FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

SITE PLAN # 40-17

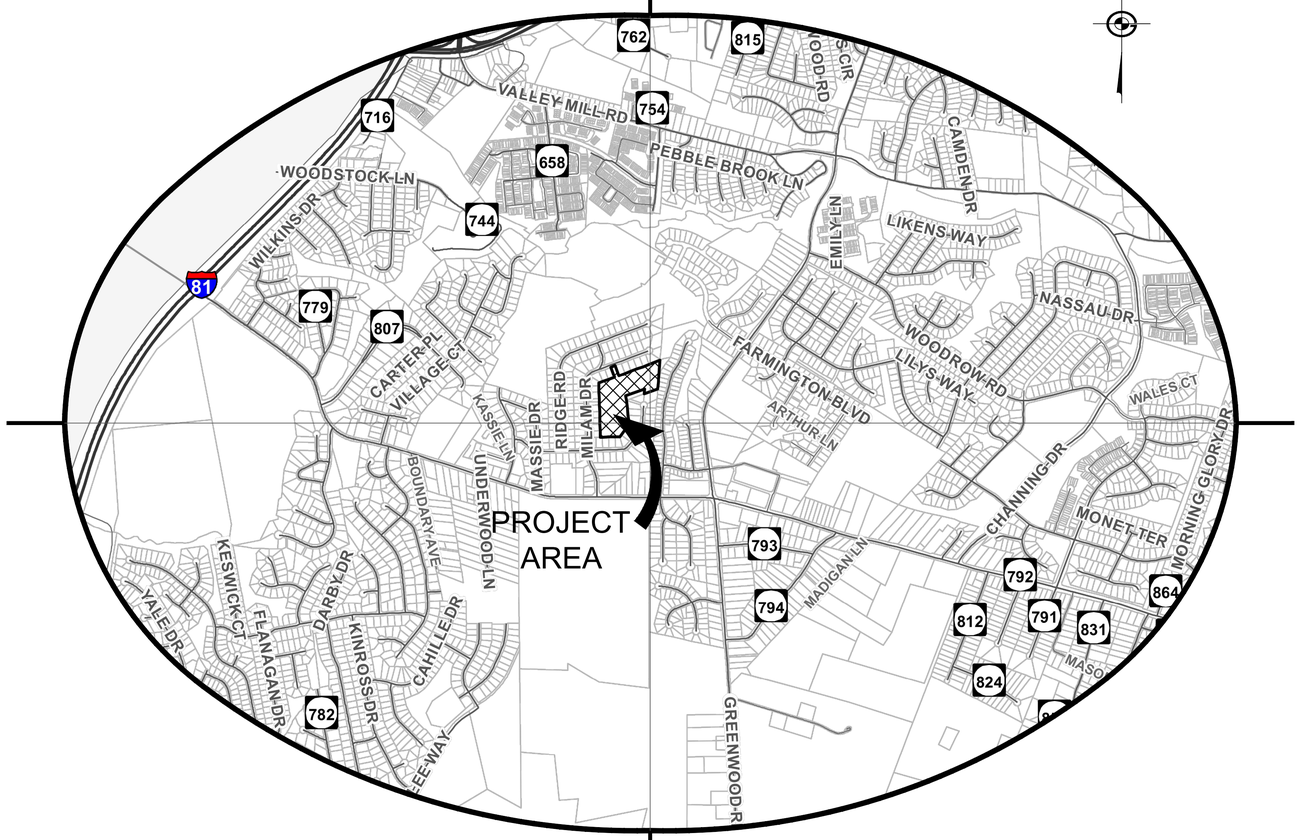
RED BUD MAGISTERIAL DISTRICT

FREDERICK COUNTY, VIRGINIA

IFB# 2018-03C

Plan Revisions

Date	Comment
12/28/17	ADDRESSED AGENCY COMMENTS
01/23/18	ADDRESSED AGENCY COMMENTS
02/01/18	ADDRESSED AGENCY COMMENT



VICINITY MAP
SCALE: 1" = 1000'

Sheet List Table

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1	Cover Sheet	1	12/28/2017
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5	E&S Notes & Details		
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CALL "MISS UTILITY"

VIRGINIA UTILITY PROTECTION SERVICE (VUPS) AT 811 OR 1-800-552-7001, 48 HOURS PRIOR TO THE START OF WORK. EXCAVATORS MUST NOTIFY ALL PUBLIC UTILITY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATING OR BLASTING AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES PRIOR TO COMMENCING EXCAVATION. THE EXCAVATOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL COUNTY REQUIREMENTS, VIRGINIA CODE AND REGULATIONS.

UTILITY NOTICE REQUIRED

Contractors shall notify all public utility 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 the operators of underground utility lines appear below. These numbers shall also be used to serve in an emergency condition

Water/Sewer:	Frederick Water P.O. Box 1877 Winchester, VA. 22604 (540) 868-1061
Power:	Rappahannock Electric Coop 137 Kelly Court Front Royal, VA 22630 1-800-552-3904
Phone:	Verizon P.O. Box 17398 Baltimore, MD 21297 (301) 954-6282
Gas:	Shenandoah Gas Co. P.O. Box 2400 Winchester, VA 22604 (540) 869-1111

OWNER
FREDERICK COUNTY PARKS & RECREATION
107 N. KENT STREET
WINCHESTER, VIRGINIA 22601
540-665-5600

DEVELOPER
FREDERICK COUNTY PARKS & RECREATION
107 N. KENT STREET
WINCHESTER, VIRGINIA 22601
540-665-5600

APPROVALS

ZONING ADMINISTRATOR _____ DATE _____

THESE PLANS ARE IN CONFORMANCE WITH FREDERICK COUNTY STANDARDS AND ORDINANCES. ANY DEVIATION OR CHANGE IN THESE PLANS SHALL BE APPROVED BY THE ZONING ADMINISTRATOR PRIOR TO CONSTRUCTION

151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 662-4185
Fax: (540) 722-9528
www.greenwayeng.com

GREENWAY ENGINEERING

COVER SHEET
FREDERICK HEIGHTS PARK TRAIL & PARKING LOT
RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017
SCALE: N/A
DESIGNED BY: JMM
FILE NO. 0142F
SHEET 1 OF 11
17-25

GENERAL NOTES

1. Greenway Engineering, Inc. (GE) issued this plan set based on project criteria dictated by the client and municipal codes. This plan set is not considered complete or appropriate for construction until ALL necessary agencies have given approval AND this plan set is signed and sealed by a licensed professional. Any work, planning, scheduling, material purchases and/or construction prior to approvals and licensed/professional sealing will be performed at the risk of the personnel authorizing work. GE shall be held harmless from and costs, time delay and/or material changes incurred on work started before this plan set receives approvals and seals.
2. Methods and materials used in the construction of the improvements herein shall conform to current County Construction Standards and Specifications and/or current VDOT Standards and Specifications.
3. The Engineer shall not have control over or charge of and shall not be responsible for construction means, methods, techniques, sequences or procedures nor for safety precautions and programs in connection with work shown on these plans. The Engineer is not responsible for the contractor's schedules or failure to carry out the work. The Engineer is not responsible for acts of omissions of the contractor, subcontractor, or their agents or employees, or any other person performing portions of the work.
4. The Contractor, Owner or Developer shall be responsible for securing any third party inspection/testing service to insure construction compliance with these plans and specifications. It is Greenway Engineering's recommendation that a third party inspection/testing service be employed to ensure that project is completed and materials installed meet the details and specifications in these plans.
5. 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 be responsible for the digging of all test holes that may be required, whether recommended or not by these plans, to determine the exact location and elevation of existing utilities. If any conflicts arising from this existing utility verification or if during the course of construction, any object of an unusual nature is encountered, the contractor shall cease work in that area and immediately notify Greenway Engineering at (540) 662-4185 and/or the proper authority. Greenway Engineering or any engineer associated with these plans shall not be responsible or liable for any construction cost that may be associated with the installation or reinstallation any utility or other improvements if not notified of any discrepancies between actual field conditions and the approved plan.
6. The approval of these plans in no way relieve the developer, the contractor, or their agents of any legal responsibility which may be required by the code of Virginia or any other ordinance enacted by the County nor does it guarantee the issuance of any required permit by the County, VDOT or any other Agency.
7. An approved set of plans and all applicable permits must be available at the construction site at all times during construction. A representative of the developer must be available at all times.
8. Prior to the initiation of any land disturbing activities the Developer, the Contractor or the Responsible Land Disturber shall obtain a Land Disturbance Permit from the County Engineer's office. The Contractor, Developer or his agent shall be responsible for obtaining a Virginia Stormwater Management Program (VSMP) Permit and shall be responsible for the registration of the construction site as required by law. They shall also be responsible for obtaining and maintaining on site a Stormwater Pollution Prevention Plan (SWPPP). 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.
9. The Developer or his agent shall be responsible for obtaining any required permits from the Virginia Department of Environmental Quality (DEQ) or the United States Army Corp of Engineers for any plan wetland disturbance as shown on these plans. They shall also be responsible the identification and delineation of any wetlands that may be present on the construction site.
10. 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, alley dust, and to take whatever measures are necessary to insure that public streets are maintained in a clean, mud and dust free condition at all times.
11. A permit must be obtained from the Office of the Resident Engineer, Virginia Department of Transportation (VDOT) and Frederick County prior to any construction activities within existing State right-of-way.
12. 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.
13. Warning signs, markers, barricades or flagmen should be in accordance with the State and Federal Manual on Uniform Traffic Control Devices (MUTCD).
14. The exact location of all guard rails and paved ditches 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.
15. All unsuitable material shall be removed from the construction limits of the site plan before placing embankment.
16. All pavement sections shown on these approved plans are based on a minimum CBR value of 6 and are for preliminary design only. Final pavement design shall be based upon actual field tested CBR values. The Contractor or Developer shall be responsible for field tests per VDOT standards to obtain actual CBR values for final design. Final pavement designs will be approved by VDOT and/or the Owner/Developer, which ever applicable, prior to installation.
17. 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.
18. When grading is proposed within easements of utilities, letters of permission from all involved companies must be provided to the County Public Works Department prior to issuance of grading and/or site development permits.
19. Notification shall be given to the appropriate utility company 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.
20. The Developer and/or Contractor shall be responsible to supply all utility companies with copies of the approved plans and advise them that all grading shall conform to the approved plans, and further that the utility companies shall be responsible for horning these plans and the finished grades in the installation of their utility lines.
21. All utilities to be located underground.
22. 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.
23. 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.
24. All parking lot/street light and dry utility design shall be performed and provided separately by others. All dry utility and or lighting information shown hereon is as specified by others and is included for informational purposes only, as directed by the Owner, Developer and/or public agency requirements. Greenway Engineering has not performed the lighting and/or dry utility design and does not warrant and is not responsible for the degree and/or adequacy of illumination on this project or the adequacy of the dry utility to service the site.
25. All sanitary sewers, water mains and appurtenances shall be constructed in accordance with the current standards and specifications of the Frederick County Sanitation Authority.
26. All stormwater piping and structures shown on these plans are only accurate to the inlet or manhole locations as shown hereon. Detail design of stormwater structures were not provided to Greenway Engineering. Actual pipe alignments will be based upon developed structural shop drawings as provided by the manufacturer. Contractor shall make adjustments to pipe alignments base on provided shop drawings. Greenway Engineering will not be held responsible or liable for any discrepancies or changes caused by the structural design. Contractor may submit shop drawings to Greenway Engineering for review and approval at contractor's expense. Shop drawings will be reviewed for compliance with design plans. The Owner or Developer will be responsible for any redesign as a result of structural shop drawing design.
27. Controlled fills shall be compacted to 95% of maximum density as determined by method "A" per standard proctor AASHTO-T99, ASTM-D698, or VTM-1 as applicable. Density shall be certified by a registered professional engineer and results submitted to Frederick County prior to pavement construction. If a geotechnical report has been prepared, it should supersede the requirements in this note.
28. Refer to Geotechnical Engineer for methods, materials and details for construction of all earthwork activities.
29. Any retaining wall 2 ft. or greater in height shall require the issuance of a separate building permit.
30. 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.
31. 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 owner and engineer must be notified immediately.
32. Individual sign permits will be required from the Zoning Office for all free standing and/or facade signs prior to erecting the sign and may require a separate building permit..

FIRE MARSHAL'S NOTE

Fire lane markings and signage:
Any "No Parking" signs and yellow painted curb locations will be installed by field inspection at the direction of the Fire Marshal's Office.

VDOT GENERAL NOTES

V1. All work on this project shall conform to the current editions of and latest revisions to the Virginia Department of Transportation (VDOT) Road and Bridge Specifications and Standards, the Virginia Erosion and Sediment Control Regulations, and any other applicable state, federal or local regulations. In case of a discrepancy or conflict between the Standards or Specifications and Regulations, the most stringent shall govern.

V2. All construction shall comply with the latest U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), and Virginia Occupational Safety & Health (VOSH) Rules and Regulations.

V3. When working within VDOT right-of-way, all traffic control, whether permanent or temporary, shall be in accordance with the current edition of VDOT's Work Area Protection Manual. A transportation management plan needs to be submitted for approval and land use permit issued prior to any execution of work within the VDOT right of way.

V4 The developer shall be responsible for relocating, at his expense, any and all utilities, including traffic signal poles, junction boxes, controllers, etc., owned by VDOT or private / public utility companies. It is the sole responsibility of the developer to locate and identify utility facilities or items that may be in conflict with the proposed construction activity. VDOT approval of these plans does not indemnify the developer from this responsibility.

V5. Design features relating to field construction, regulations, and control or safety of traffic may be subject to change as deemed necessary by VDOT. Any additional expense incurred as a result of any field revision shall be the responsibility of the developer.

V6. If required by the local VDOT Land Development Office, a pre-construction conference shall be arranged and held by the engineer and/or developer with the attendance of the contractor (s), various County agencies, utility companies and VDOT prior to initiation of work.

V7. The contractor shall notify the local VDOT Land Development Office when work is to begin or cease for any undetermined length of time. VDOT requires and shall receive 48 hours advance notice prior to any required or requested inspection.

V8. The contractor shall notify the Traffic Operations Center at (540) 332-9500 for any traffic control plan that impacts a VDOT maintained Interstate or Primary roadway to provide notification of the installation and removal of the work zone.

V9. The contractor shall be responsible for maintaining a VDOT permitted temporary construction entrance(s) in accordance with Section 3.02 of the Virginia Erosion and Sediment Control Handbook. Furthermore, access to other properties affected by this project shall be maintained through construction.

V10. Contractor shall ensure adequate drainage is achieved and maintained on the site during and at the end of construction.

V11. All water and sewer lines within existing or proposed VDOT right-of-way shall have a minimum thirty-six (36) inches cover and when possible shall be installed under roadway drainage facilities at conflict points.

V12. Any unusual subsurface conditions (e.g., unsuitable soils, springs, sinkholes, voids, caves, etc.) encountered during the course of construction shall be immediately brought to the attention of the engineer and VDOT. Work shall cease in that vicinity until an adequate design can be determined by the engineer and approved by VDOT.

V13. All fill areas, borrow material and undercut areas shall be inspected and approved by a VDOT representative prior to placement of fill. A VDOT representative shall be present to insure the soil sample(s) obtained for CBR's is representative of the location. When soil samples are submitted to private laboratories for testing, the samples shall be clearly identified and labeled as belonging to a project to be accepted by VDOT and that testing shall be performed in accordance with all applicable VDOT standards and procedures.

V14. All roadway fill, base, subgrade material, and backfill in utility/storm sewer trenches shall be compacted in accordance with the lift thicknesses, density and moisture requirements as specified in the current VDOT Road and Bridge Specifications. Certified copies of test reports shall be submitted to VDOT daily, unless specified otherwise.

V15. VDOT Standard CD and UD underdrains shall be installed where indicated on these plans and/or as specified by VDOT.

V16. A post installation visual/video camera inspection shall be conducted by the Contractor on all pipes identified on the plans as storm sewer pipe and a select number of pipe culverts. For pipe culverts, a minimum of one pipe installation for each size of each material type will be inspected or ten percent of the total amount for each size and material type summarized. All pipe installations on the plans not identified as storm sewer pipe shall be considered as culvert pipe for inspection purposes. Additional testing may be required as directed by the Area Land Use Engineer or their representative.

V17. The installation of any entrances and mailboxes within any dedicated street right-of-way shall meet VDOT minimum design standards and is the responsibility of the developer.

V18. Prior to VDOT acceptance of any streets, all required street signage and/or pavement markings shall be installed by the developer in accordance with the Manual On Uniform Traffic Control Devices.

V19. The developer shall provide the VDOT Land Development Office with a list of all material sources prior to the start of construction. Copies of all invoices for materials utilized within any dedicated street right-of-way must be provided to the local VDOT Land Development Office prior to acceptance of the work. Unit and total prices may be obscured.

V20. Aggregate base and subbase materials shall be placed on subgrade by means of a mechanical spreader. Density will be determined using the density control strip in accordance with Section 304 of the VDOT Road and Bridge Specifications and VTM-10. A certified compaction technician shall perform these tests. Certified copies of test reports shall be submitted to VDOT daily, unless specified otherwise. In addition to checking stone depths, a VDOT representative shall be notified and given the opportunity to be present during the construction and testing of the density control strip.

V21. Asphalt concrete pavements shall be placed in accordance with Section 315 of the VDOT Road and Bridge Specifications. Density shall be determined using the density control strip as specified in Section 315 and VTM-76. A certified compaction technician shall perform these tests. Certified copies of test reports shall be submitted to VDOT daily, unless specifie otherwise. A VDOT representative shall be notified and given the opportunity to be present during the construction and testing of the control strip.

V22. In accordance with Section 302.03, the foundations for pipe culverts thirty-six (36) inches and larger shall be explored below the bottom of the excavation to determine the type and condition of the foundation. The contractor shall report findings of foundation exploration to the engineer and VDOT for approval prior to placing pipe. Foundation designs shall comply with VDOT Road and Bridge Standard PB-1. Where soft, yielding, or otherwise unsuitable foundation is encountered, the foundation design and/or need for foundation stabilization shall be determined by the engineer and approved by VDOT.

V23. VDOT Standard Guardrail shall be installed where warranted and/or as proposed on these plans in accordance with VDOT's installation criteria. Final approval of the guardrail layout to be given by VDOT after grading is mostly complete.

V24. Approval of these plans shall expire five (5) years from the date of the approval letter.

V25. VDOT Standard CG-12 Curb Ramps shall be installed where indicated on these plans and/or as specified by VDOT.

V26. The foundations for all box culverts shall be investigated by means of exploratory borings advanced below proposed foundation elevation to determine the type and condition of the foundation. The contractor shall submit copies of borehole logs and report findings of foundation exploration to the engineer and VDOT for approval prior to constructing box. Foundation designs shall comply with VDOT Road and Bridge Standard PB-1. Contrary to the Standard, where rock is encountered and cast-in-place box is proposed, the thickness of bedding shall be six (6) inches. Where soft, yielding, or otherwise unsuitable foundation is encountered, the foundation design and/or need for foundation stabilization shall be determined by the engineer and approved by VDOT.

TRIP GENERATION DATA

CLASS	USE	DWELLING UNITS	* TRIP RATE	VPD

* TAKEN FROM ITE TRIP GENERATION 9TH EDITION

PROJECT NOTES

FREDERICK WATER CONSTRUCTION NOTES

1. The Authority's Water and Sewer Standards and Specifications are available at www.fcsa-water.com.
2. The contractor shall adhere to the Authority's standards and specifications in effect at the time of construction.
3. The contractor shall coordinate with and arrange for inspection by the Authority.
4. The contractor shall connect a new sewer line to an existing manhole by core drilling the manhole.
5. A new water (or forced sewer) main shall be connected to an existing main by a wet tap. The Authority shall furnish all needed material and make the tap. An Application for Wet Tap shall be submitted and the initial fee paid before tap is made.
6. Exact locations of water and sewer services on new lines are to be coordinated with the Authority's inspector.
7. The Authority's maintenance division shall furnish and install all water meters through 2 inch in size. It is the contractor's responsibility to have the meter box assembly installed correctly. Before a permanent meter is installed:
   a. The meter box, with its frame and cover, must be properly aligned with the coppersetter.
   b. The frame and cover shall be set to final grade.
   c. The distance between the top of the cover and the coppersetter shall be between 18 and 21 inches.
   d. All components of the meter box assembly shall be in proper working order.
8. For services that connect to existing lines:
   a. The Authority shall furnish and install:
      1. all 5/8"x3/4", 1", 1 ½" and 2" water services
      2. all sewer services.
   b. The owner/developer shall:
      1. coordinate (or have the contractor coordinate) the location of the service lateral with the Authority's engineering assistant
      2. submit an Application for Service and pay the required fees.
9. All water service lines must have a backflow prevention assembly (double check valve or RPZ, as required). The assembly must meet ASSE standard number 1015 or 1013.
10. All fire lines must have a backflow prevention assembly (detector double check valve or RPZ, as required). The assembly shall meet ASSE standard number 1048 or 1047. Any exterior, privately owned fire line shall also have a fire service meter. The assembly shall be installed immediately before the backflow prevention unit. Radio read remotes are required.
11. The Authority shall review the mechanical plan(s) for design and material approval of a building's:
    a. domestic water meter and its backflow prevention device, and/or its
    b. fire service line's backflow prevention device.
12. DEQ must also approve sewer pump stations. FCSA requires a copy of DEQ's Certificate to Operate and a copy of the stations DEQ approved O&M Manual. These documents must be received before substantial completion is issued and water meters released.

OCT 2011

LEGEND

EXISTING INTERMEDIATE CONTOUR 330
EXISTING INDEX CONTOUR 330
PROPOSED CONTOUR 400
EXISTING EDGE OF PAVEMENT
PROPOSED EDGE OF PAVEMENT
EXISTING CURB AND GUTTER
PROPOSED CURB AND GUTTER
TRANSITION TO REVERSE CURB
EXISTING TELEPHONE LINE
PROPOSED TELEPHONE LINE
EXISTING STORM SEWER WITH INLET
PROPOSED STORM SEWER WITH INLET
EXISTING SANITARY SEWER WITH MANHOLE
PROPOSED SANITARY SEWER WITH MANHOLE
PROPOSED SAN. LAT. CLEANOUT
EXISTING ELECTRIC SERVICE
PROPOSED ELECTRIC SERVICE
EXISTING GAS LINE
PROPOSED GAS LINE
EXISTING WATERLINE W/ TEE
PROPOSED WATERLINE W/ TEE
EXISTING FIRE HYDRANT/VALVE/METER
PROPOSED FIRE HYDRANT/VALVE/METER
PROPOSED REDUCER
PROPERTY LINE
EXISTING EASEMENT
PROPOSED EASEMENT
PROPOSED CENTERLINE
EXISTING CENTERLINE
EXISTING TREE LINE
FLOW LINE
FENCELINE
EXISTING UTILITY POLE/GUIDE WIRE
EXISTING TELEPHONE PEDESTAL
SIGNS
PARKING INDICATOR
INDICATES THE NUMBER OF TYP. PARKING SPACES 12
HANDICAP PARKING
VEHICLES PER DAY COUNT 100
PROPOSED BUILDING ENTRANCE
SANITARY MANHOLE IDENTIFIER 12
STORM DRAIN STRUCTURE IDENTIFIER 6
EXISTING SPOT ELEVATION 735.4
PROPOSED SPOT ELEVATION 35.5
LIGHT POLE

PROJECT INFORMATION

PARCEL IDENTIFICATION NO.	54-A-124A
STREET ADDRESS:	POTOMAC PLACE
PROJECT SITE AREA:	10.65 ACRES
DISTURBED AREA:	1.70 ACRES
CURRENT ZONING:	RP
CURRENT USE:	PUBLIC PARK
PROPOSED USE:	PUBLIC PARK
SIGN SETBACK:	
FRONT:	10'
REAR:	5'
SIDE:	5'
HEIGHT:	12'
SIZE:	50 SF
PARKING SETBACK:	
FRONT:	10'
SIDE:	5'
REAR:	5'
PARKING CALULATIONS:	TRAIL, PLAYGROUND (4 VEHICLES), PROPOSED PICNIC TABLES (3 VEHICLES),
PARKING REQUIRED:	7 SPACES
PARKING PROVIDED:	12 SPACES
ADA PARKING PROVIDED:	2 SPACES
TOTAL PARKING PROVIDED:	14 SPACES

SIGNS:
ALL SIGNS SHALL BE IN CONFORMANCE WITH THE FREDERICK COUNTY ZONING ORDINANCE SECTION 165-201.06 SIGNS

SITE LIGHTING:
NO LIGHTING IS PROPOSED FOR THIS SITE.

FREDERICK WATER PROJECT INFORMATION

WATER AND SANITARY SEWER USAGE

WATER DEMAND 0.000 GPD
SANITARY SEWER DISCHARGE 0.000 GPD

Calculation of demand/discharge
WATER DEMAND
*Residnetial: 235 gpd per connection
*Commercial: 75 gpd per 1,000 sf
*Industrial: 25 gpd @ 10 persons per acre
SEWER DISCHARGE
Sewer discharge equals water demand

151 Windy Hill Lane
Winchester, VA 22602
Telephone: (540) 662-4185
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GREENWAY ENGINEERING
FND 1971

GENERAL NOTES AND LEGEND

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

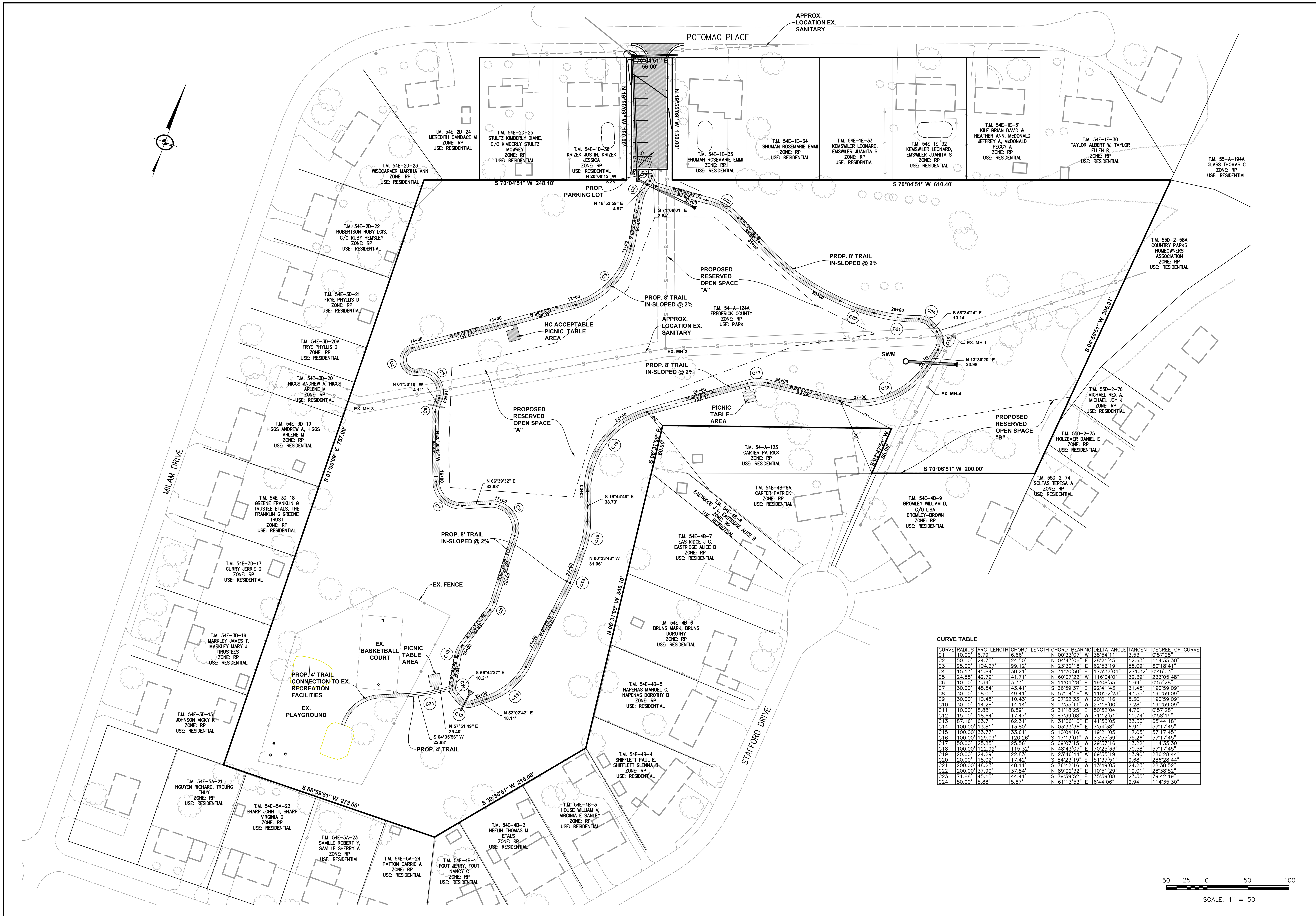
RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date
1	12/28/2017

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017
SCALE: N/A
DESIGNED BY: JMM
FILE NO. 0142F
SHEET 2 OF 11

17-25



CURVE TABLE

CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DELTA ANGLE	TANGENT	DEGREE OF CURVE
C1	10.00'	6.79'	6.66'	N 00°33'07" W	38°54'11"	3.53'	0°57'28"
C2	50.00'	24.75'	24.50'	N 04°43'06" E	28°21'45"	12.63'	114°35'30"
C3	95.00'	104.27'	99.12'	N 23°32'18" E	62°53'19"	58.09'	60°18'41"
C4	15.13'	45.84'	30.21'	S 31°20'50" E	173°37'04"	271.32'	0°46'03"
C5	24.58'	49.79'	41.71'	N 60°07'22" W	116°04'01"	39.39'	233°05'48"
C6	10.00'	3.34'	3.33'	S 11°04'28" E	19°08'35"	1.69'	0°57'28"
C7	30.00'	48.54'	43.41'	S 66°59'37" E	92°41'43"	31.45'	190°59'09"
C8	30.00'	58.05'	49.41'	N 57°54'16" W	110°52'23"	43.55'	190°59'09"
C9	30.00'	10.48'	10.43'	S 07°32'33" W	20°01'16"	5.30'	190°59'09"
C10	30.00'	14.28'	14.14'	S 03°55'11" W	27°16'00"	7.28'	190°59'09"
C11	10.00'	8.88'	8.59'	S 31°18'25" E	50°52'04"	4.76'	0°57'28"
C12	15.00'	18.64'	17.47'	S 87°39'08" W	71°12'51"	10.74'	0°58'19"
C13	87.16'	63.71'	62.31'	N 31°06'10" E	41°53'05"	33.36'	65°44'18"
C14	100.00'	13.81'	13.80'	N 03°33'36" E	7°54'38"	6.91'	57°17'45"
C15	100.00'	33.77'	33.61'	S 10°04'16" E	19°21'05"	17.05'	57°17'45"
C16	100.00'	129.03'	120.26'	S 17°13'01" W	73°55'39"	75.26'	57°17'45"
C17	50.00'	25.85'	25.56'	S 69°07'15" W	29°37'16"	13.22'	114°35'30"
C18	100.00'	122.92'	115.32'	N 48°43'07" E	70°25'33"	70.58'	57°17'45"
C19	20.00'	24.29'	22.83'	N 23°46'44" W	69°35'19"	13.90'	286°28'44"
C20	20.00'	18.02'	17.42'	S 84°23'19" E	51°37'51"	9.68'	286°28'44"
C21	200.00'	48.23'	48.11'	S 76°42'16" W	13°49'03"	24.23'	28°38'52"
C22	200.00'	37.90'	37.84'	N 89°02'32" E	10°51'29"	19.01'	28°38'52"
C23	71.88'	45.15'	44.41'	S 79°59'52" E	35°59'08"	23.35'	79°42'19"
C24	50.00'	5.88'	5.87'	N 61°13'53" E	6°44'06"	2.94'	114°35'30"

151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 662-4185
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GREENWAY ENGINEERING

OVERALL LAYOUT PLAN

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

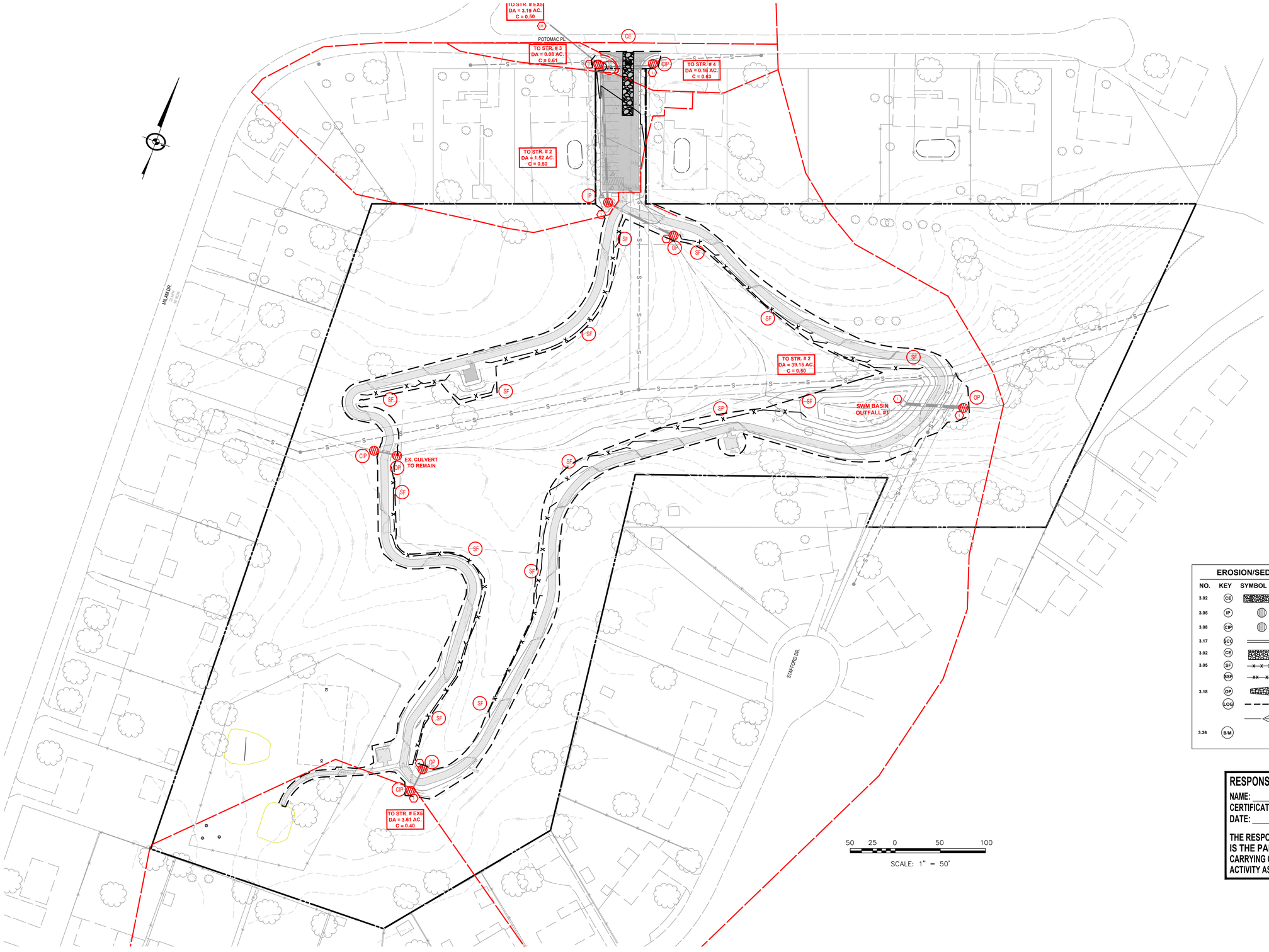
RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date
2	01/23/2018

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017
SCALE: 1" = 50'
DESIGNED BY: JMM
FILE NO. 0142F
SHEET 3 OF 11

17-25



EROSION/SEDIMENT CONTROL LEGEND

NO.	KEY	SYMBOL	DESCRIPTION
3.02	CE		CONSTRUCTION ENTRANCE W/ WASH RACK
3.05	IP		INLET PROTECTION
3.08	CIP		CULVERT INLET PROTECTION
3.17	SCC		STORMWATER CONVEYANCE CHANNEL
3.02	CE		TEMPORARY GRAVEL CONSTRUCTION ENTRANCE
3.05	SF		SILT FENCE
	SSF		SUPER SILT FENCE
3.18	OP		OUTLET PROTECTION
	LOG		LIMITS OF CLEARING & GRADING
			DRAINAGE DIVIDES
3.36	B/M		SOIL STABILIZTION BLANKETS & MATTING

RESPONSIBLE LAND DISTURBER

NAME: _____

CERTIFICATION #: _____

DATE: _____

THE RESPONSIBLE LAND DISTURBER IS THE PARTY RESPONSIBLE FOR CARRYING OUT THE LAND DISTURBING ACTIVITY AS SET FORTH IN THE PLANS.

FOR EROSION AND SEDIMENT CONTROL ONLY !!

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Winchester, Virginia 22602
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GREENWAY ENGINEERING

E&S PHASE I & II PLAN

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date
1	12/28/2017

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017

SCALE: 1" = 50'

DESIGNED BY: JMM

FILE NO. 0142F

SHEET 4 OF 11

17-25

EROSION AND SEDIMENT CONTROL NARRATIVE

Description: The scope of this project consists of the construction of a the construction of a 14 space parking lot and a walking trail in Frederick County, off Potomac Place. Approximately 1.70 acres of land will be disturbed under this application.

Date of construction: Construction will begin following plan approval.

Existing site conditions: The site is currently in use as a park with gentle slopes. There is a mix of cleared grassland and with a few trees and scrubs mostly along the east side. There is an existing recreation area to the south east. The site drains generally to the east.

Proposed site conditions: The on-site area is 10.65 acres, a 0.15 acre parking lot , 2400 liner feet of trail.

Adjacent areas: The site is bounded on the on all sides with residential properties. Access to the site is off Potomac Place.

Offsite areas: The only off-site disturbance proposed under this application is 0.96 acres of disturbance for the construction of the parking lot and stone trail.

Soils: The existing soil conditions were obtained from the USDA Soils Survey. The soils on this site consist of Weikert-Berks channery silt loam (41B), 3 to 8 percent slopes, (41D), 15 to 25 percent slopes, and Clearbrook channery silt loam (9C), 7 to 15 percent slopes. All of these soils have a moderate to high erosion potential and are well drained. Soils are in hydrologic soils group "D".

Critical areas: No critical areas on this site.

Erosion And Sediment Control Measures: Unless otherwise indicated, all vegetative and structural erosion and sediment control measures shall be constructed and maintained according to the minimum standards and specifications of the Virginia erosion and sediment control handbook.

Structural Measures:

Phase I:

Install Temporary Construction Entrances with Wash Racks (3.02) at the entrance to the site.

Install silt fence (3.05) as shown on the plans to intercept and detain small amounts of sediment and prevent it from leaving the site.

Install check dams (3.05) as shown on the plans to intercept and detain small amounts of sediment and prevent it from leaving the site.

Install STM piping as first measure with IP to divert off-site STM flow through project area as shown on plans.

Fill slope surface shall be left in a roughened condition to reduce erosion. Contractor shall redirect the concentrated flow away from the fill slope by installing diversion dike and divert the runoff to sediment traps.

Install culvert outlet protection (3.18) as shown on plans to prevent scour at stormwater outlets.

Temporary seeding (3.31) and/or permanent seeding (3.32) shall be placed on all critical slopes (3:1 or greater) and as needed to stabilize disturbed areas.

Phase II:

Only Phase I controls shown on Phase II plan to remain for the duration of the project.

Install culvert Inlet protection (3.08) on all new culverts throughout the site.

Fill slope surface shall be left in a roughened condition to reduce erosion. Contractor shall redirect the concentrated flow away from the fill slope by installing diversion dike and divert the runoff to sediment traps.

Temporary seeding (3.31) and/or permanent seeding (3.32) shall be placed on all critical slopes (3:1 or greater) and as needed to stabilize disturbed areas.

Vegetative Measures:

Permanent or temporary soil stabilization shall be applied to denuded areas within seven (7) days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven (7) days to denuded areas that may not be at final grade but will remain dormant for longer than fourteen (14) days. Permanent soil stabilization shall be applied to all areas that are to be left dormant for more than six (6) months.

Topsoil that has been stockpiled shall be surrounded with silt fence and protected by mulch and/or temporary vegetation immediately after grading.

All earth berms, diversions and sediment trap embankments are to be machine-compacted, seeded and mulched (hay mulch or straw) for temporary and/or permanent vegetative cover immediately after construction

Erosion control mats shall be installed over steep (2:1) cut and fills slope which have been brought to final grade and seeded to protect from rill and gully erosion.

Management Strategies:

Construction shall be sequenced such that grading operations will begin and end as quickly as possible.

The site superintendent shall be responsible for the installation and maintenance of all erosion and sediment control measures. Maintenance of these measures throughout the project is critical to the effectiveness of the program.

After areas above controls have been stabilized, the controls shall be cleaned up and removed.

Electric power, telephone, storm, sanitary, water & gas supply trenches are to be compacted, seeded and mulched within five (5) days after backfilling. No more than 500 feet are to be open at any one time.

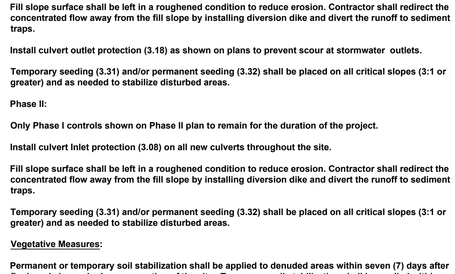
All cut and fill slopes greater that 3:1 slope are to be seeded and mulched within five (5) days of completion of grading.

Drainage swales shall be stabilized with check dams until vegetation has been well established, at which time the check dams shall be removed.

Devices listed above are considered minimum erosion and sediment controls. Additional control measures may be necessary due to contractor phasing or other unforeseen conditions. It is the contractor's responsibility to provide additional measures to those shown, as needed, in order to control erosion and contain sediment on site. All measures shall be installed according to the standards and specifications in the Virginia erosion and sediment control handbook.

Stormwater Management:

Increased runoff from this development will be controlled by the proposed stormwater management facility on site.



SOILS MAP

Stormwater Management:

Increased runoff from this development will be controlled by the proposed stormwater management facility on site.

Maintenance Program:

All control measures shall be inspected daily by the site superintendent or his representative and within 24 hours after any storm event greater than 0.25 inches of rain per 24-hour period. Any damaged structural measures are to be repaired by the end of the day. Seeded areas shall be checked regularly to ensure that a good stand of grass is maintained. All areas shall be fertilized and reseeded as needed until grass is established.

Inlet protection shall be checked regularly for sediment build-up. If the gravel outlet is clogged by sediment, it shall be removed and cleaned or replaced immediately.

Silt/ super-silt fence, sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

Temporary check dams shall be inspected and repaired if necessary after every rainfall and at least every two weeks, whether a storm has occurred or not.

The contractor is responsible for keeping existing public roads in a clean, dust and mud free, condition at all times.

Erosion and sediment control program:

1. **Hold pre-construction meeting on site with inspector.**
2. **Install construction entrance.**
3. **Placement of sediment control and BMP protection devices.**
4. **Obtain inspector's approval prior to beginning grading operations.**
5. **Clear and grub remainder of site.**
6. **Rough grade site.**
7. **Final grade site.**
8. **Stabilization of all disturbed areas. All pervious areas to be stabilized and permanently seed.**
9. **Remove erosion and sediment control measures with the approval of the inspector.**

Note: The Frederick County Public Works and Engineering Department and DEQ retain the right to add and/or modify these erosion and sediment control measures during the construction process, within reason, to ensure adequate protection to the public and the environment.

Seeding schedule (soil stabilization):

1. **All permanent seeding shall be in accordance with section 3.32 of the VESCH and the Construction General Permit.**
2. **Spread topsoil at a minimum depth of four (4) inches.**
3. **Incorporate pulverized agricultural limestone into the topsoil at a rate of 92 lbs. per 1,000 square feet (2 tons per acre).**
4. **Per 9VAC25-880-70 Part I B.4.c. "Nutrients shall be applied in accordance with manufacturer's recommendations or an approved nutrient management plan and shall not be applied during rainfall events."**
5. **Mulch application shall meet the standards provided in Table 3.35-A of Virginia Erosion and Sediment Control Handbook (VESCH). IF mulches are to be anchored with liquid mulch binders, the application rate should meet the standards presented on pg. III-345 of the VESCH. (430 gallons/acre for liquid asphalts). Non-asphalt anchors are; however, preferable due to environmental concerns associated with the introduction of petroleum-based products into water supplies.**

Dust control:

1. **Temporary seeding shall be applied to all disturbed areas subject to little or no construction traffic.**
2. **All haul roads and other heavy traffic routes shall be sprinkled with water until the surface is wet and repeated as needed to control dust.**

MINIMUM CONSTRUCTION STANDARDS NARRATIVE

An erosion and sediment control program adopted with this plan must be consistent with the VESCH for 9VAC25-840-40 minimum standards:

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.

a. 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.

b. 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:

a. No more than 500 linear feet of trench may be opened at one time.

b. Excavated material shall be placed on the uphill side of trenches.

c. 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.

d. Material used for backfilling trenches shall be properly compacted in order to minimize erosion and promote stabilization.

e. Restabilization shall be accomplished in accordance with this chapter.

f. 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.

7. 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:

a. 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.

b. Adequacy of all channels and pipes shall be verified in the following manner:

(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

(2) (a) Natural channels shall be analyzed by the use of a two-year storm to verify that stormwater will not overtop channel banks nor cause erosion of channel bed or banks.

(b) 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

(c) 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.

c. If existing natural receiving channels or previously constructed man-made channels or pipes are not adequate, the applicant shall:

(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

(2) Improve the pipe or pipe system to a condition where the 10-year storm is contained within the appurtenances;

(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

(4) Provide a combination of channel improvement, stormwater detention or other measures which is satisfactory to the VESCP authority to prevent downstream erosion.

d. The applicant shall provide evidence of permission to make the improvements.

e. All hydrologic analyses shall be based on the existing watershed characteristics and the ultimate development condition of the subject project.

f. 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.

g. 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.

h. All on-site channels must be verified to be adequate.

i. 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.

j. 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.

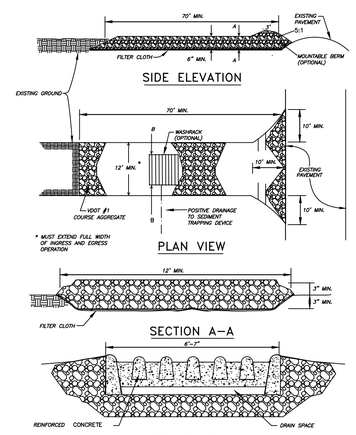
k. All measures used to protect properties and waterways shall be employed in a manner which minimizes impacts on the physical, chemical and biological integrity of rivers, streams and other waters of the state.

l. 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.

m. 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.

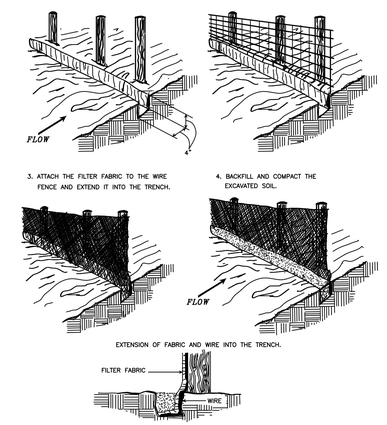
n. Compliance with the water quantity minimum standards set out in 9VAC25-870-66 of the Virginia Stormwater Management Program (VSMP) Regulation shall be deemed to satisfy the requirements of this subdivision 19.

STONE CONSTRUCTION ENTRANCE



SOURCE: ADAPTED from 1983 Maryland Standards for Soil erosion and Sediment Control, and Va. DSWC Plate 3.02-1

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)



SOURCE: Adapted from Installation of Straw and Fabric Filter Barriers for Soil Control. PLATE 3.05-1
Sherwood & Pyeatt

TABLE 3.32-C
SITE SPECIFIC PERMANENT SEEDING MIXTURES
FOR APPALACHIAN/MOUNTAIN AREA

	Total Lbs. Per Acre
Minimum Care Lawn	
– Commercial or Residential	200–250 lbs.
– Kentucky 31 or Turf-Type Tall Fescue	90–100%
– Improved Perennial Ryegrass *	0–10%
– Kentucky Bluegrass	0–10%
High-Maintenance Lawn	
Minimum of three (3) up to five (5) varieties of bluegrass from approved list for use in Virginia.	125 lbs.
General Slope (3:1 or less)	
– Kentucky 31 Fescue	128 lbs.
– Red Top Grass	2 lbs.
– Seasonal Nurse Crop**	20 lbs.
	150 lbs
Low-Maintenance Slope (Steeper than 3:1)	
– Kentucky 31 Fescue	108 lbs.
– Red Top Grass	2 lbs.
– Seasonal Nurse Crop**	20 lbs.
– Crownvetch ***	20 lbs.
	150 lbs

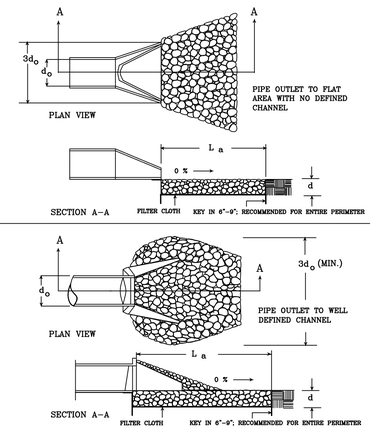
* Perennial Ryegrass will germinate faster and at lower soil temperatures than fescue, thereby providing cover and erosion resistance for seedbed.

** Use seasonal nurse crop in accordance with seeding dates as stated below:

March, April through May 15th	Annual Rye
May 16th through August 15th	Foxtail Millet
August 16th through Sept.,Oct.	Annual Rye
November through February	Winter Rye

*** If Flatpea is used, increase to 30 lbs./acre. All legume seed must be properly inoculated. Weeping Lovegrass may also be included in any slope or low-maintance mixtures during warmer seeding periods; add 10–20 lbs/acre in mixes.

PIPE OUTLET CONDITIONS



NOTES: 1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, GABION BASKET, OR CONCRETE.
2. L_a 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

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 (Secal cereale)	50 – 100
Feb. 16 – Apr. 30	Anual Ryegrass (Lolium multi-florum)	60 – 100
May 1 – Aug. 31	German Millet (Setaria italica)	50

Seeding

Seed shall be evenly applied with a broadcast seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than one inch deep. Grasses and legumes shall be planted with no less than 1/4" soil cover.

ROCK CHECK DAM

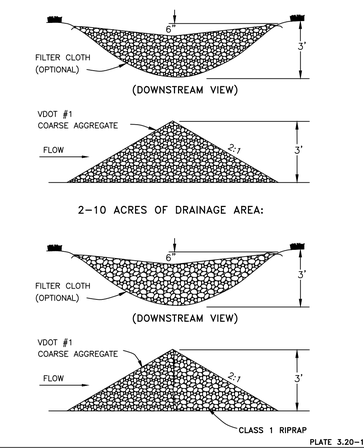


PLATE 3.20-1

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GREENWAY ENGINEERING

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

E&S NOTES & DETAILS

RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017

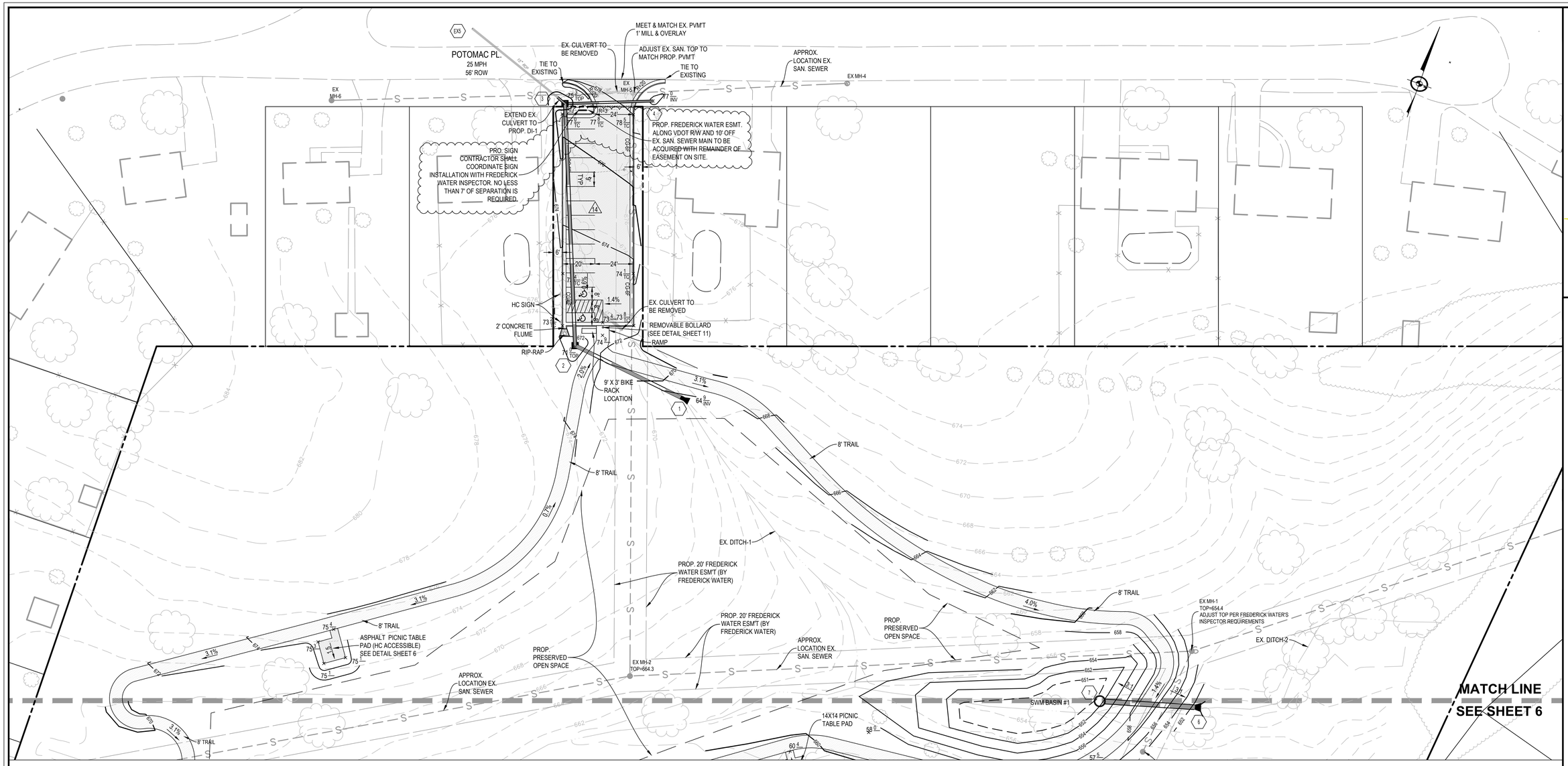
SCALE: N/A

DESIGNED BY: JMM

FILE NO. 0142F

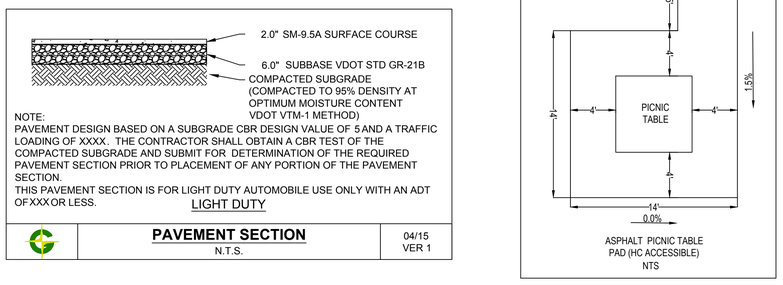
SHEET 5 OF 11

17-25



NOTES:

1. ENTRANCE CURB & GUTTER TO BE CG-6. TRANSITION AT THE END OF RADIUS OUTSIDE OF ROW FOR 5' INTO CG-6F FOR THE PARKING LOT.
2. THREE (3) PICNIC TABLES TO BE PROVIDED & INSTALLED AS A PART OF THIS PROJECT. FREDERICK COUNTY PARKS AND RECREATION SHOULD PROVIDE THE PICNIC TABLE SPECIFICATION TO THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
3. ADJUST EXISTING MANHOLE TOP PER FREDERICK WATER SPECIFICATIONS

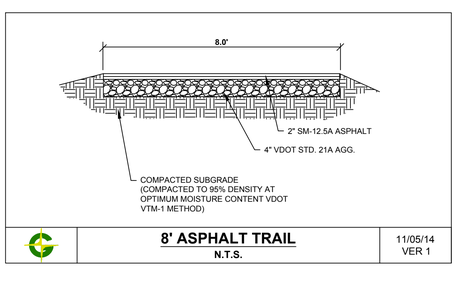


NOTE:
PAVEMENT DESIGN BASED ON A SUBGRADE CBR DESIGN VALUE OF 5 AND A TRAFFIC LOADING OF XXXX. THE CONTRACTOR SHALL OBTAIN A CBR TEST OF THE COMPACTED SUBGRADE AND SUBMIT FOR DETERMINATION OF THE REQUIRED PAVEMENT SECTION PRIOR TO PLACEMENT OF ANY PORTION OF THE PAVEMENT SECTION.
THIS PAVEMENT SECTION IS FOR LIGHT DUTY AUTOMOBILE USE ONLY WITH AN ADT OF XXX OR LESS. LIGHT DUTY

PAVEMENT SECTION N.T.S. — 04/15 VER 1

DETAIL 3

ASPHALT PICNIC TABLE PAD (HC ACCESSIBLE) NTS



8' ASPHALT TRAIL N.T.S. — 11/05/14 VER 1

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

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Telephone: (540) 662-4185
Fax: (540) 722-9528
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GREENWAY ENGINEERING

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

LAYOUT & GRADING PLAN
RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date
3	02/01/2018

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017
SCALE: 1" = 30'
DESIGNED BY: JMM
FILE NO. 0142F
SHEET 6 OF 11

17-25

MATCH LINE
SEE SHEET 6

8' TRAIL
ASPHALT PICNIC TABLE PAD (HC ACCESSIBLE) SEE DETAIL SHEET 6
PROP. PRESERVED OPEN SPACE
EX MH-2 TOP=664.3
PROP. 20' FREDERICK WATER ESMT (BY FREDERICK WATER)
APPROX. LOCATION EX. SAN. SEWER
APPROX. LOCATION EX. SAN. SEWER
PROP. PRESERVED OPEN SPACE
ADJUST TOP PER FREDERICK WATER'S INSPECTOR REQUIREMENTS
EX. DITCH-2
SWM BASIN #1
14X14 PICNIC TABLE PAD
8' TRAIL
APPROX. LOCATION EX MH-4 ADJUST TOP PER FREDERICK WATER'S INSPECTOR REQUIREMENTS
8' TRAIL
EX MH-3 TOP=673.0
EX. 18" CULVERT TO REMAIN
PROP. PRESERVED OPEN SPACE
PROP. 20' FREDERICK WATER ESMT (BY FREDERICK WATER)
PROP. PRESERVED OPEN SPACE
8' TRAIL
8' TRAIL
14x14 PICNIC TABLE PAD
CL-1 RIP-RAP 10' LONG X24" DEEP
4' TRAIL
4' TRAIL
EX. 4' GATE
STAFFORD DR.

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

151 Windy Hill Lane
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2	01/23/2018

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RANDY L. KEPLER
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PROFESSIONAL ENGINEER

DATE: 10/17/2017
SCALE: 1" = 30'
DESIGNED BY: JMM
FILE NO. 0142F
SHEET 7 OF 11
17-25

Channel Analysis: Ditch 2

Notes:

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0235 ft/ft
Manning's n: 0.0150
Flow: 56.5500 cfs

Result Parameters

Depth: 1.5438 ft
Area of Flow: 4.7668 ft^2
Wetted Perimeter: 6.9042 ft
Hydraulic Radius: 0.6904 ft
Average Velocity: 11.8633 ft/s
Top Width: 6.1753 ft
Froude Number: 2.3795
Critical Depth: 2.1837 ft
Critical Velocity: 5.9294 ft/s
Critical Slope: 0.0037 ft/ft
Critical Top Width: 8.73 ft
Calculated Max Shear Stress: 2.2639 lb/ft^2
Calculated Avg Shear Stress: 1.0124 lb/ft^2

Channel Analysis: Ditch 1

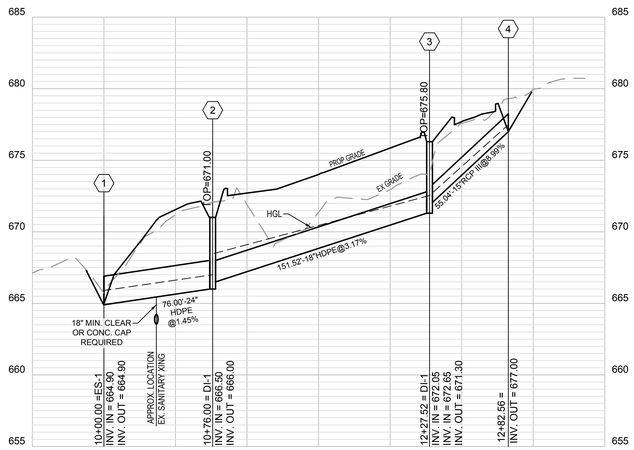
Notes:

Input Parameters

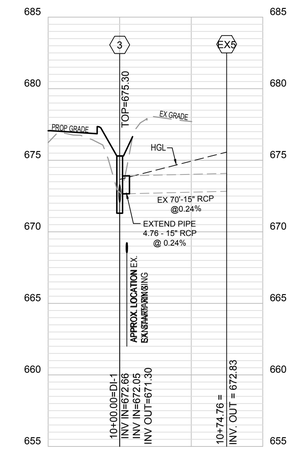
Channel Type: Triangular
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0585 ft/ft
Manning's n: 0.0150
Flow: 15.3900 cfs

Result Parameters

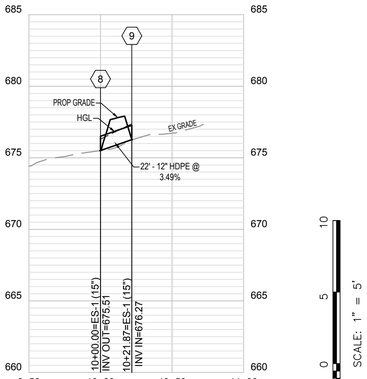
Depth: 0.7987 ft
Area of Flow: 1.2759 ft^2
Wetted Perimeter: 3.5719 ft
Hydraulic Radius: 0.3572 ft
Average Velocity: 12.0625 ft/s
Top Width: 3.1948 ft
Froude Number: 3.3638
Critical Depth: 1.2975 ft
Critical Velocity: 4.5706 ft/s
Critical Slope: 0.0044 ft/ft
Critical Top Width: 5.19 ft
Calculated Max Shear Stress: 2.9156 lb/ft^2
Calculated Avg Shear Stress: 1.3039 lb/ft^2



STR 1 - STR 4



STR 3 - STR EX. 5



STR 8 - STR 9

SCALE: 1" = 5'

SCALE: 1" = 50'

STORM SEWER COMPS

From	To	DA (Acres)	Runoff Coef. C	CA (Increm.)	CA (Accum.)	Tc (min)	Rainfall (in/hr)	Runoff Q, (cfs)	Invert Up (ft)	Invert Down (ft)	Length (ft)	Slope (%)	Diameter (in)	Capacity (cfs)	Velocity (fps)	Increm Flow Time (min)	Flow Time (min)	Pipe Material
4	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	677.00	672.05	55.04	8.99	15.00	20.89	0.00	0.00	0.00	RCP III
3	2	0.08	0.61	0.05	1.64	5.00	6.29	10.34	671.30	666.50	151.52	3.17	18.00	21.85	5.85	0.22	0.43	HDPE
2	1	1.52	0.50	0.76	2.40	5.00	6.14	14.75	666.00	664.90	76.00	1.45	24.00	31.80	4.75	0.13	0.27	HDPE
9	8	3.61	0.40	1.44	1.44	7.00	5.80	8.38	676.27	675.51	21.87	3.49	12.00	7.78	10.67	0.03	0.03	HDPE
EX5	3	3.19	0.50	1.60	1.60	5.40	6.35	10.12	672.83	672.65	74.76	0.24	15.00	3.42	8.25	0.15	0.15	RCP

STORM SEWER INLET COMPS

Inlet			DA (AC)	C	CA	Sum CA	I (in/hr)	Q (cfs)	Qb (cfs)	Qt (cfs)	S (%)	Sx (ft/ft)	T (ft)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo	a	S'w = a/(12W)	Se=Sx+S'w(Eo) (ft/ft)	Lt (ft)	L, Spec Length	L/Lt	E (%)	Qt (cfs)	Qb, Co (cfs)	Sag Inlets Only			
Structure Name	Inlet ID	Length (ft)																										Ponding Depth (in)	Curb Opening Height (ft)	d/h	T @ Sag
3	DI-1	2.16	0.08	0.61	0.05	0.05	6.50	0.32	0.00	0.32	0.01	0.02	4.30	4.00	0.93	0.02	1.00	0.00	0.00	0.00	0.02	N/A	N/A	N/A	1.00	0.32	0.00	0.09	-	-	4.30
2	DI-1	2.16	1.52	0.50	0.76	0.76	6.50	4.94	0.00	4.94	0.01	0.02	21.14	4.00	0.19	0.02	1.00	0.00	0.00	0.00	0.02	N/A	N/A	N/A	1.00	4.94	0.00	0.42	-	-	21.14

HGL COMPS

HYDRAULIC GRADE LINE CALCULATIONS

Inlet No.	Outlet W.S.E. (ft)	Do (in)	Qo (cfs)	Lo (ft)	Sfo (%)	Hf (ft)	JUNCTION LOSS													Final H (ft)	Inlet W.S.E. (ft)	Rim Elev (ft)
							Vo (fps)	Ho (ft)	Qi (cfs)	Vi (fps)	Qi/Vi	Vi^2/2g	Hi (ft)	Angle (deg)	K	Hb (ft)	Ht (ft)	1.3Ht (ft)	0.5Ht (ft)			
2	666.50	24.00	15.39	76.00	0.41	0.31	4.95	0.10	10.98	6.21	68.22	0.60	0.21	60.11	0.56	0.34	0.64	0.83	0.42	0.73	667.23	671.00
3	667.70	18.00	10.98	154.75	0.97	1.50	6.21	0.15	10.12	8.25	83.49	1.06	0.37	47.23	0.48	0.51	1.06		0.53	2.03	669.73	
									0.66	7.02	4.60	0.77		85.88	0.70	0.54						675.30
EX5	673.66	15.00	10.12	69.94	2.56	1.79	8.25	0.32									0.32	0.41	0.21	1.99	675.65	672.83
4	673.05	15.00	0.66	62.24	0.01	0.01	7.02	0.23									0.23	0.30	0.15	0.16	673.21	676.00
9	676.31	12.00	8.38	21.87	4.91	1.07	10.67	0.53									0.53	0.69	0.35	1.42	677.73	676.27

OUTLET PROTECTION - VDOT STD EC-1

STR #	OUTLET VELOCITY (fps)	TOP WIDTH (ft)	LENGTH (ft)	BOTTOM WIDTH (ft)	DEPTH (in)	TYPE (VDOT Class)
S6 - Outfall #1	7.75	11'	18'	22'	24"	CLASS I

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STORM SEWER COMPUTATIONS & PROFILES

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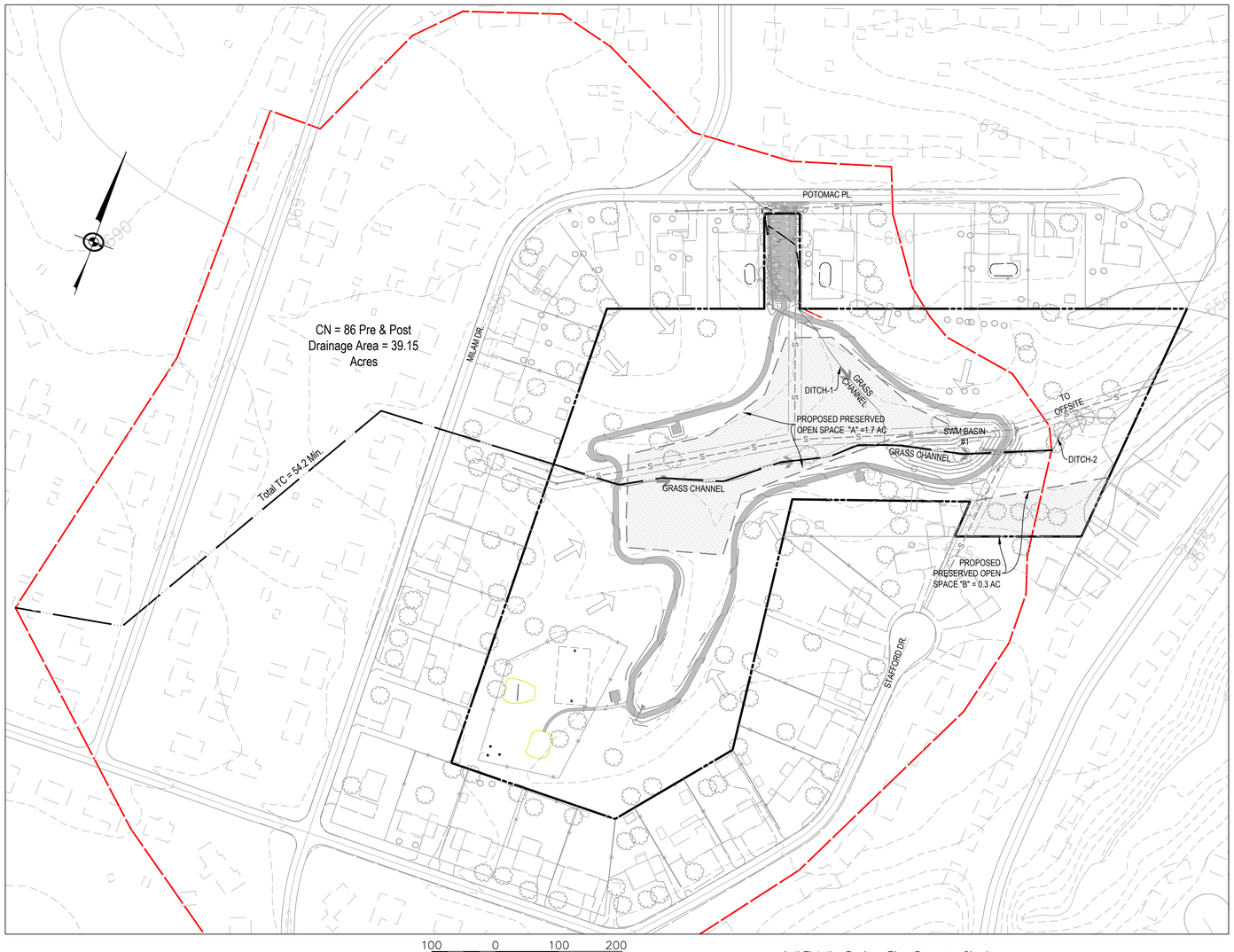
SCALE: H: 1" = 50'
V: 1" = 5'

DESIGNED BY: JMM

FILE NO. 0142F

SHEET 8 OF 11

17-25



DEVELOPMENT PROJECT LAND COVER CALCULATIONS

Pre-Developed Land Cover		
• Managed Turf Area	10.55 Acres	
• Impervious Cover	0.10 Acres	
Total Site Area		10.17 Acres
Post-Developed Land Cover		
• Managed Turf Area	9.86 Acres	
• Impervious Cover	0.79 Acres	
Total Site Area		10.17 Acres

Stormwater Management and Water Quality

This existing 10.65 acre RP "Residential Performance" Site is currently a community park. The site drains to a storm drainage ditch (ditch-2) that runs thought the center of the property and ultimately outfalls into unnamed tributary.

The existing soils for this site are 9B, 41B and 41D, Clearbrook Channery Silt loam (Hydrologic Soils Group C/D) and Weikert-Berks Channery Silt Loam (Hydrologic Soils Group D). The existing site has about 0.10 acres of impervious cover and approximately 10.55 acres of open space or managed turf areas, 0.94 percent impervious and drains to a ditch-2 that runs west to east through the center of the park.

The proposed parking lot and trail will add approximately 0.69 acres of additional impervious areas increasing the percent imperviousness to 6.48%. Post-development runoff will not change from the pre-developed drainage pattern. The proposed parking lot area will drain to a an existing drainage ditch (ditch-1) that drains into ditch-2 through the center of the site and outfalls into an unnamed tributary

The proposed trail is designed to follow the existing ground while maintaining a 2% cross-slope allowing the storm runoff to sheet flow through the conservation area and into the storm drain ditch. Stormwater management will be provided by a SWM pond on the east side of the park. The SWM Pond will provide control for the 1, 2, & 10 year storms. The site discharge will continue to drain to the east by way of the existing storm drain ditch-2.

Water Quality was met by placing 2.0 acres into a conservation easement, and by sheet flowing the trail and adjacent area through the conservation area. All runoff for this site has been evaluated using the Virginia Runoff Reduction Method for Redevelopment. The proposed shee tflow to conservation areas was evaluated using the VRRM spread sheet and all required post-development phosphorous load reductions were meet. (See submitted spread sheet for calculation details)

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

BMP Design Specifications List: **2013 Draft Stds & Specs**

Update Summary Sheet | Print Preview | Print

Site Summary

Total Rainfall = 43 inches

Site Land Cover Summary

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	0.00	0.00	2.00	2.00	19
Managed Turf (acres)	0.00	0.00	0.00	7.96	7.96	75
Impervious Cover (acres)	0.00	0.00	0.00	0.69	0.69	6
					10.65	100

Site Tv and Land Cover Nutrient Loads

Site Rv	0.26
Treatment Volume (ft^3)	9,966
TP Load (lb/yr)	6.26
TN Load (lb/yr)	44.80

Total TP Load Reduction Required (lb/yr)	1.90

Site Compliance Summary

Total Runoff Volume Reduction (ft^3)	3,082
Total TP Load Reduction Achieved (lb/yr)	1.93
Total TN Load Reduction Achieved (lb/yr)	13.84
Remaining Post Development TP Load (lb/yr)	4.33
Remaining TP Load Reduction (lb/yr) Required	0.00

** TARGET TP REDUCTION EXCEEDED BY 0.04 LB/YEAR **

NOTES:
1. SWM BASIN #1 IS A DRY DETENTION BASIN.

SWM MAINTENANCE AND INSPECTION NOTE

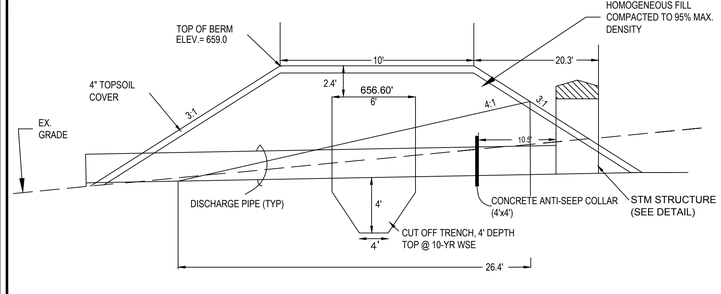
FOR DETAILED INFORMATION ON MAINTENANCE AND INSPECTION OF THE STORMWATER MANAGEMENT FACILITIES REFER TO THE VDOT POST-CONSTRUTION BMP INSPECTION AND MAINTENANCE MANUAL.
AT A MINIMUM FACILITIES SHALL BE INSPECTED ON AN ANNUAL BASIS AND AFTER ANY STORM THAT CAUSES THE CAPACITY OF THE PRINCIPE SPILLWAY TO BE EXCEEDED.
- REMOVE ANY TRASH OR DEBRIS FROM SWM FACILITY
- REMOVE BLOCKAGES FROM OUTFLOW AND INFLOW STRUCTURES
- WEED CONTROL AND GRASS MAINTENANCE

*NOTES:

1. PHREATICLINE COMP
10 YR STM ELEV = 656.60'
LINE LENGTH @4:1 = 26.4'
38' TO TOE, DOES NOT CROSS BANK ABOVE TOE, NO DRAINAGE SYSTEM REQUIRED

ANTI-SEEP COLLAR DESIGN

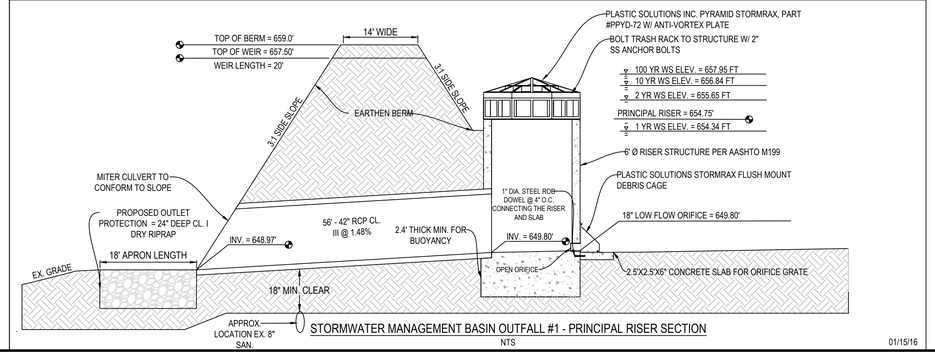
1. DEPTH OF WATER AT PRINCIPAL SPILLWAY CREST (Y) = 4.95 FT
2. SLOPE OF UPSTREAM FACE OF EMBANKMENT (Z) = 3:1 SLOPE
3. SLOPE OF PRINCIPLE SPILLWAY BARREL (Sb) = 1.48% SLOPE
4. LENGTH OF BARREL IN SATURATED ZONE (Ls) = 26.4' FT
5. NUMBER OF COLLARS REQUIRED (FROM PLATE 3.14-12) = 1 COLLAR
COLLAR DIMENSIONS - 4'x4'



STORMWATER MANAGEMENT #2 - BERM CROSS SECTION
NTS

Anti-Flotation Design - Riser Buoyancy Check
SWM Basin #1

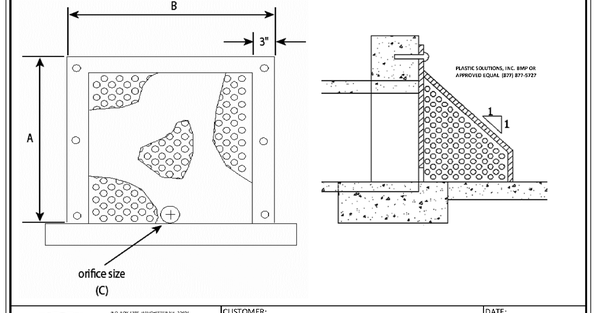
1. Volume of Water Displaced	6.00 ft.	x	6.00 ft.	x	5.30 ft.	=	190.80 cu.ft.
2. Weight of Water Displaced			190.80 lb/cu.ft.	x	62.40 lb/cu.ft.	=	11905.92 lbs
3. Volume of Concrete							
Concrete filled base	6.00 ft.	x	6.00 ft.	x	2.40 ft.	=	86.40 cu.ft.
Wall	5.30 ft.	x	0.67 ft.	x	6.00 ft.	=	21.31 cu.ft.
minus Culvert 42"			0.67 ft.	x	9.62 sqft.	=	-6.45 cu.ft.
					Total Volume minus openings		101.26 cu.ft.
4. Weight of Concrete			101.26 lb/cu.ft.	x	150.00 lb/cu.ft.	=	15189.09 lbs
5. Safety Factor Min. 1.25			15189.09 lbs	/	11905.92 lbs	=	1.28 Safety Factor



STORMWATER MANAGEMENT BASIN OUTFALL #1 - PRINCIPAL RISER SECTION
NTS

01/15/16

BMP



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PH:(877) 877-5727
FAX:(540) 723-2315
WEBSITE:WWW.PLASTIC-SOLUTION.COM

CUSTOMER:
PROJECT:
DATE:
DRAWN BY:
APP'D BY:
DETAIL:
DWG. NO:

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STORMWATER MANAGEMENT PLAN

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RED BUD MAGISTERIAL DISTRICT
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GENERAL CONDITIONS - COUNTY CODE COMPLIANT LANDSCAPE PLAN

SCOPE OF WORK

THE LANDSCAPE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT TO COMPLETE ALL LANDSCAPE WORK AS SHOWN ON THE PLANS AND SPECIFICATIONS.

NOTE: IF CONTRACTOR BIDS ACCORDING TO THE PLANT LIST, HE/SHE SHOULD THOROUGHLY CHECK THE PLANT LIST QUANTITIES WITH THE SYMBOLS DRAWN ON THE PLAN, TO BE SURE THERE ARE NO DISCREPANCIES. IF THERE IS A DISCREPANCY BETWEEN THE DRAWING AND THE LIST ON THE PLANS, THE DRAWING TAKES PRECEDENCE.

STANDARDS

ALL PLANT MATERIAL WILL CONFORM TO THE CURRENT ISSUE OF THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION (ANLA).PLANT MATERIAL MUST BE SELECTED FROM NURSERIES THAT HAVE BEEN INSPECTED AND CERTIFIED BY STATE PLANT INSPECTORS.COLLECTED MATERIAL MAY BE USED ONLY WHEN APPROVED BY OWNER'S REPRESENTATIVE.NOMENCLATURE WILL BE IN ACCORDANCE WITH HORTUS III BY L.H. BAILEY.

SUBSTITUTIONS: PRE-BID

IT IS THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY TO MAKE EVERY REASONABLE EFFORT TO FIND THE PLANTS SPECIFIED BY THE LANDSCAPE ARCHITECT. THE LANDSCAPE CONTRACTOR MAY OFFER SUBSTITUTIONS TO THE LANDSCAPE ARCHITECT FOR HIS/HER CONSIDERATION. THE LANDSCAPE CONTRACTOR WILL NOTIFY THE LANDSCAPE ARCHITECT IF THERE ARE KNOWN DISEASES OR INSECT RESISTANT SPECIES THAT CAN BE SUBSTITUTED FOR A SELECTED PEST-PRONE PLANT. THE CONTRACTOR SHALL SUBMIT A BASE BID AS PER PLAN PLUS PRICE CLARIFICATIONS FOR ALL RECOMMENDED SUBSTITUTIONS.

SUBSTITUTIONS: POST-BID

IT IS THE INTENT TO ELIMINATE POST-BID SUBSTITUTIONS. HOWEVER, IN THE EVENT THAT THE CONTRACT MATERIAL HAS BECOME UNAVAILABLE, AN APPROPRIATE SUBSTITUTION MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE.

UTILITIES AND UNDERGROUND FEATURES

THE LANDSCAPE CONTRACTOR SHALL NOTIFY UTILITY COMPANIES AND/OR THE GENERAL CONTRACTOR IN ADVANCE OF CONSTRUCTION TO LOCATE UTILITIES.
IF THERE IS A CONFLICT WITH UTILITIES AND THE PLANTING, THE LANDSCAPE ARCHITECT SHALL BE RESPONSIBLE FOR RELOCATING PLANTS PRIOR TO THE PLANTING PROCESS. ANY COST DUE TO RELOCATING AFTER PLANTING SHALL BE BORNE BY THE OWNER. IF PLANTS ARE TO BE INSTALLED IN AREAS THAT SHOW OBVIOUS POOR DRAINAGE, AND THE PLANTS ARE INAPPROPRIATE FOR THAT CONDITION, THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT AND OWNER. IF THEY DEEM NECESSARY, THE PLANTS SHALL BE RELOCATED, THE CONTRACT SHALL BE ADJUSTED TO ALLOW FOR DRAINAGE CORRECTION AT A NEGOTIATED COST, OR THE PLANT SELECTION MODIFIED BY THE LANDSCAPE ARCHITECT TO ACCOMMODATE THE POOR DRAINAGE.

WARRANTY

THE STANDARD WARRANTY IS FOR ONE (1) YEAR PERIOD, EXCLUDING BULBS, SOD AND ANNUALS, COMMENCING ON THE DATE OF INITIAL ACCEPTANCE. ALL PLANTS SHALL BE ALIVE AND IN SATISFACTORY GROWTH AT THE END OF THE GUARANTEE PERIOD. ANY MATERIAL THAT IS 25% DEAD OR MORE SHALL BE CONSIDERED DEAD AND MUST BE REPLACED AT NO CHARGE. A TREE SHALL BE CONSIDERED DEAD WHEN THE MAIN LEADER HAS DIED BACK, OR 25% OF THE CROWN IS DEAD. REPLACEMENTS SHALL BE MADE DURING THE NEXT PLANTING PERIOD. REPLACEMENTS SHALL BE OF THE SAME TYPE, SIZE AND QUALITY AS ORIGINAL SPECIES UNLESS OTHERWISE NEGOTIATED.

C. CONTAINER - GROWN STOCK

1. THE SIZE OF CONTAINER-GROWN SHRUBS IS MEASURED BY HEIGHT AND WIDTH OF THE PLANT. CONTAINER-GROWN TREES ARE MEASURED BY THE SAME STANDARDS LISTED IN B.3. ABOVE. THE ROOT SYSTEM OF CONTAINER-GROWN PLANTS SHALL BE WELL DEVELOPED AND WELL DISTRIBUTED THROUGH OUT THE CONTAINER.
2. ALL CONTAINER-GROWN TREES AND SHRUBS THAT HAVE CIRCLING (GIRDLING) AND MATTED ROOTS SHALL BE TREATED IN THE FOLLOWING MANNER PRIOR TO PLANTING: SEPARATE THE ROOTS BY HAND, UNTANGLING SO CIRCLING ROOTS WILL NOT DAMAGE FUTURE OF THE PLANT. SEE PLANTING PROCEDURES FOR ALL CONTAINER-GROWN TREES & SHRUBS IN THIS SECTION.
3. ALL CONTAINER-GROWN PLANTS SHOULD BE GROUPED AND WATERED DAILY UNTIL THEY ARE PLANTED IN THE LANDSCAPE, THE SOIL SHALL BE KEPT MOIST WITH THE EQUIVALENT OF ONE-INCH OF RAINFALL PER WEEK.

D. PRUNING SHALL BE DONE BEFORE PLANTING OR DURING THE PLANTING OPERATION. PRUNING DETAIL FOR TREES IN THIS SECTION.

E. ALL PLANT MATERIAL IN TRANSIT SHALL BE COVERED TO KEEP MATERIAL FROM DRYING OUT. THE COVERING SHALL COMPLY WITH THE STATE AND LOCAL LAWS PERTAINING TO THE TRANSPORT OF MATERIALS.

F. TREES SHALL BE PLACED IN AN UPRIGHT POSITION WITH THE ROOTBALL COVERED BY MULCH AND KEPT MOIST. TREES AND SHRUBS SHOULD NOT BE LEFT ON SITE UNPLANTED FOR MORE THAN 24-HOURS WITHOUT ADEQUATE WATER TO INSURE ROOT SURVIVAL.

INSPECTION

A. PLANTS MAY BE SUBJECT TO INSPECTION AND APPROVAL BY THE OWNER OR OWNER'S REPRESENTATIVE AT THE PLACE OF GROWTH OR HOLDING YARD FOR CONFORMITY TO SPECIFICATION REQUIREMENTS AS TO QUALITY, SIZE AND VARIETY.

B. PLANTS DAMAGED IN HANDLING OR TRANSPORTATION CAN BE REJECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.

C. STATE NURSERY INSPECTION CERTIFICATES SHALL BE FURNISHED TO THE LANDSCAPE ARCHITECT UPON REQUEST.

STANDARDS

A. PLANTS WILL BE IN ACCORDANCE WITH THE CURRENT ANLA'S STANDARDS AND CONFORM IN GENERAL TO REPRESENTATIVE SPECIES.

B. BALLED AND BURLAPPED (B&B)
1. BALLED AND BURLAPPED PLANTS SHALL BE DUG WITH FIRM ROOT BALLS FREE OF NOXIOUS WEEDS. THERE SHOULD BE NO EXCESS SOIL ON TOP OF THE ROOTBALL OR AROUND THE TRUNK
2. BALL SIZES SHALL BE IN ACCORDANCE WITH ANLA STANDARDS.
3. CALIPER AND HEIGHT MEASUREMENT: IN SIZE GRADING B&B SINGLE TRUNK TREES, CALIPER SHALL TAKE PRECEDENCE OVER HEIGHT. CALIPER OF THE TRUNK SHALL BE TAKEN 6" ABOVE GROUND LEVEL (UP TO AND INCLUDING 4" CALIPER SIZE) AND 12" ABOVE THE GROUND LEVEL FOR LARGER TREES. FOR MULTIPLE-TRUNK TREES, HEIGHT MEASUREMENT SHALL TAKE PRECEDENCE OVER CALIPER.

NOTES:

1) ALL PLANTING SHALL CONFORM WITH 165-203.01 - B OF THE FREDERICK COUNTY ZONING ORDINANCE (PLANT SELECTION, PLANTING PROCEDURE, AND MAINTENANCE).

2) ANY PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY THE FREDERICK COUNTY PLANNING DEPARTMENT.

3) NO TREES OR SHRUBS SHALL BE PLACED ON FCSA EASEMENTS.

OPEN SPACE CALCULATIONS

25% MINIMUM OPEN SPACE REQUIRED
10.65 ACRES (SITE AREA) x 25% = 2.67 ACRES REQUIRED
10.49 ACRES PROVIDED / 10.65 ACRES (SITE AREA) = 98.5% OPEN SPACE PROVIDED

PARKING LOT PLANT SCHEDULE

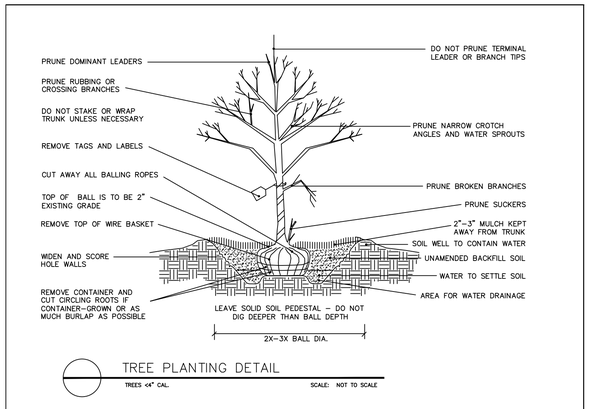
ABB	BOTANIC NAME	COMMON NAME	QUANTITY	SIZE
PROPOSED TREE PLANTINGS				
Mg	Magnollia Grandiflora	Magnollia	6	2" cal, B&B
IS	Ilex crenata "Steeds"	Steeds Jap. Holly	37	36" HT B&B

PARKING LOT LANDSCAPE CALCULATIONS

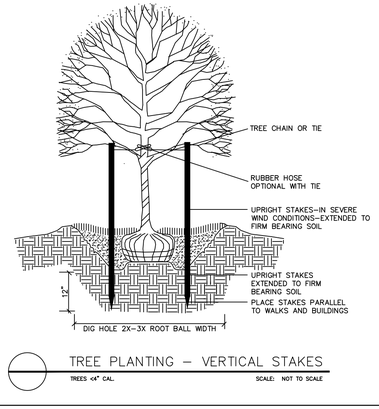
1. INTERIOR LANDSCAPING:
1 TREE PER 10 SPACES, 14 SPACES / 10 = 1.4 TREES REQUIRED
2 TREES PROVIDED

2. PERIMETER LANDSCAPING:
6,880 SF OF IMPERVIOUS AREA
1 TREE PER 2,000 SF OF IMPERVIOUS PAVEMENT 6,880 SF/ 2000 = 3.4 REQUIRED TREES
4 TREES PROVIDED

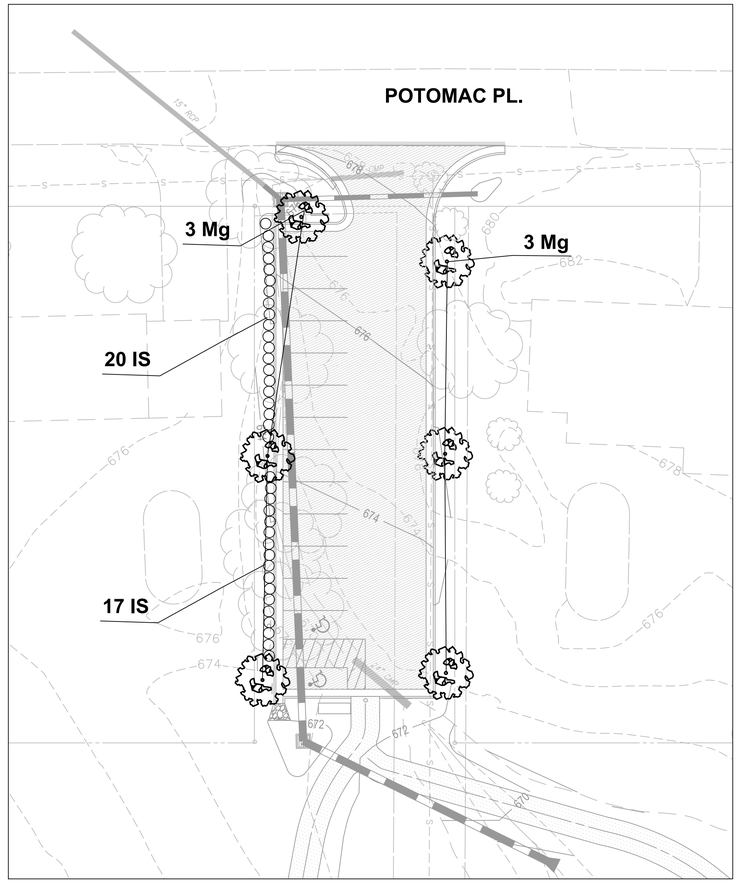
TOTAL PARKING LOT LANDSCAPE TREES REQUIRED = 6, TOTAL TREES PROVIDED = 6



TREE PLANTING DETAIL
TREES <4" CAL. SCALE: NOT TO SCALE



TREE PLANTING – VERTICAL STAKES
TREES <4" CAL. SCALE: NOT TO SCALE



20 10 0 20 40
SCALE: 1" = 20'

151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 662-4185
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www.greenwayeng.com

GREENWAY ENGINEERING
FND 1971

LANDSCAPE PLAN

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

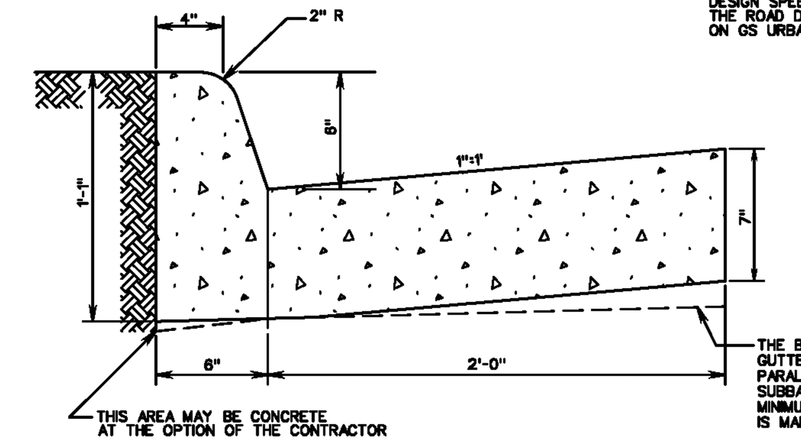
RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date

COMMONWEALTH OF VIRGINIA
RANDY L. KEPLER
Lic. No. 32809
PROFESSIONAL ENGINEER

DATE: 10/17/2017
SCALE: AS SHOWN
DESIGNED BY: JMM
FILE NO. 0142F
SHEET 10 OF 11
17-25

CG-6



NOTES:

1. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
2. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
3. COMBINATION CURB & GUTTER HAVING A RADIUS OF 300 FEET OR LESS (ALONG FACE OF CURB) SHALL BE PAID FOR AS RADIAL COMBINATION CURB & GUTTER.
4. FOR USE WITH STABILIZED OPEN-GRADED DRAINAGE LAYER, THE BOTTOM OF THE CURB & GUTTER SHALL BE CONSTRUCTED PARALLEL TO THE SLOPE OF SUBBASE COURSES AND TO THE DEPTH OF THE PAVEMENT.
5. ALLOWABLE CRITERIA FOR THE USE OF CG-6 IS BASED ON ROADWAY CLASSIFICATION AND DESIGN SPEED AS SHOWN IN APPENDIX A OF THE ROAD DESIGN MANUAL IN THE SECTION ON GS URBAN STANDARDS.

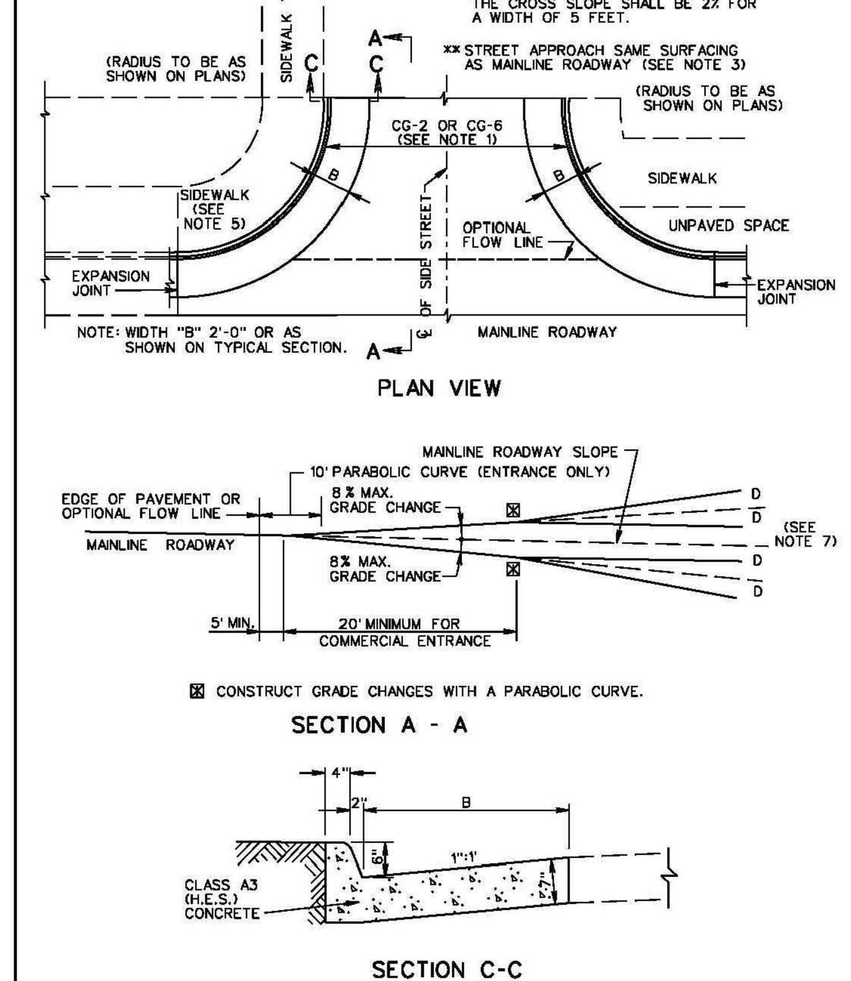
SPECIFICATION REFERENCE 105 502

COMBINATION 6" CURB AND GUTTER

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS | REVISION DATE | SHEET 1 OF 1 | 201.03

CG-11



GENERAL NOTES

1. WHEN USED IN CONJUNCTION WITH STANDARD CG-3 OR CG-7, THE CURB FACE ON THIS STANDARD IS TO BE ADJUSTED TO MATCH THE MOUNTABLE CURB CONFIGURATION.
2. SEE STANDARD CG-12 FOR CURB RAMP DESIGN TO BE USED WITH THIS STANDARD.
3. MAINLINE PAVEMENT SHALL BE CONSTRUCTED TO THE R/W LINE (EXCEPT ANY SUBGRADE STABILIZATION REQUIRED FOR MAINLINE PAVEMENT WHICH CAN BE OMITTED IN THE ENTRANCE.)
4. RADIAL CURB OR COMBINATION CURB AND GUTTER SHALL NOT BE CONSTRUCTED BEYOND THE R/W LINE EXCEPT FOR REPLACEMENT PURPOSES.

ENTRANCE NOTES

5. WHEN THE ENTRANCE RADII CANNOT ACCOMMODATE THE TURNING REQUIREMENTS OF ANTICIPATED HEAVY TRUCK TRAFFIC, THE DEPTH FOR SIDEWALK & CURB RAMPS WITHIN THE LIMITS OF THE RADII SHOULD BE INCREASED TO 7". (SEE CG-13)
6. PLANS ARE TO INDICATE WHEN CONSTRUCTION OF A FLOW LINE IS REQUIRED TO PROVIDE POSITIVE DRAINAGE ACROSS THE ENTRANCE.
7. THE DESIRABLE AND MAXIMUM ENTRANCE GRADE CHANGES "D" ARE LISTED IN THE ALLOWABLE ENTRANCE GRADE TABLE. THESE VALUES ARE NOT APPLICABLE TO STREET CONNECTIONS.

INTERSECTION NOTES

8. WHEN CG-11 IS USED FOR STREET CONNECTIONS, THE CONNECTION MUST BE DESIGNED IN ACCORDANCE WITH AASHTO POLICY AND THE APPLICABLE REQUIREMENTS OF THE VDOT ROAD DESIGN MANUAL, INCLUDING STOPPING SIGHT DISTANCE AND K VALUE REQUIREMENTS.
9. OPTIONAL FLOWLINE MAY REQUIRE WARPING OF A PORTION OF GUTTER TO PROVIDE POSITIVE DRAINAGE ACROSS THE INTERSECTION.

ALLOWABLE ENTRANCE GRADE CHANGES

ENTRANCE VOLUME		GRADE CHANGE "D" DESIRABLE	MAXIMUM
HIGH	MORE THAN 1500 VPD	0 %	3 %
MEDIUM	500-1500 VPD	≤ 3 %	6 %
LOW	LESS THAN 500 VPD	≤ 6 %	8 %

NOTE: ALLOWABLE ENTRANCE GRADE TABLE IS NOT APPLICABLE TO STREET CONNECTIONS

SPECIFICATION REFERENCE 502

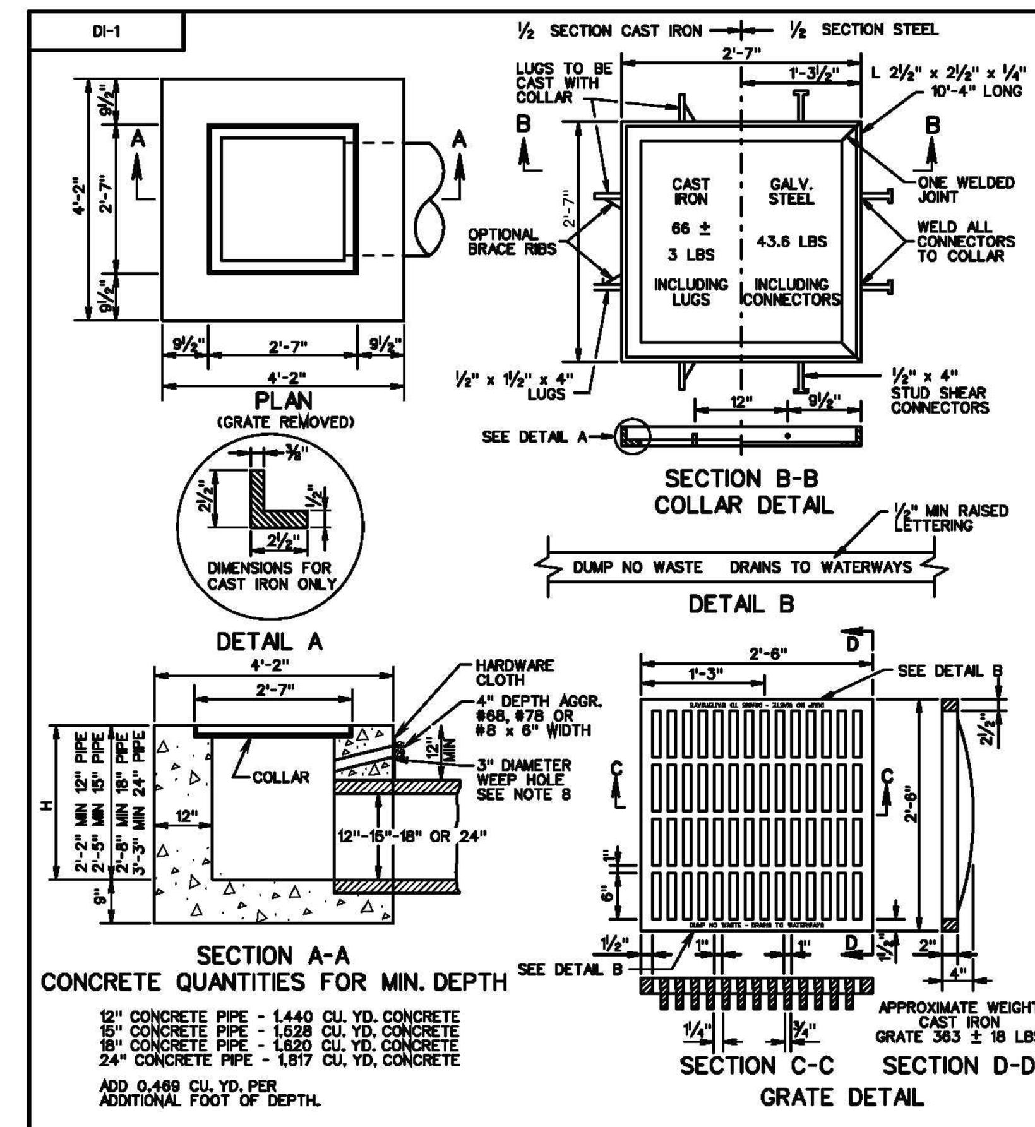
METHOD OF TREATMENT

(CONNECTION FOR STREET INTERSECTIONS AND COMMERCIAL ENTRANCES)

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS | REVISION DATE 07/15 | SHEET 1 OF 1 | 203.04

DI-1



CONCRETE QUANTITIES FOR MIN. DEPTH

12" CONCRETE PIPE - 1.440 CU. YD. CONCRETE
15" CONCRETE PIPE - 1.528 CU. YD. CONCRETE
18" CONCRETE PIPE - 1.620 CU. YD. CONCRETE
24" CONCRETE PIPE - 1.817 CU. YD. CONCRETE

ADD 0.469 CU. YD. PER ADDITIONAL FOOT OF DEPTH.

NOTES

1. DEPTH OF INLET (H) TO BE SHOWN ON PLANS. FOR DEPTH GREATER THAN 10' USE STANDARD DI-1A
2. THE "H" DIMENSION SHOWN ON THE STANDARDS AND SPECIFIED ON THE PLANS WILL BE MEASURED FROM THE INVERT OF THE OUTFALL PIPE TO THE TOP OF THE STRUCTURE. PLAN "H" DIMENSIONS ARE APPROXIMATE ONLY FOR ESTIMATING PURPOSES AND THE ACTUAL DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR FROM FIELD CONDITIONS.
3. WHEN SPECIFIED ON THE PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD IS-1. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
4. IN THE EVENT THE INVERT OF THE OUTFALL PIPE IS HIGHER THAN THE BOTTOM OF THE STRUCTURE, THE INVERT OF THE STRUCTURE SHALL BE SHAPED WITH CEMENT MORTAR TO PREVENT STANDING OR PONDING OF WATER IN THE STRUCTURE. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO INLET SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
5. STEPS ARE TO BE PROVIDED WHEN H IS 4'-0" OR GREATER. FOR DETAILS SEE STANDARD ST-1.
6. THIS ITEM MAY BE PRECAST OR CAST-IN-PLACE.
7. #4 X 8" SMOOTH DOWELS AT APPROXIMATELY 12" C-C TO BE PLACED IN ALL AREAS ADJACENT TO ABUTTING CONCRETE TO PREVENT SETTLEMENT. IN LIEU OF DOWELS A 2"X4" NOTCH MAY BE PROVIDED. SEE STANDARD T-DI-3, 4 FOR ALTERNATE DESIGN.
8. 3" DIAMETER WEEP HOLE WITH 12"X12" PLASTIC HARDWARE CLOTH ¼" MESH OR GALVANIZED STEEL WIRE, MINIMUM WIRE DIAMETER 0.03", NUMBER 4 MESH HARDWARE CLOTH ANCHORED FIRMLY TO THE OUTSIDE OF THE STRUCTURE.
9. CAST IN PLACE CONCRETE IS TO BE CLASS A3 (3000 PSI). PRECAST CONCRETE IS TO BE 4000 PSI.
10. ANY ALTERNATE METHODS OF ANCHORAGE MEETING THE APPROVAL OF THE ENGINEER MAY BE SUBSTITUTED FOR THE CAST IRON LUGS AS SHOWN HEREON.
11. DUMP NO WASTE DRAINS TO WATERWAY LETTERING IS REQUIRED ON ALL DI-1 GRATES. LOCATION OF LETTERING MAY VARY BY MANUFACTURER.

VDOT ROAD AND BRIDGE STANDARDS | SHEET 1 OF 1 | REVISION DATE | 104.01

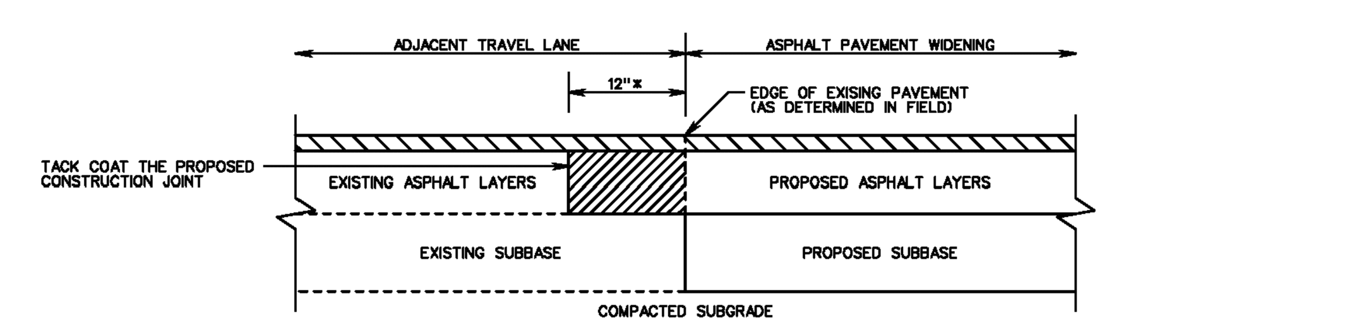
STANDARD DROP INLET

12" - 24" PIPE: MAXIMUM DEPTH (H) = 10'

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE 233 302

WP-2



CONSTRUCTION JOINT DETAIL

- REMOVE EXISTING ASPHALT LAYERS TO EXISTING SUBBASE AND REPLACE WITH PROPOSED ASPHALT WIDENING LAYERS
- PROPOSED MINIMUM 1½ INCH THICK ASPHALT SURFACE COURSE (SEE NOTE 5)
- x MINIMUM 12 INCHES, OR GREATER AS NECESSARY TO ABUT THE FULL THICKNESS OF EXISTING ASPHALT LAYERS AS DETERMINED BY CORES (SEE NOTE 3)

NOTES:

1. ASPHALT PAVEMENT WIDENING SHALL HAVE A PAVEMENT DESIGN IN ACCORDANCE WITH CURRENT VDOT PROCEDURES AND BE APPROVED BY THE ENGINEER.
2. THE PAVEMENT DESIGN FOR ASPHALT PAVEMENT WIDENING SHALL MEET OR EXCEED THE DEPTHS AND TYPES OF THE LAYERS OF EXISTING PAVEMENT. SUBSURFACE DRAINAGE OF THE EXISTING AND PROPOSED PAVEMENT SHALL BE ADDRESSED IN THE PAVEMENT DESIGN.
3. A MINIMUM OF THREE CORES SHALL BE TAKEN ALONG THE CENTER OF THE ADJACENT TRAVEL LANE TO DETERMINE THE TYPE AND THICKNESS OF EXISTING PAVEMENT LAYERS. THESE CORES SHALL BE SPACED NO MORE THAN 500 FEET APART.
4. THE ADJACENT TRAVEL LANE SHALL BE MILLED A MINIMUM DEPTH OF 1½ INCHES AND REPLACED WITH AN ASPHALT SURFACE COURSE TO MATCH THE PROPOSED PAVEMENT WIDENING SURFACE COURSE, UNLESS WAIVED BY THE ENGINEER.
5. THE ENGINEER MAY REQUIRE THE MILLING DEPTH OF THE EXISTING PAVEMENT TO BE ADJUSTED TO ACHIEVE AN ACCEPTABLE PAVEMENT CROSS-SLOPE AND EFFECTIVE SURFACE DRAINAGE.
6. EXISTING PAVEMENT MARKINGS AND MARKERS WITHIN THE PROJECT LIMITS SHALL BE RESTORED SUBJECT TO THE APPROVAL OF THE ENGINEER.
7. FINAL TRANSVERSE PAVEMENT TIE-IN SHALL CONFORM TO THE REQUIREMENTS OF SECTION 315.05(c) OF THE SPECIFICATIONS EXCEPT THAT ALL JOINTS AT TIE-IN LOCATIONS SHALL BE TESTED USING A 10 FOOT STRAIGHTEDGE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 315.07(a) OF THE SPECIFICATIONS.

VDOT ROAD AND BRIDGE STANDARDS | SHEET 1 OF 1 | REVISION DATE | 303.02

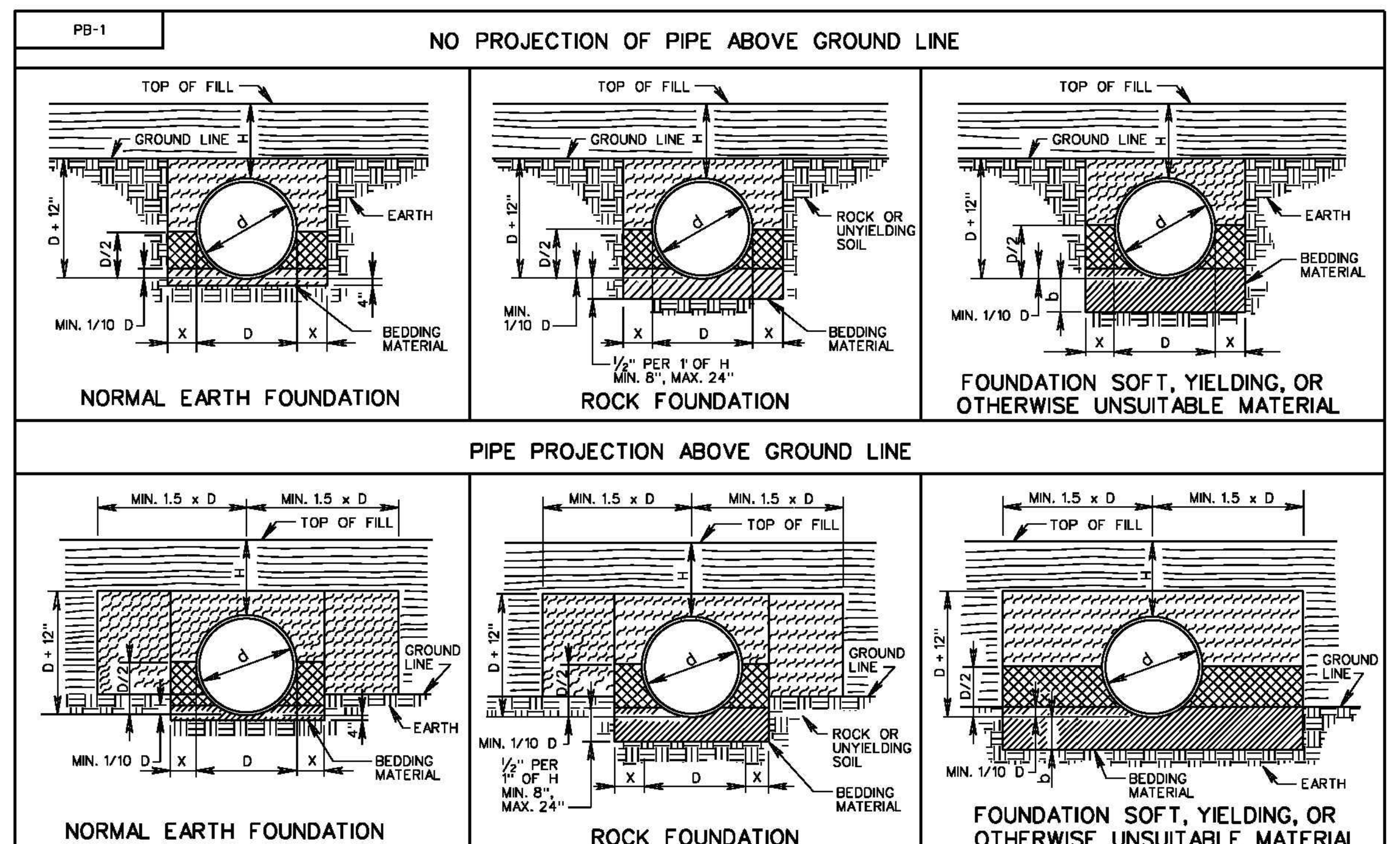
ASPHALT PAVEMENT WIDENING

FOR WIDENING SUBJECT TO TRAFFIC

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE 315

PB-1



- BEDDING MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.
- CLASS I BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.
- FOR PLASTIC PIPE CLASS I BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.
- FOR ALL OTHER PIPE REGULAR BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.
- EMBANKMENT

NOTES:

FOR GENERAL NOTES ON PIPE BEDDING, SEE INSTALLATION OF PIPE CULVERTS AND STORM SEWERS GENERAL NOTES ON SHEET 107.00.

CRUSHED GLASS CONFORMING TO THE SIZE REQUIREMENTS FOR CRUSHER RUN AGGREGATE SIZE 25 AND 26 MAY BE USED IN PLACE OF CLASS I BACKFILL.

VDOT ROAD AND BRIDGE STANDARDS | SHEET 1 OF 4 | REVISION DATE 7/11 | 107.01

INSTALL. OF PIPE CULVERTS AND STORM SEWERS CIRC. PIPE BEDDING AND BACKFILL - METHOD "A"

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE 302 303

MH-1

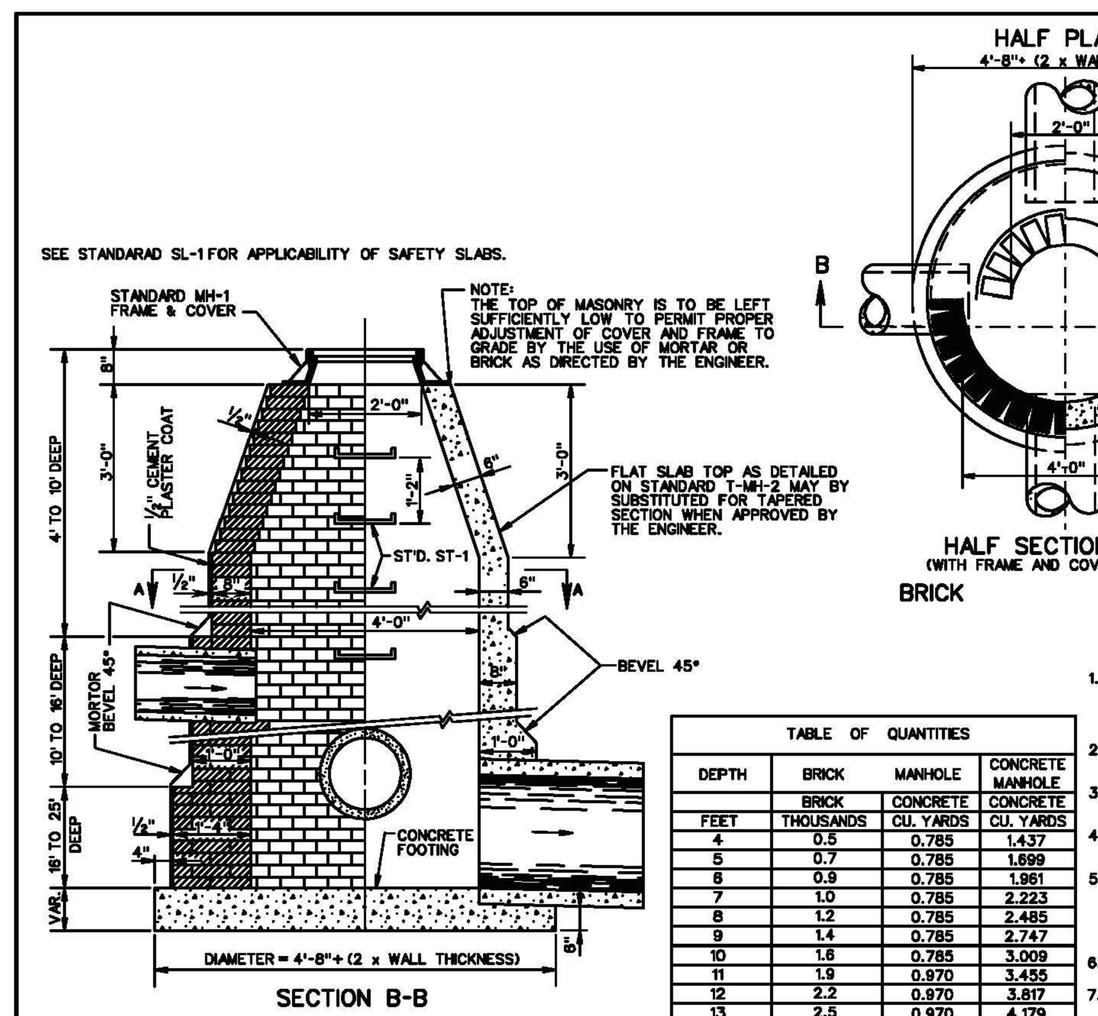


TABLE OF QUANTITIES

DEPTH	BRICK	MANHOLE	CONCRETE MANHOLE
	BRICK	CONCRETE	CONCRETE
FEET	THOUSANDS	CU. YARDS	CU. YARDS
4	0.5	0.785	1.437
5	0.7	0.785	1.699
6	0.9	0.785	1.961
7	1.0	0.785	2.223
8	1.2	0.785	2.485
9	1.4	0.785	2.747
10	1.6	0.785	3.009
11	1.9	0.970	3.455
12	2.2	0.970	3.817
13	2.5	0.970	4.179
14	2.8	0.970	4.541
15	3.1	0.970	4.903
16	3.4	0.970	5.265
17	4.0	1.173	6.032
INCREMENT	0.45	-	0.582

NOTES:

1. QUANTITIES SHOWN ARE FOR MANHOLE WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES.
2. A BASE THICKNESS OF 9" WAS USED IN COMPUTING CONCRETE QUANTITIES.
3. INCREMENTS TO BE ADDED FOR EACH ADDITIONAL FOOT OF DEPTH.
4. MATERIALS MAY BE BRICK, CONCRETE OR APPROVED CONCRETE MANHOLE BLOCK.
5. IF BLOCKS ARE USED THE MINIMUM THICKNESS OF SAME IS TO BE 5". OTHER THICKNESSES ARE TO CONFORM TO WALL THICKNESS SHOWN FOR CONCRETE.
6. ALL CONCRETE TO BE CLASS A3.
7. WHEN SPECIFIED ON PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD IS-1. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.

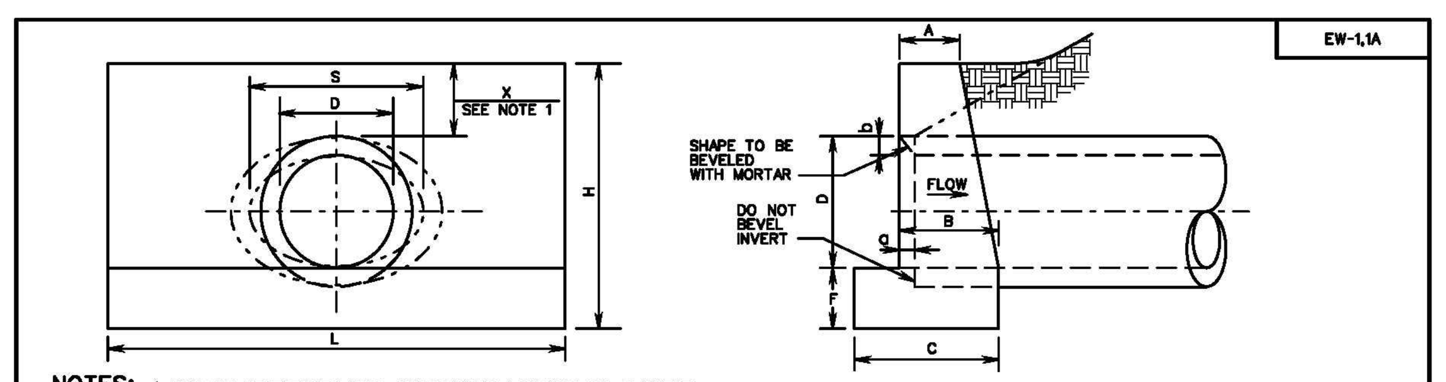
SPECIFICATION REFERENCE 302

MANHOLE FOR 12" - 48" PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS | REVISION DATE | SHEET 1 OF 5 | 106.01

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

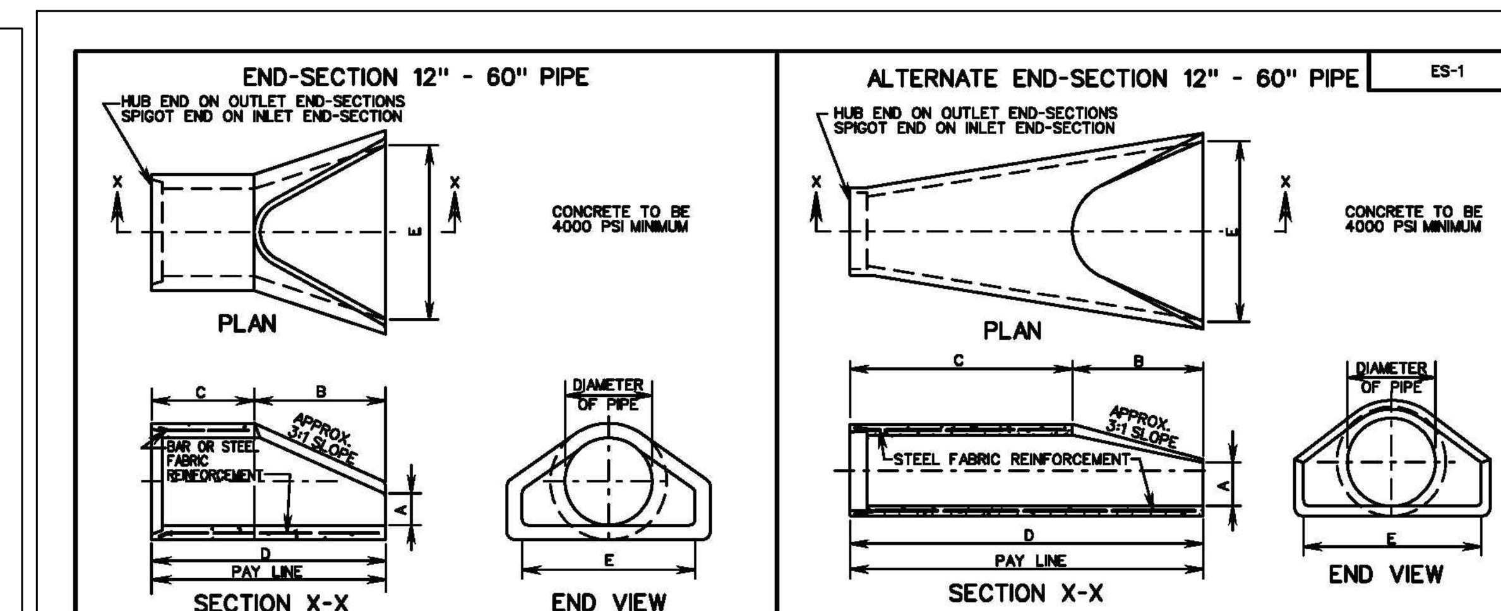
STANDARD ENDWALL FOR PIPE CULVERTS

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

ES-1

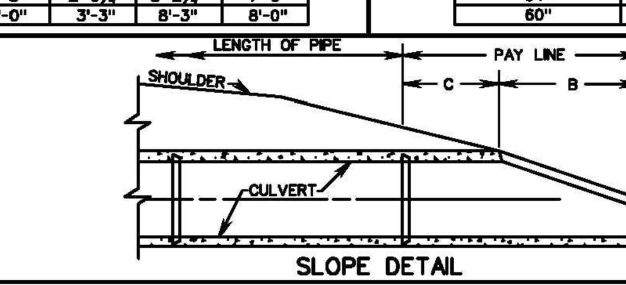


END SECTION DIMENSIONS

PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	2'-0"	4'-0"	2'-0"
15"	6"	2'-3"	1'-9"	4'-0"	2'-6"
18"	9"	2'-3"	1'-9"	4'-0"	3'-0"
21"	9¼"	2'-11"	2'-1"	5'-0"	3'-6"
24"	9½"	3'-7"	2'-6"	6'-1"	4'-0"
27"	10¾"	4'-0"	2'-1"	6'-1"	4'-6"
30"	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"
33"	1'-1½"	4'-10½"	2'-3¼"	7'-1¾"	5'-6"
36"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"
60"	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"

END SECTION DIMENSIONS (ALTERNATE)

PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	4'-1"	6'-1"	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
21"	9"	2'-11"	3'-2"	6'-1"	3'-6"
24"	10"	3'-7"	2'-8"	6'-3"	4'-0"
27"	10½"	4'-0"	2'-1½"	6'-1½"	4'-6"
30"	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"
33"	1'-1½"	4'-10½"	3'-3¼"	8'-1¾"	5'-6"
36"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-11"	8'-4"	7'-6"
60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"



SLOPE DETAIL

NOTES:

PIPE LENGTHS SHOWN ON PLANS ARE BASED ON END-SECTION DESIGN SHOWN ON THE LEFT. IF THE CONTRACTOR ELECTS TO USE THE ALTERNATE DESIGN SHOWN ON THE RIGHT, LENGTHS WILL BE REDUCED BY THE DIFFERENCE IN DIMENSION "D".

SPECIFICATION REFERENCE 302

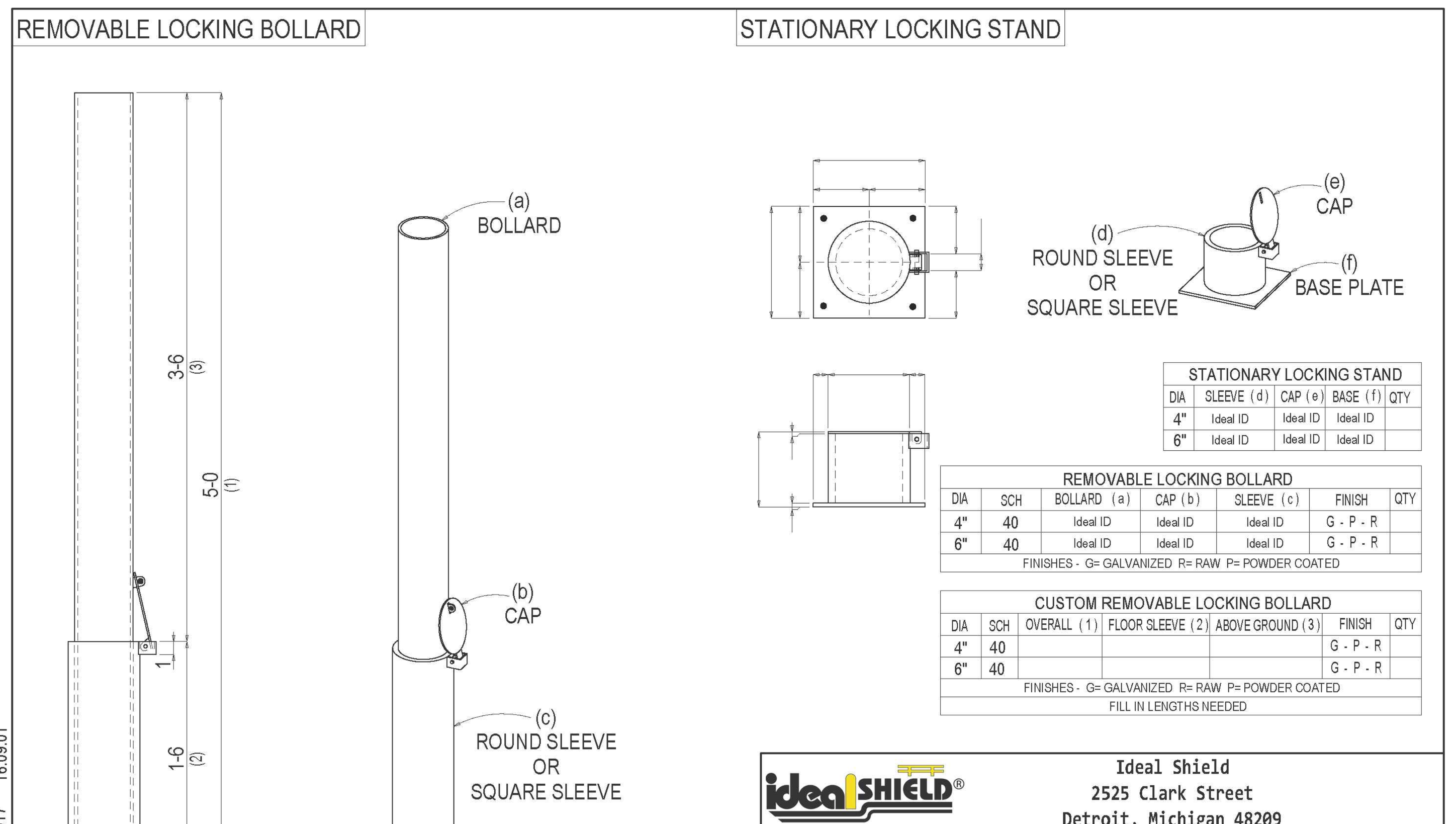
FLARED END SECTION

12" - 60" CONCRETE PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS | REVISION DATE | SHEET 1 OF 1 | 102.01

REMOVABLE LOCKING BOLLARD / STATIONARY LOCKING STAND



STATIONARY LOCKING STAND

DIA	SLEEVE (d)	CAP (e)	BASE (f)	QTY
4"	Ideal ID	Ideal ID	Ideal ID	
6"	Ideal ID	Ideal ID	Ideal ID	

REMOVABLE LOCKING BOLLARD

DIA	SCH	BOLLARD (a)	CAP (b)	SLEEVE (c)	FINISH	QTY
4"	40	Ideal ID	Ideal ID	Ideal ID	G - P - R	
6"	40	Ideal ID	Ideal ID	Ideal ID	G - P - R	

FINISHES - G= GALVANIZED R= RAW P= POWDER COATED

CUSTOM REMOVABLE LOCKING BOLLARD

DIA	SCH	OVERALL (1)	FLOOR SLEEVE (2)	ABOVE GROUND (3)	FINISH	QTY
4"	40				G - P - R	
6"	40				G - P - R	

FINISHES - G= GALVANIZED R= RAW P= POWDER COATED

FILL IN LENGTHS NEEDED

Ideal Shield
2525 Clark Street
Detroit, Michigan 48209

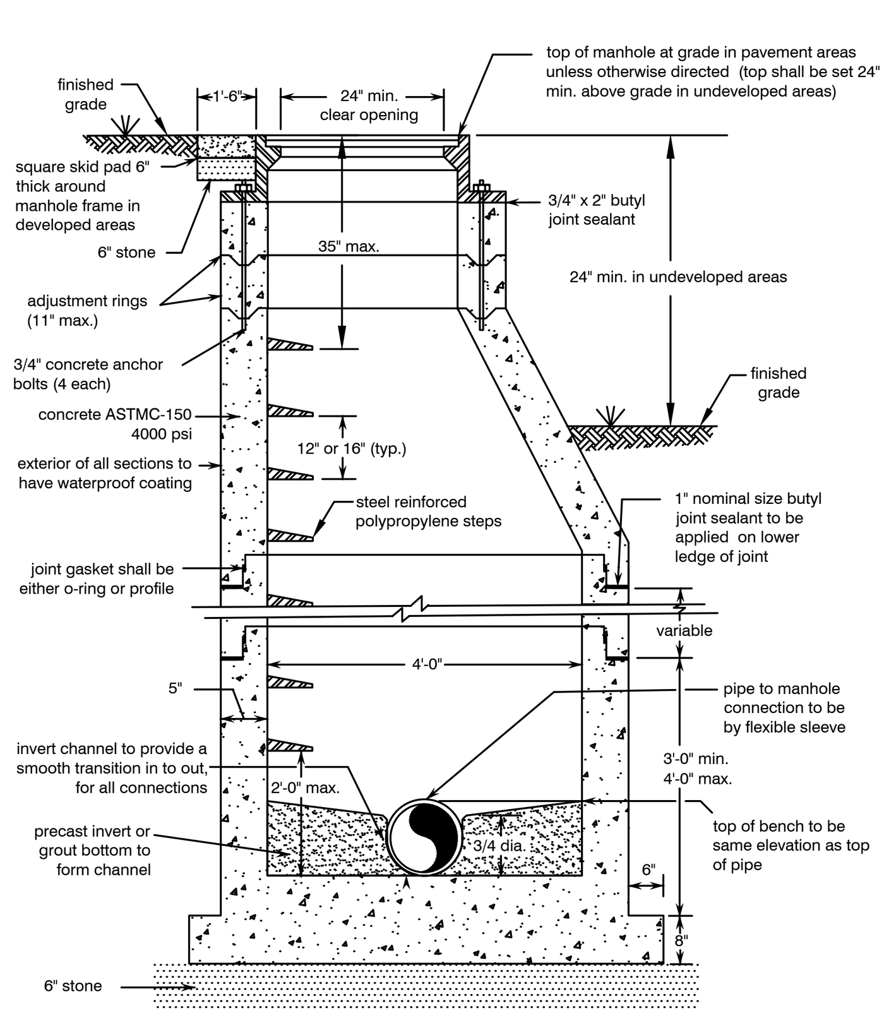
REMOVABLE LOCKING BOLLARD SPECIFICATION SHEET

CONTACT US FOR A QUOTE TODAY
1-866-825-8659 WWW.IDEALSHIELD.COM

RECOMMENDED USE:
CORE DRILLED IN CONCRETE

BOLLARD NOTE:
USE IDEAL SHIELD OR APPROVED EQUIVALENT.

STANDARD MANHOLE

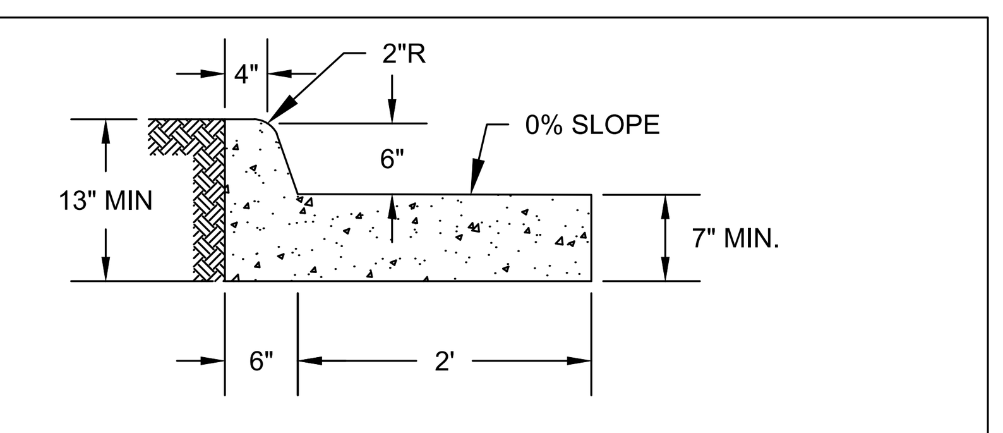


NOTES :
1. Manhole sections shall have an external coating of approved polymer film water proofing prior to installation.
2. If adjustment elevation exceeds two inches use concrete adjustment rings with a exterior coating of water proofing.
3. Final slope adjustment of manhole frame shall be by shims and non-shrink grout.
4. Skid pad to be placed around manholes located in shoulders of roads.
5. Flat top shall be used if height from invert out to rim is four feet or less. Frame to be 4" in height.
6. There shall be a 0.20 foot drop in elevation through the manhole.

STANDARD MANHOLE

-15-

FEB 09

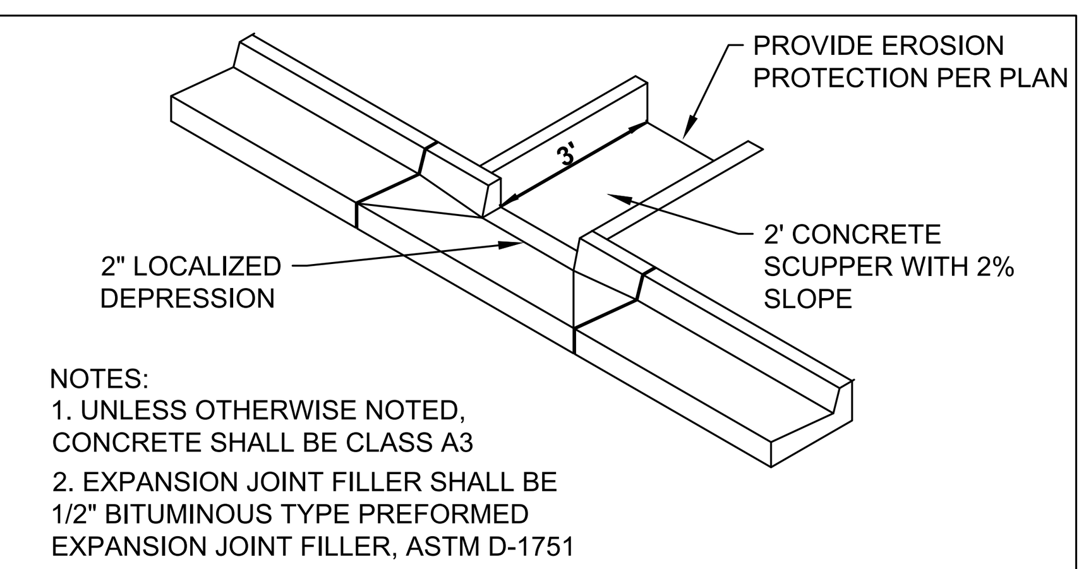


NOTES:
1. CURB SHALL MEET CURRENT SPECIFICATIONS OF VDOT STANDARD CG-6
2. LONGITUDINAL SLOPE OF GUTTER SHALL MATCH SLOPE OF PAVEMENT
3. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST

CG-6F - 6" FLAT CURB & GUTTER

N.T.S.

10/29/14 VER 1

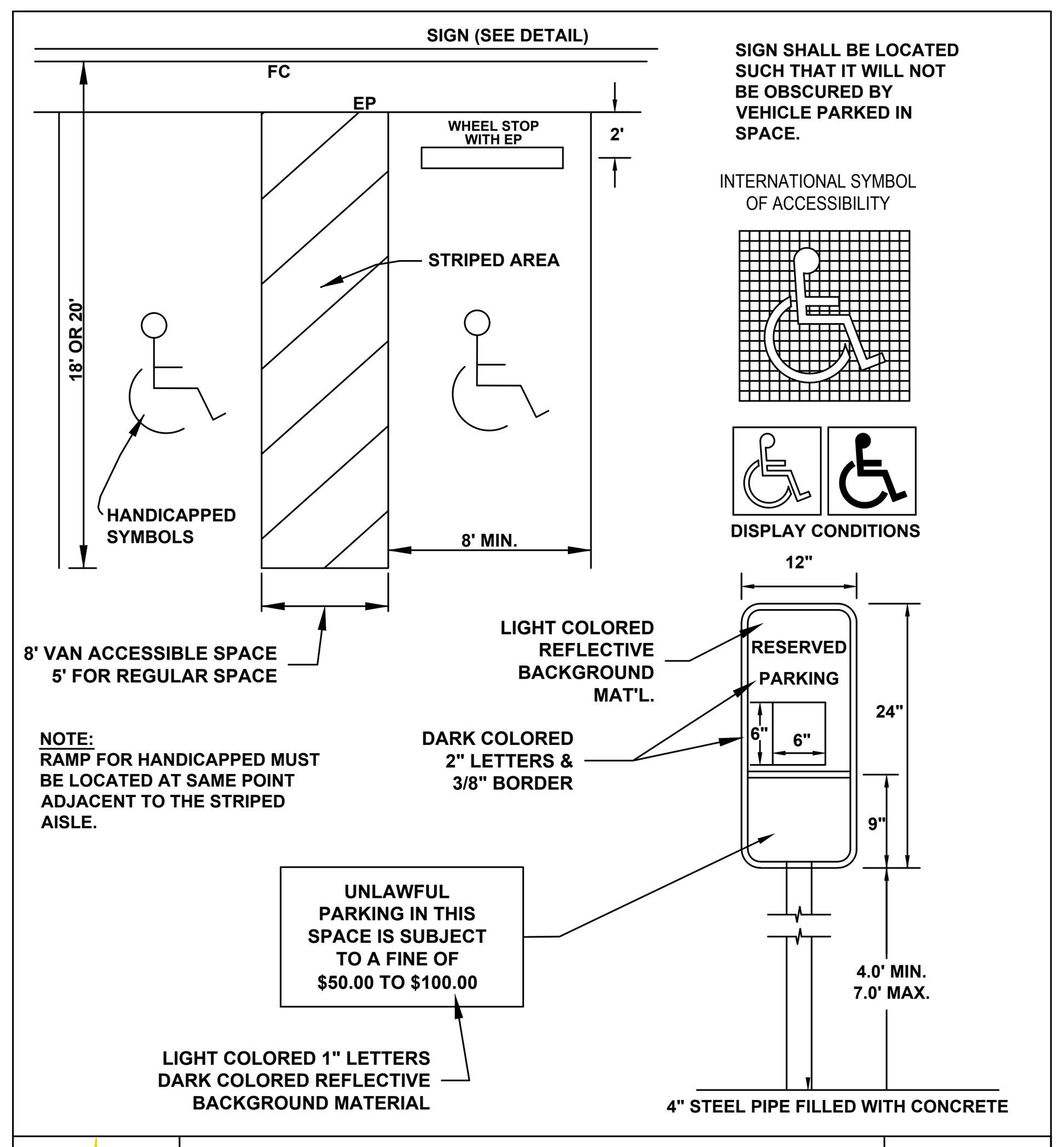


NOTES:
1. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS A3
2. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751

CONCRETE SCUPPER

N.T.S.

04/15 VER 1



HANDICAPPED PARKING

N.T.S.

04/15 VER 1

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151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 662-4185
Fax: (540) 722-9528
www.greenwayeng.com

GREENWAY ENGINEERING — FND 1971

SITE DETAILS

FREDERICK HEIGHTS PARK TRAIL & PARKING LOT

RED BUD MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

Rev. No.	Date
1	12/28/2017

COMMONWEALTH OF VIRGINIA — RANDY L. KEPLER Lic. No. 32809 — PROFESSIONAL ENGINEER

DATE: 10/17/2017

SCALE: N/A

DESIGNED BY: JMM

FILE NO. 0142F

SHEET 11 OF 11

17-25

Square Pedestal Picnic Table with Sun Shelter

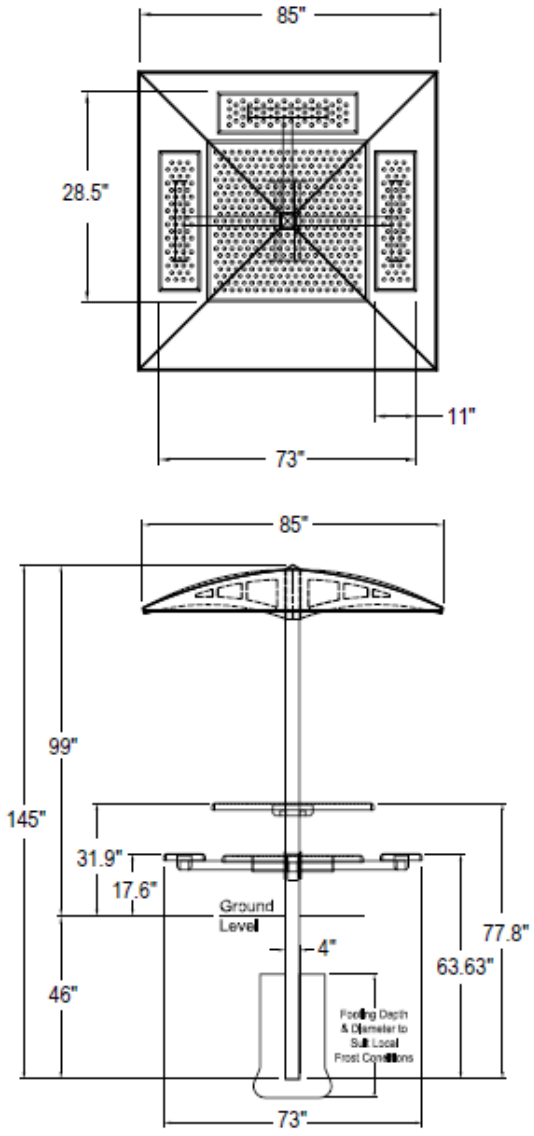
Specifications:

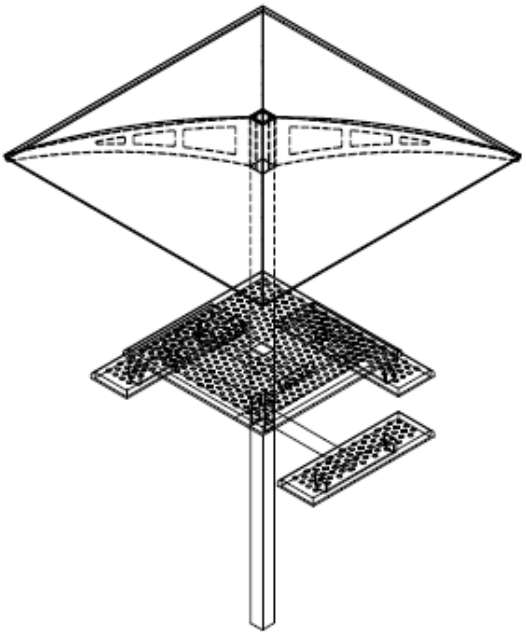
- Single Pedestal
- Minimum Dimensions Shown Below
- Minimum 13 Gauge Steel
- Gloss polyester powder-coat finish
- 3 tables total, 1 must be handicap accessible (HC Accessible)

PICNIC TABLE AREA PAVING REQURIEMENTS

- Picnic table area should be 14’ x’ 14’ as per plan
- Slope of paved area should be 1.5% per plan, and under no circumstance greater than 2%
- Paved walkway to table should be a minimum of 36” wide and 84” long. Table should be a minimum of 10’ from main trail edge.
- Paved area around picnic table should be no less than 36” from any protrusion of the table or benches
- HC Accessible Table should be oriented so that the HC Accessible space is closest to the trail

SQUARE SHADED ADA PICNIC TABLE | PERFORATED STEEL





SQUARE SHADED PICNIC TABLE | PERFORATED STEEL