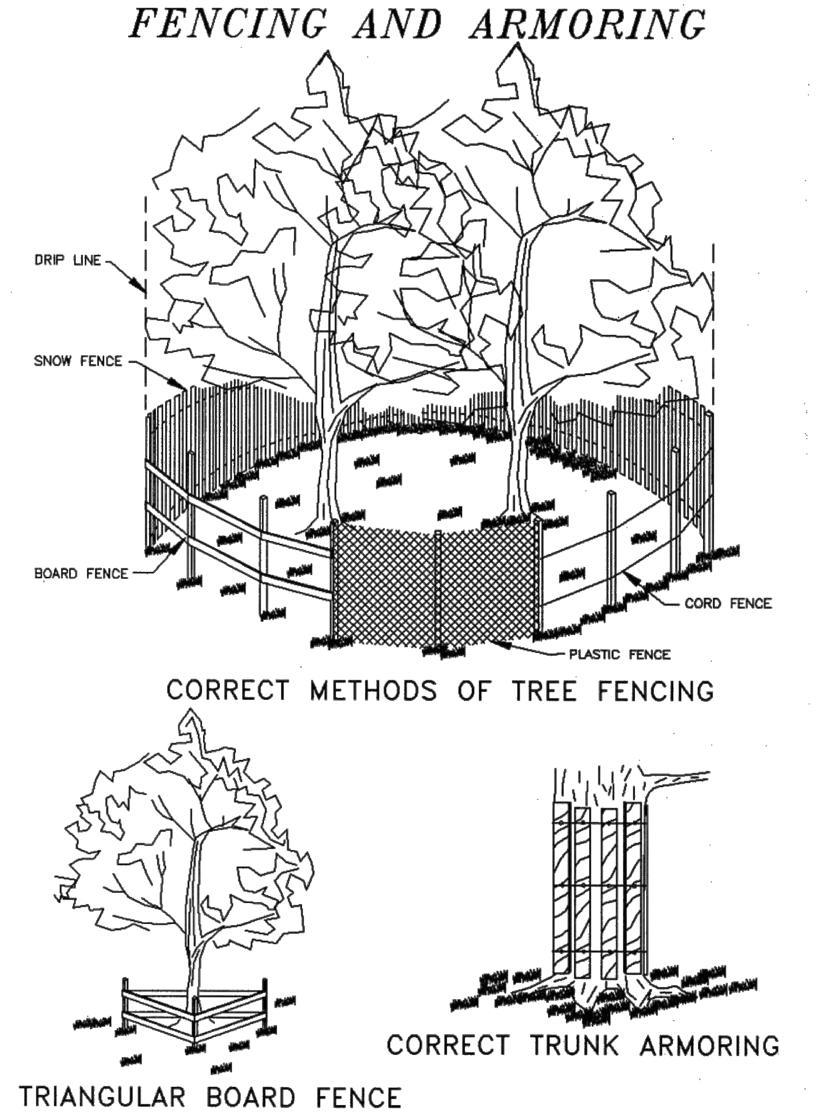


Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC

Plate 3.02-1

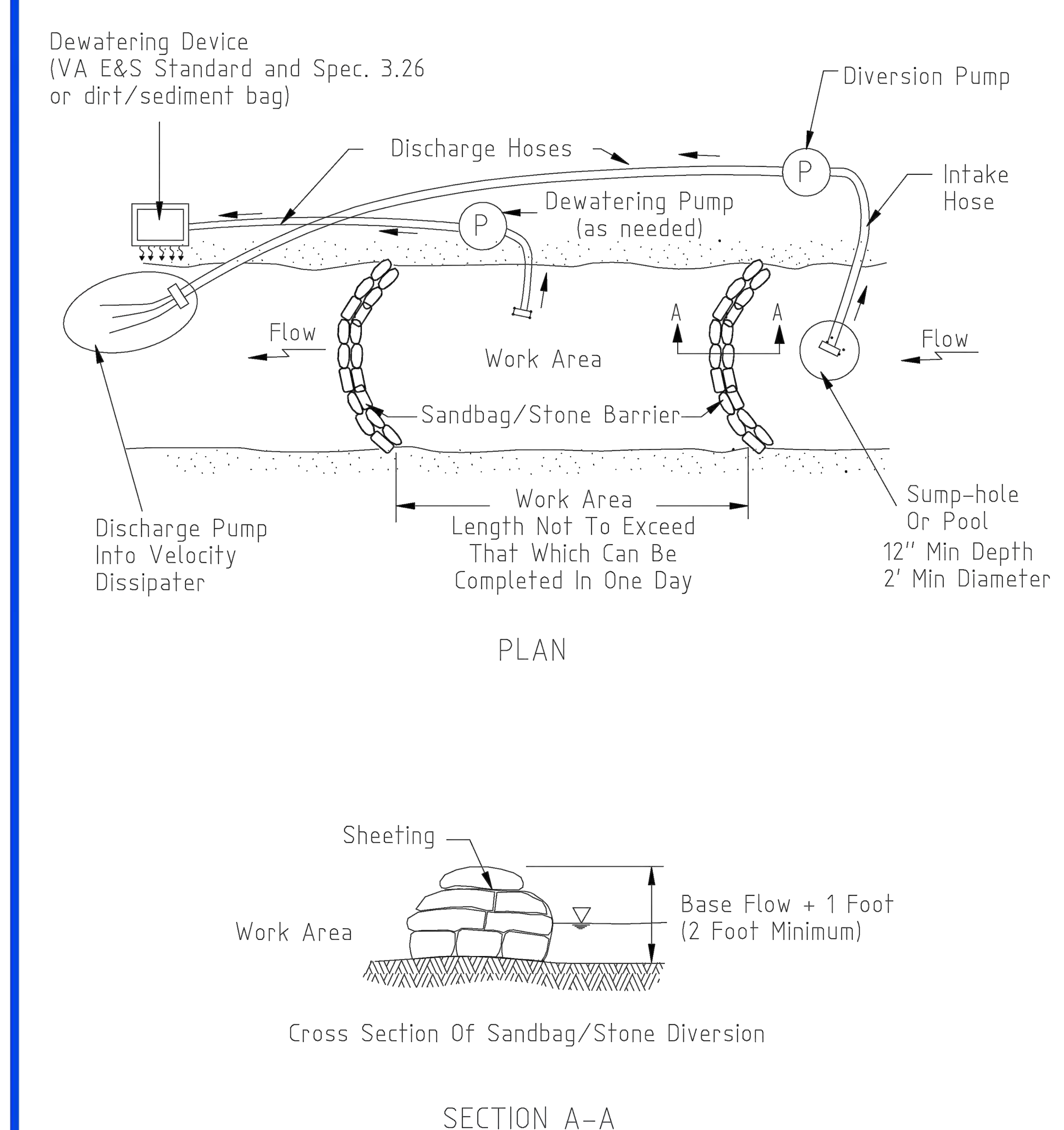
1992 3.38

FENCING AND ARMORING



Source: Va. DSWC

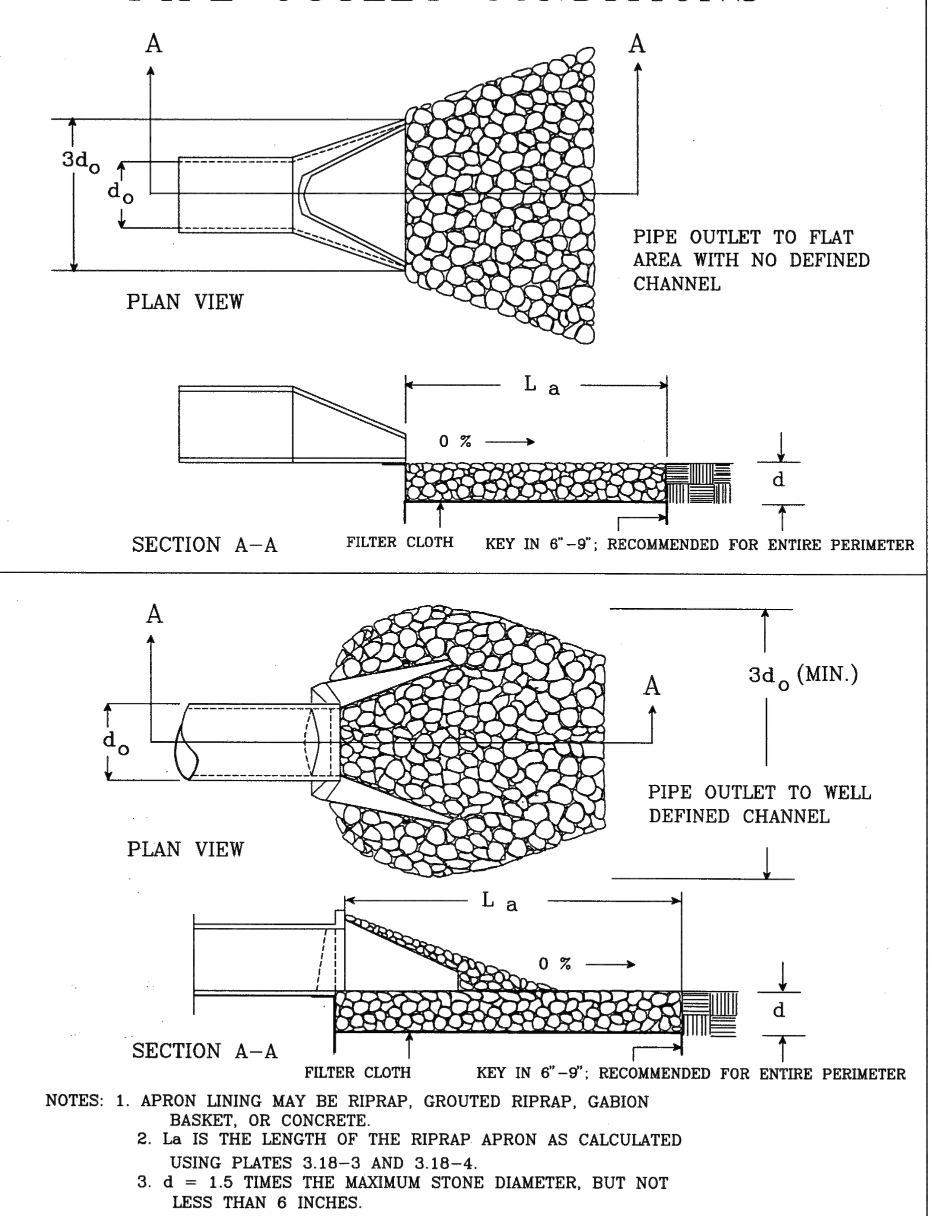
Plate 3.38-2



ANGLER ENVIRONMENTAL a res company 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187 P: 703.393.4844 WWW.RES.US	PUMP AROUND DIVERSION	DETAIL SB-1

1992 3.18

PIPE OUTLET CONDITIONS



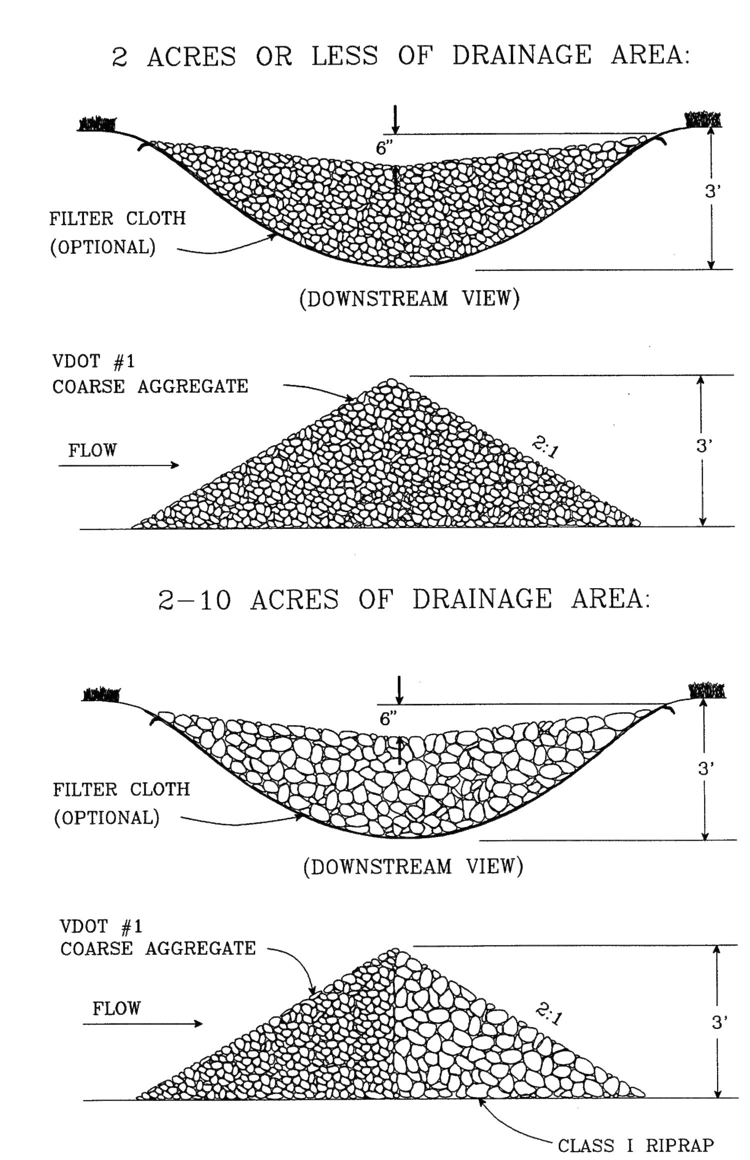
NOTES: 1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, GABION BASKET, OR CONCRETE.
2. La IS THE LENGTH OF THE RIPRAP APRON AS CALCULATED USING PLATES 3.18-3 AND 3.18-4
3. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6 INCHES.

Source: Va. DSWC

Plate 3.18-1

1992 3.20

ROCK CHECK DAM



Source: Va. DSWC

Plate 3.20-1

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CHINN PARK BMP RETROFIT

ESC DETAILS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

REVISIONS:

PROJECT MANAGER:	BS
DESIGNED:	JL
DRAWN:	JL
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	11/24/2021
SHEET NO:	B9 OF10

FILENAME:R:\Rescad\Projects\102215-Chinn Park Stream And BMP Design\CADD\Plan Sheets\BMP Retrofit\ESC DETAILS.dwgDATE:12/2/2021 12:16 PM BY:Jleibensperger

DESIGN NARRATIVE

RES HAS PROPOSED TO RETROFIT AN EXISTING EXTENDED DETENTION BEST MANAGEMENT PRACTICE (BMP) WITH A CONTINUOUS MONITORING AND ADAPTIVE CONTROL (CMAC) SYSTEM DESIGNED BY OPTI RTC, INC. TO CONTROL AND REGULATE STORMWATER DISCHARGE AS WELL AS INCREASE STORAGE CAPACITY AT CHINN PARK IN PRINCE WILLIAM COUNTY, VA. THIS RETROFIT IS CONSIDERED A MODIFICATION TO THE EXISTING BMP.

CREDITING CALCULATIONS FOR THE AFOREMENTIONED BMP RETROFIT REFERENCE TWO DOCUMENTS, WHICH DETAIL THE PROCESSES FOR DETERMINING ANNUAL POLLUTANT REMOVAL LOADS FOR TOTAL PHOSPHORUS (TP), TOTAL NITROGEN (TN), AND TOTAL SUSPENDED SOLIDS (TSS).[1,2]

THE CREDITING FOR THE BMP RETROFIT UTILIZED THE RETROFIT EQUATIONS ASSOCIATED WITH THE POLLUTANT REMOVAL ADJUSTOR CURVES FOR TP, TN, AND TSS TO CALCULATE POLLUTANT REMOVAL EFFICIENCIES. THESE VALUES ARE THEN USED IN CONJUNCTION WITH EDGE OF STREAM (EOS) POLLUTANT SOURCE LOADS FOR IMPERVIOUS, PERVIOUS AND FORESTED AREAS (TABLE III.1 AND TABLE 3A[2]) BASED ON THE DRAINAGE AREAS ASSOCIATED WITH EACH LAND USE TYPE DRAINING TO THE BMP FACILITY. FOR THIS BMP RETROFIT, A DOWNWARD MODIFICATION OF 10% WAS UTILIZED DUE TO THE MISSING DESIGN FEATURE OF A SEDIMENT FOREBAY. THIS VALUE WAS SUBTRACTED FROM THE ESTABLISHED POLLUTANT REMOVAL EFFICIENCIES ASSOCIATED WITH THE CHESAPEAKE BAY PROGRAM (CBP). THESE VALUES ARE THEN SUBTRACTED FROM THE POLLUTANT REMOVAL EFFICIENCIES CALCULATED USING THE AFOREMENTIONED ADJUSTOR CURVES TO DETERMINE THE ACTUAL REMOVAL ACHIEVED BY THE STORMWATER PRACTICE.

A SUMMARY OF THE RESULTANT POLLUTANT REMOVAL CALCULATIONS CAN BE FOUND ON THIS SHEET FOR THE PROPOSED BMP RETROFIT.

THE NUTRIENT CREDIT CALCULATIONS REFERENCE TWO DOCUMENTS:

[1] RECOMMENDATIONS OF THE EXPERT PANEL TO DEFINE REMOVAL RATES FOR URBAN STORMWATER RETROFIT PROJECTS', BY THE CHESAPEAKE STORMWATER NETWORK, 1/20/2015;

[2] GUIDANCE MEMO NO. 20-2003, VA DEQ WATER DIVISION, 11/12/2020.

SURVEY NOTES

1. THE PROPERTY DELINEATED HEREON IS LOCATED ON PRINCE WILLIAM COUNTY MAP # 8192-79-9203, AND IS CURRENTLY ZONED A-1.
2. VERTICAL DATUM IS REFERENCED TO NAVD88.
3. HORIZONTAL DATUM IS REFERENCED TO NAD83, NORTH ZONE VIRGINIA, US SURVEY FOOT.
4. TOPOGRAPHICAL INFORMATION SHOWN HEREON IS A COMBINATION OF DATA ACQUIRED BY CAP LAND SURVEYING, PLLC IN AUGUST AND REVISED IN OCTOBER 2021 WITH A CONTOUR INTERVAL OF 1' AND SUPPLEMENTED BY PWC COUNTY GIS DATA WITH A CONTOUR INTERVAL OF 2'.

GENERAL NOTES

1. THE PURPOSE OF THIS PROJECT IS TO RETROFIT AND MODIFY AN EXISTING EXTENDED DETENTION BEST MANAGEMENT PRACTICE (BMP) STORMWATER FACILITY IN ORDER TO ENHANCE ITS WATER QUALITY TREATMENT AND WATER QUANTITY MANAGEMENT CAPABILITIES.
2. THE PROPERTY SHOWN HERE IS RECORDED IN THE NAME OF:

GPIN	OWNER	DB/PG #
8192-79-9203	PWC BOARD OF COUNTY SUPERVISORS	201206210058314

3. THE PROPOSED USE OF THE PROPERTY WILL BE THE SAME AS ITS EXISTING USE AS PART OF PWC PARKS AND RECREATION.
4. SOILS INFORMATION IS BASED UPON THE USDA WEB SOIL SURVEY DATABASE UTILIZING CURRENT INFORMATION FOR PRINCE WILLIAM COUNTY, VA.
5. THE PROPERTY SHOWN HEREON IS WITHIN AN UNMAPPED 100-YR FLOODPLAIN.
6. STORMWATER MANAGEMENT FOR THE PROJECT IS PROVIDED THROUGH AN ONSITE EXTENDED DETENTION BMP.
7. PWC COUNTY ITS SUCCESSORS AND ASSIGNS SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF STORMWATER DETENTION/DRAINAGE FACILITIES AND EASEMENTS.
8. EROSION AND SEDIMENT CONTROL WILL BE PROVIDED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).

RS	116,656.0	cu ft
RS	2.678	ac-ft

Removal Rates (from Adjustor Curve Equations)

Per GM20-2003
Table V.B.2 - Retrofit Equations

RS	2.678	ac-ft	
IA	26.89	ac	
RD	1.20	in	RD = RS * 12 / IA

RS = Runoff Storage = Water Quality Volume
IA = Impervious Acres (ac)
RD = Runoff Depth treated
RR = Runoff Reduction
ST = Stormwater Treatment Practice

TP	x	1.20		
ST	y	0.57	57%	y = 0.0239x5 - 0.2058x4 + 0.7198x3 - 1.3229x2 + 1.3414x - 0.0072

TN	x	1.20		
ST	y	0.36	36%	y = 0.0152x5 - 0.131x4 + 0.4581x3 - 0.8418x2 + 0.8536x - 0.0046

TSS	x	1.20		
ST	y	0.73	73%	y = 0.0304x5 - 0.2619x4 + 0.9161x3 - 1.6837x2 + 1.7072x - 0.0091

EOS Loading Rates per Chesapeake Bay Watershed Model Progress Run 5.3.2
Tables 3a-3d; App. I.3., GM20-2003

Watershed Basin: Potomac River
BMP Type: Proprietary BMP - Opti

Pollutant	Land Cover	EOS Annual Baseline Load (lb/ac/yr)	Land Cover DA (ac)	Removal Rates: Existing Pollutant Removal Rate[3] (%)	Removal Rates: Retrofit Pollutant Removal Rate (%)	Pollutant Load Removal (lb/yr)
TP	Imp	1.62	26.89	18	57	17.14
TP	Perv	0.41	43.39	18	57	7.00
TP	Forest	0.13	76.32	18	57	3.90
TN	Imp	16.86	26.89	18	36	83.87
TN	Perv	10.07	43.39	18	36	80.83
TN	Forest	5.29	76.32	18	36	74.69
TSS	Imp	1171.32	26.89	54	73	5,983.47
TSS	Perv	175.80	43.39	54	73	1,449.09
TSS	Forest	79.91	76.32	54	73	1,158.58

[3] CBP Efficiencies minus Downward Modification for no sediment forebay.

Summary

Pollutant	Annual Load Reduction (lb/ac/yr)
TP	28.05
TN	239.38
TSS	8,591.14

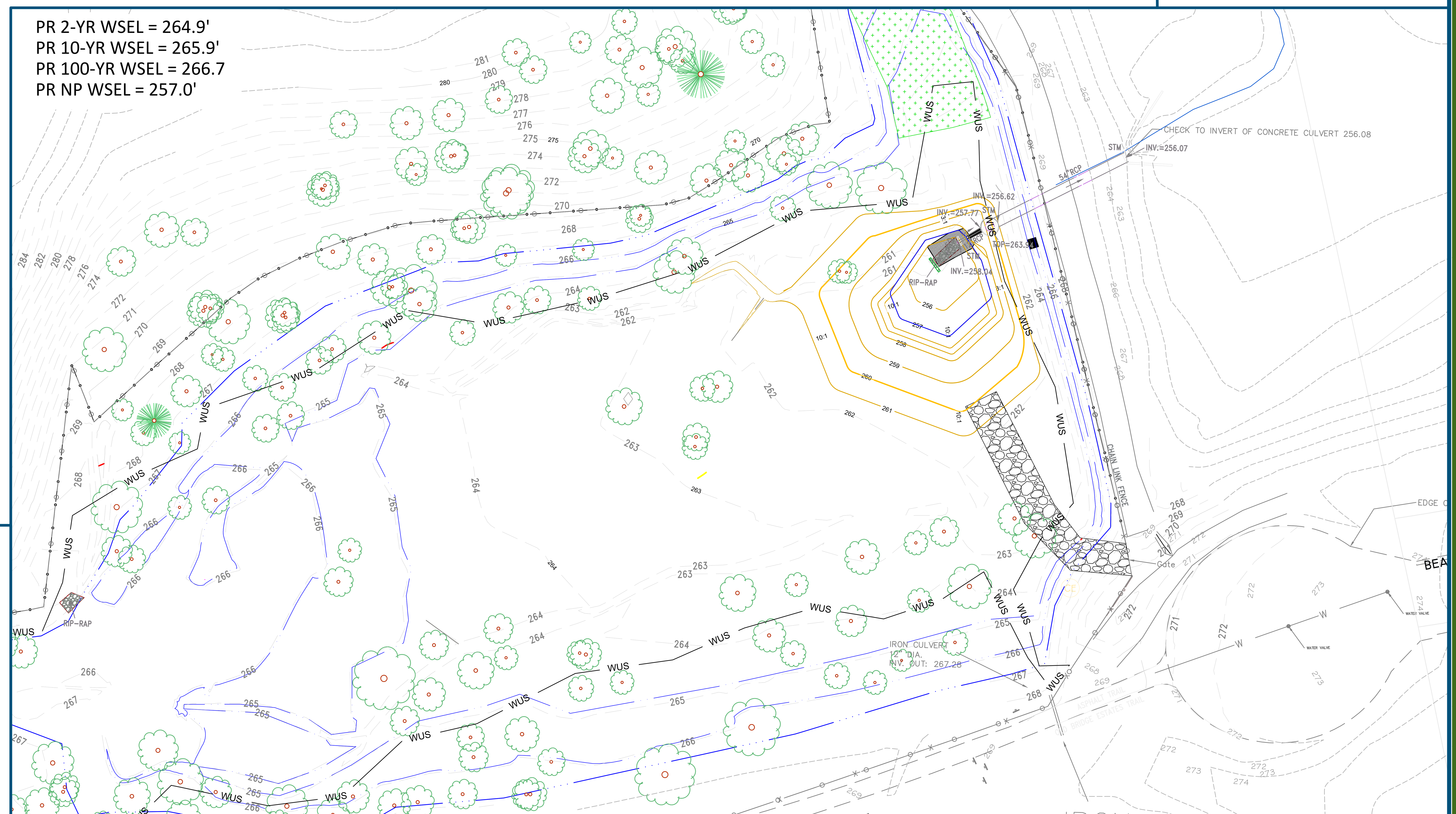
	Downward Modification missing sediment forebay	% 10
TP*	20	18
TN*	20	18
TSS*	60	54

* CBP Efficiencies for Dry Extended Detention

PR Pond Volume Treatment			
Elev. (ft)	Depth (ft)	Area (sq ft)	Volume (cu ft)
256		1,476	
	2		3,954
258		2,478	
	1		3,233
259		3,987	
	1		4,957
260.0		5,926	
	1		7,132
261		8,337	
	1		10,686
262		13,035	
	1		20,641
263		28,247	
	1		37,691
264		47,135	
	1		56,726
265		66,317	
Total Volume			145,019
		Tv*	116,656

*Volume at Riser Crest Invert = 264.5'

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



DESIGN LEGEND:

PR. MAJOR CONTOUR
PR. MINOR CONTOUR
EX. MAJOR CONTOUR
EX. MINOR CONTOUR
WUS — EX. WATERS OF THE US
PR. 2YR WSE
PR. 10YR WSE
PR. 100 YR WSE
PR. NORMAL POOL
PR. RIP RAP
EX. RIP RAP

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CHINN PARK BMP RETROFIT

NARRATIVE, NOTES AND CREDITING SUMMARY

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
5/17/24
JOSHUA E. LEIBENSPERGER
Lic. No. 045898
PROFESSIONAL ENGINEER

REVISIONS:

PROJECT MANAGER:	BS
DESIGNED:	JL
DRAWN:	JL
JOB NUMBER:	102215
DESIGN TYPE:	BMP
DATE:	12/2/2021
SHEET NO:	B10 OF 10

PROTOCOL 1 – STREAM BANK LOAD REDUCTION

LOAD REDUCTION PROJECTIONS FOR UT TO HOOES RUN AT CHIINN PARK ARE BASED ON RECOMMENDATIONS FROM THE CHESAPEAKE BAY TMDL SPECIAL CONDITION GUIDANCE (VADEQ 2021), SPECIFICALLY USING PROTOCOL 1 FROM THE EXPERT PANEL REPORT (BERG ET AL SEPT 2014), UPDATED BY THE CHESAPEAKE BAY STORMWATER NETWORK MEMO (ATLAND ET. AL., 2020). PROTOCOL 1 (PREVENTED SEDIMENT) ESTIMATES THE LOAD GENERATED BY BANK EROSION, AND PROJECTS THE REDUCTION LOAD DUE TO RESTORATION. TO ESTIMATE THE TOTAL ANNUAL LOAD, THE BANK ASSESSMENT FOR NON-POINT SOURCE CONSEQUENCES OF SEDIMENT (BANCS) MODEL WAS USED (ROSGEN 2001). THE FOLLOWING STEPS WERE FOLLOWED TO OBTAIN THE LOAD REDUCTION PROJECTIONS:

STEP 1 - ESTIMATE STREAM SEDIMENT EROSION RATES AND ANNUAL SEDIMENT LOADINGS

THE BANCS MODEL CONSISTS OF TWO COMPONENTS: BANK EROSION HAZARD INDEX (BEHI) AND NEAR BANK STRESS (NBS) (ROSGEN 2001). BEHI IS USED TO PREDICT THE POTENTIAL BANK EROSION WITHIN A BANK SEGMENT BY MEASURING BANK HEIGHT, BANKFULL DEPTH, ANGLE, ROOTING DEPTH OF VEGETATION, SURFACE PROTECTION, AND BANK MATERIAL. NBS IS RELATED TO THE SHEAR STRESS PRODUCED BY THE STREAM ON A STREAMBANK. THE HIGHER THE NBS, THE GREATER THE FORCE APPLIED TO THE BANK BY THE CHANNEL. THERE ARE SEVERAL DIFFERENT METHODS DEVELOPED TO DETERMINE NBS; FOR THIS PROJECT, ROSGEN'S METHOD 1 (VISUAL ASSESSMENT) WAS USED. THIS ENTAILS LOOKING AT FIELD INDICATORS, SUCH AS PLANFORM, NEAR BANK CHANNEL DEPTH, AND MIDCHANNEL BARS, TO DETERMINE THE GENERAL FORCE APPLIED TO THE STREAMBANK. EACH METRIC FOR BEHI AND NBS WAS MEASURED IN THE FIELD AND RECORDED USING A TABLET WITH THE COLLECTOR FOR ARCGIS APP IN COMBINATION WITH AN EXTERNAL GLOBAL POSITIONING SYSTEM (GPS) TO COLLECT A GEOGRAPHIC LOCATION AT SUB-METER ACCURACY AND INFORMATION AT EACH POINT. THE COLLECTOR FOR ARCGIS APP UPLOADS THE RECORDED FEATURES TO A WEBMAP HOSTED ON ARCGIS ONLINE. FIELD DATA POINTS ARE THEN TRANSFORMED INTO A LINE FEATURE TO DETERMINE LENGTHS OF EACH BEHI SECTION. ONCE THE BEHI AND NBS SCORES ARE DETERMINE FOR EACH BANK SEGMENT, THE RATE OF EROSION IS IDENTIFIED USING A BANK EROSION CURVE. WITHIN APPENDIX C OF THEIR MEMO, THE CHESAPEAKE BAY STORMWATER NETWORK RECOMMENDS THE BANK EROSION RATES CURVE DEVELOPED BY THE UNITED STATES FISH AND WILDLIFE SERVICE (USFWS), WHICH USES DATA TAKEN AT HICKEY RUN IN WASHINGTON, DC (FIGURE 1, STARR AND MCCANDLESS 2005), PLUS SUPPLEMENTAL DATA THE ROSGEN’S COLORADO BANK EROSION RATES CURVE (ROSGEN, 2001). THE EROSION RATES IN CUBIC FEET ARE CONVERTED TO TONS BASED ON SITE SPECIFIC SOIL BULK DENSITY, OBTAINED FROM SOIL SAMPLES TAKEN FROM STREAMBANKS EVERY 200-500 LINEAR FEET. THIS INFORMATION, ALONG WITH BANK HEIGHT AND LENGTH, WERE THEN ANALYZED TO CALCULATE THE EXISTING NUTRIENT LOAD PROJECTIONS FOR THE FULL SITE USING THE FORMULA BELOW:

EROSION RATE X BANK HEIGHT X BANK LENGTH = TOTAL ANNUAL LOAD OF TSS FROM BANK EROSION WITHIN THE REACH

STEP 2 - CONVERT SEDIMENT EROSION RATES TO NITROGEN AND PHOSPHORUS LOADINGS

TOTAL ANNUAL LOAD (TOTAL SUSPENDED SOLID (TSS) TONS PER YEAR) PER REACH WITHIN THE PROJECT AREA IS GENERATED USING THE BANK HEIGHT, LENGTH, AND EROSION RATE BASED ON BEHI AND NBS CATEGORY. TOTAL PHOSPHORUS (TP) AND TOTAL NITROGEN (TN) NUTRIENT LOADING RATES ARE DETERMINED BY MULTIPLYING TSS BY THE SITE SPECIFIC LOADING RATES, WHICH COME FROM THE WEIGHTED AVERAGE OF THE SOIL TESTING RESULTS.

STEP 3 - ESTIMATE REDUCTION ATTRIBUTED TO RESTORATION

THE EFFICIENCY OF STREAM RESTORATION AT REDUCING LOADING FROM BANK EROSION WAS ASSUMED BY THE EXPERT PANEL REPORT TO BE 50% OF THE PREDICTED LOAD. THIS EFFICIENCY ORIGINATED FROM A SINGLE STUDY OF THE BALTIMORE COUNTY DEP SPRING BRANCH PROJECT REFERENCED WITHIN THE EXPERT PANEL REPORT. DEQ ACCEPTS ENHANCED EFFICIENCIES BASED ON POST-CONSTRUCTION MONITORING. THE SAME BEHI/NBS METHODOLOGY THAT WAS USED DURING THE EXISTING CONDITIONS ASSESSMENT WILL BE USED DURING THE POST-CONSTRUCTION MONITORING TO ACCURATELY SHOW THE REDUCTION IN NUTRIENT LOADING. OUR DESIGN WILL SIGNIFICANTLY REDUCE BANK EROSION HAZARDS THROUGHOUT THE PROJECT SITE BY CREATING A MORE COMPETENT CROSS SECTION GEOMETRY, REMOVING TIGHT MEANDER BENDS, BUILDING UP RIFFLE GRADE CONTROL STRUCTURES, AND IMPROVING VEGETATION POST-CONSTRUCTION. THE DESIGN OF THE STREAM WILL TARGET A BEHI/NBS SCORE OF MODERATE/MODERATE OR LOWER, WHICH WOULD PRODUCE AN 80-90+% EFFICIENCY. THE PLACEMENT OF NATURAL FIBER MATTING ON THE BANKS GREATLY INCREASES THE SURFACE PROTECTION DURING THE FIRST FEW YEARS POST CONSTRUCTION, WHILE VEGETATION ESTABLISHED TO PROTECT THE BANKS LONG-TERM. THE LOAD REDUCTIONS WERE ESTIMATED USING A 50% AND 85% EFFICIENCY. THE RESULTS ARE SHOWN IN THE TABLES BELOW.

PROTOCOL 2

PROTOCOL 2 CREDIT VALUES WILL BE ASSESSED DURING THE MONITORING PHASE OF THE PROJECT THROUGH THE INSTILLATION OF GROUNDWATER WELLS, PER THE REVISED METHODOLOGY PROVIDED BY ATLAND ET AL (2020).

REFERENCES

ATLAND, D., J. BERG, B. BROWN, J. BURCH, R. COOK, L. FRALEY-MCNEAL, M. MEYERS, J. RUNNING, R. STARR, J. SWEENEY, T. THOMPSON, J. WHITE, AND A. BLAIR. 2019. CONSENSUS RECOMMENDATIONS FOR IMPROVING THE APPLICATION OF THE PREVENTED SEDIMENT PROTOCOL FOR URBAN STREAM RESTORATION PROJECTS BUILT FOR POLLUTANT REMOVAL CREDIT. CHESAPEAKE STORMWATER NETWORK. OCTOBER 15, 2019. REVISED 02/27/20.

ATLAND, D., BECRAFT, C., BERG, J., BROWN, T., BURCH, J., CLEARWATER, D., COLEMAN, J., CRAWFORD, S., DOLL, B., GERATZ, J., HANSON, J., HARTRANFT, J., HOTTENSTEIN, J., KAUSHAL, S., LOWE, S., MAYER, P., NOE, G., OBERHOLZER, W., PAROLA, A., SCOTT, D., STACK, B., SWENNEY, J., AND WHITE, J. 2020. CONSENSUS RECOMMENDATIONS TO IMPROVE PROTOCOLS 2 AND 3 FOR DEFINING STREAM RESTORATION POLLUTANT REMOVAL CREDITS. CHESAPEAKE STORMWATER NETWORK. OCTOBER 27, 2020.

BERG, J., BURCH, J., CAPPUCCITTI, D., FILOSO, S., FRALEY-MCNEAL, L., GOERMAN, D., HARDMAN, N., KAUSHAL, S., MEDINA, D., MEYERS, M., KERR, B., STEWART, S., SULLIVAN, B., WALTER, R., WINTERS, J. SEPTEMBER 2014. RECOMMENDATIONS OF THE EXPERT PANEL TO DEFINE REMOVAL RATES FOR INDIVIDUAL STREAM RESTORATION PROJECTS. ANNAPOLIS, MD: CHESAPEAKE BAY PROGRAM.

ROSGEN, D. 2001. A PRACTICAL METHOD OF COMPUTING STREAM BANK EROSION RATE. PROCEEDINGS OF THE SEVENTH FEDERAL INTERAGENCY SEDIMENTATION CONFERENCE. VOL. 2, PP. II - 9*15, MARCH 25-29, 2001, RENO, NV.

STARR, R. R., AND T.L. MCCANDLESS. 2005. HICKEY BRANCH, WASHINGTON, D.C. WATERSHED AND STREAM ASSESSMENT, U.S. FISH AND WILDLIFE SERVICE, CHESAPEAKE BAY FIELD OFFICE, STREAM HABITAT ASSESSMENT AND RESTORATION PROGRAM, ANNAPOLIS, MD, CBFO-S05-01

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY WATER DIVISION, CHESAPEAKE BAY TMDL SPECIAL CONDITION GUIDANCE, FEBRUARY 6, 2021.

NUTRIENT REDUCTION SUMMARY

Site Name: Chinn Park

50% Efficiency

	TSS	P	N	Stream Length	P/LF
(Left and Right Banks)	ton/year	lbs/year	lbs/year	Linear Feet	
UT TO HOOES RUN	275.65	49.62	157.12	1575	0.032
T1R1	26.24	2.89	18.11	510	0.006
T1R2	92.12	6.45	38.69	1143	0.006
T2	30.58	3.36	25.68	406	0.008
Sum	**424.58**	**62.31**	**239.59**	**3634**	**0.017**

85% Efficiency

	TSS	P	N	Stream Length	P/LF
	ton/year	lbs/year	lbs/year	Linear Feet	
UT TO HOOES RUN	468.60	84.35	267.10	1575	0.054
T1R1	44.61	4.91	30.78	510	0.010
T1R2	156.60	10.96	65.77	1143	0.010
T2	51.98	5.72	43.66	406	0.014
Sum	**721.78**	**105.93**	**407.31**	**3634**	**0.029**

Pre-construction Total Site Load

	TSS	P	N	Stream Length	P/LF
	ton/year	lbs/year	lbs/year	Linear Feet	
UT TO HOOES RUN	551.29	99.23	314.24	1575	0.063
T1R1	52.48	5.77	36.21	510	0.011
T1R2	184.23	12.90	77.38	1143	0.011
T2	61.15	6.73	51.37	406	0.017
Sum	**849.15**	**124.63**	**479.19**	**3634**	**0.034**

Urban Stream Restoration Load Reduction

Based on September 2014 Expert Panel Report, Protocol 1 memo (2020) and DEQ Chesapeake Bay TMDL Special Condition Guidance 2021

Enter data into these fields

Step 1: Estimate Stream Erosion Rates (See Tab Erosion Rate Calculator)

	UT TO HOOES RUN		T1R2		T1R1		T2		Total
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank	
Total Annual Load (TSS ton/year)	**369.81**	**181.48**	**86.28**	**97.95**	**26.92**	**25.56**	**21.98**	**39.17**	**849.15**

Step 2: Convert Stream Bank Erosion Rates to Nutrient Loads

Use site spcific bulk density and nutrient concentrations from soil testing.

	UT TO	T1R2	T1R1	T2
Bulk Density (lbs/cf)	96.67	90.99	76.16	88.02
TP (lbs/ton)	0.18	0.07	0.11	0.11
TN (lbs/ton)	0.57	0.42	0.69	0.84

	UT TO HOOES RUN		T1R2		T1R1		T2		Total
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank	
TSS ton/year	369.81	181.48	86.28	97.95	26.92	25.56	21.98	39.17	849.15
P lbs/year	66.57	32.67	6.04	6.86	2.96	2.81	2.42	4.31	124.63
N lbs/year	210.79	103.44	36.24	41.14	18.57	17.64	18.46	32.90	479.19

PROTOCOL 4 - INFILTRATION CASCADE/POOL SYSTEM AS STORMWATER RETROFIT

RES HAS PROPOSED TO INSTALL A NEW BEST MANAGEMENT PRACTICE (BMP) INFILTRATION CASCADE/POOL SYSTEM DOWNSTREAM OF A 36” RIGID CONCRETE PIPE OUTFALL DISCHARGING ADJACENT TO TROWBRDIGE DRIVE NEAR JENKINS ELEMENTARY SCHOOL IN PRINCE WILLIAM, VA. THIS NEW RETROFIT WILL TREAT RUNOFF FROM APPROXIMATELY 9.6 AC OF IMPERVIOUS AREA (TOTAL DRAINAGE AREA OF 27.5 AC) DRAINING FROM PRINCE WILLIAM PARKWAY, NEIGHBORING COMMERCIAL PROPERTIES AND AN ADJACENT DEVELOPMENT PRIOR TO CONNECTING WITH ADDITIONAL STREAM RESTORATION OCCURRING DOWNSTREAM. THE INFILTRATION CASCADE/POOL SYSTEM COMPRISES APPROXIMATELY EIGHT POOLS AND WILL CREATE STORAGE FOR STORMWATER RUNOFF TREATMENT AND SEDIMENT COLLECTION.

CREDITING CALCULATIONS FOR THE AFOREMENTIONED BMP RETROFIT REFERENCE TWO DOCUMENTS, WHICH DETAIL THE PROCESSES FOR DETERMINING ANNUAL POLLUTANT REMOVAL LOADS FOR TOTAL PHOSPHORUS (TP), TOTAL NITROGEN (TN), AND TOTAL SUSPENDED SOLIDS (TSS).

THE CREDITING FOR THE BMP RETROFIT UTILIZED THE RETROFIT EQUATIONS ASSOCIATED WITH THE POLLUTANT REMOVAL ADJUSTOR CURVES FOR TP, TN, AND TSS TO CALCULATE POLLUTANT REMOVAL EFFICIENCIES. THESE VALUES ARE THEN USED IN CONJUNCTION WITH EDGE OF STREAM (EOS) POLLUTANT SOURCE LOADS FOR IMPERVIOUS, PERVIOUS AND FORESTED AREAS (TABLE III.1 AND TABLE 3A2) BASED ON THE DRAINAGE AREAS ASSOCIATED WITH EACH LAND USE TYPE DRAINING TO THE PROPOSED BMP FACILITY. SINCE THIS WOULD BE A NEW FACILITY, THE POLLUTANT REMOVAL EFFICIENCIES CALCULATED USING THE AFOREMENTIONED ADJUSTOR CURVES WOULD BE USED TO DETERMINE THE ACTUAL REMOVAL ACHIEVED BY THE STORMWATER PRACTICE.
A SUMMARY OF THE RESULTANT POLLUTANT REMOVAL CALCULATIONS CAN BE FOUND ON THIS SHEET FOR THE PROPOSED BMP RETROFIT.

REFERENCES

1 RECOMMENDATIONS OF THE EXPERT PANEL TO DEFINE REMOVAL RATES FOR URBAN STORMWATER RETROFIT PROJECTS', BY THE CHESAPEAKE STORMWATER NETWORK, 1/20/2015;
2 GUIDANCE MEMO NO. 20-2003, VA DEQ WATER DIVISION, 11/12/2020.

Urban Stormwater Retrofit Summary

Project Name : Chinn Park Aquatic Center
Project Location : Prince William County, VA

Legend	Project Information	
referenced	Retrofit Category[1]:	New
input	Retrofit Type[1]:	Enhancement
calculated	Year Installed:	
	Watershed Basin:	Potomac River
	BMP type:	RSC
	BMP Classification[2]:	RR

[1] *See descriptions on BMP Info tab for explanations of determinations.*
[2] *See Classification tab.*

Land Cover

Total DA:	27.45	ac
Pervious DA:	17.85	ac
Turf DA:	7.45	ac
Forest DA:	10.40	ac
Impervious DA:	9.60	ac
Paved DA	9.60	ac
Pond SA	0.00	ac

Calculate Runoff Storage

See RSC pool volume calcs.

RS	2,400.0	cu ft
RS	0.055	ac-ft

Removal Rates (from Adjustor Curve Equations)

Per GM20-2003
Table V.B.2 - Retrofit Equations

RS	0.055	ac-ft
IA	9.60	ac
RD	0.07	in

RD = RS * 12 / IA

RS = Runoff Storage = Water Quality Volume
IA = Impervious Acres (ac)
RD = Runoff Depth treated
RR = Runoff Reduction
ST = Stormwater Treatment Practice

TP	x	0.07		
RR	y	0.10	10%	y = 0.0304x5 - 0.2619x4 + 0.9161x3 - 1.6837x2 + 1.7072x - 0.0091
TN	x	0.07		
RR	y	0.08	8%	y = 0.0308x5 - 0.2562x4 + 0.8634x3 - 1.5285x2 + 1.501x - 0.013
TSS	x	0.07		
RR	y	0.11	11%	y = 0.0326x5 - 0.2806x4 + 0.9816x3 - 1.8039x2 + 1.8292x - 0.0098

EOS Loading Rates per Chesapeake Bay Watershed Model Progress Run 5.3.2
Tables 3a-3d; App. I.3., GM20-2003

Watershed Basin: Potomac River
BMP Type: RSC

Pollutant	Land Cover	EOS Annual Baseline Load (lb/ac/yr)	Land Cover DA (ac)	Removal Rates: Existing Pollutant Removal Rate (%)	Removal Rates: Retrofit Pollutant Removal Rate (%)	Pollutant Load Removal (lb/yr)
TP	Imp	1.62	9.60	0	10	1.57
TP	Perv	0.41	7.45	0	10	0.31
TP	Forest	0.13	10.40	0	10	0.14
TN	Imp	16.86	9.60	0	8	13.50
TN	Perv	10.07	7.45	0	8	6.26
TN	Forest	5.29	10.40	0	8	4.59
TSS	Imp	1171.32	9.60	0	11	1,213.72
TSS	Perv	175.80	7.45	0	11	141.37
TSS	Forest	79.91	10.40	0	11	89.70

Summary

Pollutant	Annual Load Reduction (lb/ac/yr)
TP	2.01
TN	24.34
TSS	1,444.78

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CHINN PARK STREAM RESTORATION & STORMWATER BMP
PRINCE WILLIAM COUNTY

CREDIT CALCULATIONS

PRINCE WILLIAM COUNTY, VA

STAMP/SEAL:

COMMONWEALTH OF VIRGINIA
AARON S. HOFBERG
Lic. No. 43860
5/17/24
PROFESSIONAL ENGINEER

30% DESIGN REVIEW
x 11/2021
Signature Date

60% DESIGN REVIEW
x 11/14/2022
Signature Date

CONSTRUCTION PLAN REVIEW
x ----
Signature Date

REVISIONS:

PROJECT MANAGER:	ASL
DESIGNED:	AH/BS/LS
DRAWN:	LS
JOB NUMBER:	SPR2023-00397 S03
DESIGN TYPE:	RESTORATION
DATE:	9/3/2024
SHEET NO:	48 OF 48