

## SITE DATA

### OWNER/DEVELOPER

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CONTACT: GEORGE HAMBLETON

### ENGINEER

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### WETLANDS CONSULTANT

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## SHEET INDEX

1. TITLE SHEET
2. OVERALL PLAN
3. STORMWATER MANAGEMENT PLAN BMP#1
4. STORMWATER MANAGEMENT PLAN BMP#1
5. NOTES & DETAILS
6. NOTES & DETAILS

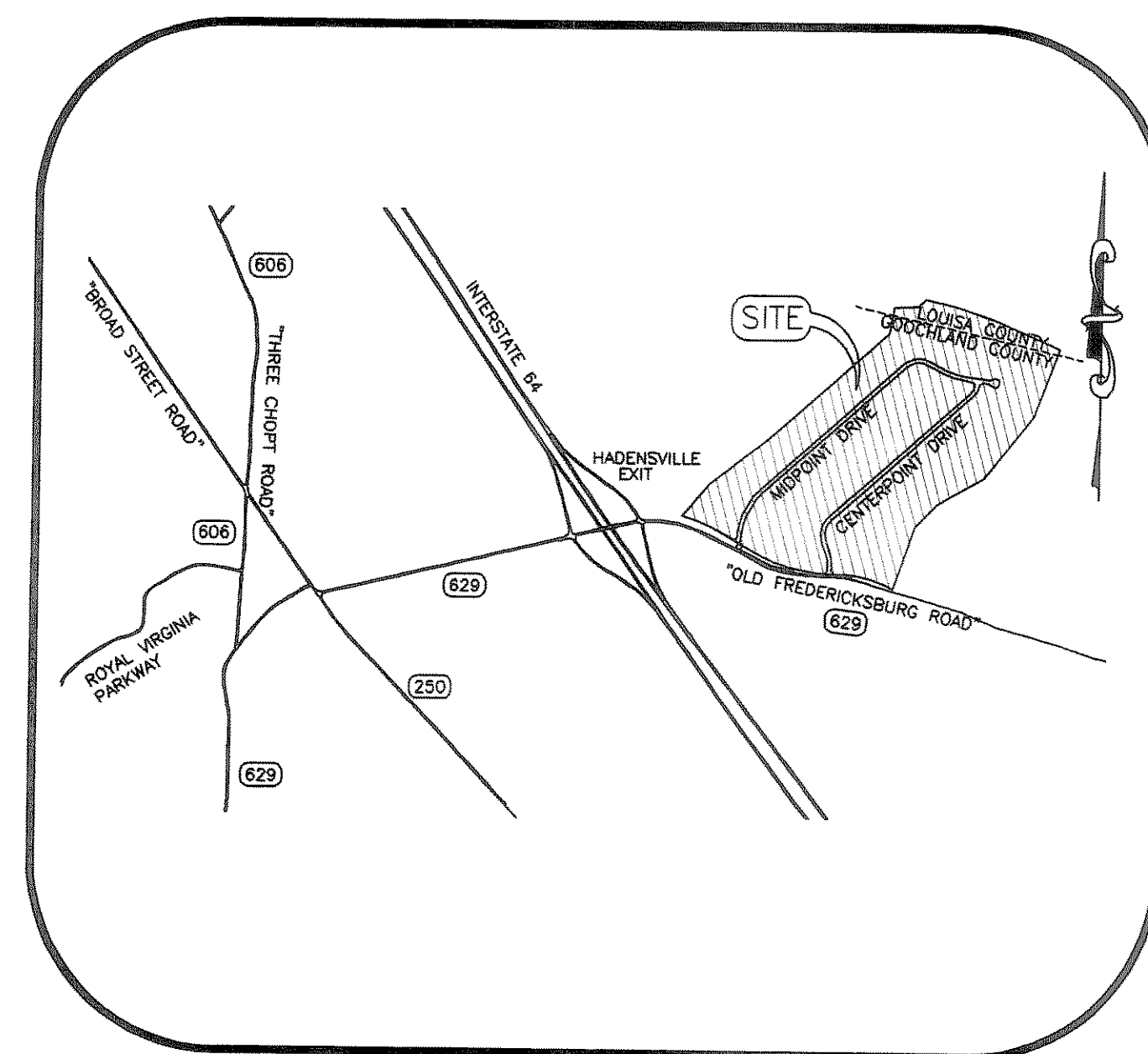
## NOTES:

1. THIS PROJECT WAS PREVIOUSLY PERMITTED UNDER VPDES CGP (VAR10) PERMIT NUMBER VAR104426 AND IS SUBJECT TO THE PART IIC TECHNICAL CRITERIA.
2. ALL AFFECTED STREETS WILL BE CLEANED FREE OF DEBRIS AND SILT AT THE END OF EACH DAY.

# MIDPOINT INDUSTRIAL PARK

## LAND DISTURBANCE & STORMWATER MANAGEMENT PLAN

BYRD DISTRICT  
GOOCHLAND COUNTY, VIRGINIA



VICINITY MAP  
SCALE: 1" = 2000'

## LEGEND

- EROSION CONTROL -		- STORM SEWER -	
	INLET PROTECTION		EXIST. STORM SEWER
	SILT FENCE		PROP. STORM SEWER
	RIP-RAP		EXIST. DROP INLET
	SEDIMENT TRAP		PROP. DROP INLET
	CONSTRUCTION ENTRANCE		INLET NUMBER
			EXIST. TOPO
			PROP. TOPO (GRADING)
			CENTERLINE OF CREEK

ORIGINAL SUBMITTAL DATE:

APRIL 15, 2009

REVISION DATES:

JULY 22, 2009  
OCTOBER 21, 2009  
MAY 10, 2012  
APRIL 21, 2015  
JUNE 8, 2015  
NOV. 5, 2015  
MARCH 23, 2016

Approved by  
L.D.P.  
Department of  
Community Development

Date  
Approval expires one year after date signed

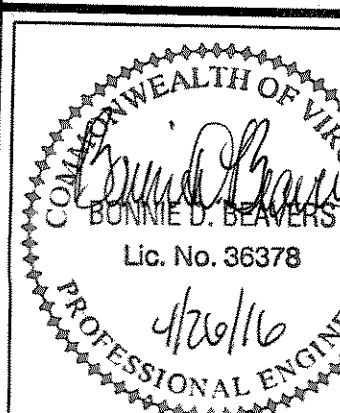
## SITE STATISTICS

ZONING M-1 & M-2  
ZONING CASES R99-07 AND R99-08  
PROPOSED USE INDUSTRIAL PARK  
TAX MAP # (SEE CHART BELOW)  
TOTAL AREA 197.75 AC.  
GPIN # (SEE CHART BELOW)

### MIDPOINT INDUSTRIAL PARK LOT INFORMATION

LOT #	LOT OWNER	GPIN #	TAX MAP #	ZONING
1	ANDREWS JOSEPH JR & PHOEBE C	6833-31-9604	6-13-0-1-0	M-1
2	MID POINT INDUSTRIAL PARK LLC	6833-41-0948	6-13-0-2-0	M-1
3	MID POINT INDUSTRIAL PARK LLC	6833-42-3204	6-13-0-3-0	M-2
4	HALEY & HARRELL LLC	6833-42-5570	6-13-0-4-0	M-2
5	D M LEASING LLC	6833-42-8715	6-13-0-5-0	M-2
6	ANDREWS JOSEPH JR & PHOEBE C	6833-52-0917	6-13-0-6-0	M-2
7	MID POINT INDUSTRIAL PARK LLC	6833-53-2231	6-13-0-7-0	M-2
ACCESS AREA	GORDON & GORDON LLC	6833-53-3397	6-13-0-8-0	M-2
8	MID POINT INDUSTRIAL PARK LLC	6833-53-5532	6-13-0-9-0	M-2
9	MID POINT INDUSTRIAL PARK LLC	6833-53-7745	6-13-0-10-0	M-2
10	MID POINT INDUSTRIAL PARK LLC	6833-54-9073	6-13-0-11-0	M-2
11	MID POINT INDUSTRIAL PARK LLC	6833-64-3091	6-13-0-12-0	M-2
12	MID POINT INDUSTRIAL PARK LLC	6833-63-8943	6-13-0-13-0	M-2
13	B & G VENTURES LLC	6833-73-3916	6-13-0-14-0	M-2
14	MID POINT INDUSTRIAL PARK LLC	6833-73-7758	6-13-0-15-0	M-2
15	MID POINT INDUSTRIAL PARK LLC	6833-73-3304	6-13-0-16-0	M-2
16	Goochland County	6833-73-0067	6-13-0-17-0	M-2
17	Goochland County	6833-62-8882	6-13-0-18-0	M-2
18	MID POINT INDUSTRIAL PARK LLC	6833-62-6680	6-13-0-19-0	M-2
19	MID POINT INDUSTRIAL PARK LLC	6833-62-3398	6-13-0-20-0	M-2
20	MID POINT INDUSTRIAL PARK LLC	6833-62-1151	6-13-0-21-0	M-2
21	MID POINT INDUSTRIAL PARK LLC	6833-51-9930	6-13-0-22-0	M-1
22	MID POINT INDUSTRIAL PARK LLC	6833-61-0972	6-13-0-23-0	M-1
23	MID POINT INDUSTRIAL PARK LLC	6833-51-7325	6-13-0-24-0	M-2
24	MID POINT INDUSTRIAL PARK LLC	6833-51-5625	6-13-0-25-0	M-1
25	MID POINT INDUSTRIAL PARK LLC	6833-51-1228	6-13-0-26-0	M-1
26	AEI HOLDINGS LLC	6833-51-0548	6-13-0-27-0	M-2
27	Goochland County	6833-51-0813	6-13-0-28-0	M-2
28	Goochland County	6833-52-2045	6-13-0-29-0	M-2
29	Goochland County	6833-52-4246	6-13-0-30-0	M-2
30	Goochland County	6833-52-6458	6-13-0-31-0	M-2
31	MID POINT INDUSTRIAL PARK LLC	6833-52-8750	6-13-0-32-0	M-2
32	MID POINT INDUSTRIAL PARK LLC	6833-62-0839	6-13-0-33-0	M-2
33	MID POINT INDUSTRIAL PARK LLC	6833-63-2007	6-13-0-34-0	M-2
34	MIDDLESEX BOTTLED GAS INC	6833-63-4208	6-13-0-35-0	M-2
35	Gordon & Gordon LLC	6833-63-6540	6-13-0-36-0	M-2
36	MID POINT INDUSTRIAL PARK LLC	6833-63-1587	6-13-0-37-0	M-2
37	CURTIS W TODD JR & SHERRI L	6833-53-9332	6-13-0-38-0	M-2
38	HAMBLETON PROPERTIES LLC	6833-53-7164	6-13-0-39-0	M-2
39	HAMBLETON PROPERTIES LLC	6833-52-5984	6-13-0-40-0	M-2
40	HAMBLETON PROPERTIES LLC	6833-52-3772	6-13-0-41-0	M-2
41	NORTHSTAR DEVELOPMENTS INC	6833-52-1445	6-13-0-42-0	M-2
41B	NORTHSTAR DEVELOPMENTS INC	6833-42-8175	6-13-0-43-0	M-2
41A2	NORTHSTAR DEVELOPMENTS INC	6833-42-8216	6-13-0-44-0	M-2
41A3	APT PROPERTIES LLC	6833-42-8262	6-13-0-45-0	M-2
43	MID POINT INDUSTRIAL PARK LLC	6833-42-7014	6-13-0-46-0	M-2
44	Goochland County	6833-41-4553	6-13-0-47-0	M-1
EX. POND LOT	Gordon & Gordon LLC	6833-41-7391	6-13-0-48-0	M-1

YOUNGBLOOD, TYLER and ASSOCIATES, P.C.  
CONSULTING ENGINEERS, PLANNERS & SURVEYORS



J.N. 309-01-100

SHEET 1 OF 6

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APR 2012-00005



# EROSION CONTROL NARRATIVE

THE PURPOSE OF THIS PLAN IS TO INSTALL A STORMWATER MANAGEMENT BASIN TO MEET WATER QUALITY AND QUANTITY REQUIREMENTS FOR MIDPOINT INDUSTRIAL PARK. FOR LOTS NOT TREATED BY THE BMP PROPOSED ON THIS PLAN, STORMWATER MANAGEMENT WILL BE ADDRESSED AT THE TIME OF LOT DEVELOPMENT. 2.2 ACRES OF LAND DISTURBANCE IS NECESSARY TO INSTALL THE BMP PROPOSED WITH THIS PLAN.

THE EXISTING MIDPOINT INDUSTRIAL PARK IS A 44-LOT INDUSTRIAL DEVELOPMENT IN GOOCHLAND COUNTY. THE LOTS ARE ALL LARGER THAN TWO ACRES IN AREA AND AVERAGE JUST OVER FOUR ACRES. ALTHOUGH THE LOTS HAVE BEEN CREATED AND THE INFRASTRUCTURE TO SERVE THEM CONSTRUCTED, MOST OF THE INDIVIDUAL LOTS HAVE NOT YET BEEN DEVELOPED AND ARE CURRENTLY VACANT. GENERALLY, THE SITE DRAINS TO A CREEK ALONG THE NORTHERN EDGE OF THE PROJECT. THERE IS A DRAINAGE DRAIN ALONG THE EASTERN SIDE OF THE SITE THAT RUNS IN A NORTHERLY DIRECTION AND JOINS THE CREEK AT THE NORTHEASTERN CORNER OF THE SITE. THE CREEK CONTINUES TO FLOW AWAY FROM THE SITE IN AN EASTERLY DIRECTION. THERE IS A RESIDENTIAL SUBDIVISION TO THE EAST OF THE PARK WHICH SHOULD NOT BE SIGNIFICANTLY AFFECTED BY THIS PLAN DUE TO THE 250' NATURAL BUFFER ADJACENT TO THAT DEVELOPMENT. NO OFF-SITE LAND DISTURBANCE IS ANTICIPATED WITH THIS PROJECT.

THE SOILS MAP AND INFORMATION FOR THIS PROJECT IS SHOWN ON SHEET 6. THE SOILS ARE PREDOMINANTLY FINE SANDY LOAMS WITH MODERATE RUNOFF POTENTIAL. THE NATURAL RESOURCES CONSERVATION SERVICE HAS RATED SOME SOILS ON-SITE AS A POOR SOURCE OF FILL MATERIAL. THE SOILS MAP ON SHEET 6 INDICATES THE LOCATION OF ALL SOILS ON-SITE AND SHOWS THE FILL SOURCE RATING OF EACH. SOILS RATED POOR SHOULD NOT BE USED IN THE CONSTRUCTION OF BMP EMBANKMENTS. THE BMP EMBANKMENTS SHOULD ONLY BE CONSTRUCTED WITH GOOD STRUCTURAL MATERIAL AND COMPACTED IN 8 INCH LIFTS TO 95% COMPACTION. CRITICAL AREAS TO BE MONITORED DURING CONSTRUCTION INCLUDE AREAS OF STEEP SLOPES AND AREAS ADJACENT TO WETLANDS TO REMAIN. EROSION SHALL BE CONTROLLED BY INSTALLING SILT FENCE AND RIP-RAP WHERE SHOWN ON THE PLAN AS WELL AS SEEDING IN ACCORDANCE WITH STATE MINIMUM STANDARDS #1, 3, AND 5 SHOWN ON SHEET 5. IF EROSION OCCURS DESPITE THESE MEASURES, ADDITIONAL MEASURES SHALL BE IMPLEMENTED WHICH MAY INCLUDE WIRE-BACKED SILT FENCE OR SOIL STABILIZATION MATINGS. ONCE CONSTRUCTION OF THE BMP IS COMPLETE, ALL DENUDED AREAS SHALL BE PERMANENTLY SEED. PROPOSED RIP-RAP WILL ALSO PREVENT EROSION IN AREAS OF CONCENTRATED STORMWATER FLOWS. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

THE PROPOSED BMP HAS BEEN DESIGNED TO ADDRESS STORMWATER QUALITY REQUIREMENTS BY REMOVING POLLUTANTS FROM RUNOFF. IT HAS ALSO BEEN DESIGNED TO PREVENT CHANNEL EROSION BY DETAINING STORMWATER SO THAT THE 2-YEAR POST-DEVELOPMENT RELEASE RATE IS LESS THAN THE PRE-DEVELOPMENT 2-YEAR RUNOFF RATE. IT ALSO HAS BEEN DESIGNED TO PREVENT DOWNSTREAM CHANNEL FLOODING BY DETAINING STORMWATER SO THAT THE 10-YEAR POST-DEVELOPMENT RELEASE RATE IS LESS THAN THE PRE-DEVELOPMENT 10-YEAR RUNOFF RATE. CALCULATIONS FOR POLLUTANT REMOVAL AND STORMWATER DETENTION ARE SHOWN ON SHEETS 3 & 4 OF THIS PLAN. ALL TEMPORARY AND PERMANENT EROSION CONTROL MEASURES SHALL BE INSPECTED PERIODICALLY (AT LEAST WEEKLY) AND AFTER EACH RAINFALL EVENT TO ENSURE THEIR INTEGRITY. ANY NECESSARY REPAIRS OR OTHER MEASURES SHALL BE MADE IN A TIMELY MANNER TO PREVENT SEDIMENT DUE TO CONSTRUCTION ACTIVITIES FROM BEING RELEASED FROM THE SITE, INCLUDING ON ROADWAYS. ROADS SHALL BE CLEANED IN ACCORDANCE WITH STATE MINIMUM STANDARD 17 SHOWN ON SHEET 5.

## PHASE 1 SEQUENCE OF CONSTRUCTION

1. THE CONTRACTOR MUST SCHEDULE AN ON-SITE PRECONSTRUCTION MEETING WITH THE GOOCHLAND COUNTY ENVIRONMENTAL INSPECTOR PRIOR TO THE ISSUANCE OF THE LAND DISTURBANCE PERMIT. THE CERTIFIED RESPONSIBLE LAND DISTURBER MUST BE IN ATTENDANCE.
2. CONTACT MISS UTILITIES AT LEAST 48 HOURS BEFORE BEGINNING WORK AND HAVE ALL UNDERGROUND UTILITIES MARKED.
3. FLAG ALL WETLANDS TO REMAIN WITH NON-TEARABLE YELLOW & BLACK BARRICADE TAPE.
4. CLEAR AND GRUB ONLY AS NEEDED TO INSTALL THE SILT FENCE SHOWN ON THIS PLAN. THROUGHOUT THE CONSTRUCTION PROCESS, PROVIDE SEEDING IN ACCORDANCE WITH STATE MINIMUM STANDARDS 1, 3, AND 5.
5. INSTALL SILT FENCE.
6. CONTACT THE ENVIRONMENTAL ENGINEER TO INSPECT ALL EROSION CONTROL MEASURES. THE INSPECTOR MUST APPROVE ALL MEASURES PRIOR TO COMMENCEMENT OF PHASE 2 WORK.

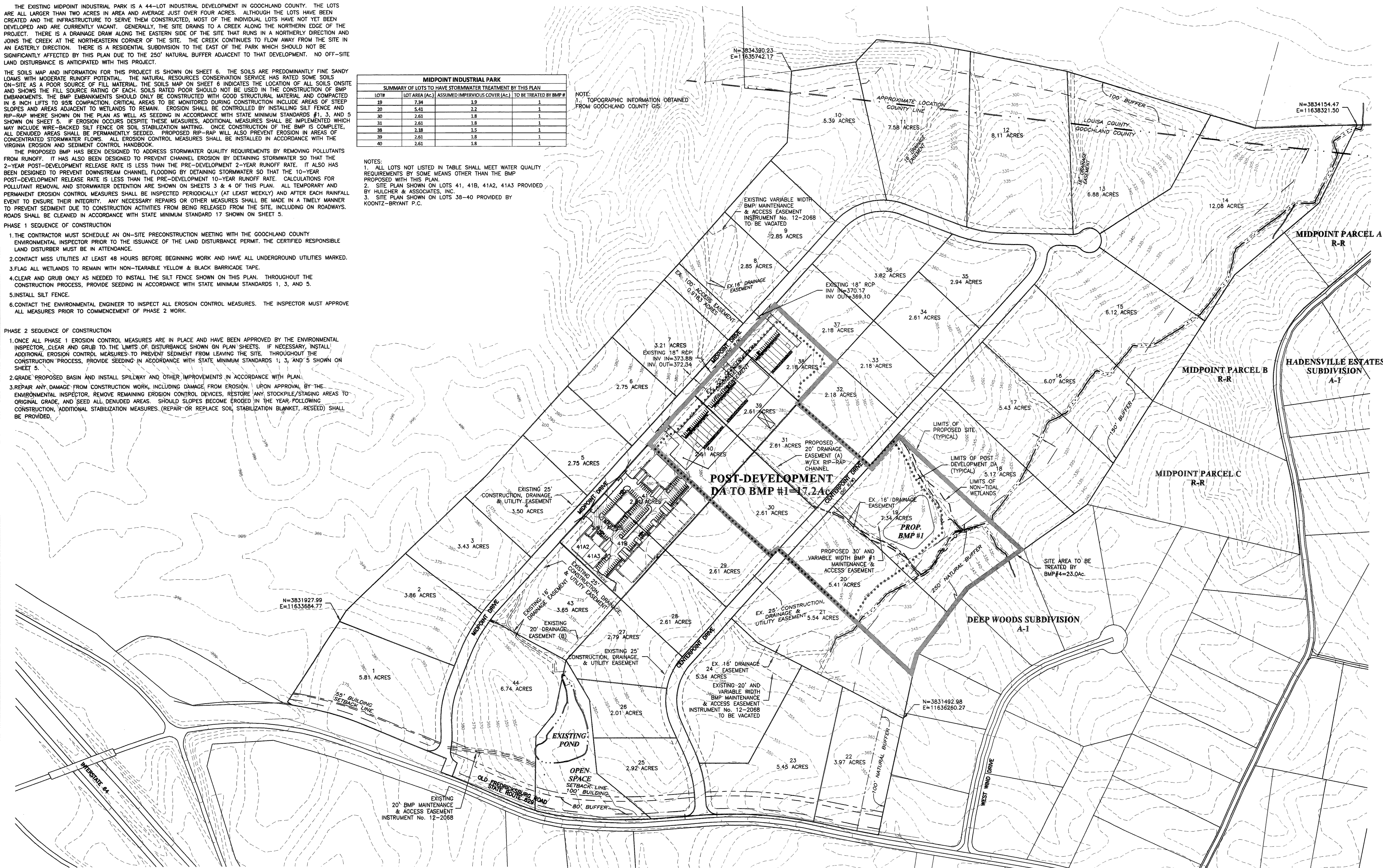
## PHASE 2 SEQUENCE OF CONSTRUCTION

1. ONCE ALL PHASE 1 EROSION CONTROL MEASURES ARE IN PLACE AND HAVE BEEN APPROVED BY THE ENVIRONMENTAL INSPECTOR, CLEAR AND GRUB TO THE LIMITS OF DISTURBANCE SHOWN ON PLAN SHEETS. IF NECESSARY, INSTALL ADDITIONAL EROSION CONTROL MEASURES TO PREVENT SEDIMENT FROM LEAVING THE SITE. THROUGHOUT THE CONSTRUCTION PROCESS, PROVIDE SEEDING IN ACCORDANCE WITH STATE MINIMUM STANDARDS 1, 3, AND 5 SHOWN ON SHEET 5.
2. GRADE PROPOSED BASIN AND INSTALL SPILLWAY AND OTHER IMPROVEMENTS IN ACCORDANCE WITH PLAN.
3. REPAIR ANY DAMAGE FROM CONSTRUCTION WORK, INCLUDING DAMAGE FROM EROSION. UPON APPROVAL BY THE ENVIRONMENTAL INSPECTOR, REMOVE REMAINING EROSION CONTROL DEVICES, RESTORE ANY STOCKPILE/STAGING AREAS TO ORIGINAL GRADE, AND SEED ALL DENUDED AREAS. SHOULD SLOPES BECOME ERODED IN THE YEAR FOLLOWING CONSTRUCTION, ADDITIONAL STABILIZATION MEASURES (REPAIR OR REPLACE SOIL STABILIZATION BLANKET, RESEED) SHALL BE PROVIDED.

MIDPOINT INDUSTRIAL PARK				
SUMMARY OF LOTS TO HAVE STORMWATER TREATMENT BY THIS PLAN				
LOT#	LOT AREA (AC)	ASSUMED IMPERVIOUS COVER (AC)	TO BE TREATED BY BMP #	
19	7.94	1.9	1	
20	5.41	2.2	1	
30	2.61	1.8	1	
31	2.61	1.8	1	
38	2.18	1.5	1	
39	2.61	1.8	1	
40	2.61	1.8	1	

- NOTES:
1. ALL LOTS NOT LISTED IN TABLE SHALL MEET WATER QUALITY REQUIREMENTS BY SOME MEANS OTHER THAN THE BMP PROPOSED WITH THIS PLAN.
  2. SITE PLAN SHOWN ON LOTS 41, 41B, 41A2, 41A3 PROVIDED BY HULCHER & ASSOCIATES, INC.
  3. SITE PLAN SHOWN ON LOTS 38-40 PROVIDED BY KOONTZ-BRYANT P.C.

NOTE:  
1. TOPOGRAPHIC INFORMATION OBTAINED FROM GOOCHLAND COUNTY GIS.



**YOUNGBLOOD, TYLER & ASSOCIATES P.C.**  
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**MIDPOINT INDUSTRIAL PARK**  
BYRD DISTRICT GOOCHLAND COUNTY, VIRGINIA  
CUCKOO DISTRICT LOUISA COUNTY, VIRGINIA

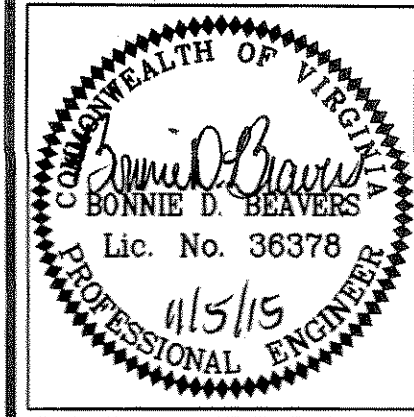
OVERALL  
BMP PLAN

DATE: APRIL 5, 2009

REVISIONS	
DATE	NOTES
JULY 22, 2009	COUNTY COMMENTS
MAY 10, 2012	PROPOSE 1 BMP
APRIL 21, 2015	COUNTY COMMENTS
JUNE 6, 2015	COUNTY COMMENTS

DESIGNED BY: WAB  
DRAWN BY: BDF  
CHECKED BY: WAB

J. N.: 309-01-100  
CAD FILE: Midpoint Ova BMP



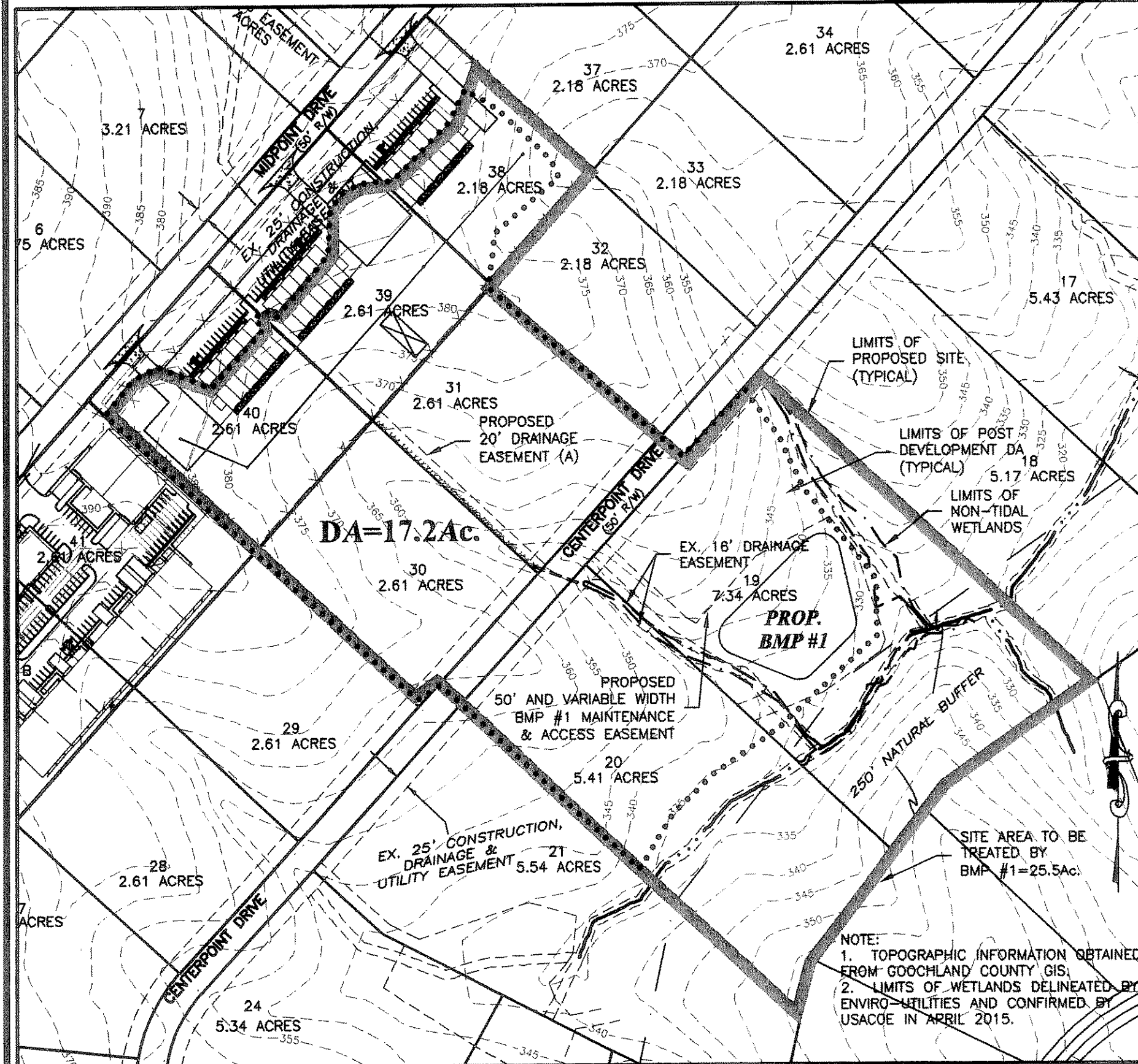
SHEET 2 OF 6



# STORMWATER MANAGEMENT PLAN FOR LOTS 19, 20, 30, 31, AND PART OF LOTS 38, 39, & 40 OF MIDPOINT INDUSTRIAL PARK

## DRAINAGE AREA TO BMP #1

SCALE: 1"=200'



VA DEQ STORMWATER DESIGN SPECIFICATION INTRODUCTION: APPENDIX B: PRINCIPAL SPILLWAY

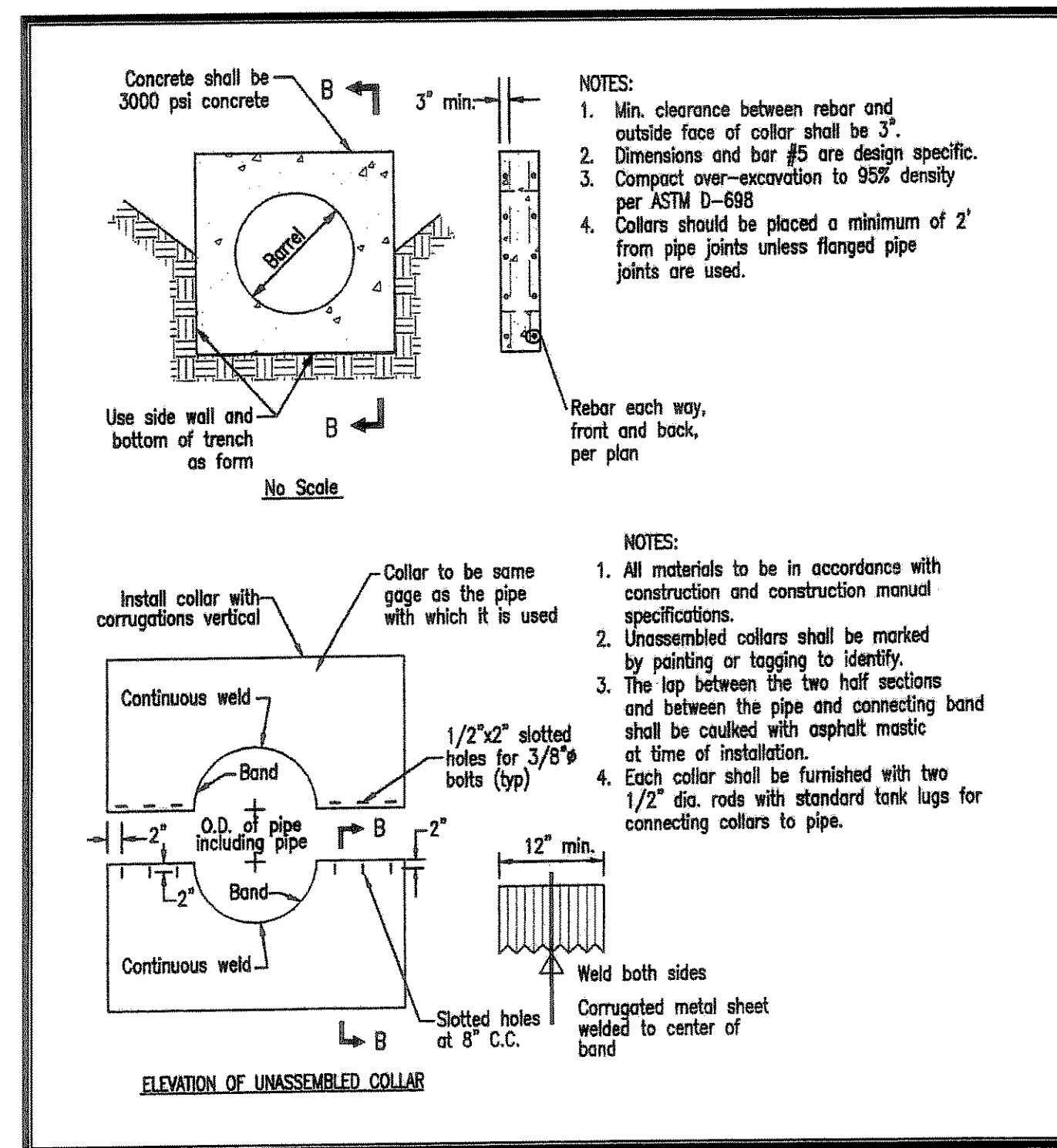
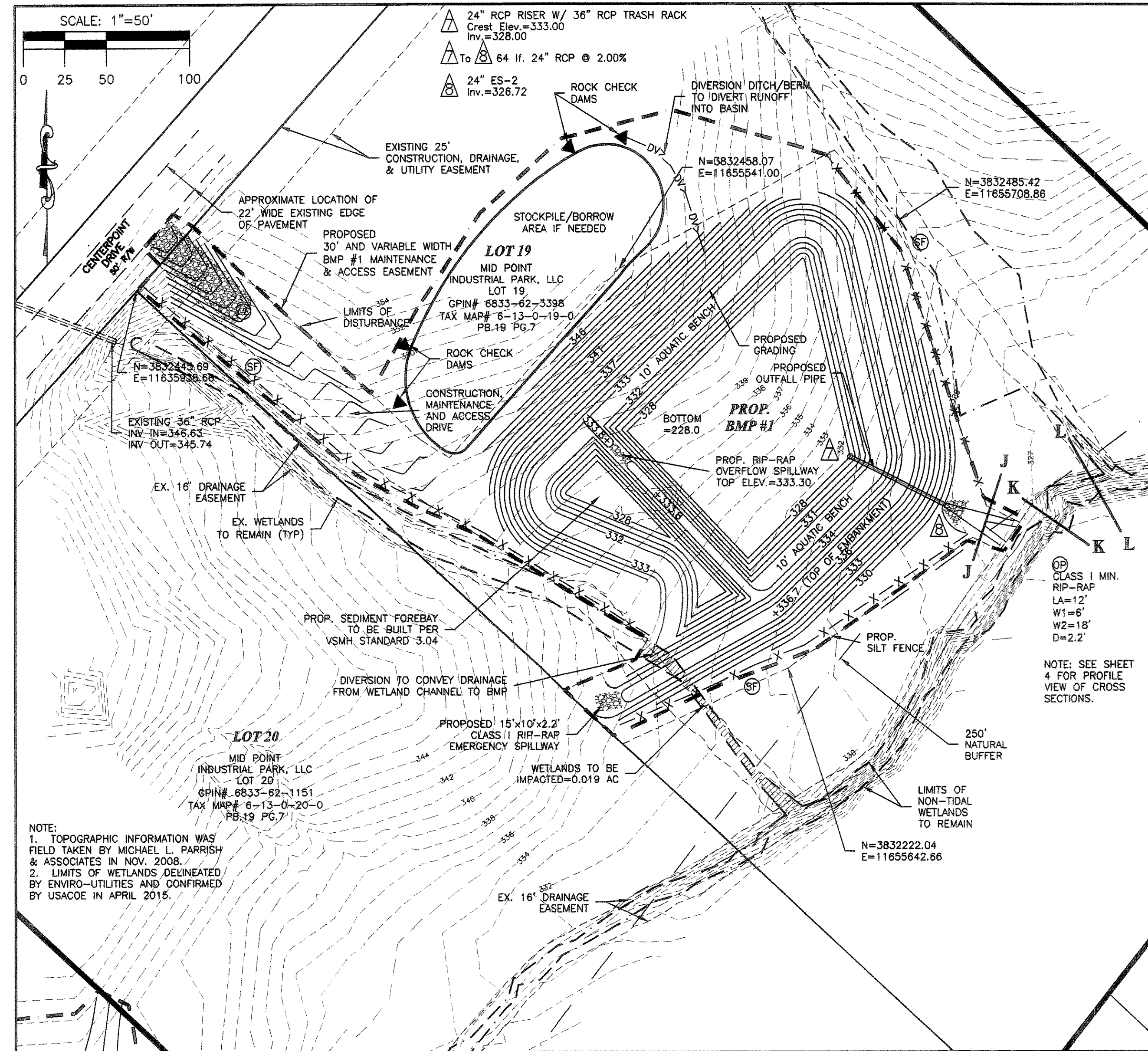


Figure B-2. Concrete Anti-Seep Collar

## BMP #1 DETAIL

SCALE: 1"=50'



NOTE: 1. TOPOGRAPHIC INFORMATION WAS FIELD TAKEN BY MICHAEL L. PARRISH & ASSOCIATES IN NOV. 2008. 2. LIMITS OF WETLANDS Delineated BY ENVIRO-UTILITIES AND CONFIRMED BY USACE IN APRIL 2015.

## EROSION CONTROL QUANTITIES

CONSTRUCTION ENTRANCE	1 EA.
SILT FENCE	790 LF
ROCK CHECK DAM	4 EA.
DIVERSION DITCH	85 LF
LAND DISTURBANCE	36.2cy
LAND DISTURBANCE	2.2 AC.

NOTE: QUANTITIES ARE APPROXIMATE CONTRACTOR TO PERFORM HIS OWN TAKE-OFF.

IMPERVIOUS AREAS ASSUMED TO DRAIN TO BMP 4		
SOURCE	IMPERVIOUS AREA (Ac.)	BASIS
ROADS	0.3	MEASURED
LOT 19	1.9	ASSUMED 85% OF USABLE LOT AREA
LOT 20	2.2	ASSUMED 85% OF USABLE LOT AREA
LOT 30	1.8	ASSUMED 70% OF LOT AREA
LOT 31	1.8	ASSUMED 70% OF LOT AREA
LOT 38	1.5	ASSUMED 70% OF LOT AREA
LOT 39	1.8	ASSUMED 70% OF LOT AREA
LOT 40	1.8	ASSUMED 70% OF LOT AREA
	13.1	

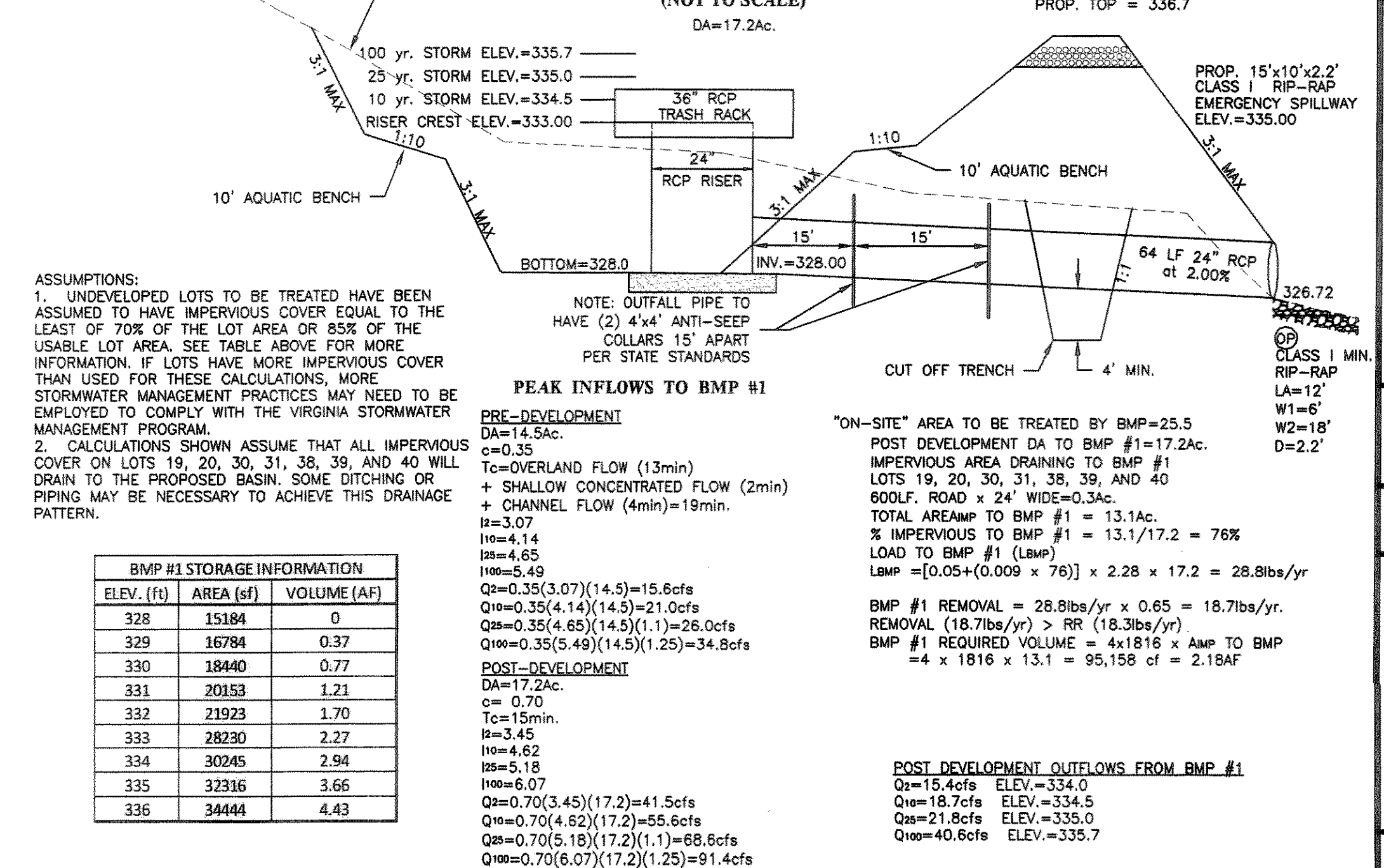
BMP #1 SURFACE AREA - POOL DEPTH RELATIONSHIP		
TOTAL BMP SURFACE AREA=28,230sf @ ELEV.=333.00		
POOL DEPTH (ft)	SURFACE AREA (sf)	% OF TOTAL BMP SURFACE AREA
0-1.5	7199	25.5%
1.5-2.0	878	3.1%
2.0-6.0	20153	71.4%
	TOTAL=28230	100%

## HYDRAULIC RESIDENCE TIME

VOLUME OF BASIN AT PERMANENT POOL=2.27AF=98,881cf.  
2yr STORM OUTFLOW FROM BASIN=15.4cfs  
RESIDENCE TIME=98,881cf/15.4cfs=6421sec=1.78hrs

## BMP #1 DETAIL

(NOT TO SCALE)



ASSUMPTIONS:  
1. UNDEVELOPED LOTS TO BE TREATED HAVE BEEN ASSUMED TO HAVE IMPERVIOUS COVER EQUAL TO THE LEAST OF 70% OF THE LOT AREA OR 85% OF THE USABLE LOT AREA. SEE TABLE ABOVE FOR MORE INFORMATION. IF LOTS HAVE MORE IMPERVIOUS COVER THAN USED FOR THESE CALCULATIONS, MORE STORMWATER MANAGEMENT PRACTICES MAY NEED TO BE EMPLOYED TO COMPLY WITH THE VIRGINIA STORMWATER MANAGEMENT PROGRAM.  
2. CALCULATIONS SHOWN ASSUME THAT ALL IMPERVIOUS COVER ON LOTS 19, 20, 30, 31, 38, 39, AND 40 WILL DRAIN TO THE PROPOSED BASIN. SOME DITCHING OR PIPING MAY BE NECESSARY TO ACHIEVE THIS DRAINAGE PATTERN.

BMP #1 STORAGE INFORMATION		
ELEV. (ft)	AREA (sf)	VOLUME (AF)
328	15184	0
329	16784	0.37
330	18440	0.77
331	20153	1.21
332	21923	1.70
333	28230	2.27
334	30245	2.94
335	32316	3.66
336	34444	4.43

PEAK INFLOWS TO BMP #1  
PRE-DEVELOPMENT  
DA=14.5Ac.  
c=0.35  
To=OVERLAND FLOW (13min)  
+ SHALLOW CONCENTRATED FLOW (2min)  
+ CHANNEL FLOW (4min)=19min.  
I=3.07  
Ia=4.14  
Ib=5.49  
Q=0.35(3.07)(14.5)=15.6cfs  
Q1=0.35(4.14)(14.5)=21.0cfs  
Q2=0.35(5.49)(14.5)=28.0cfs  
Q10=0.35(5.49)(14.5)(1.25)=34.8cfs  
POST-DEVELOPMENT  
DA=17.2Ac.  
c=0.70  
To=15min.  
I=3.45  
Ia=4.62  
Ib=5.18  
Ic=6.07  
Q=0.70(3.45)(17.2)=41.5cfs  
Q1=0.70(4.62)(17.2)=55.6cfs  
Q2=0.70(5.18)(17.2)=68.6cfs  
Q10=0.70(6.07)(17.2)=81.4cfs

"ON-SITE" AREA TO BE TREATED BY BMP=25.5  
POST DEVELOPMENT DA TO BMP #1=17.2Ac.  
IMPERVIOUS AREA DRAINING TO BMP #1  
+ LOTS 19, 20, 30, 31, 38, 39, AND 40  
600LF. ROAD x 24' WIDE=0.3Ac.  
TOTAL AREAMP TO BMP #1 = 13.1Ac.  
% IMPERVIOUS TO BMP #1 = 13.1/17.2 = 76%  
LOAD TO BMP #1 (Lbwp)  
Lbwp=[0.05+(0.009 x 76)] x 2.28 x 17.2 = 28.8lbs/yr  
BMP #1 REMOVAL = 28.8lbs/yr x 0.65 = 18.7lbs/yr.  
REMOVAL (18.7lbs/yr) > RR (18.3lbs/yr)  
BMP #1 REQUIRED VOLUME = 4x1816 x Awp TO BMP  
= 4 x 1816 x 13.1 = 95,158 cf = 2.18AF

POST DEVELOPMENT OUTFLOWS FROM BMP #1  
Q=15.4cfs ELEV.=334.0  
Q1=18.7cfs ELEV.=334.5  
Q2=21.8cfs ELEV.=335.0  
Q10=40.6cfs ELEV.=335.7

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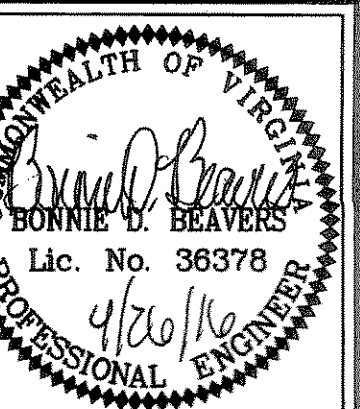
STORMWATER MANAGEMENT PLAN BMP #1

DATE: APRIL 5, 2009

REVISIONS	
DATE	COMMENTS
JULY 22, 2009	CONTRACT AMENDMENTS
OCTOBER 21, 2009	ADJUST EASEMENTS
MAY 10, 2012	PROPOSE 1 BMP
APRIL 21, 2015	REVISE WETLAND IMPACT
JULY 7, 2015	REVISE BMP GRADING
NOV. 5, 2015	ADJUST EASE & EASEMENTS
NOV. 16, 2015	ADJUST EASEMENTS
MARCH 23, 2016	ADJUST EASEMENTS

DESIGNED BY: WAB  
DRAWN BY: BDF  
CHECKED BY: WAB

J. N.: 309-01-100  
CAD FILE: Midpoint Ova BMP



SHEET 3 OF 6



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**MIDPOINT  
INDUSTRIAL PARK**  
BYRD DISTRICT GOOCHLAND COUNTY, VIRGINIA  
CUCKOO DISTRICT LOUISA COUNTY, VIRGINIA

STORMWATER  
MANAGEMENT  
PLAN BMP #1

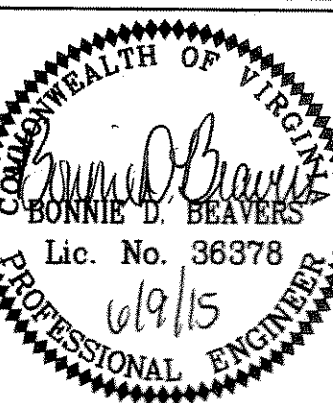
DATE: APRIL 5, 2009

## REVISIONS

JULY 22, 2009	COUNTY COMMENTS
MAY 10, 2012	
APRIL 21, 2015	PROPOSE 1 BMP
JUNE 8, 2015	COUNTY COMMENTS

DESIGNED BY: WAB  
DRAWN BY: BDF  
CHECKED BY: WAB

AD FILE: Midpoint Ova BME



SHEET 4 OF 6

## PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

## Worksheet 2 : Situation 2

**STEP 5** Determine the relative post-development pollutant load ( $E_{\text{rel}}$ )

$$I_{\text{net}} = [0.05 + (0.008 \times I_{\text{net}})] \times 4 \times 2.28 \quad (\text{Equation 5.21})$$

where:

- $L_{post}$  = relative post-development total phosphorous load (pounds per year)
- $I_{post}$  = post-development percent impervious cover (percent expressed in whole numbers)
- $A$  = applicable area (acres)

$$L_{post} = \{0.05 + (0.009 \times \underline{51})\} \times \underline{75.5} \times 2.28$$

= 29.6 pounds per year

**STEP 6** Determine the relative pollutant removal requirement (RR).

$$RR = \frac{I_{\text{post}} - I_{\text{pre(waterbody)}}}{I_{\text{pre}}}$$

$$RR = \frac{29.6 - 11.7}{11.7}$$

= 18.3 pounds per year

**STEP 7** Identify best management practice (BMP) for the site.

$$EFF = (RR + I_{\text{pret}}) \times 100 \quad (\text{Equation 5-22})$$

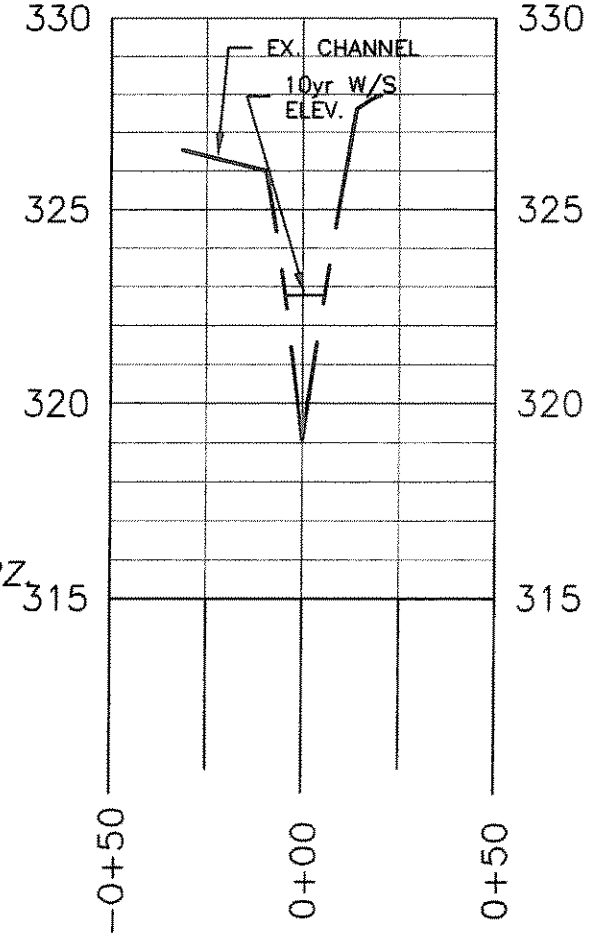
RR = pollutant removal requirement (pounds per acre)

$L_{\text{post}}$  = relative post-development total phosphorous load (pounds per year)

$$EFF = \left( \frac{11.5}{1.7} + \frac{14.6}{21} \right) \times 100$$

CROSS SECTION L-L

FLOWS ARE TAKEN FROM  
 BMP ROUTING.



Q2=63.3cfs  
V2=4.1fps  
2yr ELEV.=322.4  
Q10=82.5cfs  
V10=4.3fps  
10yr ELEV.=322.8  
Q100=136.8cfs  
V100=4.9fps  
100yr ELEV.=323.6  
s=1.0%  
n=0.045

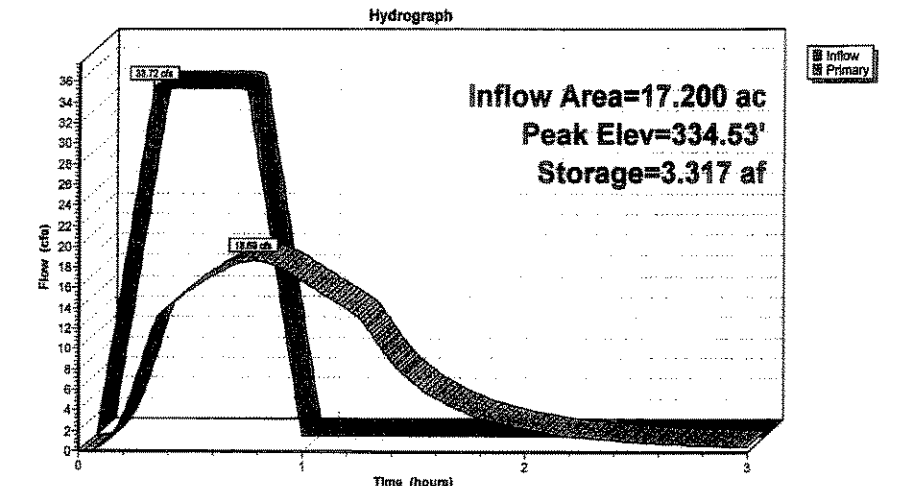
**SCALE:**

1"=50' HOR.  
1"=5' VERT.

## BMP #1 10yr STORM ROUTING INFORMATION

midpoint VA-goochland 10-yr Duration=40 min, Inten=2.78 in/hr  
Prepared by Youngblood, Tyler & Associates, P.C. Printed 4/29/2015  
HydroCAD® 10.00 s/n 08121 © 2013 HydroCAD Software Solutions LLC

**Pond 1P: BMP #1**



J:\Eng3\CAD\MIDPOINT\BMP#1 PLANS\BMP1 PLANS.JWG



SVAC25-840-40. Minimum standards.

A VESCP must be consistent with the following criteria, techniques and methods:

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.
19. Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increases in volume, velocity and peak flow rate of stormwater runoff for the stated frequency storm of 24-hour duration in accordance with the following standards and criteria. Stream restoration and

relocation projects that incorporate natural channel design concepts are not man-made channels and shall be exempt from any flow rate capacity and velocity requirements for natural or man-made channels:

- 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 ten-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 ten-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 ten-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 ten-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 ten-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 9VAC25-820-68 of the Virginia Stormwater Management Program (VSMP) Regulations.

n. Compliance with the water quantity minimum standards set out in 9VAC25-820-66 of the Virginia Stormwater Management Program (VSMP) Regulations shall be deemed to satisfy the requirements of subdivision 19 of this subsection.

Statutory Authority

§ 62.1-44.15:52 of the Code of Virginia.

Historical Notes

Former 9VAC59-30-40, derived from VR625-02-00 § 4; eff September 13, 1990; amended, Virginia Register Volume 11, Issue 11, eff. March 22, 1995; Volume 29, Issue 4, eff. November 21, 2012; amended and renumbered, Virginia Register Volume 30, Issue 2, eff. October 23, 2013.

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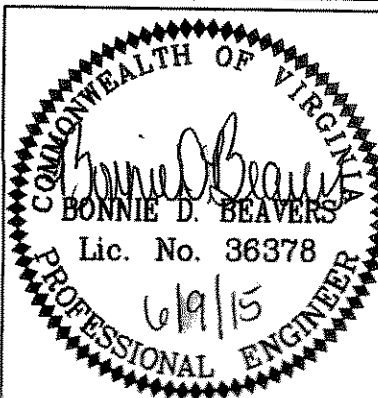
NOTES &  
DETAILS

DATE: APRIL 5, 2009

REVISIONS			
DATE	NOTES	PROPOSED BY	COUNTY COMMENTS
01/01/2012			
04/01/2013			
JUNE 8, 2015			

DESIGNED BY: WAB  
DRAWN BY: BDF  
CHECKED BY: WAB

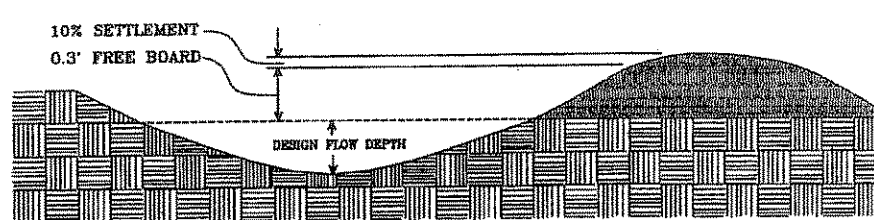
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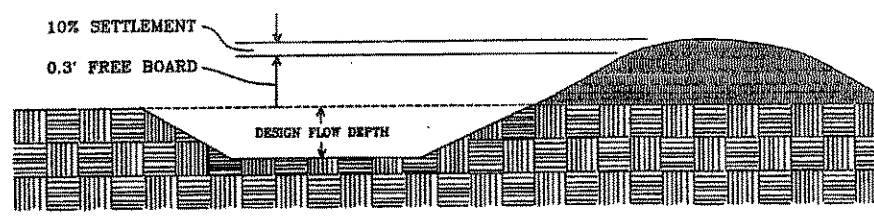
SHEET 5 OF 6



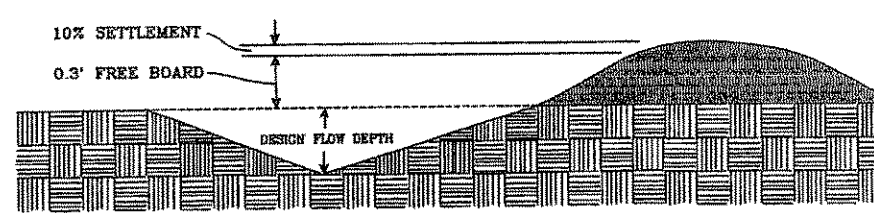
## DIVERSIONS



TYPICAL PARABOLIC DIVERSION



TYPICAL TRAPEZOIDAL DIVERSION



TYPICAL VEE-SHAPED DIVERSION

Source: Va. DSWC

Plate 3.12-1

III - 67

TABLE 3.32-D  
SITE SPECIFIC SEEDING MIXTURES FOR COASTAL PLAIN AREA

	Total Lbs. Per Acre
<b>Minimum Care Lawn</b>	
- Commercial or Residential	
- Kentucky 31 or Turf-Type Tall Fescue	175-200 lbs.
- Common Bermudagrass **	75 lbs.
<b>High-Maintenance Lawn</b>	
- Kentucky 31 or Turf-Type Tall Fescue	200-250 lbs.
- Hybrid Bermudagrass (seed) **	40 lbs. (unhulled)
- Hybrid Bermudagrass (by other vegetative establishment method, see Std. & Spec. 3.34)	30 lbs. (hulled)
<b>General Slope (3:1 or less)</b>	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
<b>Low Maintenance Slope (Steeper than 3:1)</b>	
- Kentucky 31 Tall Fescue	95-108 lbs.
- Common Bermudagrass **	0-15 lbs.
- Red Top Grass	2 lbs.
- Seasonal Nurse Crop *	20 lbs.
- Serotina Lespedeza **	150 lbs.

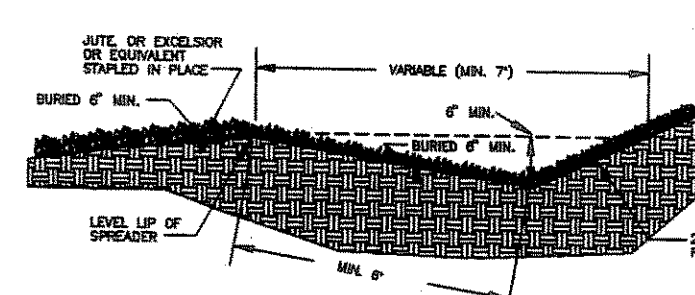
\* Use seasonal nurse crop in accordance with seeding dates as stated below:  
 February, March through April ..... Annual Rye  
 May 1st through August ..... Fescue Millet  
 September, October through November 15th ..... Annual Rye  
 November 16th through January ..... Winter Rye

\*\* May through October, use hulled seed. All other seeding periods, use unhulled seed. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in mixes.

III - 304

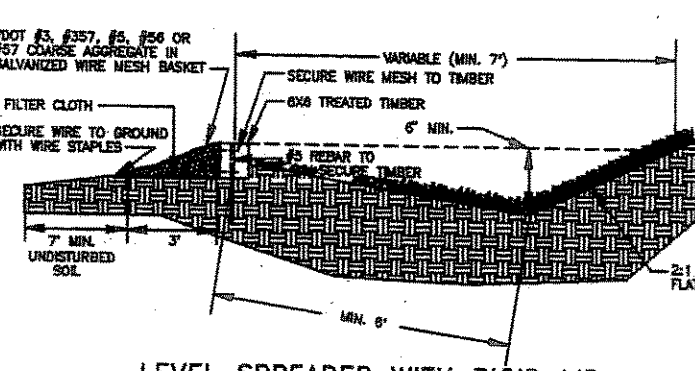
## LEVEL SPREADER

## CROSS SECTION



LEVEL SPREADER WITH VEGETATED LIP

## CROSS SECTION



LEVEL SPREADER WITH RIGID LIP

Source: Va. DSWC and N.C. Erosion and Sediment Control Planning and Design Manual

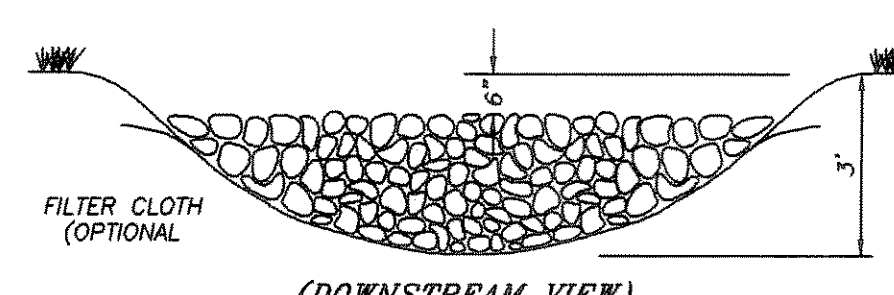
Plate 3.21-2

III - 195

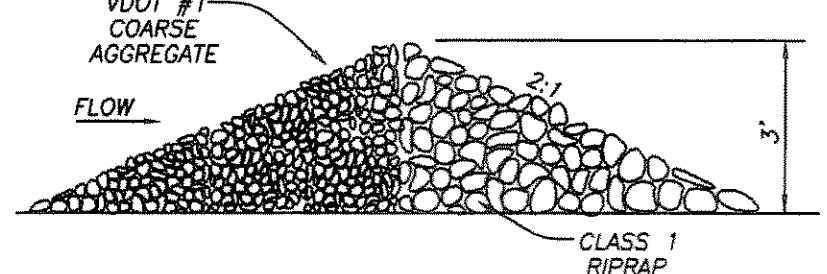
## ROCK CHECK DAM

STD. & SPEC. #3.20  
N.T.S.

CD



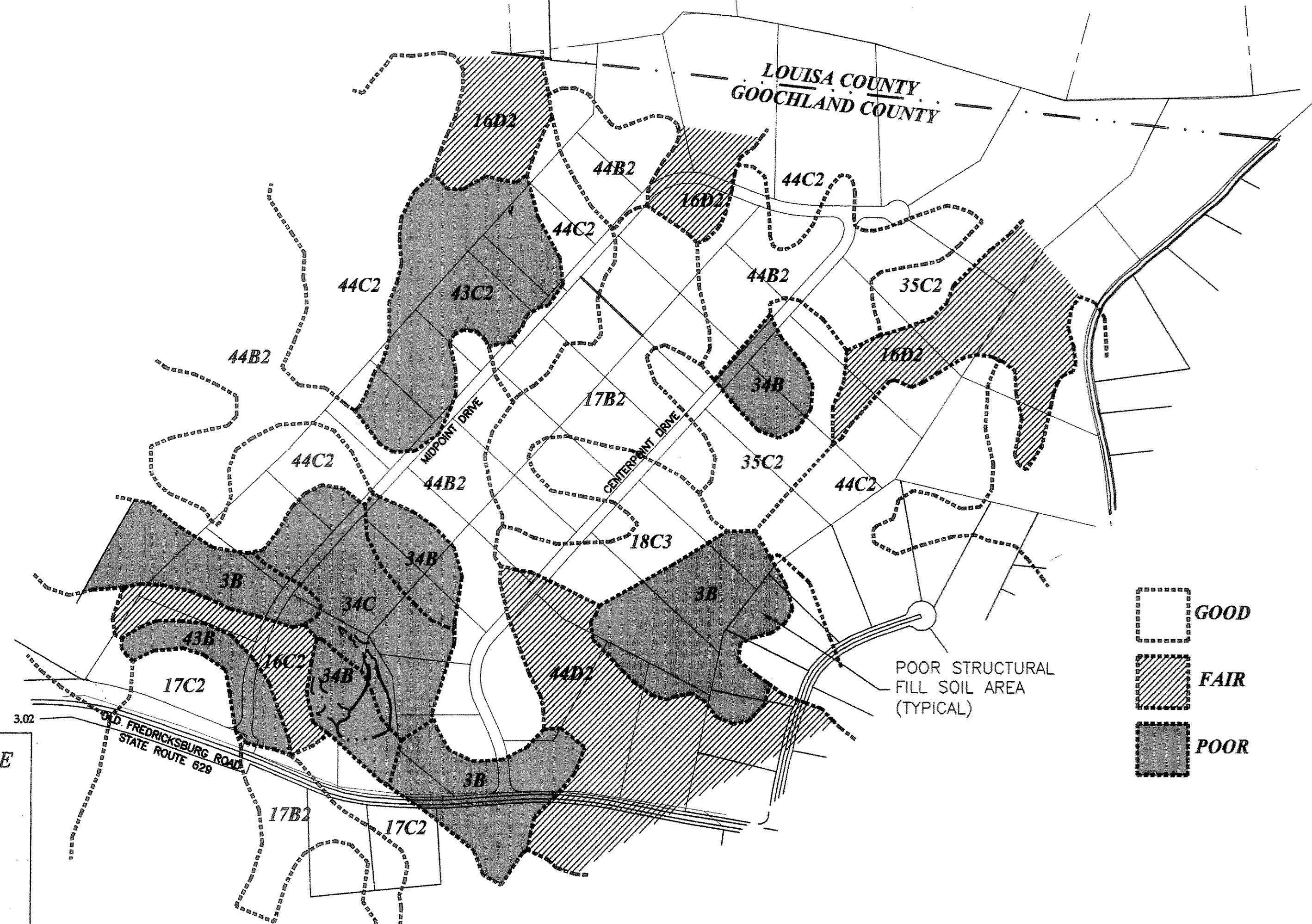
(DOWNSTREAM VIEW)



CLASS 1 RIPRAP

## SOILS MAP

SCALE: 1"=400'



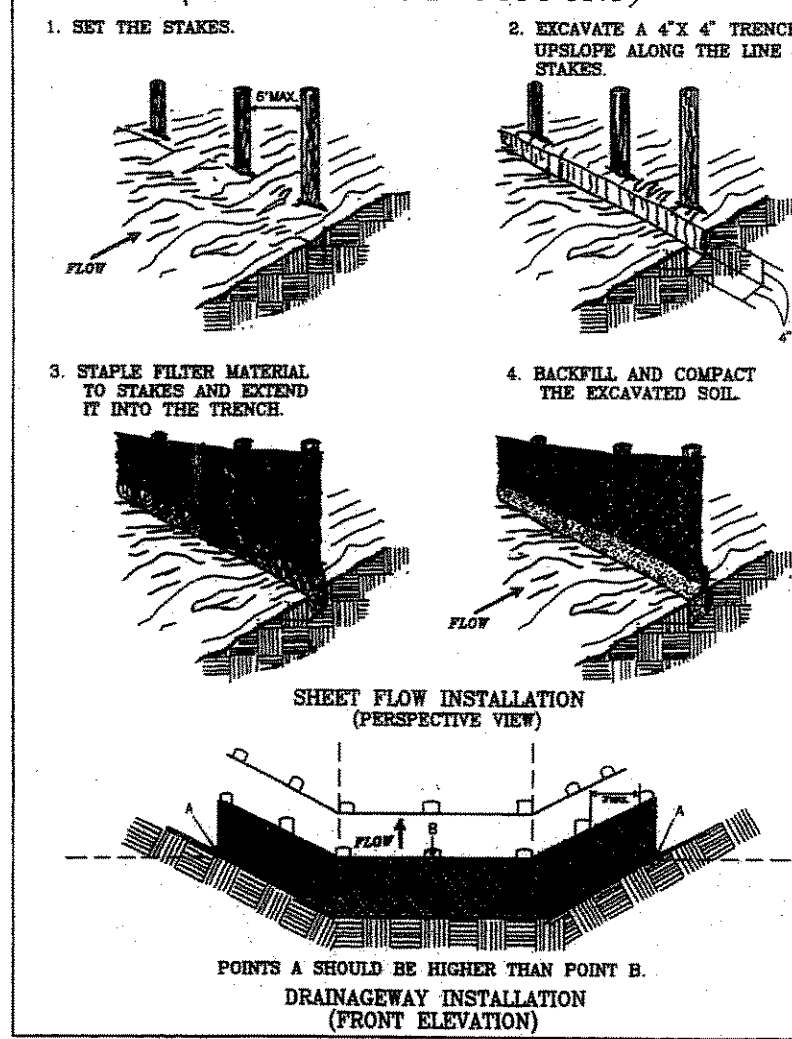
GOOD  
FAIR  
POOR

POOR STRUCTURAL  
FILL SOIL AREA  
(TYPICAL)

## Midpoint Industrial Park Soils Summary

Soil Map #	Soil Name	USDA Texture (Surface)	Slope (%)	Hydrologic Soil Group	Structural Fill Quality
3B	Bolling	Silt Loam	2-7%	C	POOR
16C2	Louisburg	Fine Sandy Loam	7-15%	B	FAIR
16D2	Louisburg	Fine Sandy Loam	15-25%	B	FAIR
17B2	Madison	Fine Sandy Loam	2-7%	B	GOOD
17C2	Madison	Fine Sandy Loam	7-15%	B	GOOD
18C3	Madison	Clay Loam	7-15%	B	GOOD
34B	Sedgefield	Fine Sandy Loam	2-7%	C	POOR
34C	Sedgefield	Fine Sandy Loam	7-15%	C	POOR
35C2	Tallapoosa	Fine Sandy Loam	7-15%	C	GOOD
43B	Vance	Fine Sandy Loam	2-7%	C	POOR
43C2	Vance	Fine Sandy Loam	7-15%	C	POOR
44B2	Wedowee	Fine Sandy Loam	2-7%	B	GOOD
44C2	Wedowee	Fine Sandy Loam	7-15%	B	GOOD
44D2	Wedowee	Fine Sandy Loam	15-25%	B	FAIR

SOILS INFORMATION WAS OBTAINED FROM NATURAL RESOURCES CONSERVATION SERVICE FOR GOOCHLAND COUNTY, VIRGINIA.

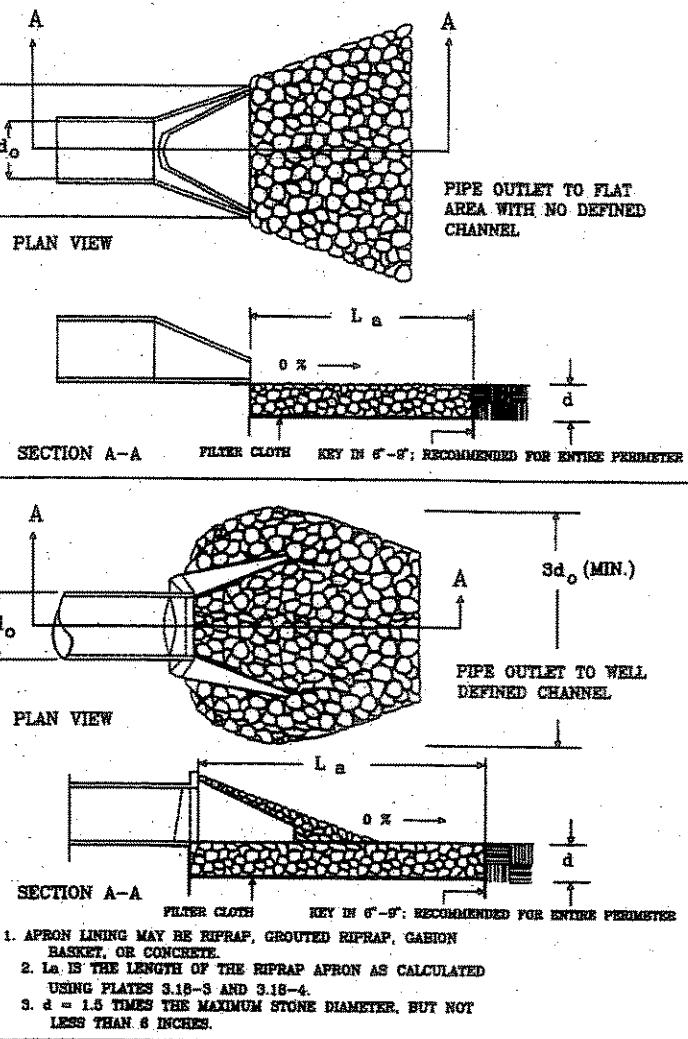
CONSTRUCTION OF A SILT FENCE  
(WITHOUT WIRE SUPPORT)

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

Plate 3.05-2

III - 25

## PIPE OUTLET CONDITIONS



Source: Va. DSWC

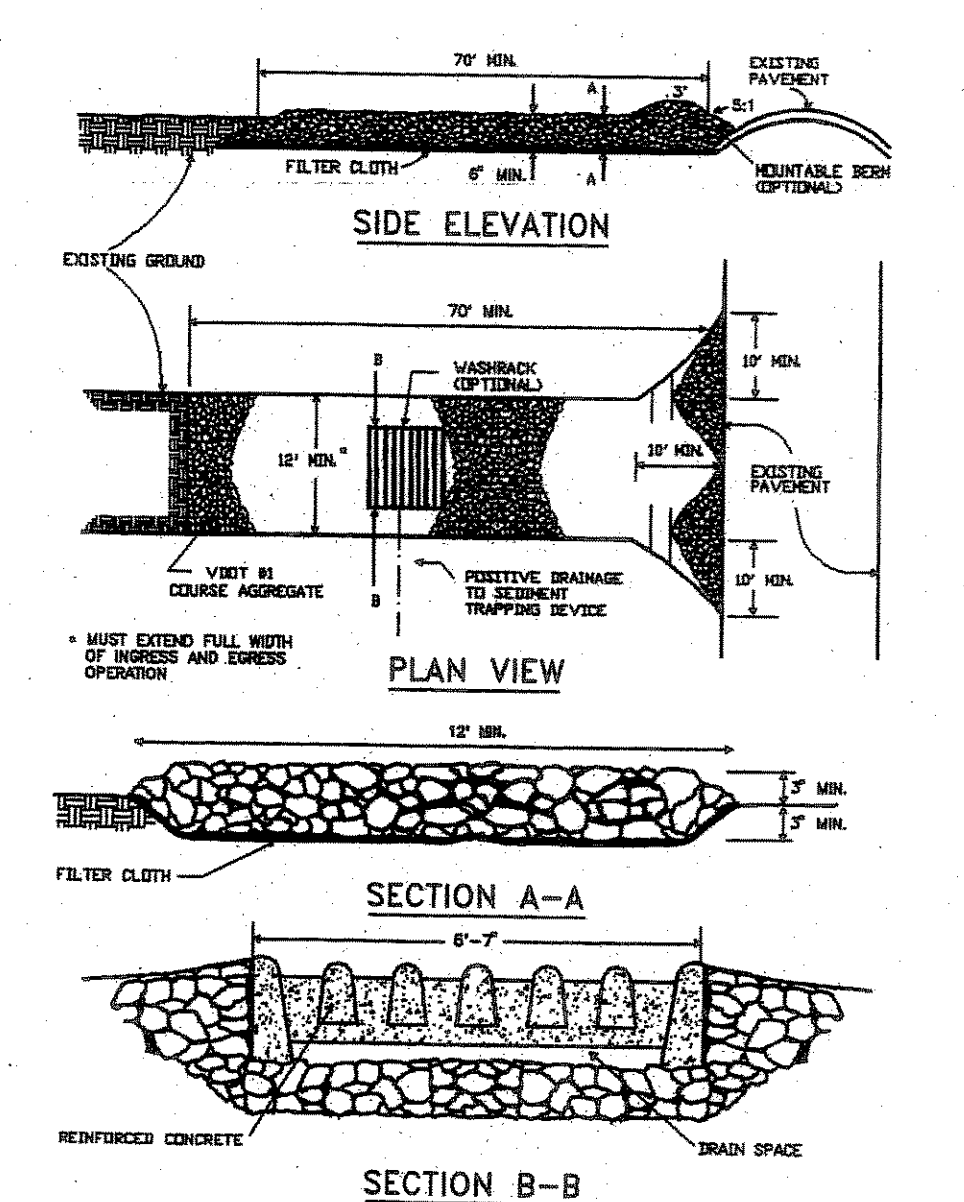
Plate 3.18-1

III - 157

## EROSION CONTROL NOTES

- UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATIONS VR 625-02-00 EROSION AND SEDIMENT CONTROL REGULATIONS.
- ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING. IF DURING CONSTRUCTION, ADDITIONAL EROSION CONTROL DEVICES ARE FOUND NECESSARY, THEY SHALL BE INSTALLED AS DIRECTED BY THE COUNTY ENGINEER.
- A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.
- NO DISTURBED AREA WILL BE DENuded FOR MORE THAN 30 CALENDAR DAYS.
- ALL STORM AND SANITARY SEWER LINES NOT IN STREETS ARE TO BE MULCHED AND SEEDED IMMEDIATELY AFTER BACKFILL. NO MORE THAN FIVE HUNDRED (500) FEET ARE TO BE OPEN AT ONE TIME.
- ELECTRIC POWER, TELEPHONE, AND GAS SUPPLY TRENCHES ARE TO BE COMPACTED, SEEDED AND MULCHED IMMEDIATELY AFTER BACKFILL.
- ALL TEMPORARY EARTH BERMS, DIVERSIONS, AND SILT DAMS ARE TO BE MULCHED AND SEEDED FOR VEGETATIVE COVER IMMEDIATELY AFTER GRADING. STRAW OR HAY MULCH IS REQUIRED. THE SAME APPLIES TO ALL SOIL STOCKPILES.
- DURING CONSTRUCTION, ALL STORM SEWER INLETS WILL BE PROTECTED BY SILT TRAPS, MAINTAINED AND MODIFIED AS REQUIRED BY CONSTRUCTION PROGRESS.
- ANY DISTURBED AREA NOT PAVED, SODDED, OR BUILT UPON BY NOVEMBER 1st, IS TO BE SEEDED ON THAT DATE WITH GATS, ABRUZZI, RYE OR EQUIVALENT AND MULCHED WITH HAY OR STRAW MULCH. MODIFY AS APPLICABLE DEPENDING ON PROPOSED TIME OF CONSTRUCTION.
- THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
- DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.
- PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE COUNTY ENGINEER.

## STONE CONSTRUCTION ENTRANCE

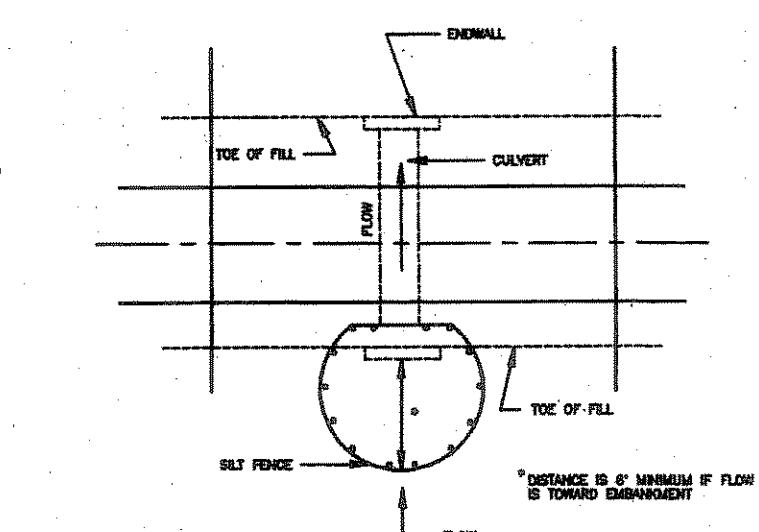


Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC

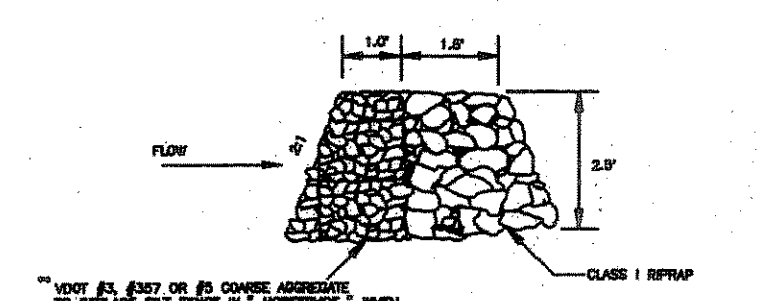
Plate 3.02-1

III - 9

## SILT FENCE CULVERT INLET PROTECTION



## OPTIONAL STONE COMBINATION



Source: Adapted from VDOT Standard Sheets and Va. DSWC

Plate 3.08-1

III - 49

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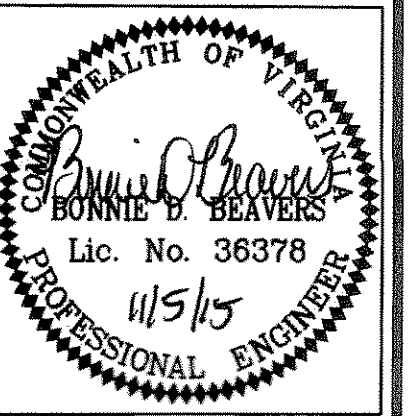
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J. N.: 309-01-100  
 CAD FILE: Midpoint Ova BMP



SHEET 6 OF 6