TRANSMITTAL SHEET

ENGINEERING & RESOURCE PROTECTION → STORMWATER

Project: **Wythe-Will Distribution Center**

County Plan No. **SP-130-03**

Assigned BMP No.: WC097

BMP Type: Detention Pond

X Record Drawings (Asbuilts)

X Construction Certification

X Computations

☐ Other:

Note:

Name: Tina Creech

Date: April 22, 2013

Signature: _____

James City County
VIRGINIA
Jamestown 1607

Development Management
101-A Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P: 757-253-6671
F. 757-253-6822
devman@james-city.va.us

jamescitycountyva.gov

Building Safety and Permits 757-253-6620
Engineering and Resource Protection 757-253-6670
Planning 757-253-6685
Zoning Enforcement 757-253-6671

August 10, 2012

Mr. Piotr Swietuchowski
VHB | Vanasse Hangen Brustlin, Inc.
351 McLaws Circle, Suite 3
Williamsburg, VA 23185-6316

Re: Wythe Will Distribution Facility
County Plan No. SP-130-03
County BMP ID Code: WC 097

Dear Mr. Swietuchowski:

Engineering and Resource Protection is in receipt of your request dated March 12, 2012 to reclassify the existing approved BMP for the project from an infiltration basin, to an extended detention pond with partial infiltration and no planting bench. The BMP was intended to be an infiltration basin, County Type C-4 BMP which serves 7.8 acres of the development site.

Based on our review of all information as submitted, it has been determined that a variance to reclassify the BMP can be approved. This is based on observed conditions, revised calculations dated March 12, 2012 and current stormwater function characteristics of the BMP. Therefore, this request is hereby ***approved*** for reclassification of the BMP to a County Type A-3 extended detention pond with partial infiltration and no planting bench. This exception shall become part of the approved site stormwater management plan.

Approval of this variance is also contingent upon no major (substantial) changes in the development plan or the subject best management practice facilities, or if site conditions change, become apparent or alter significantly following the date of this approval.

Sincerely,

Barry E. Moses, P.E.
Senior Civil Engineer
Engineering and Resource Protection

BEM/bem

SWMProg/Variances/SPvar/Var081012.SP13003

Transportation
Land Development
Environmental
Services

imagination | innovation | energy Creating results for our clients and benefits for our communities

VHB+LandMark • Legacy • Leadership • Results

March 12, 2009

Mr. Scott Thomas, P.E.
Director
Engineering and Resource Protection Division
101-E Mounts Bay Road
Williamsburg, VA 23185

RE: **Wythe-Will Distribution Center at Stonehouse Commerce Park**
BMP Reclassification Request
JCC BMP # WC 097

Dear Mr. Thomas:

On behalf of the Owner of the above referenced property/project, VHB, Inc., requests your consideration of this letter as our formal request for a re-classification of the above referenced Stormwater Management Facility from the Infiltration Basin, approved as part of SP-0130-2003, to an Extended Wet Detention pond with partial infiltration and no planting bench. This Stormwater Management Facility was designed to provide water quantity control only.

As you are aware, construction of this facility was completed in 2004 and the maintenance responsibilities for the facility were assumed by the Owner then. On August 1, 2011, the Owner received a letter from JCC (see attached) requesting that some outstanding items be addressed prior to the release of the bond in the amount of $70,000, which is still being held by JCC.

We have been working with the Owner to address the outstanding items and these are currently scheduled to be completed in the coming weeks. We have observed that the Stormwater Management Facility retains few feet of water on a long term basis. The design specified for the bottom to be at elevation 62.0 and soil borings obtained during the design process confirmed required infiltration rates at that depth. Data collected by our surveyors indicates that the design bottom elevation is 60.0 (2 feet lower than design) and the static water surface elevation to be approximately 65.20 based.

Based on conversations with the Owner, it is apparent that the water surface elevation within the BMP has been consistent over the past 8 years. In an attempt to determine why the BMP holds the water, we obtained four (4)

Vanasse Hangen Brustlin, Inc.
351 McLaws Circle, Suite 3
Williamsburg, Virginia 23185
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www.vhb.com

additional soil borings around the BMP which included infiltration data. These soil borings indicate that infiltration may be occurring along the side slopes above the "static" water level during and/or shortly after rainfall events.

Our calculations indicate that there is adequate storage volume at the facility, which is also borne out by our field observations which indicate a lack of any overtopping of the embankment.

Therefore, based on the above information we request that you consider this request to reclassify this existing Stormwater Management Facility from an Infiltration Basin to an Extended Detention Wet pond with partial infiltration and no planting bench. In doing so, we would not expect to have to do any construction/modification to the pond other than the planned necessary repairs to release the bond.

We trust that this request is satisfactory for your approval. Please advise us if you need additional information or wish to discuss this further.

Sincerely,

Vanasse Hangen Brustlin, Inc

Piotr Swietuchowski, P.E.

Project Manager

VHB

Vanasse Hangen Brustlin, Inc. TRANSMITTAL

Transportation
Land Development
Environmental Services

351 McLaws Circle, Suite 3
Williamsburg, VA 23185-6316
757 220 0500
FAX 757 220 8544

Date: 03/12/2012	**VHB Project No.:** 33516.00
Re: Wythe-Will Distribution Center	
At Stonehouse Commerce Park	

To: Mr. Scott Thomas, PE
Engineering and Resource Protection Division
101-E Mounts Bay Road
Williamsburg, VA 23185

We are sending you: ☐ Attached ☐ Under Separate cover via Regular Mail the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Diskettes ☐ Specifications ☐ Copy of Letter ☐ Change Order
☒ Other

Copies	Date	No.	Description
2	3/12/2012		Supporting Engineering Documents
1	3/12/2012		Waiver Request
1			Stormwater Management Facility Phonographs

These are transmitted as checked below:

☐ For approval
☐ For your use
☒ As requested
☐ For review and comment
☐ Returned prints on loan to VHB
☐ Approved as submitted
☐ Approved as noted
☐ Return for corrections
☐ For bids due
☐ Resubmit ____ Copies for approval
☐ Submit ____ Copies for distribution
☐ Return ____ Corrected prints

REMARKS:

If VHB provides materials to the Client that are stored electronically, the Client recognizes that data, plans, specifications, reports, documents, or other information recorded on or transmitted as electronic media ("CADD Documents") are subject to undetectable alteration, either intentional or unintentional, due to, among other causes, transmission, conversion, media degradation, software error, or human alteration. Accordingly, the CADD Documents are provided to the Client for informational purposes only and not as an end product. VHB makes no warranties, either express or implied, regarding the fitness or suitability of the CADD Documents.

The CADD Documents are instruments of professional service, and shall not be used, in whole or in part, for any project other than that for which they were created, without the express written consent of VHB and without suitable compensation to VHB. Accordingly, the Client agrees to waive any and all claims against VHB resulting in any way from the unauthorized alternation, misuse or reuse of the CADD documents and to defend, indemnify, and hold VHB harmless for any claims, losses, damages, or costs, including attorneys fees, arising out of the alteration, misuse or reuse of any CADD Documents.

Copy to: 33516.00

By: Piotr Swietuchowski, PE
VHB, Inc.

Supporting Engineering Documents

WYTHE-WILL DISTRIBUTION CENTER AT STONEHOUSE COMMERCE PARK

Williamsburg, Virginia

Prepared for Liberty Property Trust
12 South Third Street
Richmond, VA 23219
Phone # 757.644.9111

Prepared by Piotr Swietuchowski, PE / Vanasse Hangen Brustlin, Inc.
Transportation, Land Development, Environmental Services
351 McLaws Circle, Suite 3
Williamsburg, VA 23185-6316
Phone # 757.220.0500

COMMONWEALTH OF VIRGINIA
PIOTR SWIETUCHOWSKI
Lic. No. 044606
03/12/12
PROFESSIONAL ENGINEER

03/12/2012

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BMP CONVERSION WAIVER REQUEST

March 12, 2009

Mr. Scott Thomas, P.E.
Director
Engineering and Resource Protection Division
101-E Mounts Bay Road
Williamsburg, VA 23185

RE: **Wythe-Will Distribution Center at Stonehouse Commerce Park**
BMP Reclassification Request
JCC BMP # WC 097

Dear Mr. Thomas:

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As you are aware, construction of this facility was completed in 2004 and the maintenance responsibilities for the facility were assumed by the Owner then. On August 1, 2011, the Owner received a letter from JCC (see attached) requesting that some outstanding items be addressed prior to the release of the bond in the amount of $70,000, which is still being held by JCC.

We have been working with the Owner to address the outstanding items and these are currently scheduled to be completed in the coming weeks. We have observed that the Stormwater Management Facility retains few feet of water on a long term basis. The design specified for the bottom to be at elevation 62.0 and soil borings obtained during the design process confirmed required infiltration rates at that depth. Data collected by our surveyors indicates that the design bottom elevation is 60.0 (2 feet lower than design) and the static water surface elevation to be approximately 65.20 based.

Based on conversations with the Owner, it is apparent that the water surface elevation within the BMP has been consistent over the past 8 years. In an attempt to determine why the BMP holds the water, we obtained four (4)

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additional soil borings around the BMP which included infiltration data. These soil borings indicate that infiltration may be occurring along the side slopes above the "static" water level during and/or shortly after rainfall events.

Our calculations indicate that there is adequate storage volume at the facility, which is also borne out by our field observations which indicate a lack of any overtopping of the embankment.

Therefore, based on the above information we request that you consider this request to reclassify this existing Stormwater Management Facility from an Infiltration Basin to an Extended Detention Wet pond with partial infiltration and no planting bench. In doing so, we would not expect to have to do any construction/modification to the pond other than the planned necessary repairs to release the bond.

We trust that this request is satisfactory for your approval. Please advise us if you need additional information or wish to discuss this further.

Sincerely,

Vanasse Hangen Brustlin, Inc

Piotr Swietuchowski, P.E.

Project Manager

BMP STAGE STORAGE DATA

Wythe Will Bmp

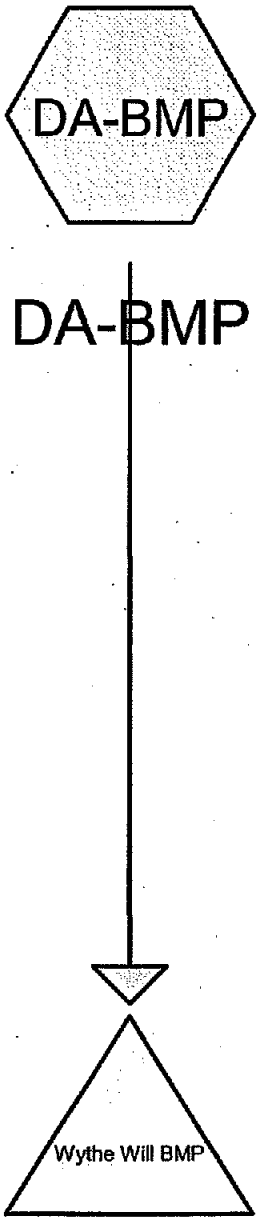
Elevation	Volume CY	Total from bottom CY
59.98-60	0	0
60-61	37.82	37.82
61-62	290.17	327.99
62-63	551.07	879.06
63-64	627.37	1506.43
64-65	693.91	2200.34
65-66	763.03	2963.37
66-67	827.6	3790.97
67-68	880.52	4671.49
68-68.77	713.92	5385.41
68.77-69	219.38	5604.79
69-70	987.32	6592.11
70-71	1042.41	7634.52
71-72	1098.64	8733.16
72-73	1156.22	9889.38
73-74	1214.72	11104.1
74-75	1274.41	12378.51
75-76	1338.84	13717.35
76-77	1418.57	15135.92
77-78	1489.07	16624.99

Stage-Area-Storage for Pond Wythe Will BMP: Wythe Will BMP

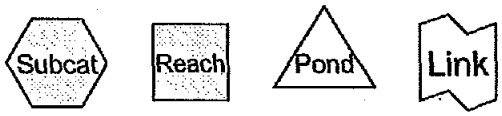
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
59.98	0	70.38	188,682
60.18	2,431	70.58	194,311
60.38	3,998	70.78	199,940
60.58	5,565	70.98	205,569
60.78	7,132	71.18	211,471
60.98	8,699	71.38	217,404
61.18	11,534	71.58	223,337
61.38	14,510	71.78	229,269
61.58	17,486	71.98	235,202
61.78	20,462	72.18	241,414
61.98	23,437	72.38	247,658
62.18	26,784	72.58	253,901
62.38	30,172	72.78	260,145
62.58	33,560	72.98	266,389
62.78	36,947	73.18	272,917
62.98	40,335	73.38	279,476
63.18	44,046	73.58	286,036
63.38	47,793	73.78	292,595
63.58	51,540	73.98	299,155
63.78	55,287	74.18	306,005
63.98	59,034	74.38	312,886
64.18	63,117	74.58	319,768
64.38	67,238	74.78	326,650
64.58	71,358	74.98	333,532
64.78	75,479	75.18	340,727
64.98	79,599	75.38	347,956
65.18	84,033	75.58	355,186
65.38	88,502	75.78	362,415
65.58	92,971	75.98	369,645
65.78	97,440	76.18	377,262
65.98	101,909	76.38	384,923
66.18	106,635	76.58	392,583
66.38	111,390	76.78	400,244
66.58	116,145	76.98	407,904
66.78	120,900	77.18	415,907
66.98	125,655	77.38	423,948
67.18	129,600	77.58	431,989
67.38	133,455	77.78	440,030
67.58	137,310	77.98	**448,071**
67.78	141,165		
67.98	145,020		
68.18	146,472		
68.38	147,657		
68.58	148,841		
68.78	150,026		
68.98	151,211		
69.18	156,127		
69.38	161,459		
69.58	166,791		
69.78	172,122		
69.98	177,454		
70.18	183,053		

BMP STORMWATER CALCULATIONS

NORMAL POOL WSEL AT 68.77



Wythe Will BMP



Routing Diagram for 33516-Whyte Will BMP
Prepared by {enter your company name here}, Printed 3/12/2012
HydroCAD® 10.00 s/n 01238 © 2011 HydroCAD Software Solutions LLC

2-YEAR STORM

Summary for Pond Wythe Will BMP: Wythe Will BMP

Inflow Area = 7.800 ac, 0.00% Impervious, Inflow Depth = 1.31" for 2-Year event
Inflow = 6.71 cfs @ 0.00 hrs, Volume= 0.849 af
Outflow = 3.23 cfs @ 1.52 hrs, Volume= 0.822 af, Atten= 52%, Lag= 91.0 min
Primary = 3.23 cfs @ 1.52 hrs, Volume= 0.822 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 68.77' Surf.Area= 0 sf Storage= 149,967 cf
Peak Elev= 70.00' @ 1.52 hrs Surf.Area= 0 sf Storage= 178,006 cf (28,039 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (156,726 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 156.5 min (201.5 - 45.0)

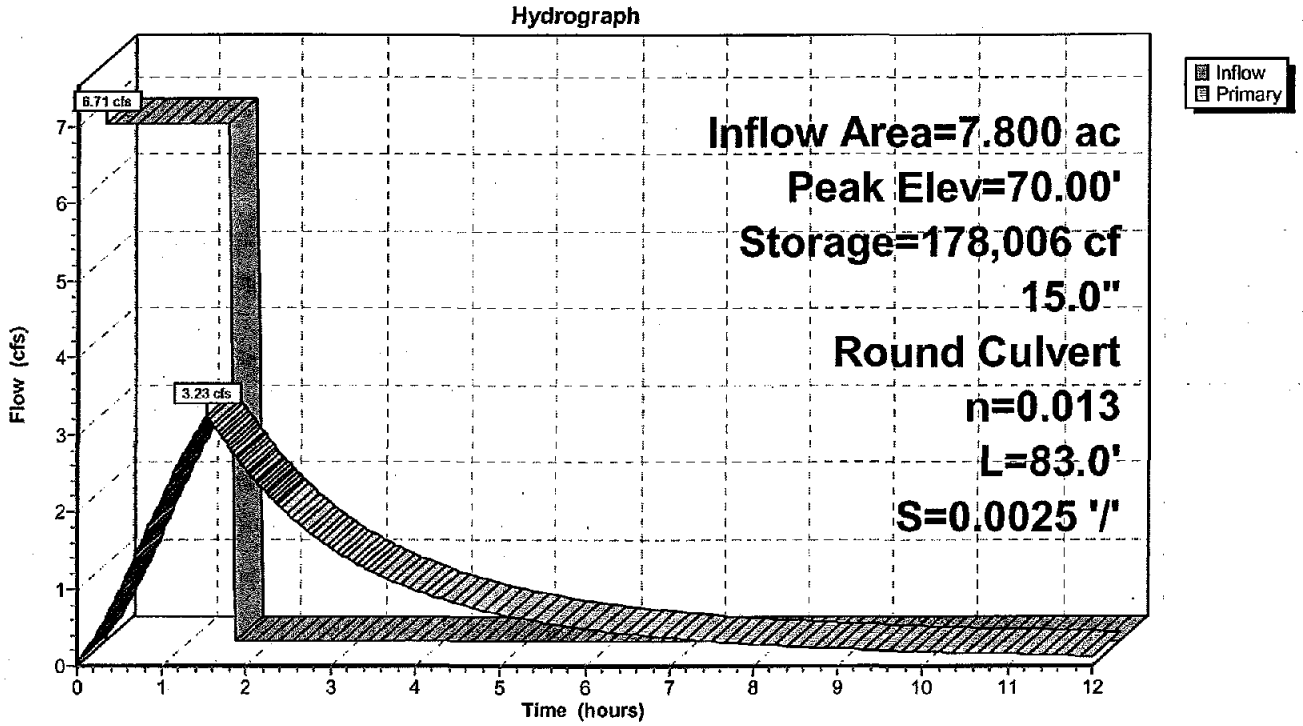
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=3.22 cfs @ 1.52 hrs HW=70.00' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.22 cfs @ 3.32 fps)

Pond Wythe Will BMP: Wythe Will BMP



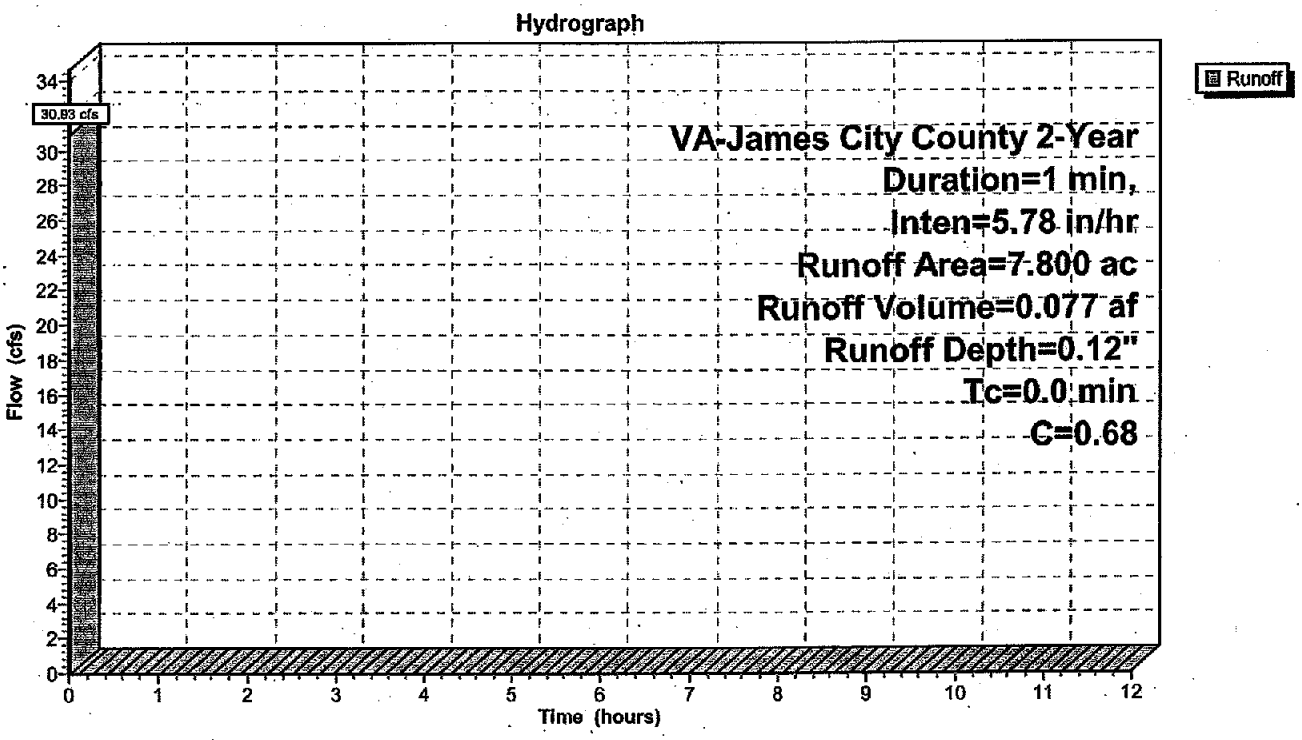
Summary for Subcatchment DA-BMP: DA-BMP

Runoff = 30.93 cfs @ 0.00 hrs, Volume= 0.077 af, Depth= 0.12"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 2-Year Duration=1 min, Inten=5.78 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA-BMP: DA-BMP



10-YEAR STORM

Summary for Pond Wythe Will BMP: Wythe Will BMP

Inflow Area =	7.800 ac,	0.00% Impervious,	Inflow Depth =	2.03"	for 10-Year event
Inflow =	8.71 cfs @	0.00 hrs,	Volume=	1.318 af	
Outflow =	4.30 cfs @	1.92 hrs,	Volume=	1.277 af,	Atten= 51%, Lag= 115.2 min
Primary =	4.30 cfs @	1.92 hrs,	Volume=	1.277 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 68.77' Surf.Area= 0 sf Storage= 149,967 cf
Peak Elev= 70.45' @ 1.82 hrs Surf.Area= 0 sf Storage= 190,643 cf (40,676 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (156,726 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 144.9 min (198.9 - 54.0)

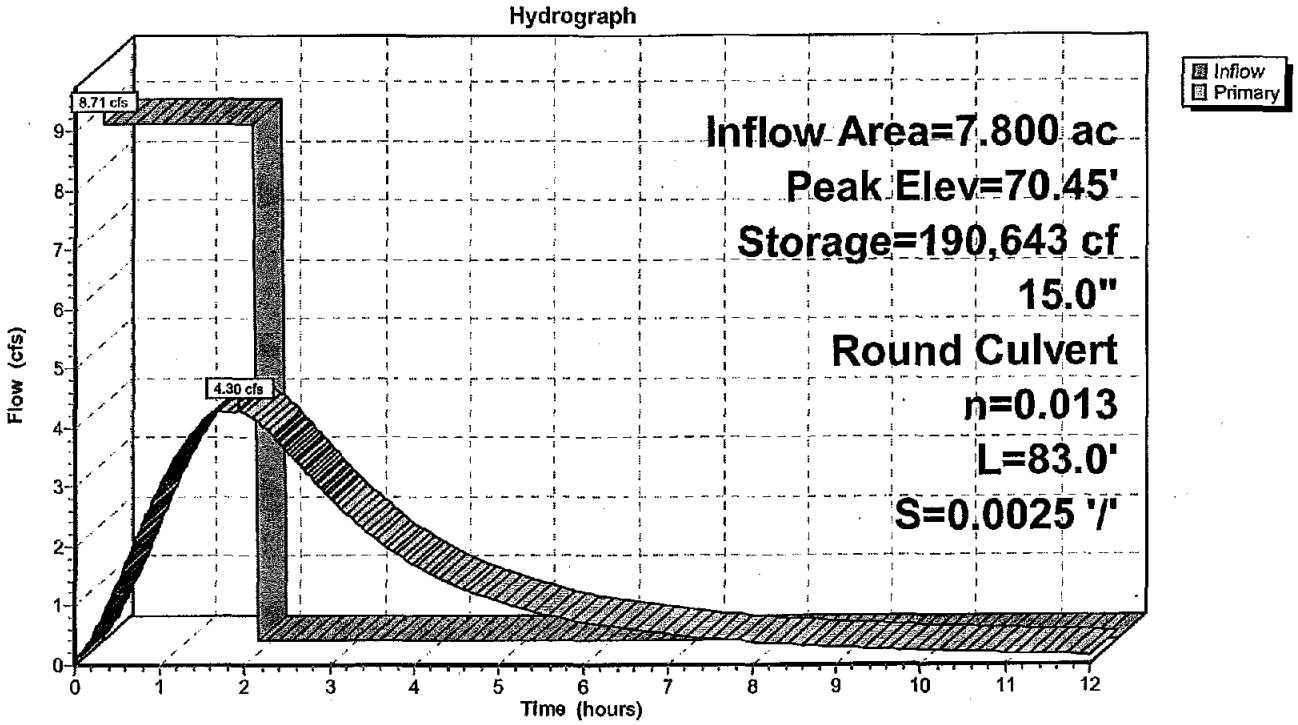
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=4.30 cfs @ 1.92 hrs HW=70.40' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.30 cfs @ 3.52 fps)

Pond Wythe Will BMP: Wythe Will BMP



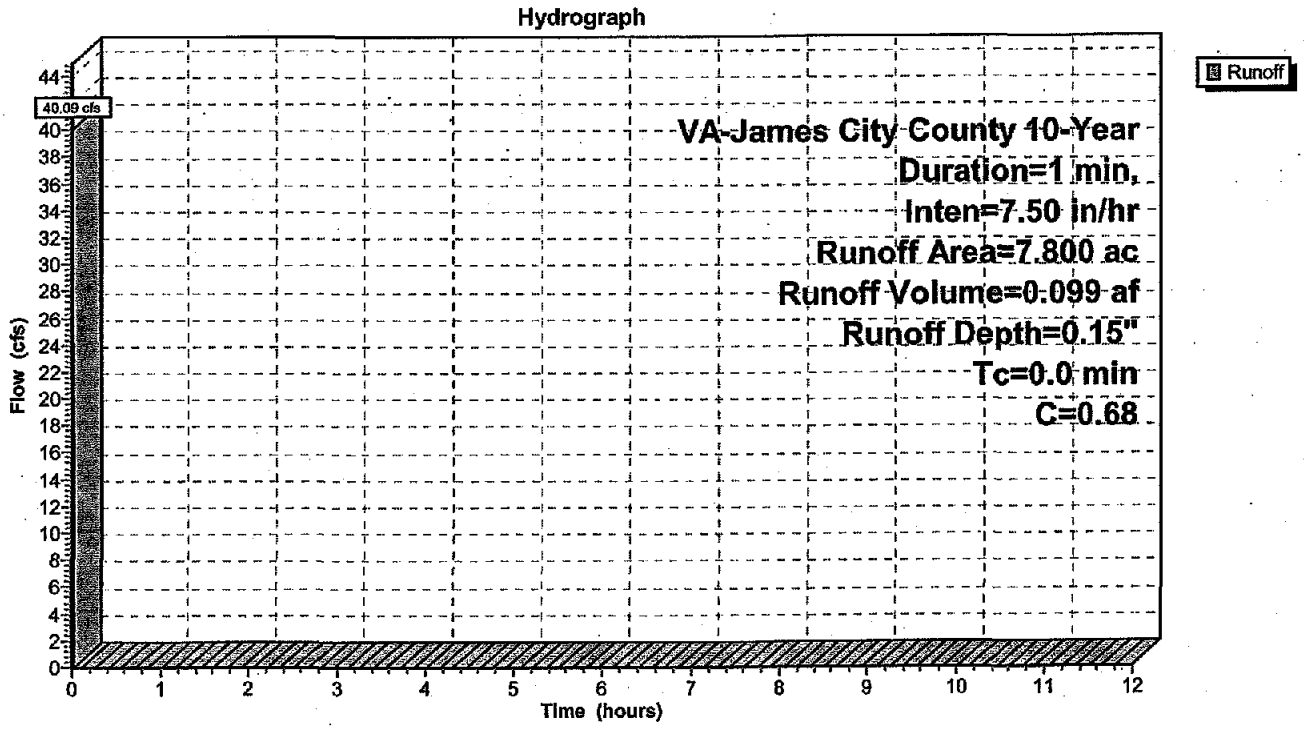
Summary for Subcatchment DA-BMP: DA-BMP

Runoff = 40.09 cfs @ 0.00 hrs, Volume= 0.099 af, Depth= 0.15"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 10-Year Duration=1 min, Inten=7.50 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA-BMP: DA-BMP



25-YEAR STORM

Summary for Pond Wythe Will BMP: Wythe Will BMP

Inflow Area =	7.800 ac,	0.00% Impervious,	Inflow Depth =	2.70"	for 25-Year event
Inflow =	9.32 cfs @	0.00 hrs,	Volume=	1.755 af	
Outflow =	5.30 cfs @	2.26 hrs,	Volume=	1.699 af,	Atten= 43%, Lag= 135.7 min
Primary =	5.30 cfs @	2.26 hrs,	Volume=	1.699 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 68.77' Surf.Area= 0 sf Storage= 149,967 cf
Peak Elev= 70.80' @ 2.26 hrs Surf.Area= 0 sf Storage= 200,632 cf (50,666 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (156,726 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 142.8 min (210.3 - 67.5)

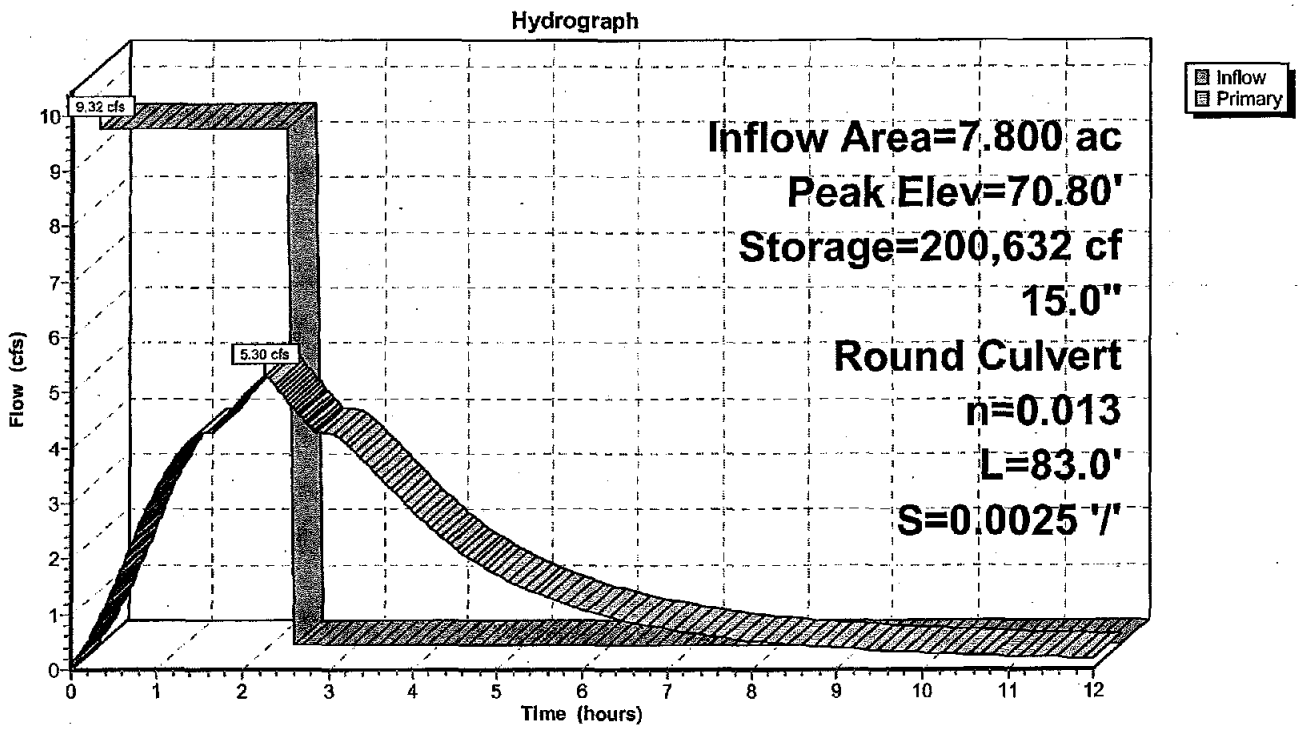
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=5.29 cfs @ 2.26 hrs HW=70.80' (Free Discharge)
└**1=Culvert** (Barrel Controls 5.29 cfs @ 4.31 fps)

Pond Wythe Will BMP: Wythe Will BMP



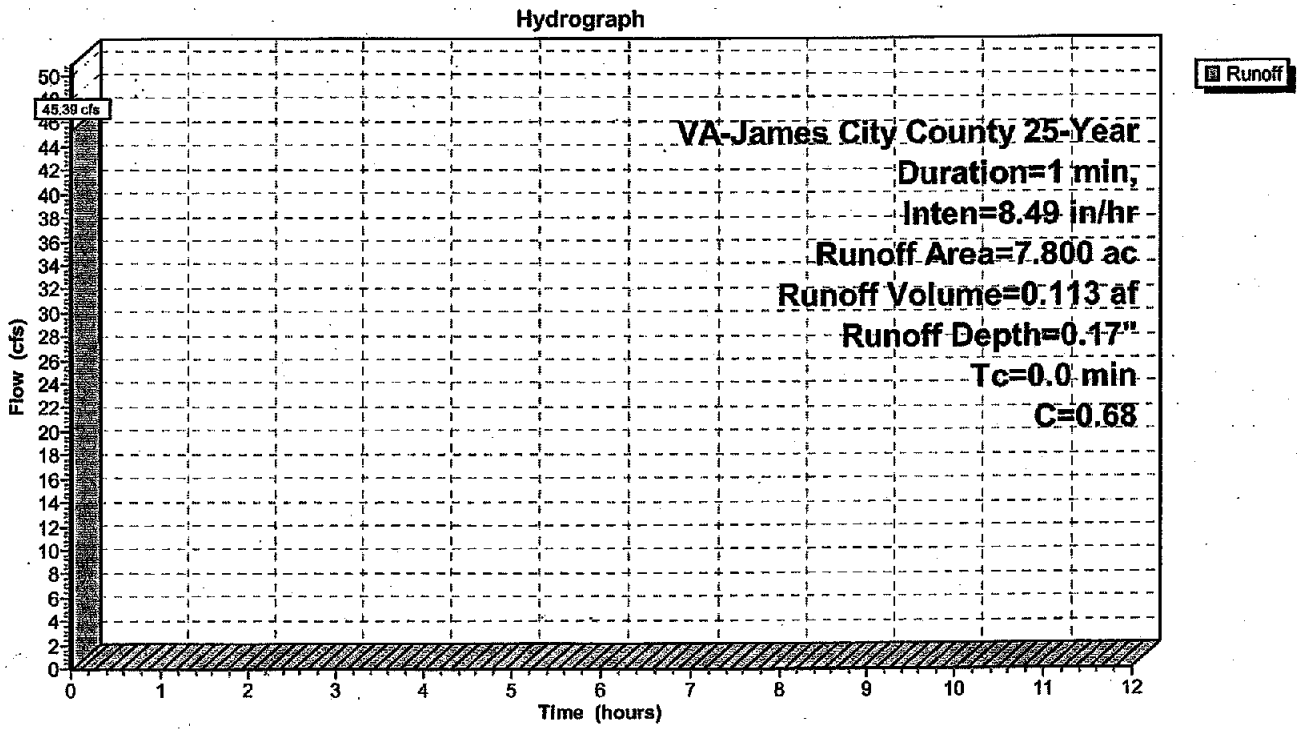
Summary for Subcatchment DA-BMP: DA-BMP

Runoff = 45.39 cfs @ 0.00 hrs, Volume= 0.113 af, Depth= 0.17"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 25-Year Duration=1 min, Inten=8.49 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA-BMP: DA-BMP



100-YEAR STORM

Summary for Pond Wythe Will BMP: Wythe Will BMP

Inflow Area = 7.800 ac, 0.00% Impervious, Inflow Depth = 4.07" for 100-Year event
Inflow = 10.56 cfs @ 0.00 hrs, Volume= 2.645 af
Outflow = 6.77 cfs @ 3.01 hrs, Volume= 2.559 af, Atten= 36%, Lag= 180.4 min
Primary = 6.77 cfs @ 3.01 hrs, Volume= 2.559 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 68.77' Surf.Area= 0 sf Storage= 149,967 cf
Peak Elev= 71.43' @ 3.01 hrs Surf.Area= 0 sf Storage= 218,976 cf (69,009 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (156,726 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 142.9 min (232.9 - 90.0)

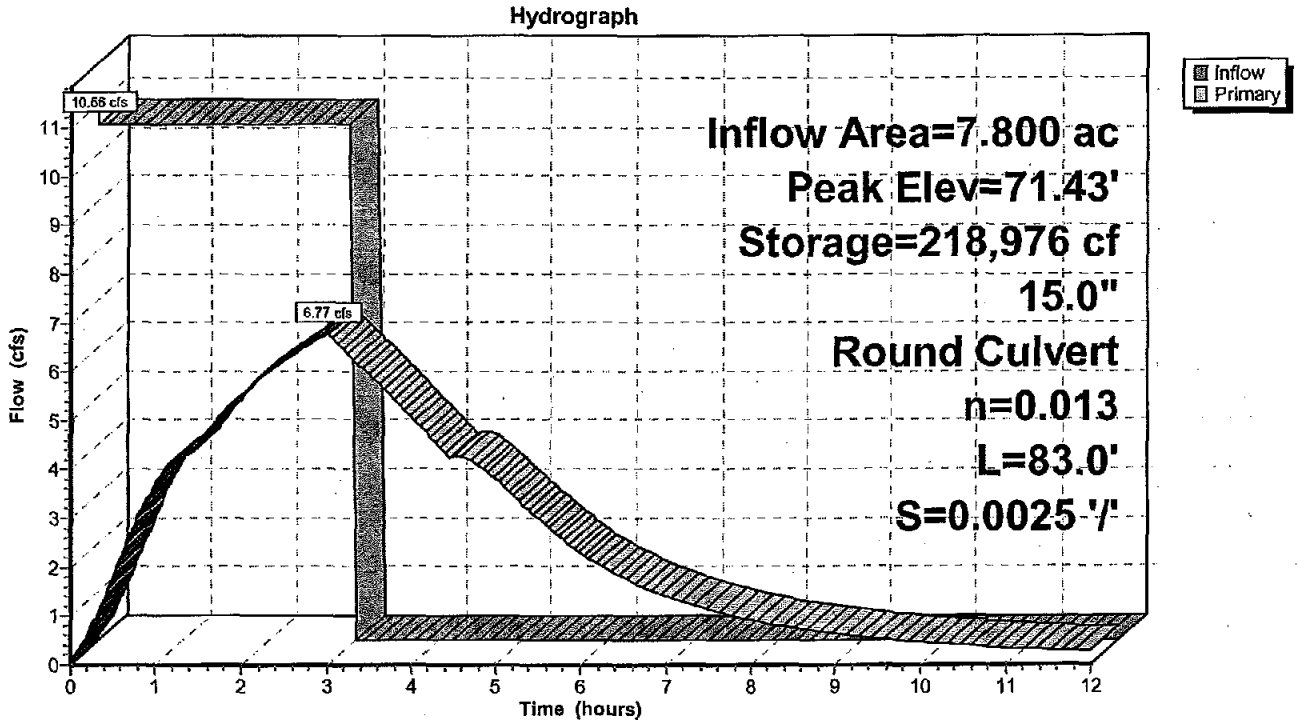
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=6.77 cfs @ 3.01 hrs HW=71.43' (Free Discharge)
└**1=Culvert** (Barrel Controls 6.77 cfs @ 5.51 fps)

Pond Wythe Will BMP: Wythe Will BMP



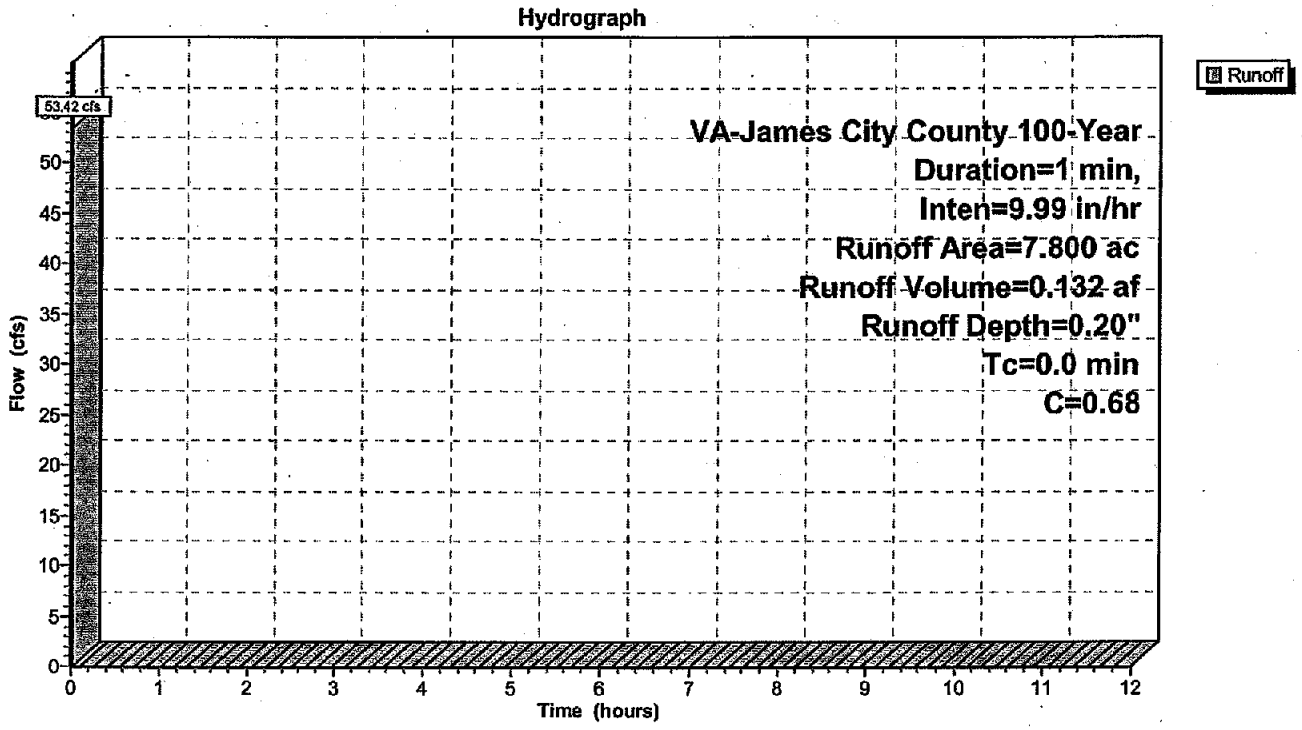
Summary for Subcatchment DA-BMP: DA-BMP

Runoff = 53.42 cfs @ 0.00 hrs, Volume= 0.132 af, Depth= 0.20"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 100-Year Duration=1 min, Inten=9.99 in/hr

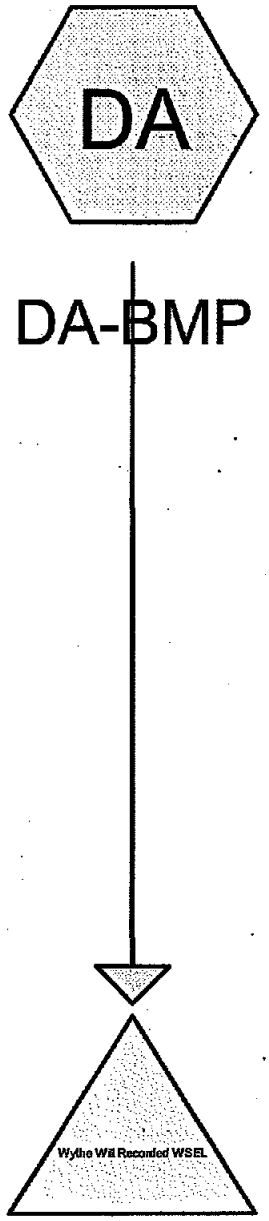
Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA-BMP: DA-BMP

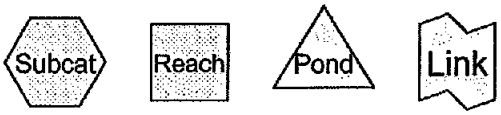


BMP STORMWATER CALCULATIONS

NORMAL POOL WSEL AT 65.20



Wythe Will Recorded
WSEL



Routing Diagram for 33516-Whyte Will BMP
Prepared by {enter your company name here}, Printed 3/12/2012
HydroCAD® 10.00 s/n 01238 © 2011 HydroCAD Software Solutions LLC

2-YEAR STORM

Summary for Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL

Inflow Area =	7.800 ac,	0.00% Impervious,	Inflow Depth >	1.86"	for 2-Year event
Inflow =	1.22 cfs @	0.00 hrs, Volume=	1.208 af		
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 100%,	Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 65.20' Surf.Area= 0 sf Storage= 84,480 cf
Peak Elev= 67.57' @ 12.00 hrs Surf.Area= 0 sf Storage= 137,047 cf (52,567 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (222,213 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

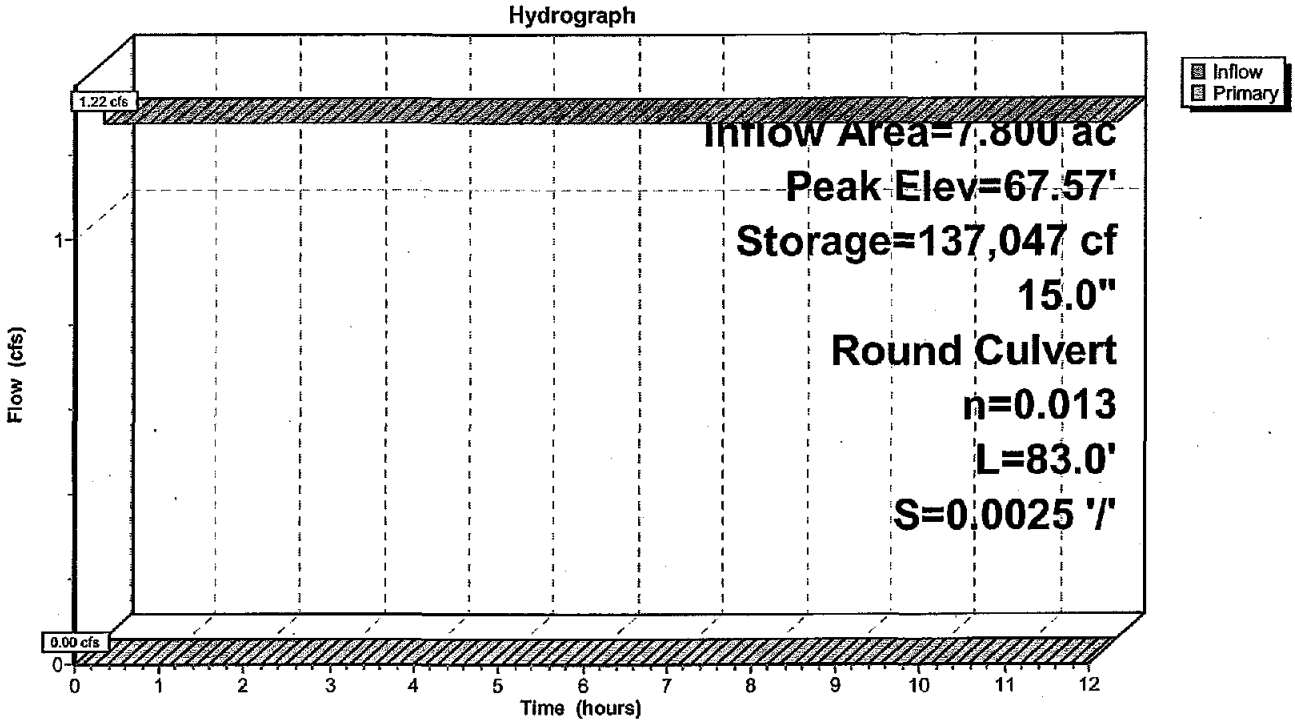
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.20' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL



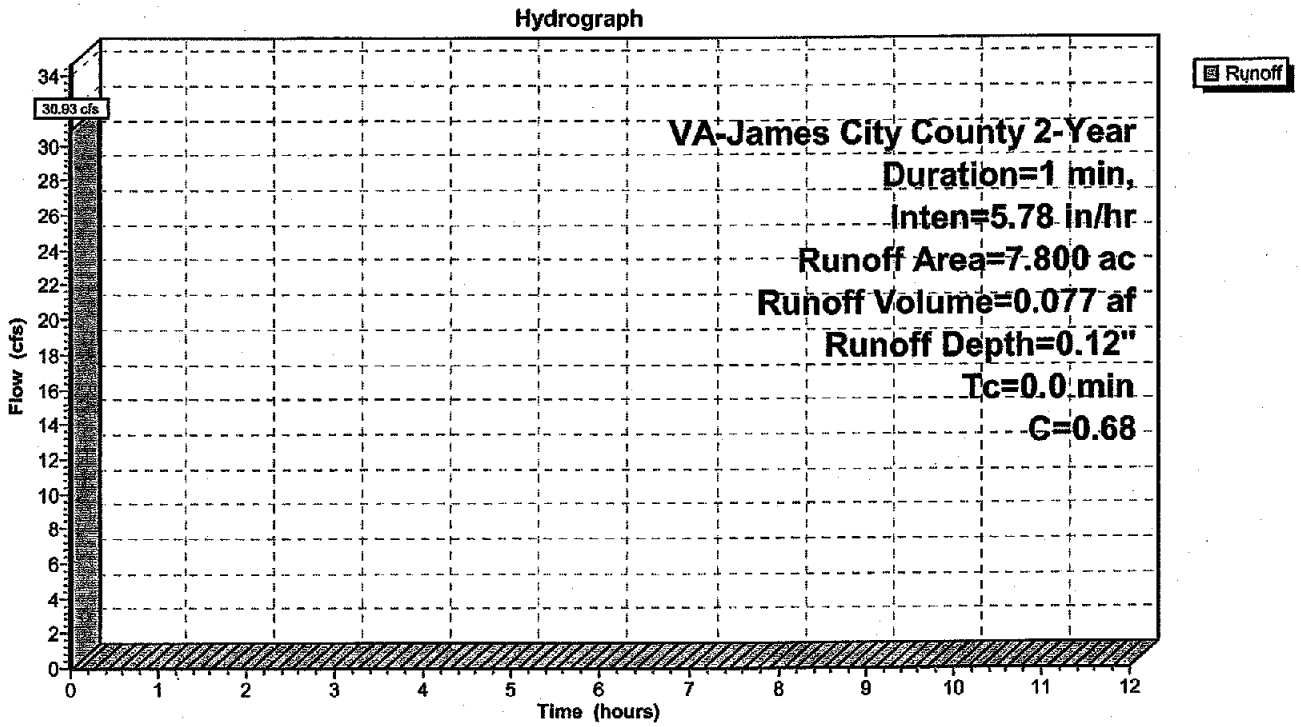
Summary for Subcatchment DA: DA-BMP

Runoff = 30.93 cfs @ 0.00 hrs, Volume= 0.077 af, Depth= 0.12"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 2-Year Duration=1 min, Inten=5.78 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA: DA-BMP



10-YEAR STORM

Summary for Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL

Inflow Area = 7.800 ac, 0.00% Impervious, Inflow Depth = 3.42" for 10-Year event
Inflow = 2.33 cfs @ 0.00 hrs, Volume= 2.226 af
Outflow = 1.79 cfs @ 11.55 hrs, Volume= 0.369 af, Atten= 23%, Lag= 692.9 min
Primary = 1.79 cfs @ 11.55 hrs, Volume= 0.369 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 65.20' Surf.Area= 0 sf Storage= 84,480 cf
Peak Elev= 69.62' @ 11.55 hrs Surf.Area= 0 sf Storage= 167,941 cf (83,461 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (222,213 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 284.4 min (630.9 - 346.5)

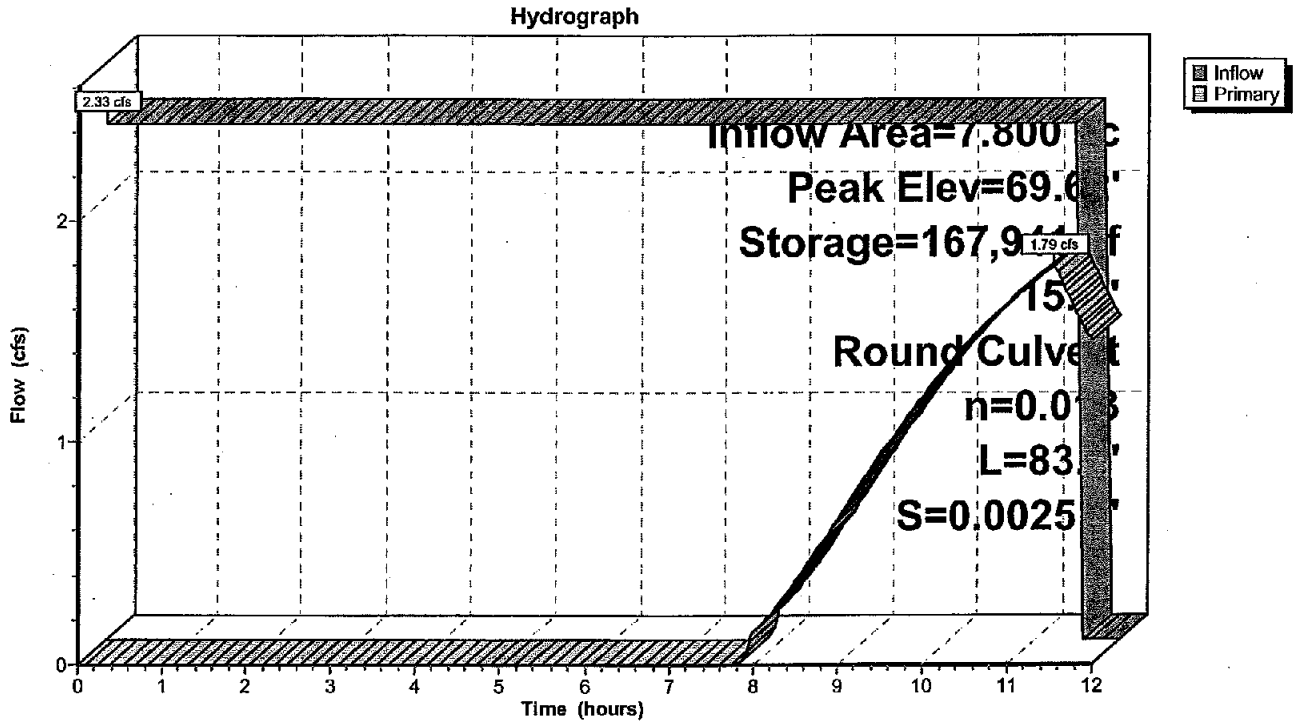
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=1.79 cfs @ 11.55 hrs HW=69.62' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.79 cfs @ 2.83 fps)

Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL



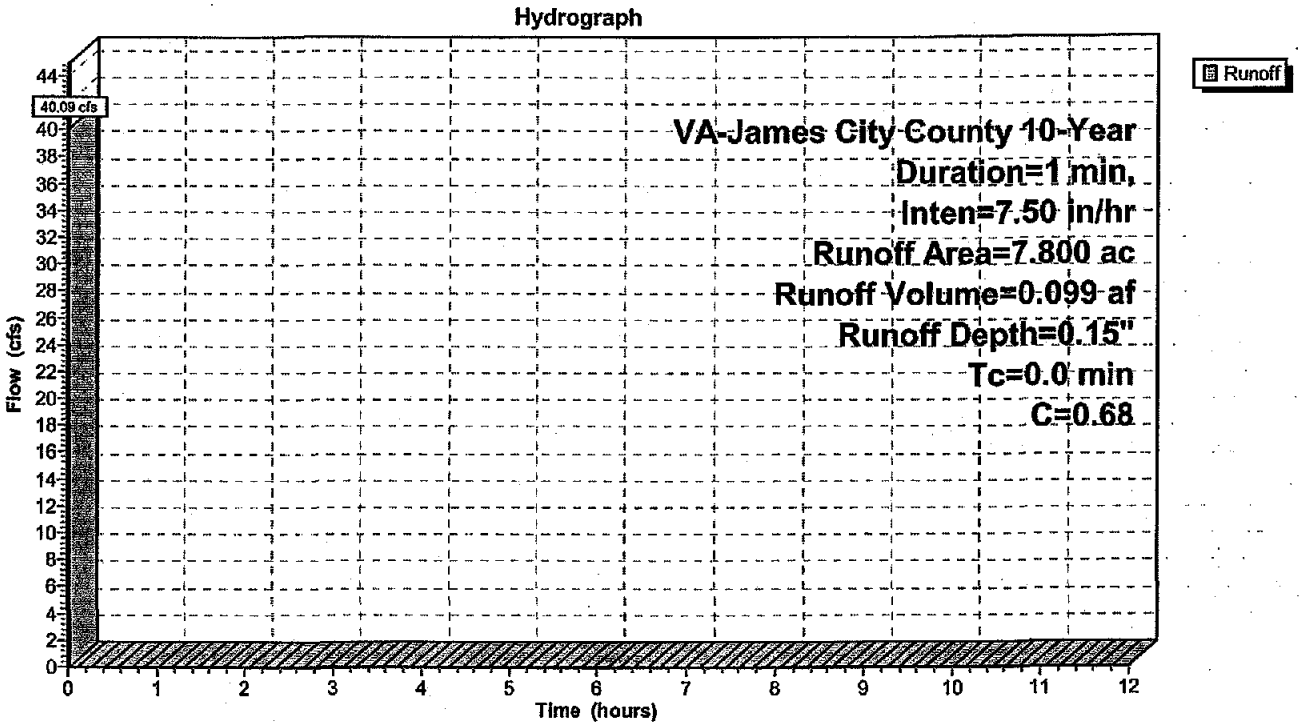
Summary for Subcatchment DA: DA-BMP

Runoff = 40.09 cfs @ 0.00 hrs, Volume= 0.099 af, Depth= 0.15"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 10-Year Duration=1 min, Inten=7.50 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA: DA-BMP



25-YEAR STORM

Summary for Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL

Inflow Area = 7.800 ac, 0.00% Impervious, Inflow Depth = 4.10" for 25-Year event
Inflow = 4.28 cfs @ 0.00 hrs, Volume= 2.662 af
Outflow = 3.29 cfs @ 7.50 hrs, Volume= 1.006 af, Atten= 23%, Lag= 449.9 min
Primary = 3.29 cfs @ 7.50 hrs, Volume= 1.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 65.20' Surf.Area= 0 sf Storage= 84,480 cf
Peak Elev= 70.02' @ 7.50 hrs Surf.Area= 0 sf Storage= 178,458 cf (93,978 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (222,213 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 238.5 min (463.5 - 225.0)

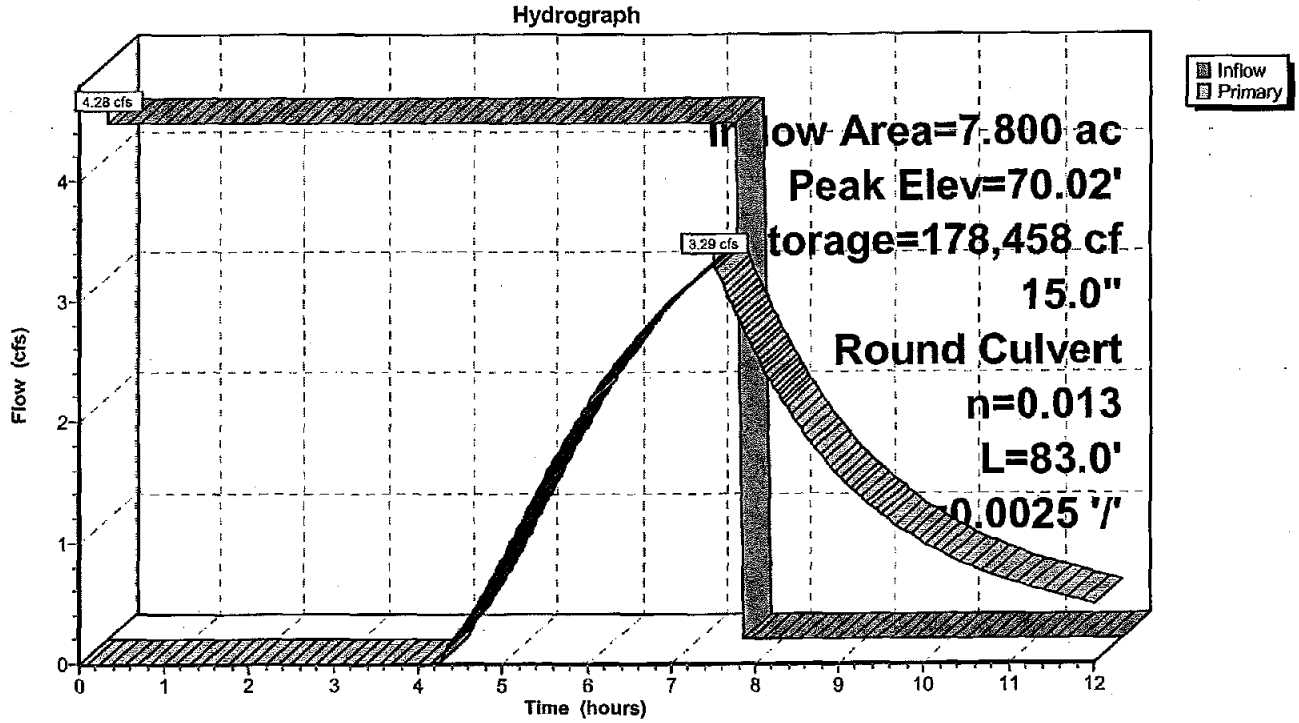
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=3.29 cfs @ 7.50 hrs HW=70.02' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.29 cfs @ 3.34 fps)

Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL



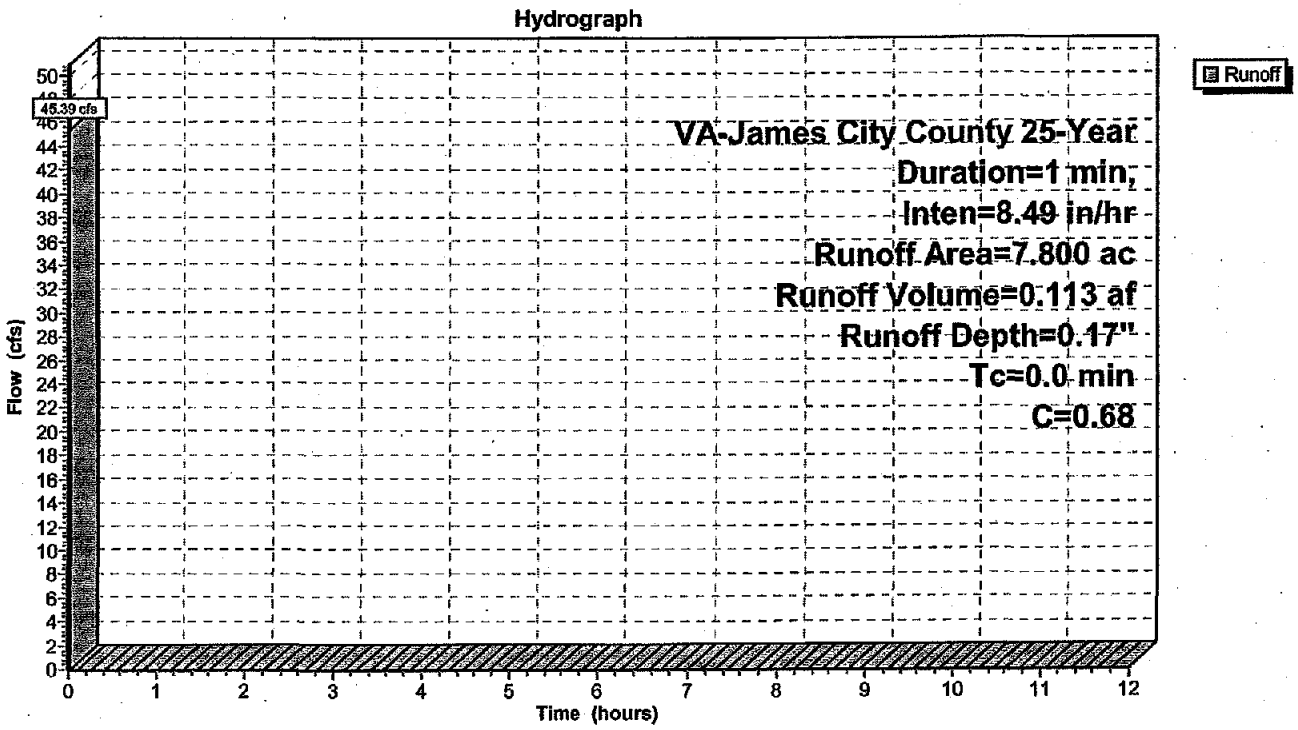
Summary for Subcatchment DA: DA-BMP

Runoff = 45.39 cfs @ 0.00 hrs, Volume= 0.113 af, Depth= 0.17"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 25-Year Duration=1 min, Inten=8.49 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA: DA-BMP



100-YEAR STORM

Summary for Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL

Inflow Area = 7.800 ac, 0.00% Impervious, Inflow Depth = 5.83" for 100-Year event
Inflow = 6.77 cfs @ 0.00 hrs, Volume= 3.792 af
Outflow = 5.24 cfs @ 6.75 hrs, Volume= 2.106 af, Atten= 23%, Lag= 404.9 min
Primary = 5.24 cfs @ 6.75 hrs, Volume= 2.106 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs / 4
Starting Elev= 65.20' Surf.Area= 0 sf Storage= 84,480 cf
Peak Elev= 70.78' @ 6.75 hrs Surf.Area= 0 sf Storage= 200,033 cf (115,553 cf above start)
Flood Elev= 74.20' Surf.Area= 0 sf Storage= 306,693 cf (222,213 cf above start)

Plug-Flow detention time= 641.9 min calculated for 0.158 af (4% of inflow)
Center-of-Mass det. time= 200.9 min (403.4 - 202.5)

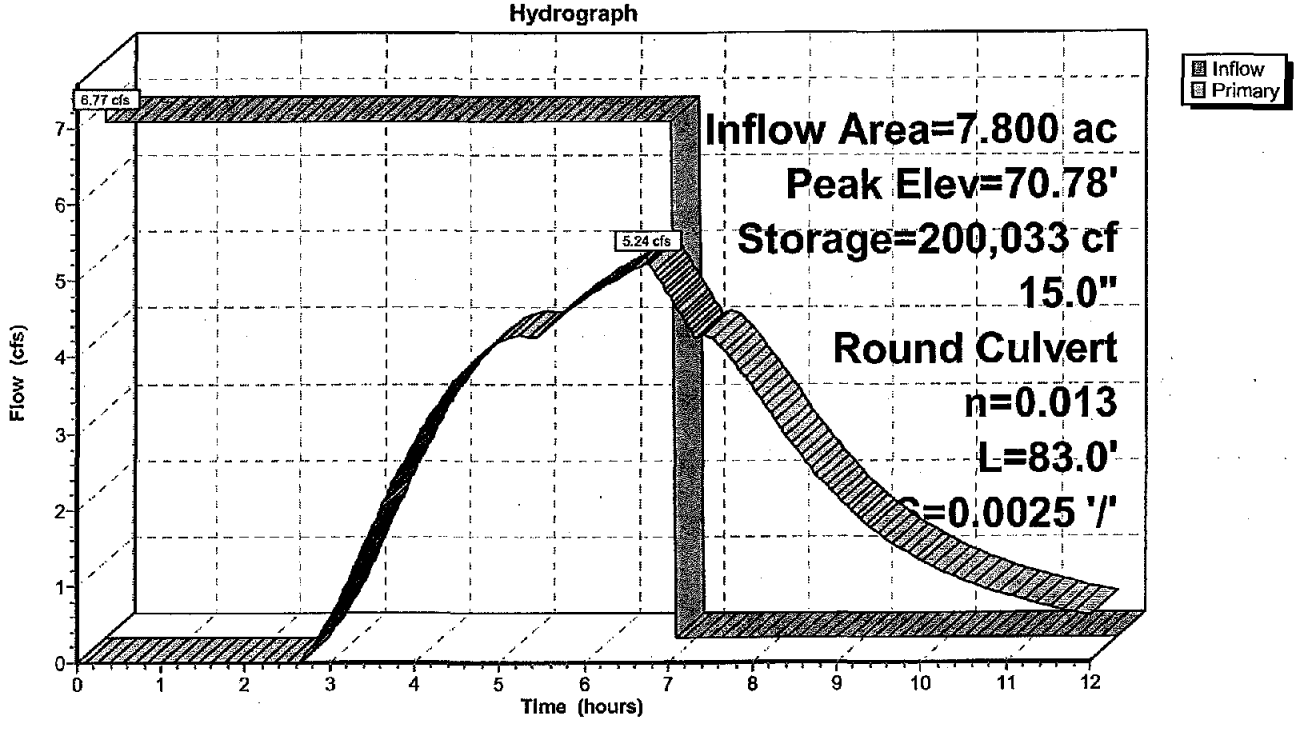
Volume	Invert	Avail.Storage	Storage Description
#1	59.98'	448,875 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
59.98	0
60.00	1,021
61.00	8,856
62.00	23,735
63.00	40,674
64.00	59,409
65.00	80,011
66.00	102,356
67.00	126,130
68.00	145,406
69.00	151,329
70.00	177,987
71.00	206,132
72.00	235,795
73.00	267,013
74.00	299,811
75.00	334,220
76.00	370,368
77.00	408,670
78.00	448,875

Device	Routing	Invert	Outlet Devices
#1	Primary	68.77'	**15.0" Round Culvert** L= 83.0' Ke= 0.500 Inlet / Outlet Invert= 68.77' / 68.56' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=5.24 cfs @ 6.75 hrs HW=70.78' (Free Discharge)
└**1=Culvert** (Barrel Controls 5.24 cfs @ 4.27 fps)

Pond Wythe Will Recorded WSEL: Wythe Will Recorded WSEL



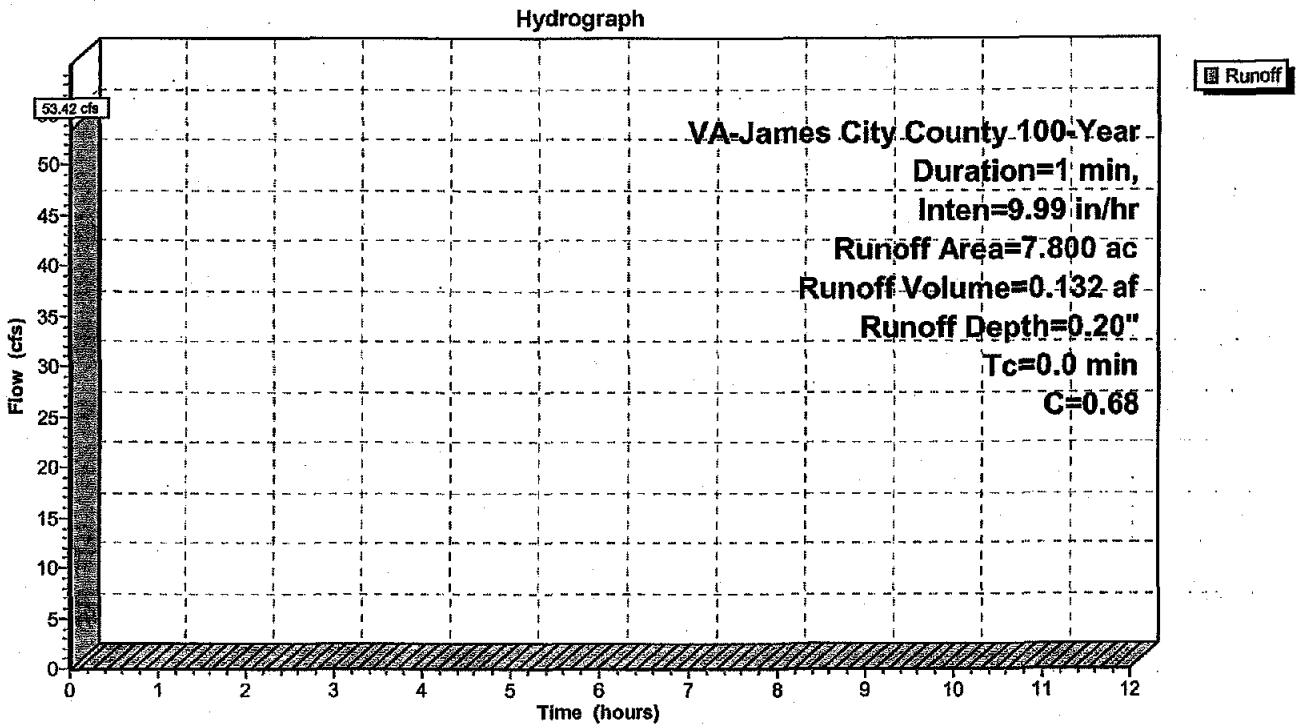
Summary for Subcatchment DA: DA-BMP

Runoff = 53.42 cfs @ 0.00 hrs, Volume= 0.132 af, Depth= 0.20"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-12.00 hrs, dt= 0.03 hrs
VA-James City County 100-Year Duration=1 min, Inten=9.99 in/hr

Area (ac)	C	Description
4.670	0.90	Impervious
3.130	0.35	Pervious
7.800	0.68	Weighted Average
7.800		100.00% Pervious Area

Subcatchment DA: DA-BMP



RECEIVING ROAD CULVERT CALCULATIONS

Culvert Calculations

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.04910	ft/ft
Normal Depth	1.25	ft
Diameter	1.25	ft
Discharge	14.31	ft^3/s

Results

Discharge	14.31	ft^3/s
Normal Depth	1.25	ft
Flow Area	1.23	ft^2
Wetted Perimeter	3.93	ft
Hydraulic Radius	0.31	ft
Top Width	0.00	ft
Critical Depth	1.23	ft
Percent Full	100.0	%
Critical Slope	0.04471	ft/ft
Velocity	11.66	ft/s
Velocity Head	2.11	ft
Specific Energy	3.36	ft
Froude Number	0.00	
Maximum Discharge	15.40	ft^3/s
Discharge Full	14.31	ft^3/s
Slope Full	0.04910	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Culvert Calculations

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.25	ft
Critical Depth	1.23	ft
Channel Slope	0.04910	ft/ft
Critical Slope	0.04471	ft/ft

GEOTECHNICAL REPORT

GET Solutions, Inc.

Geotechnical • Environmental • Testing

February 22, 2012

TO: **Liberty Trust Property**
5626 Eastport Boulevard
Richmond, VA 23231

Attn: Mr. Dana Dame

RE: Report of Subsurface Investigation and Geotechnical Engineering Services
BMP Facility – Wythe Will Distribution
3612 La Grange Parkway
James City County, Virginia
G E T Project No: WM11-167G Revised

Dear Mr. Dame:

In compliance with your instructions, we have completed our Subsurface Investigation and Geotechnical Engineering Services for the above referenced project. The results of this study are presented in this report. The project site is located at 3612 La Grange Parkway within Stonehouse Commerce Park in James City County, Virginia.

Project Description and Purpose:

The site development was completed about 5 years ago. The site consists of a large warehouse building, pavement areas, landscaped areas, a BMP facility, and other associated infrastructure.

The BMP facility is located on the southwest corner of the intersection of Six Mount Zion Road and La Grange Parkway and to the east of the Wythe Will Distribution building. The BMP facility was intended to be an infiltration type facility, but the basin normally holds several feet of water and does not appear to be functioning as intended.

Based on the as-built drawing (dated November 4, 2011), provided by VHB, Inc., the bottom of the basin generally ranges in elevation from about 60 feet to 61 feet MSL. The BMP facility was created entirely by excavation, with surrounding grades ranging from about elevation 75 feet to 86 feet MSL.

The purpose of our investigation was to determine the subsurface soil and groundwater conditions and the permeability of the subsurface soils within the bottom of the BMP facility. Since it was not feasible to dewater the entire BMP basin at this time, our field investigation was limited to investigating the subsurface soil and groundwater conditions and permeability of the subsurface soils located around the perimeter of the BMP facility.

1592 Penniman Road, Suite e • Williamsburg, Virginia 23185 • Phone: (757)-564-6452 • Fax: (757)-564-6453
info@getsolutionsinc.com

Field Exploration:

In order to explore the general subsurface soil types, four (4) 25 to 30-foot deep Standard Penetration Test (SPT) borings (designated as B-1 through B-4) were drilled near the top edge of the slope surrounding the BMP facility. These borings were advanced to depths sufficient to extend to an elevation of at least 3 feet or more below the bottom elevation of the BMP facility.

The SPT borings were performed with the use of rotary wash "mud" drilling procedures in general accordance with ASTM D 1586. The tests were performed continuously from the existing ground surface to a depth of 12 feet, and generally at 5-foot intervals thereafter. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches, using an automatic hammer. The number of blows required to drive the sampler each 6-inch increment of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value (uncorrected for automatic hammer). A representative portion of each disturbed split-spoon sample was collected with each SPT, placed in a glass jar, sealed, labeled, and returned to our laboratory for review.

In order to determine the permeability of the subsurface soils in the BMP facility's "zone of infiltration," which is from the bottom of the BMP facility to about 3 feet below the bottom of the BMP facility, a thin-walled tube sample was obtained within each of the four bore holes at a similar elevation. The tubes were sealed to prevent moisture loss and returned to the laboratory for permeability testing in accordance with ASTM D2434 "Standard Test Method for Permeability of Granular Soil (Constant Head).

The boring locations were established and staked in the field by a representative of **G E T Solutions, Inc.** The approximate boring locations are shown on the Boring Location Plan of Appendix I, which was reproduced based on as-built drawing (dated November 4, 2011) provided by VHB, Inc.

Laboratory Procedures:

Representative portions of all soil samples collected during drilling were sealed in glass jars, labeled, and transferred to our laboratory for classification and analysis. The soil classification was performed by a Geologist in accordance with ASTM D2488. The classification system for soil exploration is included in Appendix II.

Four (4) representative soil samples were selected and subjected to natural moisture, Atterberg limits, grain size testing and analysis in order to corroborate the visual classification. These test results are provided in the "Summary of Laboratory Test Results" in Appendix V and are also presented on the "Boring Log" sheets in Appendix III.

Subsurface Soil Conditions:

The results of our field exploration program are indicated in a tabular form below:

Table I – Subsurface Soil Conditions

AVERAGE DEPTH (feet)	STRATUM	DESCRIPTION	RANGES OF SPT[1] N-VALUES
0 to 0.25-0.33	Topsoil	3 to 4 Inches of Topsoil	
0.25 to 2.0	FILL	Silty, fine to medium SAND (SM) with trace Gravel and Clay *FILL materials was not observed at boring locations B-1, B-3, and B-4*	7
0.25-0.33 to 25.0-30.0	I	SAND (SM, SP-SM, and SC) with varying amounts of Silt, Clay, and organics	4 - 32
5.0-8.0 to 7.0-10.0	IA	Lean and Fat CLAY (CL and CH) with varying amounts of Sand *This cohesive soil layer was not present at boring location B-2.*	7 - 19
17.0-22.0 to 20.0-25.0	IB	Lean CLAY (CL) with varying amounts of Sand and Clayey, fine SAND (SC) *This cohesive layer was not observed at boring location B-1.*	3 - 5

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot

The topsoil designation references the presence of surfical organic laden soil, and does not represent any particular quality specification. This material should be tested for approval prior to its use.

The subsurface description is of a generalized nature provided to highlight the major soil strata encountered. The records of the subsurface exploration are included in Appendix III (Boring Logs) and in Appendix IV (Generalized Soil Profile), which should be reviewed for specific information as to the individual borings. The stratifications shown on the records of the subsurface exploration represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the transition may be gradual or occur between sample intervals.

Groundwater Information:

The groundwater level was recorded at the boring locations and as observed through the relative wetness of the recovered soil samples during the drilling operations. The groundwater table is estimated to occur at depths ranging from 22 to 27 feet below current grades at the boring locations at the time of the drilling procedures. A temporary piezometer was installed at each boring location in order to obtain stabilized groundwater readings. Stabilized groundwater level readings ranged from 19.9 to 25.1 feet below current grades. Refer to Table II below for specific groundwater level readings and estimated elevations.

Table II – Groundwater Level Readings

Boring No.	Estimated Boring Elevation (MSL)	Groundwater Level at Time of Boring Completion (Below Current Grade)	Stabilized Groundwater Level (Below Current Grade)	Estimated Stabilized Groundwater Elevation (MSL)
B-1	83 feet	25 feet	24 feet	59 feet
B-2	86 feet	27 feet	25.1 feet	60.9 feet
B-3	80 feet	22 feet	20 feet	60 feet
B-4	78 feet	22 feet	19.9 feet	58.1 feet

It should be noted that these groundwater levels may be influenced by the presence of water within the BMP facility due to its close proximity. We recommend pumping the BMP basin dry and install monitoring wells within the actual bottom of the BMP basin or its side slopes for a period of time. This would require dewatering operations following rain events in order to prevent water from ponding in the BMP facility.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, underdrains, and areas of covered soil (paved parking lots, side walks, etc.). In the project area, seasonal groundwater fluctuations of ± 3 feet are common; however, greater fluctuations have been documented. Since it appears that the groundwater table is influencing the normal pool elevation within the BMP basin, we recommend installing groundwater wells in the pond area or monitor them for a period of time to further substantiate the groundwater level and determine its seasonal fluctuations.

Infiltration Testing:

As previously mentioned, the BMP facility was intended to be an infiltration type facility, but the basin normally holds several feet of water and does not appear to be functioning as intended. Since we could not access the actual bottom of the BMP facility, a thin-walled tube sample was obtained within each of the four (4) bore holes (located at the top of the slope surrounding the BMP facility) at elevations corresponding to the bottom of the BMP basin. Specifically, the tube samples were obtained at elevations ranging from 58 to 61 feet MSL. The tubes were sealed to prevent moisture loss and returned to the laboratory for permeability testing in accordance with ASTM D2434 "Standard Test Method for Permeability of Granular Soil (Constant Head). The intent is to use the results of these tests to correlate with the anticipated permeability of the actual soils located within the bottom of the BMP basin.

Permeability testing (designated as INF-1 through INF-4) was performed on each of the tube samples that were obtained at depths ranging from 18 to 27 feet below current grades (corresponding to elevations 58 to 61 feet MSL). The permeability testing was performed in our laboratory in accordance with the procedures of ASTM D2434. The hydraulic conductivity of the subsurface soils at the locations and depths tested is below (Table III).

Table III – Infiltration Test Results

Infiltration Test	Boring Location	Depth of Tube Sample (feet)	Elevation of Tube Sample (feet)	-#200 Sieve (%)	Classification	Hydraulic Conductivity		Ksat Class
						(in/hr)	(cm/sec)	
INF-1	B-1	22-24	59-61	36	SM	0.028	1.94×10^{-5}	Moderately Low
INF-2	B-2	25-27	59-61	43	SM	0.024	1.71×10^{-5}	Moderately Low
INF-3	B-3	20-22	58-60	48	SM	0.015	1.09×10^{-5}	Moderately Low
INF-4	B-4	18-20	58-60	29	SM	0.065	4.59×10^{-5}	Moderately Low

We appreciate the opportunity to be of continuous service to you on this project, and we trust that the information contained herein meets your immediate need. Please feel free to call this office with any questions that you may have.

Respectfully Submitted,
G E T Solutions, Inc.

James R. Wheeler
Project Geologist

Camille A. Kattan, P.E.
Principal Engineer
VA Reg. # 018045

COMMONWEALTH OF VIRGINIA
CAMILLE A. KATTAN
Lic. No. 018045
PROFESSIONAL ENGINEER

Copies: (1) Client via e-mail (ddame@libertyproperty.com)
(1) VHB, Inc. (sromeo@vhb.com)

APPENDICES

I BORING LOCATION PLAN

II CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

III BORING LOGS

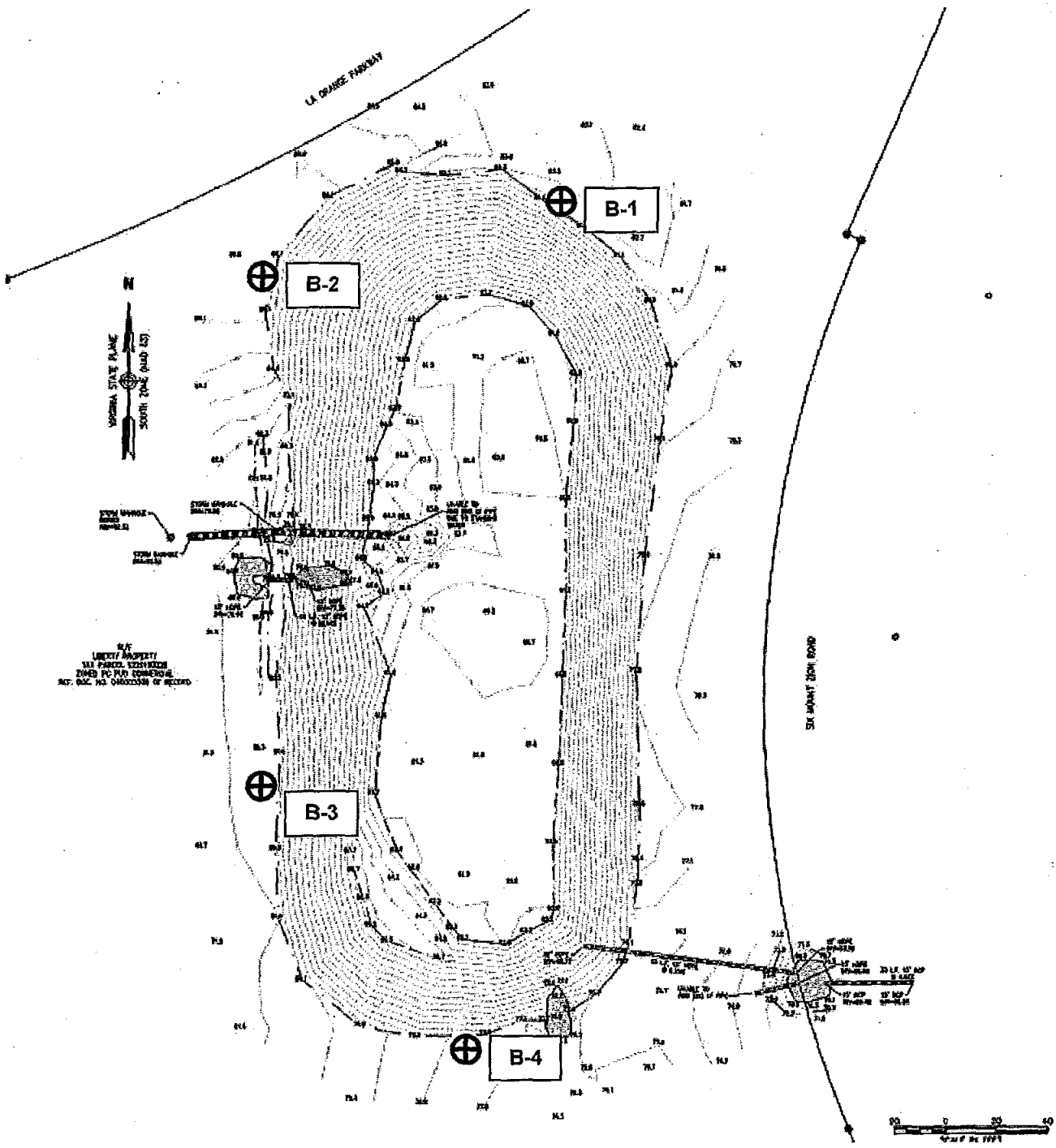
IV GENERALIZED SOIL PROFILE

V LABORATORY TEST RESULTS

APPENDIX I

BORING LOCATION PLAN

Locations are approximate based on site visit sketch.



Boring Location Plan

Project: BMP Facility – Wythe Will Distribution
3612 La Grange Parkway
James City County, Virginia

Project No: WM11-167G Revised

Client: Liberty Property Trust

Scale: As Drawn
Date: 2/22/2012
Plot By: JW

APPENDIX II

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

GET Solutions, Inc.
Geotechnical • Environmental • Testing

Virginia Beach Office
204 Grayson Road
Virginia Beach, VA 23462
(757) 518-1703

Williamsburg Office
1592 Penniman Rd. Suite E
Williamsburg, Virginia 23185
(757) 564-6452

Elizabeth City Office
504 East Elizabeth St. Suite 2
Elizabeth City, NC 27909
(252) 335-9765

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

Standard Penetration Test (SPT), N-value

Standard Penetration Tests (SPT) were performed in the field in general accordance with ASTM D 1586. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler each 6-inch increment (4 increments for each soil sample) of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value.

NON COHESIVE SOILS

(SILT, SAND, GRAVEL and Combinations)

Relative Density

Very Loose	4 blows/ft. or less
Loose	5 to 10 blows/ft.
Medium Dense	11 to 30 blows/ft.
Dense	31 to 50 blows/ft.
Very Dense	51 blows/ft. or more

Particle Size Identification

Boulders	8 inch diameter or more	
Cobbles	3 to 8 inch diameter	
Gravel	Coarse	1 to 3 inch diameter
	Medium	$^1/_2$ to 1 inch diameter
	Fine	$^1/_4$ to $^1/_2$ inch diameter
Sand	Coarse	2.00 mm to $^1/_4$ inch (diameter of pencil lead)
	Medium	0.42 to 2.00 mm (diameter of broom straw)
	Fine	0.074 to 0.42 mm (diameter of human hair)
Silt		0.002 to 0.074 mm (cannot see particles)

COHESIVE SOILS

(CLAY, SILT and Combinations)

Consistency

Very Soft	2 blows/ft. or less
Soft	3 to 4 blows/ft.
Medium Stiff	5 to 8 blows/ft.
Stiff	9 to 15 blows/ft.
Very Stiff	16 to 30 blows/ft.
Hard	31 blows/ft. or more

Relative Proportions

Descriptive Term	Percent
Trace	0-5
Few	5-10
Little	15-25
Some	30-45
Mostly	50-100

Strata Changes

In the column "Description" on the boring log, the horizontal lines represent approximate strata changes.

Groundwater Readings

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as tidal influences and man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.).

CLASSIFICATION SYMBOLS (ASTM D 2487 and D 2488)

Coarse Grained Soils

More than 50% retained on No. 200 sieve

GW - Well-graded Gravel
GP - Poorly graded Gravel
GW-GM - Well-graded Gravel w/Silt
GW-GC - Well-graded Gravel w/Clay
GP-GM - Poorly graded Gravel w/Silt
GP-GC - Poorly graded Gravel w/Clay
GM - Silty Gravel
GC - Clayey Gravel
GC-GM - Silty, Clayey Gravel
SW - Well-graded Sand
SP - Poorly graded Sand
SW-SM - Well-graded Sand w/Silt
SW-SC - Well-graded Sand w/Clay
SP-SM - Poorly graded Sand w/Silt
SP-SC - Poorly graded Sand w/Clay
SM - Silty Sand
SC - Clayey Sand
SC-SM - Silty, Clayey Sand

Fine-Grained Soils

50% or more passes the No. 200 sieve

CL - Lean Clay
CL-ML - Silty Clay
ML - Silt
OL - Organic Clay/Silt

Liquid Limit 50% or greater

CH - Fat Clay
MH - Elastic Silt
OH - Organic Clay/Silt

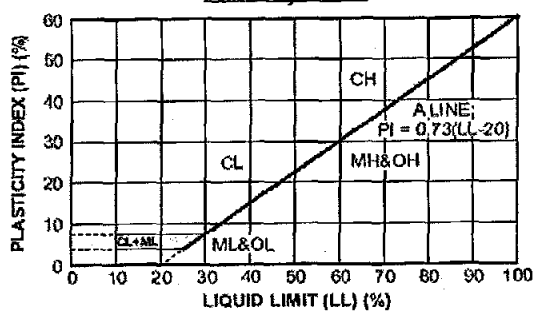
Highly Organic Soils

PT - Peat

Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent	GW, GP, SW,SP
More than 12 percent	GM, GC, SM, SC
5 to 12 percent	Borderline cases requiring dual symbols

Plasticity Chart



APPENDIX III

BORING LOGS

GET Solutions, Inc.

LOG OF BORING No. B-1

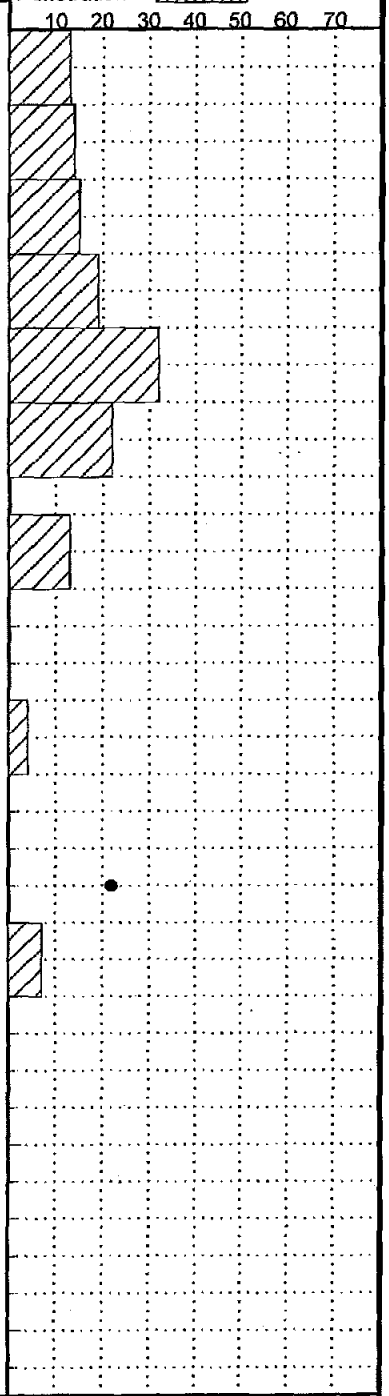
PROJECT: BMP Facility - Wythe Will Distribution
CLIENT: Liberty Trust Property
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM11-167G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:** 83'
DRILLER: GET Solutions Inc. — **LOGGED BY:** J. Wheeler
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 12-28-2012
DEPTH TO WATER - INITIAL*: ▽ 25' **AFTER 24 HOURS:** ▽ 24' **CAVING** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows Per 6"	N-Value	% <#200
	0	0								
			3 Inches of Topsoil (0.25)		1	21	SS	5 6 7 13	13	
			Brown, moist, Silty, fine to medium SAND (SM) with trace organics, Medium Dense (2.5)		2	14	SS	7 7 7 7	14	
80		5	Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense (5)		3	23	SS	7 8 7 7	15	
			Mottled, gray-orangish brown, moist, Lean CLAY (CL) with little Sand, Stiff to Very Stiff (8)		4	18	SS	6 8 11 13	19	
75	2.5	10	Orangish brown, moist, Silty, fine SAND (SM), Dense (10)		5	17	SS	8 13 19 17	32	
			Orangish brown, moist, Silty, fine to medium SAND (SM), Medium Dense (17)		6	11	SS	9 11 11 13	22	
70		15			7	12	SS	4 5 6 10	13	
	5									
65		20	Orangish brown to brown, moist, Silty, fine SAND (SM) with trace Clay, Very Loose to Loose		8	11	SS	1 2 2 1	4	
60			Hydraulic Conductivity at 22-24 Feet = 1.94 x 10-5 cm/sec		9	24	ST	- - - -		36
	7.5	25 ▽	Wet Below 24 Feet		10	13	SS	3 3 4 4	7	
			Boring terminated at 26 ft.							
55		30								
50	10	35								

(new title)

TEST RESULTS

Plastic Limit ├──┤ Liquid Limit
Moisture Content ●
Penetration ▨



Notes:

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

* The initial groundwater reading may not be indicative of the static groundwater level

59

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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LOG OF BORING No. B-2

PROJECT: BMP Facility - Wythe Will Distribution
CLIENT: Liberty Trust Property
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM11-167G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:** 86'
DRILLER: GET Solutions Inc. — **LOGGED BY:** J. Wheeler
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 12-28-2012
DEPTH TO WATER - INITIAL*: ▽ 27' **AFTER 24 HOURS:** ▽ 25.1' **CAVING** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Sample No.	Sample Recovery	Sample Type	Blows Per 6"	N-Value	% <#200
	0	0							
85			3 Inches of Topsoil (.25)	1	17	SS	3 3 4 5	7	
			Brown, moist, Silty, fine to medium SAND (SM) with trace Gravel and Clay, FILL, Loose (2)	2	22	SS	5 5 7 8	12	
		5	Brown, moist, Silty, fine to medium SAND (SM) with trace organics, Medium Dense (4)	3	16	SS	5 6 7 8	13	
80			Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose to Medium Dense (7)	4	17	SS	5 4 5 5	9	
	2.5		Orangish brown, moist, Poorly graded, fine to medium SAND (SP-SM) with Silt, Loose (8)	5	15	SS	2 3 4 4	7	
		10	Orangish brown, moist, Silty, fine to medium SAND (SM), Loose to Medium Dense	6	15	SS	4 7 8 9	15	
75				7	17	SS	4 7 11 12	18	
		15							
70	5		(17)						
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense	8	18	SS	6 8 7 9	15	
		20							
65			(22)						
			Orangish brown, moist, Lean CLAY (CL) with Sand, Soft	9	18	SS	1 1 2 2	3	
	7.5	25	(25)						
60			Orangish brown, wet, Silty, fine SAND (SM) with trace Clay, Loose	10	24	ST	- - - -		43
			Hydraulic Conductivity at 25-27 Feet = 1.71 x 10-5 cm/sec	11	16	SS	3 3 4 5	7	
		30							
55			Boring terminated at 30 ft.						
	10								
		35							
50									

(new title)
TEST RESULTS
Plastic Limit ├──┤ Liquid Limit
Moisture Content ●
Penetration ▨
10 20 30 40 50 60 70

Notes:

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

* The initial groundwater reading may not be indicative of the static groundwater level.

60

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.
Geotechnical • Environmental • Testing

LOG OF BORING No. B-3

PROJECT: BMP Facility - Wythe Will Distribution
CLIENT: Liberty Trust Property
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM11-167G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:** 80'
DRILLER: GET Solutions Inc. — **LOGGED BY:** J. Wheeler
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 12-29-2012
DEPTH TO WATER - INITIAL*: ▽ 22' **AFTER 24 HOURS:** ▽ 20' **CAVING** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Sample No.	Sample Recovery	Sample Type	Blows Per 6"	N-Value	% <#200
80	0	0	4 Inches of Topsoil (0.33)	1	17	SS	2 3 5 5	8	
			Brown to orangish brown, moist, Silty, fine to medium SAND (SM) with trace organics, Loose (2)	2	20	SS	4 5 4 6	9	
75		5	Orangish brown, moist, Silty, fine to medium SAND (SM), Loose to Medium Dense Trace Clay from 4 to 6 Feet	3	15	SS	5 5 6 7	11	
	2.5			4	23	SS	7 9 9 11	18	
			Mottled, orangish brown-gray, moist, Fat CLAY (CH) with trace Sand, Medium Stiff (8)	5	16	SS	4 4 3 4	7	
70		10	Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense (10)	6	18	SS	3 9 12 10	21	
				7	12	SS	5 7 9 8	16	
65	5	15							
			Orangish brown, moist, Sandy, Lean CLAY (CL), Medium Stiff (17)	8	22	SS	2 2 3 3	5	
60		20	Orangish brown, wet, Silty, fine SAND (SM) with trace Clay, Loose (20) Hydraulic Conductivity at 20-22 Feet = 1.09 x 10-5 cm/sec	9	24	ST	- - - -		48
	7.5	25		10	20	SS	3 4 5 6	9	
55			Boring terminated at 25 ft.						
50	10	30							
45		35							

(new title)
TEST RESULTS
Plastic Limit ├──┤ Liquid Limit
Moisture Content ●
Penetration ▨
10 20 30 40 50 60 70

Notes:

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

* The initial groundwater reading may not be indicative of the static groundwater level

61

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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LOG OF BORING No. B-4

PROJECT: BMP Facility - Wythe Will Distribution
CLIENT: Liberty Trust Property
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM11-167G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:** 78'
DRILLER: GET Solutions Inc. — **LOGGED BY:** J. Wheeler
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 12-29-2012
DEPTH TO WATER - INITIAL*: ▽ 22' — **AFTER 24 HOURS:** ▼ 19.9' — **CAVING** C.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows Per 6"	N-Value	% <#200
	0	0								
			3 Inches of Topsoil (0.25)		1	14	SS	1 2 3 2	5	
			Brown, moist, Silty, fine SAND (SM) with trace organics, Loose (2)		2	16	SS	3 4 4 4	8	
75		5	Brown to orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose to Medium Dense (6)		3	21	SS	8 9 12 10	21	
			Mottled, orangish brown-gray, moist, Sandy, Lean CLAY (CL), Stiff (7)		4	22	SS	9 7 8 10	15	
70	2.5		Orangish brown, moist, Silty, fine to medium SAND (SM), Medium Dense (10)		5	15	SS	4 6 7 6	13	
		10	Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense (12)		6	11	SS	4 5 6 7	11	
65			Orangish brown, moist, Clayey, fine SAND (SC), Loose (17)		7	16	SS	4 3 4 4	7	
		15								
	5									
60			Orangish brown, moist to wet, Silty, fine SAND (SM) with trace Clay, Loose Hydraulic Conductivity at 18-20 Feet = 4.59 x 10-5 cm/sec Wet Below 19.9 Feet		8	24	ST			29
		20								
55					9	19	SS	3 4 3 5	7	
	7.5	25	Boring terminated at 25 ft.							
50		30								
45	10	35								

(new title)

TEST RESULTS

Plastic Limit ├──┤ Liquid Limit

Moisture Content ●

Penetration ▨

10 20 30 40 50 60 70

Notes:

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

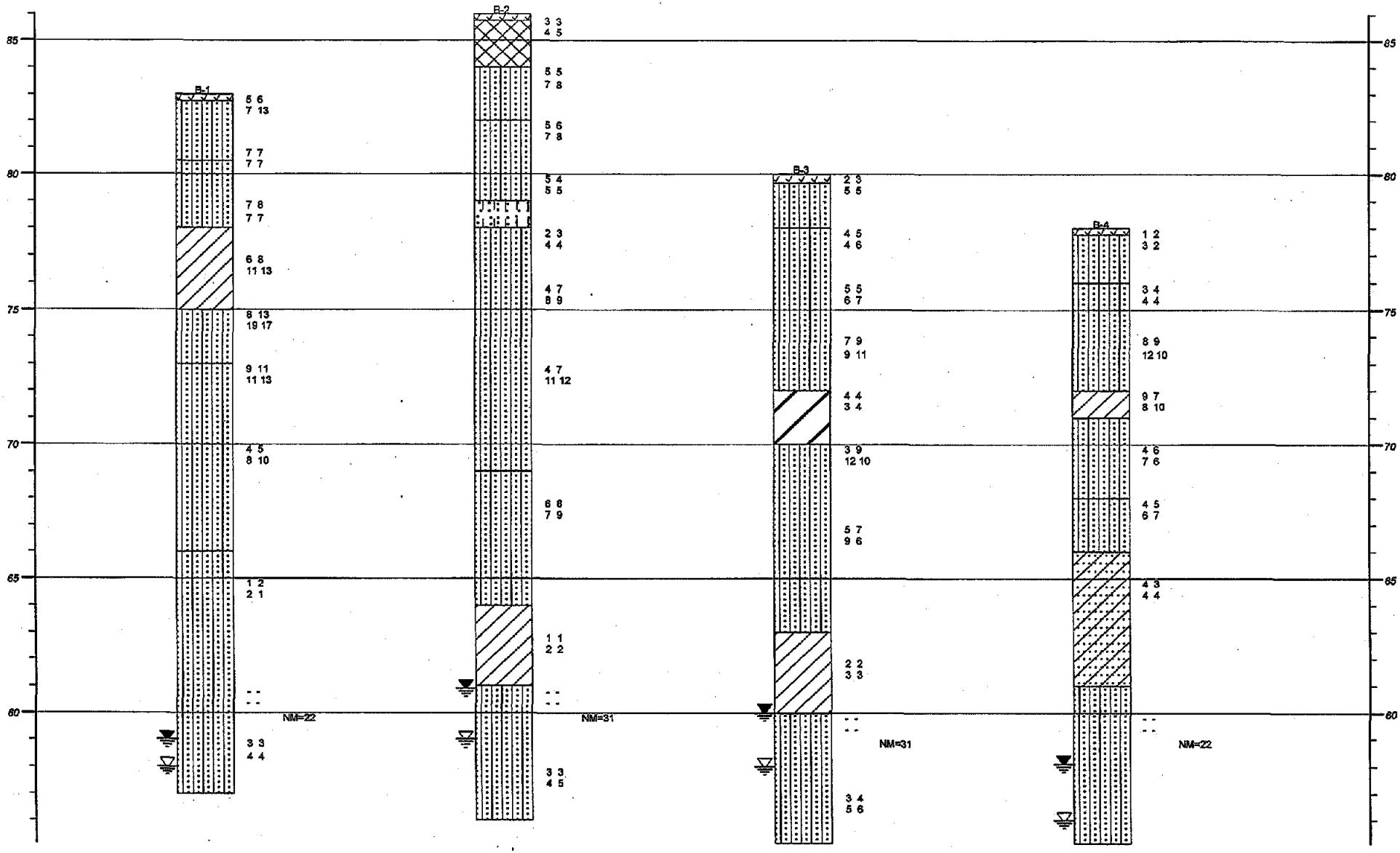
* The initial groundwater reading may not be indicative of the static groundwater level

62

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

APPENDIX IV

GENERALIZED SOIL PROFILE



Strata symbols

- Topsoil
- Silty sand
- Low plasticity clay
- Fill
- Poorly graded sand with silt
- High plasticity clay
- Clayey sand

GET Solutions, Inc.

GENERALIZED SOIL PROFILE

HORIZONTAL SCALE:	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: 1"=5'	JW	1/23/2012

BMP Facility - Wythe Will Distribution

James City County, Virginia

PROJECT NO. WM11-167G	FIGURE NUMBER
	1

APPENDIX V

SUMMARY OF LABORATORY TEST RESULTS

GET Solutions, Inc.

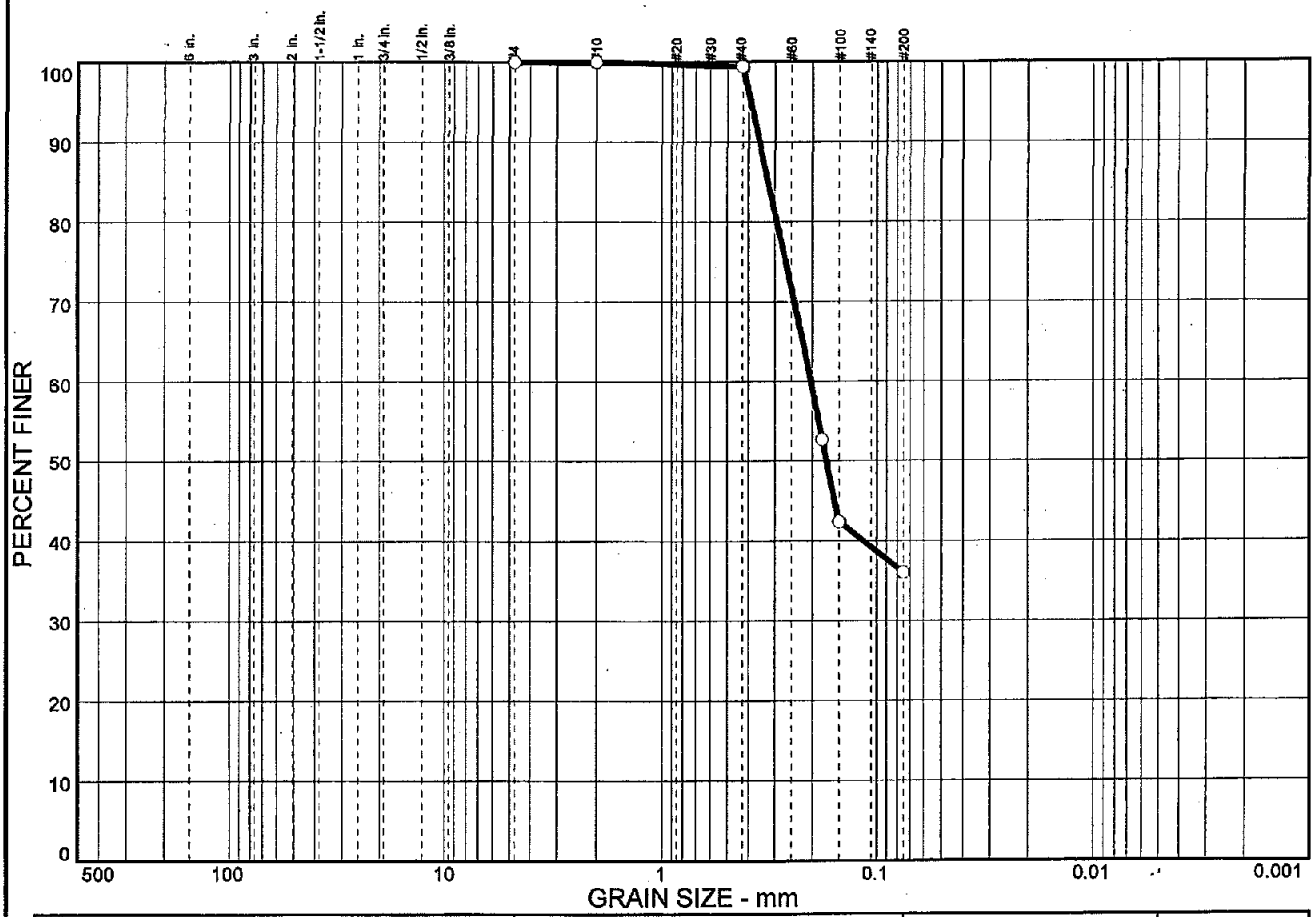
Geotechnical • Environmental • Testing

SUMMARY OF LABORATORY TEST RESULTS

BMP Facility – Wythe Will Distribution
3612 La Grange Parkway
James City County, Virginia
G E T Project No: WM11-167G

Boring No.	Sample Depth (ft)	Natural Moisture Content (%)	Percent Passing #200	Atterberg Limits (LL/PL/PI)	Unified Soil Classification
B-1	22-24	22	36	Non Plastic	SM
B-2	25-27	31	43	Non Plastic	SM
B-3	20-22	31	48	Non Plastic	SM
B-4	18-20	22	29	Non Plastic	SM

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	64.0	36.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	99.4		
#80	52.7		
#100	42.4		
#200	36.0		

* (no specification provided)

Soil Description

Orangish brown, Silty, fine SAND (SM) with trace Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.322 D_{60}= 0.204 D_{50}= 0.172
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

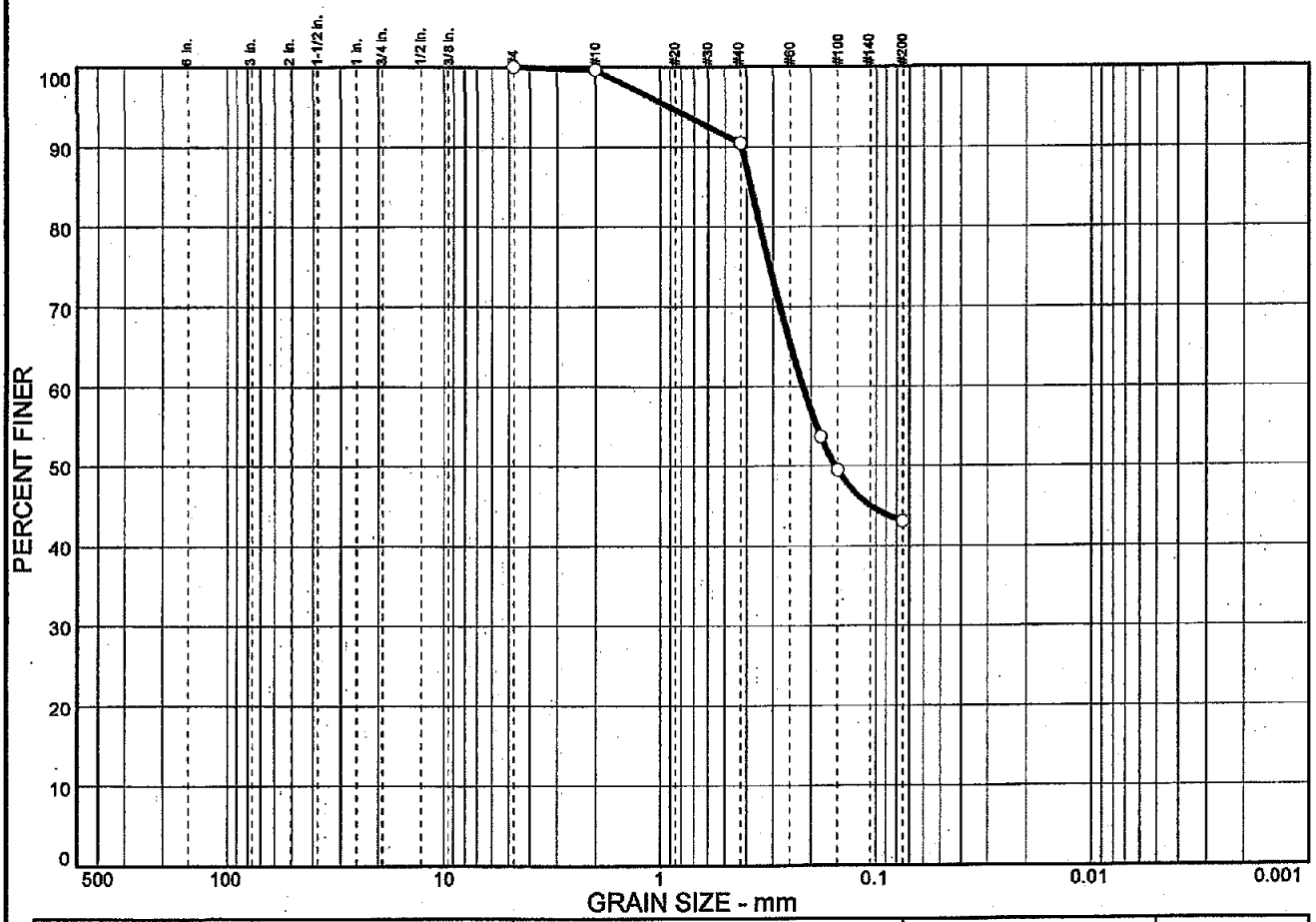
Sample B-1
Sample Obtained: 12/28/11

Sample No.: B-1 **Source of Sample:** **Date:** 12/28/11
Location: B-1 (22-24 Ft) **Elev./Depth:** 22-24 Ft

GET SOLUTIONS, INC.

Client: Liberty Trust Property
Project: BMP Facility - Wythe Will Distribution
Project No: WM11-167G **Figure** 1

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	56.9	43.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#40	90.5		
#80	53.7		
#100	49.5		
#200	43.1		

* (no specification provided)

Soil Description

Orangish brown, Silty, fine SAND (SM) with trace Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.381 D_{60}= 0.219 D_{50}= 0.154
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

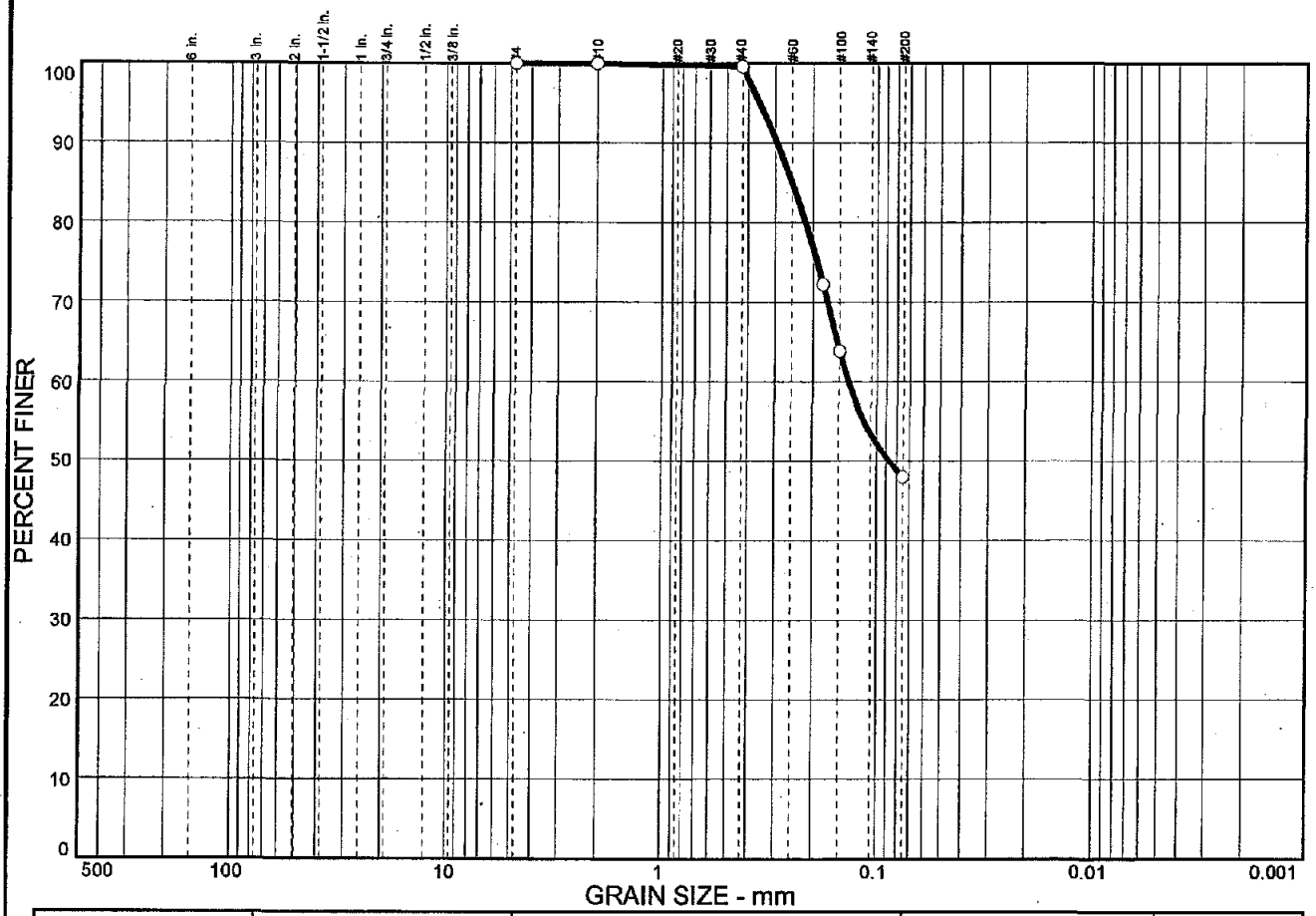
Sample B-2
Sample Obtained: 12/28/11

Sample No.: B-2 **Source of Sample:** **Date:** 12/28/11
Location: B-2 (25-27 Ft) **Elev./Depth:** 25-27 Ft

GET SOLUTIONS, INC.

Client: Liberty Trust Property
Project: BMP Facility - Wythe Will Distribution
Project No: WM11-167G **Figure** 2

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	52.0	48.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	99.6		
#80	72.2		
#100	63.8		
#200	48.0		

* (no specification provided)

Soil Description

Orangish brown, Silty, fine SAND (SM) with trace Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.250 D_{60}= 0.136 D_{50}= 0.0870
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

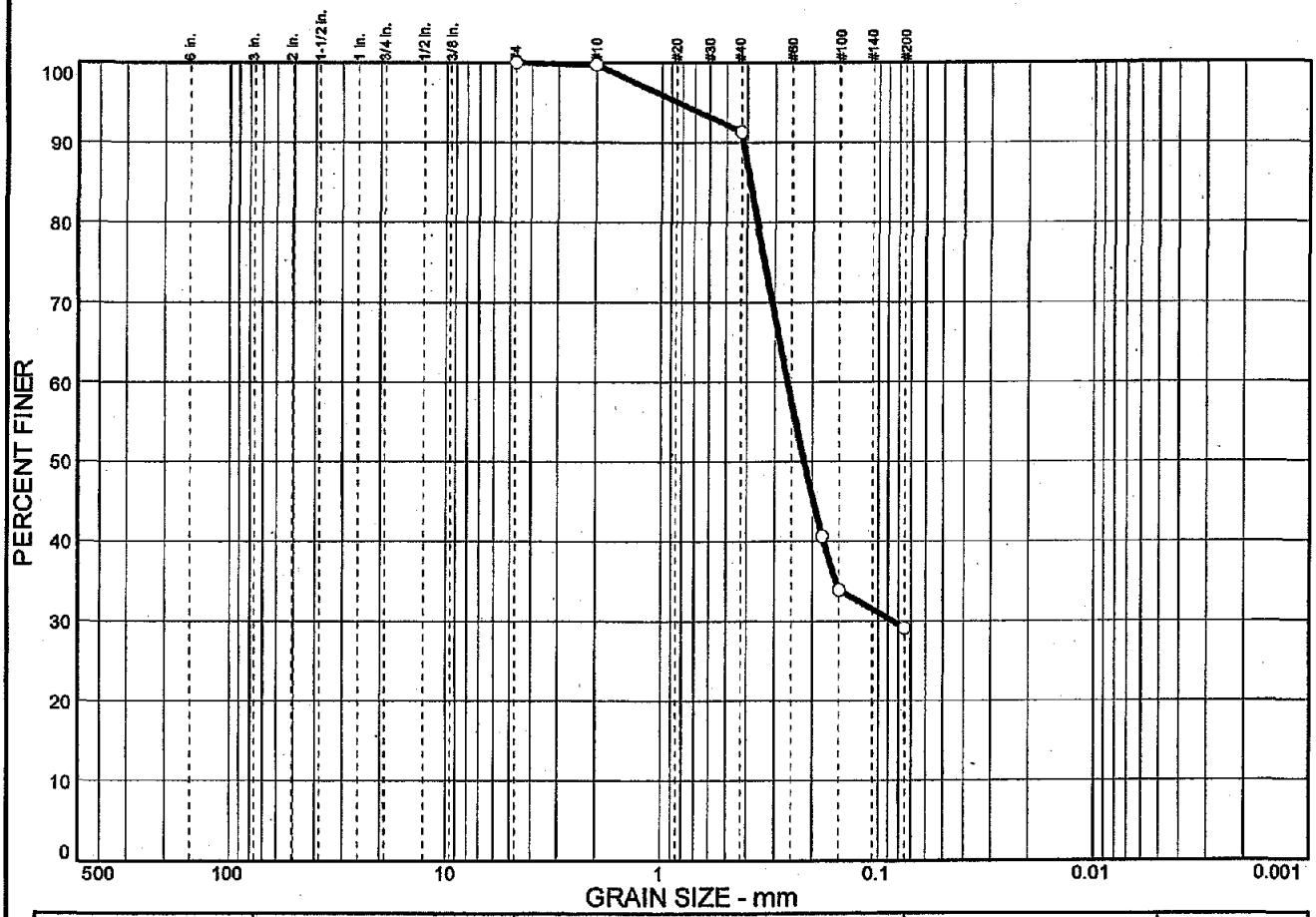
Sample B-3
Sample Obtained: 12/28/11

Sample No.: B-3 **Source of Sample:** **Date:** 12/28/11
Location: B-3 (20-22 Ft) **Elev./Depth:** 20-22 Ft

GET SOLUTIONS, INC.

Client: Liberty Trust Property
Project: BMP Facility - Wythe Will Distribution
Project No: WM11-167G **Figure** 3

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	70.9	29.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#40	91.3		
#80	40.6		
#100	33.9		
#200	29.1		

* (no specification provided)

Soil Description

Orangish brown, Silty, fine SAND (SM) with trace Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.387 D_{60}= 0.261 D_{50}= 0.219
D_{30}= 0.0854 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample B-4
Sample Obtained: 12/28/11

Sample No.: B-4 **Source of Sample:** **Date:** 12/28/11
Location: B-4 (18-20 Ft) **Elev./Depth:** 18-20 Ft

GET SOLUTIONS, INC.

Client: Liberty Trust Property
Project: BMP Facility - Wythe Will Distribution
Project No: WM11-167G **Figure** 4

BMP RECORD DRAWING

RECORD DRAWING

BASE INFORMATION SHOWN HERE ON IS BASED ON AN ON THE GROUND SURVEY PERFORMED BY VHB OCTOBER 2011.

VHB

Vanasse Hangen Brustlin, Inc.

Transportation
Land Development
Environmental Services

351 McLaws Circle, Suite 3
Williamsburg, Virginia 23185-6316
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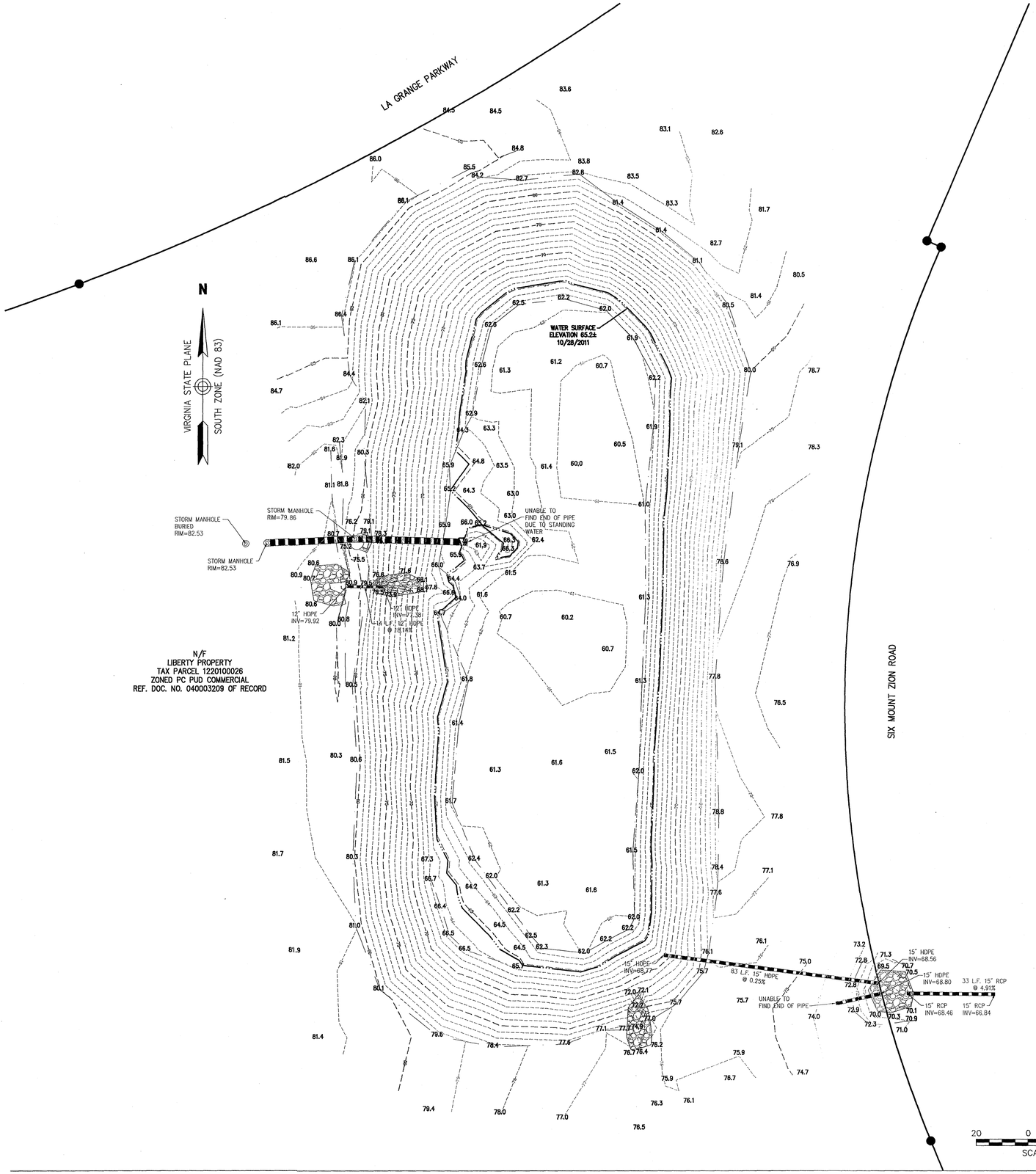

Legend

- IPF IRON PIPE FOUND
- IRF IRON ROD FOUND
- CMF CONCRETE MONUMENT FOUND
- IRS IRON ROD SET
- CMS CONCRETE MONUMENT SET
- BOL BOLLARD
- STORM SEWER MANHOLE
- DI DRAIN INLET (DI)
- YDI DRAIN INLET (YDI)
- DS DOWN SPOUT
- DCO DRAIN CLEANOUT
- SANITARY SEWER MANHOLE
- SEWER CLEANOUT
- WATER VALVE
- FIRE HYDRANT
- WM WATER METER
- SIAMESE CONNECTION
- PIV POST INDICATOR VALVE (PIV)
- EM ELECTRIC METER
- TPED TELEPHONE PEDESTAL
- CATV CABLE TV BOX
- LIGHT POLE
- UTILITY POLE
- STREET SIGN
- CONCRETE CURB
- STORM SEWER LINE
- SANITARY SEWER LINE
- OHW OVERHEAD WIRE
- E UNDERGROUND ELECTRIC
- T TELEPHONE LINE
- CATV CABLE TV
- W WATER LINE
- CONC. PAVEMENT
- P.O.B. POINT OF BEGINNING
- {4} REFER TO SPECIAL EXCEPTIONS

No.	Revision	Date	Appvd.

Designed by	Drawn by CRO	Checked by SAR	
CAD checked by		Approved by	
Scale 1"=20'		Date 11/04/2011	

Project Title

WYTHE WILL BMP

Toano, Virginia

Issued for

RECORD DRAWINGS

Drawing Title

NOTES:

1. APPROVED PLAN JCC CASE NO. SP-0130-2003 DEPICTED DESIGN AS INFILTRATION BASIN. SURVEY AND OBSERVATIONS INDICATE STORMWATER MANAGEMENT FACILITY HOLDING WATER TO AN APPROXIMATE DEPTH OF 5 FT.
2. APPROVED PLAN JCC CASE NO. SP-0130-2003 DEPICTED DESIGN BOTTOM ELEVATION OF 62 FOR STORMWATER MANAGEMENT FACILITY. SURVEY INDICATES BOTTOM ELEVATION OF 60.

RECORD DRAWING CERTIFICATION

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITION OF THE STORMWATER MANAGEMENT / BMP FACILITY. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

THIS RECORD DRAWING WAS PREPARED UNDER MY DIRECT SUPERVISION FROM AN ON-THE-GROUND SURVEY, AND THE ORIGINAL DATA WAS OBTAINED IN THE FIELD OCTOBER, 2011. THIS SURVEY MEETS THE MINIMUM ACCURACY STANDARDS PUBLISHED IN 18 VAC 10-20-382.

SIGNED: Stephen Romeo DATE: 3/12/12

COMMONWEALTH OF VIRGINIA
3/12/12
STEPHEN A. ROMEO
LIC. NO. 1448-B
LAND SURVEYOR

FOR RECORD DRAWING INFORMATION ONLY

Drawing Number

R-1

Sheet 1 of 1

Project Number

P:\33516.00 WYTHE WILL DIST FACILITY\CAD\SR\PLANSET\3351600-BMP-REC.DWG

RECORD DRAWING

BASE INFORMATION SHOWN HERE ON IS BASED ON AN ON THE GROUND SURVEY PERFORMED BY VHB OCTOBER 2011.

VHB

Vanasse Hangen Brustlin, Inc.

Transportation
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Environmental Services

351 McLaws Circle, Suite 3
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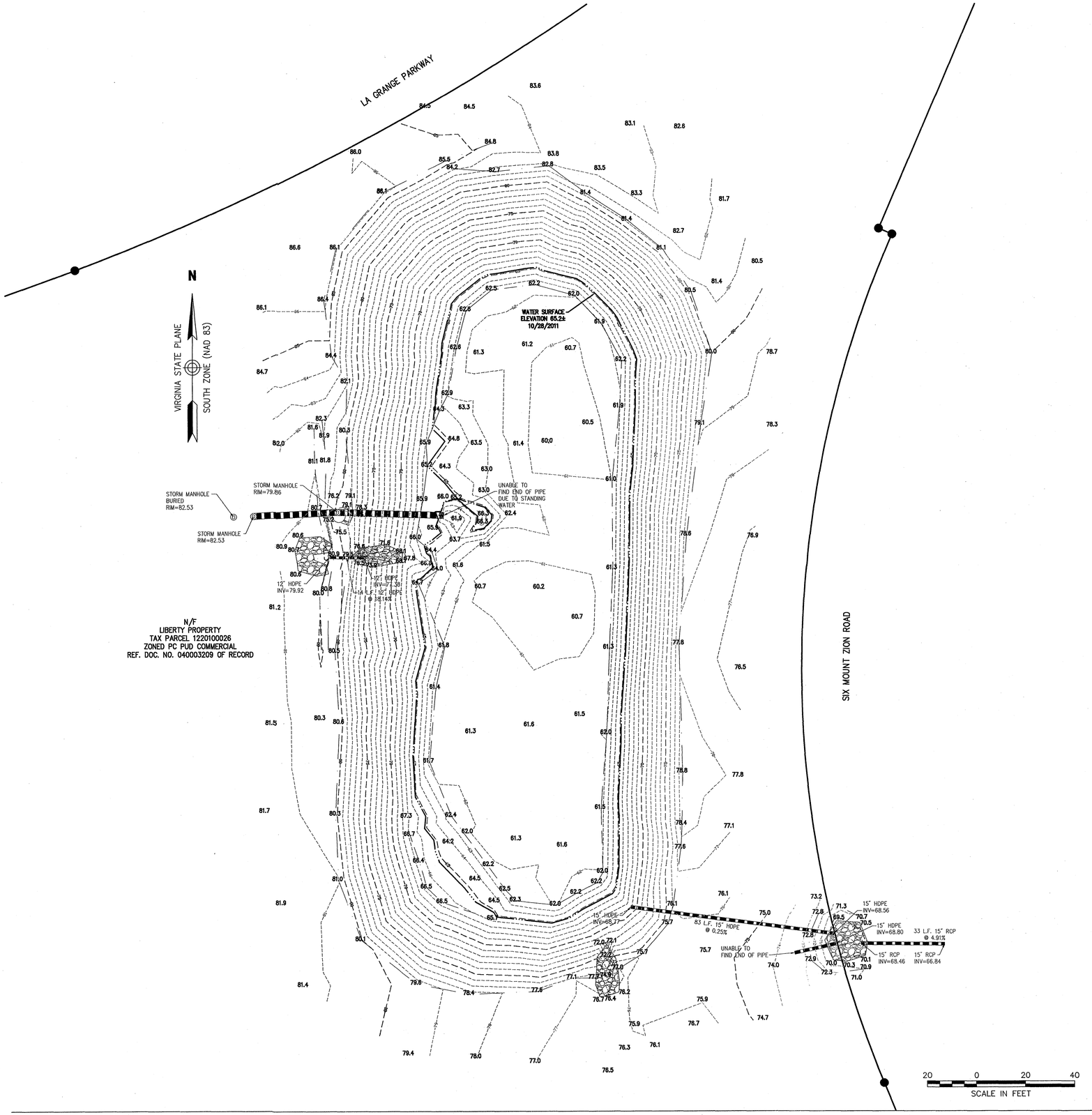
757 220 0500 • FAX 757 220 8544



Legend

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- SEWER CLEANOUT
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- P.O.B. POINT OF BEGINNING
- {4} REFER TO SPECIAL EXCEPTIONS

NOTES:

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SIGNED: Stephen Romeo DATE: 3/12/12

COMMONWEALTH OF VIRGINIA
3/12/12
STEPHEN A. ROMEO
LIC. NO. 1448-B
LAND SURVEYOR
FOR RECORD DRAWING INFORMATION ONLY

No.	Revision	Date	Appvd.

Designed by	Drawn by CRO	Checked by SAR	
CAD checked by	Approved by		
Scale 1"=20'	Date 11/04/2011		

Project Title

WYTHE WILL BMP

Toano, Virginia

Issued for

RECORD DRAWINGS

Drawing Title

Environmental Division

AUG 01 2012

RECEIVED

Drawing Number

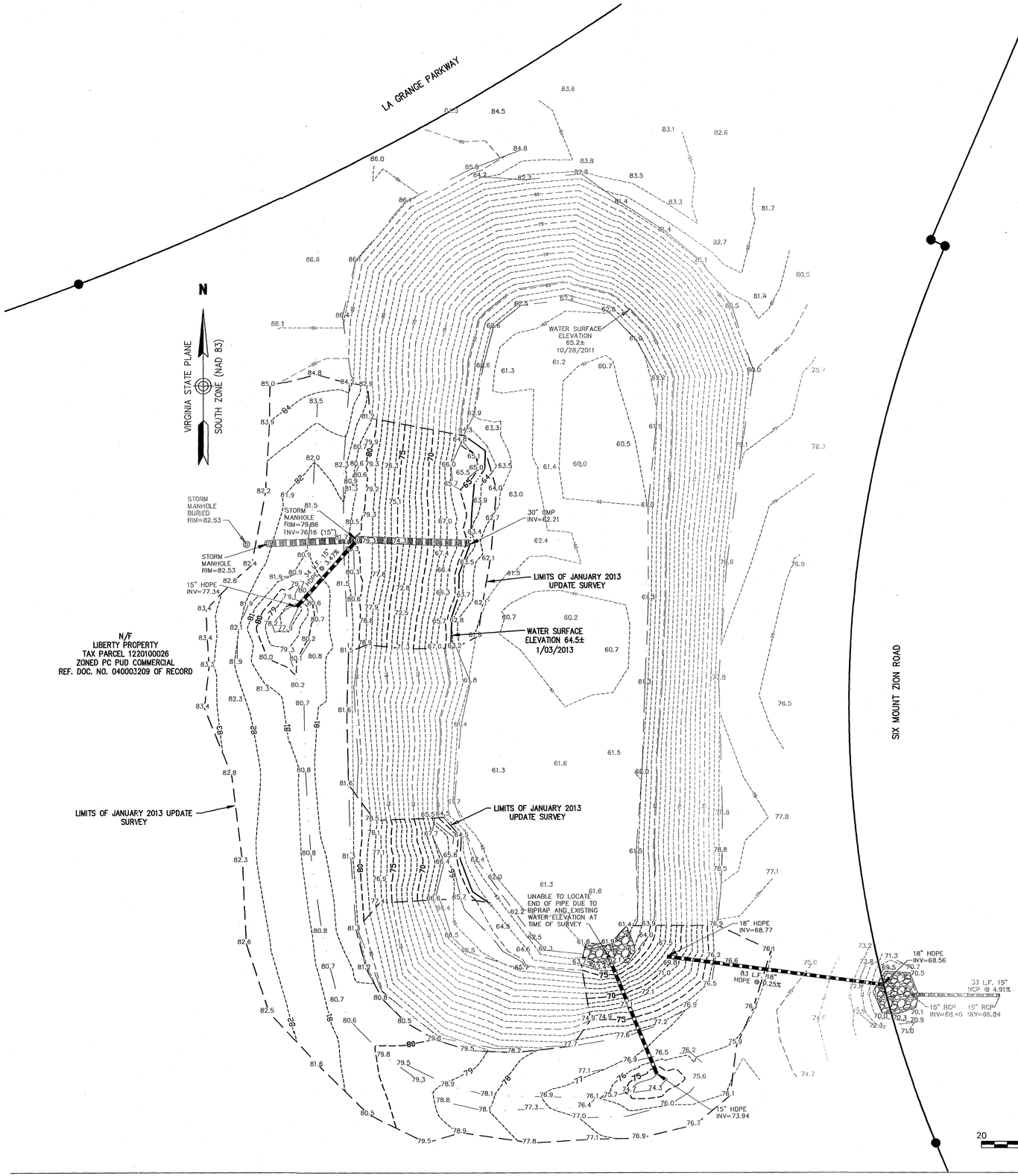
R-1

Sheet 1 of 1

Project Number

P:\33516.00 WYTHE WILL DIST FACILITY\CAD\SR\PLANSET\3351600-BMP-REC.DWG

RECORD DRAWING
SHADED BASE INFORMATION SHOWN HERE ON IS BASED ON AN ON THE GROUND SURVEY PERFORMED BY VHB OCTOBER 2011.
UPDATED INFORMATION SHOWN HERE ON IS BASED ON AN ON THE GROUND SURVEY PERFORMED BY VHB JANUARY 2013.



VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
351 McLaws Circle, Suite 3
Williamsburg, Virginia 23185-6316
757 220 0500 • FAX 757 220 8544

Legend

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	DRAIN INLET (DI)
	DRAIN INLET (YDI)
DS	DOWN SPOUT
DCO	DRAIN CLEANOUT
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P.O.B.	POINT OF BEGINNING
{4}	REFER TO SPECIAL EXCEPTIONS

No.	Revision	Date	Appvd.

Designed by	Drawn by CRO	Checked by SAR	
CAD checked by	Approved by		
Scale 1"=20'	Date 1/15/2013		

Project Title
WYTHE WILL BMP

Toano, Virginia
Issued for
RECORD DRAWINGS

Drawing Title

Environmental Division
JAN 18 2013
RECEIVED

NOTES:

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SIGNED: Stephen Romeo DATE: 1-17-13

COMMONWEALTH OF VIRGINIA
1-17-13
STEPHEN A. ROMEO
LIC. NO. 1448-B
LAND SURVEYOR
FOR RECORD DRAWING INFORMATION ONLY

Drawing Number
R-1
Sheet 1 of 1
Project Number

P:\33516.00 WYTHE WILL DIST FACILITY\CAD\SR\PLANSET\3351600-BMP-REC-REV.DWG

Environmental Division

AUG 01 2012

Vanasse Hangen Brustlin, Inc. TRANSMITTAL

Transportation
Land Development
Environmental Services

351 McLaws Circle, Suite 3
Williamsburg, VA 23185-6316
757 220 0500
FAX 757 220 8544

Date: 03/12/2012	**VHB Project No.:** 33516.00 RECEIVED
Re: Wythe-Will Distribution Center	
At Stonehouse Commerce Park	

To: Bill Cain, Chief Engineer
Engineering and Resource Protection Division
101-E Mounts Bay Road
Williamsburg, VA 23185

We are sending you: ☐ Attached ☐ Under Separate cover via Regular Mail the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Diskettes ☐ Specifications ☐ Copy of Letter ☐ Change Order
☒ Other

Copies	Date	No.	Description
1	3/12/2012		Record Drawing
1	8/1/2012		Record Drawing and Construction Certification Forms

These are transmitted as checked below:

☐ For approval
☐ For your use
☒ As requested
☐ For review and comment
☐ Returned prints on loan to VHB
☐ Approved as submitted
☐ Approved as noted
☐ Return for corrections
☐ For bids due
☐ Resubmit ____ Copies for approval
☐ Submit ____ Copies for distribution
☐ Return ____ Corrected prints

REMARKS:

If VHB provides materials to the Client that are stored electronically, the Client recognizes that data, plans, specifications, reports, documents, or other information recorded on or transmitted as electronic media ("CADD Documents") are subject to undetectable alteration, either intentional or unintentional, due to, among other causes, transmission, conversion, media degradation, software error, or human alteration. Accordingly, the CADD Documents are provided to the Client for informational purposes only and not as an end product. VHB makes no warranties, either express or implied, regarding the fitness or suitability of the CADD Documents.

The CADD Documents are instruments of professional service, and shall not be used, in whole or in part, for any project other than that for which they were created, without the express written consent of VHB and without suitable compensation to VHB. Accordingly, the Client agrees to waive any and all claims against VHB resulting in any way from the unauthorized alternation, misuse or reuse of the CADD documents and to defend, indemnify, and hold VHB harmless for any claims, losses, damages, or costs, including attorneys fees, arising out of the alteration, misuse or reuse of any CADD Documents.

Copy to: 33516.00

By: Piotr Swietuchowski, PE
VHB, Inc.

Environmental Division

AUG 01 2012

RECEIVED

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities
Record Drawing and Construction Certification Forms

(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name: WYTHE - WILL DISTRIBUTION
Structure/BMP Name: INFILTRATION BASIN / RETENTION BASIN
Project Location: TOANO, VIRGINIA
BMP Location: BETWEEN SIX MOUNT ZION ROAD AND LA GRANGE PARKWAY
County Plan No.: SP - 0130 - 2003

Project Type:
- ☐ Residential
- ☐ Business
- ☑ Commercial
- ☐ Office
- ☐ Institutional
- ☐ Industrial
- ☐ Public
- ☐ Roadway
- ☐ Other _____

Tax Map/Parcel No.: 1220100026
BMP ID Code (if known): WC-097
Zoning District:: PUD-C PLANNED UNIT DEVELOPMENT
Land Use: COMMERCIAL WITH PROFFERS
Site Area (sf or acres): 15.58

Brief Description of Stormwater Management/BMP Facility:

EXTENDED WET DETENTION BASIN WITH PARTIAL INFILTRATION, AND NO PLANTING BENCH

Nearest Visible Landmark to SWM/BMP Facility: _____

Nearest Vertical Ground Control (if known):
- ☑ JCC Geodetic Ground Control
- ☐ USGS
- ☐ Temporary
- ☐ Arbitrary
- ☐ Other

Station Number or Name: 340
Datum or Reference Elevation: 123.20 NGVD (29)
Control Description: DISK IN CONCRETE STAMPED STATION NO. 340
Control Location from Subject Facility: 7,606 LF, PAST THE ON RAMP AT THE INTERSECTION OF ROUTE 30 AND INTERSTATE 64

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☑ Unknown
Approx. Construction Start Date for SWM/BMP Facility: JANUARY 2004
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☑ Unknown
Name of Site Work Contractor Who Constructed Facility: R.L. CROWDER CONSTRUCTION
Name of Professional Firm Who Routinely Monitored Construction: UNKNOWN
Date of Completion for SWM/BMP Facility: MARCH 2004
Date of Record Drawing/Construction Certification Submittal: 03/12/12

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: LIBERTY PROPERTY TRUST
Mailing Address: 12 SOUTH THIRD STREET
RICHMOND, VA 23219
Business Phone: 757-644-9111 Fax: 757-783-9969
Contact Person: Title:

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*

Firm Name: LANDMARK DESIGN GROUP A WHOLLY OWN SUBSIDIARY OF VHB, INC
Mailing Address: 351 McLAWS CIRCLE, SUITE 3
Business Phone: 757-220-0500
Fax: 757-220-8544
Responsible Plan Preparer: STEPHEN A. ROMEO, LS
Title: PRINCIPAL
Plan Name: WHITE-WILL DISTRIBUTION CENTER
Firm's Project No. 2003151-000.09 / 3351600
Plan Date: 08/20/2004
Sheet No.'s Applicable to SWM/BMP Facility: C-2 / C-4 / C-5 / C-7 / C-8

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*

Name: R.L. CROWDER CONSTRUCTION
Mailing Address: P.O. BOX 2125
PETERSBURG, VIRGINIA 23804
Business Phone: 804-748-8448
Fax: 804-861-1361
Contact Person: ROBERT LETCHWORTH
Site Foreman/Supervisor: ROBERT LETCHWORTH
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 - Professional Certifications:

Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: VANASSE HANGEN BRUSTLIN, INC.
Mailing Address: 351 McLAWS CIRCLE SUITE 3
Business Phone: 757-220-0500 X 6239
Fax: 757-220-8544

Name: STEPHEN ROMEO
Title: PRINCIPAL

Signature: Stephen Romeo
Date: 8/1/12

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
8/1/12
STEPHEN A. ROMEO
Lic. No. 1448-B
Stephen Romeo
LAND SURVEYOR

(Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: VANASSE HANGEN BRUSTLIN, INC
Mailing Address: 351 McLAWS CIRCLE, SUITE 3 WILLIAMSBURG, VA 23185
Business Phone: 757-220-0500
Fax: 757-220-8544

Name: PIOTR SWIETUCHOWSKI
Title: PROJECT MANAGER

Signature:
Date: 08/01/12

I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted. WHILE WE WERE NOT UNDER CONTRACTUAL OBLIGATION TO PROVIDE CONSTRUCTION OVERSIGHT, AND WHILE STAFF WAS NOT PRESENT DURING CONSTRUCTION, SITE INVESTIGATION REVEALS THAT TO THE BEST OF MY KNOWLEDGE AND UNDERSTANDING THAT ALL MATERIALS AND APPURTENANCES APPEAR TO HAVE BEEN INSTALLED GENERALLY IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS.

COMMONWEALTH OF VIRGINIA
PIOTR SWIETUCHOWSKI
Lic. No. 044606
08/01/12
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer

Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

☑ PreConstruction Meeting - Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.

☑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM*** and ***RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.

☑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.

☑ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.

☑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

Dual Purpose Facilities - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

Interim Construction Certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

☑ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*

☑ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate **"RECORD DRAWING "** in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, ***or similar forms thereof,*** and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.

☑ Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

I. Methods and Presentation: *(Required for all Stormwater Management / BMP facilities.)*

XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.

XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.

XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).

XX 4. All plan sheet revision blocks modified to indicate date and record drawing status.

XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

II. Minimum Standards: *(Required for all Stormwater Management / BMP facilities, as applicable.)*

XX 1. All requirements of Section I (Methods and Presentation) apply to this section.

XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.

XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.

N/A 4. Top widths, berm widths and embankment side slopes.

XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

N/A 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

N/A 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

N/A 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.

N/A 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

N/A 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.

N/A 12. Type, location, size and number of anti-seep collars or documentation of other methods *utilized for* seepage control. **May need to obtain this information during construction.**

N/A 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**

XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.

XX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.

XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.

N/A 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.

N/A 18. Maintenance plan taken from approved design plan transposed onto record drawing set.

N/A 19. Fencing location and type, if applicable to facility.

XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.

XX 21. No visual signs of erosion or channel degradation immediately downstream of facility.

N/A 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

EXTENDED WET DETENTION BASIN WITH PARTIAL INFILTRATION AND NO PLANTING BENCH

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

III. Group A - Wet Ponds *(Includes A-1 Small Wet Ponds; A-2 Wet Ponds; A-3 Wet Ext Det Ponds.)*

INC A1. All requirements of Section II, Minimum Standards, apply to Group A facilities.

N/A A2. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

N/A A3. Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.

N/A A4. Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.

N/A A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.

N/A A6. Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.

N/A A7. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).

N/A A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.

XX A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.

N/A A10. Low flow orifice has a non-clogging mechanism.

N/A A11. A pond drain pipe with valve was provided.

XX A12. Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.

N/A A13. End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IV. Group B - Wetlands *(Includes B-1 Shallow Marsh; B-2 Ext Det Shallow Wetlands; B-3 Pond Wetland System and B-4 Pocket Wetland)*

_____ B1. Same requirements as Group A Wet Ponds.

_____ B2. Minimum 2:1 length to width flow path provided across the facility.

_____ B3. Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).

_____ B4. Wetland type landscaping provided in accordance with approved plan. Includes correct pondscaping zones, plant species, planting arrangements, wetland beds, etc. Wetland plants include 5 to 7 emergent wetland species. Individual plants at 18 inches on center in clumps.

_____ B5. Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).

_____ B6. No more than one-half (½) of the wetland surface area is planted.

_____ B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

_____ B8. Planting zones staked or flagged in field and locations subsequently established by appropriate field surveying methods for record drawing presentation.

EXTENDED WET DETENTION BASIN WITH PARTIAL INFILTRATION AND NO PLANTING BENCH

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

V. Group C - Infiltration Practices

(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)

INC. C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.

XX C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.

XX C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.

N/A C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel; grass filter strip; bottom sand layer; upper filter fabric layer; use of washed bank run gravel aggregate.

N/A C5. Sides of infiltration practice lined with filter fabric.

XX C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

XX C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

XX C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.

XX C9. Minimum twenty-five (25) foot separation down gradient from any structure.

XX C10. Stormwater outfalls provided for overflow associated with larger design storms.

INC. C11. No visual signs of erosion or channel degradation immediately downstream of facility.

XX C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.

N/A C13. Observation well provided.

XX C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VI. Group D - Filtering Systems *(Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters)*

_____ D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

_____ D2. Sediment pretreatment devices provided.

_____ D3. For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.

_____ D4. For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.

_____ D5. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ D6. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed .

_____ D7. Filtering system is off-line from storm drainage conveyance system.

_____ D8. Overflow outlet has adequate erosion protection.

_____ D9. Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.

_____ D10. Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.

_____ D11. Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.

_____ D12. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

_____ D13. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ D14. Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VII. Group E - Open Channel Systems *(Includes E-1 Wet Swales (Check Dams); E-2 Dry Swales;and E-3 Biofilters)*

_____ E1. All requirements of Section II, Minimum Standards, apply to Group E facilities as applicable.

_____ E2. Open channel system has constructed longitudinal slope of less than four (4) percent.

_____ E3. No visual signs of erosion in the open channel system's soil and/or vegetative cover.

_____ E4. Open channel side slopes are no steeper than 2H:1V at any location. Preferred channel sideslope is 3H:1V or flatter.

_____ E5. No visual signs of ponding are present at any location in the open channel system, except at rock check dam locations for E-1 systems (Wet Swales).

_____ E6. For E-2 BMPs (Dry Swales), an underdrain system was provided.

_____ E7. Treated timber or rock check dams provided as pretreatment devices for the open channel system.

_____ E8. Gravel diaphragm provided in areas where lateral sheet flow from impervious surfaces are directly connected to the open channel system.

_____ E9. Grass cover/stabilization in the open channel system appears adaptable to the specific soils and hydric conditions for the site and along the channel system.

_____ E10. Open channel system areas with grass covers higher than four (4) to six (6) inches were properly mowed.

_____ E11. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ E12. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

_____ E13. For E-3 BMPs (Biofilters), the bottom width is six (6) feet maximum at any location.

_____ E14. For E-3 BMPs (Biofilters), sideslopes are 3H:1V maximum at any location.

_____ E15. For E-3 BMPs (Biofilters), the constructed channel slope is less than or equal to three (3) percent at any location.

_____ E16. For E-3 BMPs (Biofilters), the constructed grass channel is approximately equivalent to the constructed roadway length.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VIII. Group F - Extended Dry Detention *(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)*

_____ F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

_____ F2. Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.

_____ F3. Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)

_____ F4. Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.

_____ F5. A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging.

_____ F6. Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

_____ F7. Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.

_____ F8. Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.

_____ F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

_____ F10. Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.

_____ F11. Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.

_____ F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

_____ F13. Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide, slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.

_____ F14. No visual signs of undercutting of timber walls or clogging of the low orifice were present.

_____ F15. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ F16. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IX. Group G - Open Spaces *(Includes All Open Space Types G-1; G-2; and G-3)*

_____ G1. All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.

_____ G2. Constructed impervious areas appear to conform with locations indicated on the approved plan and appear less than sixty (60) percent impervious in accordance with the requirements of the James City County Chesapeake Bay Preservation Ordinance.

_____ G3. Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.

_____ G4. Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).

_____ G5. Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.

_____ G6. Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

X. Storm Drainage Systems (Associated with BMP's Only)

(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)

INC. SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

XX SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.

XX SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).

XX SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.

XX SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XII. Other Systems

(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception .)

N/A O1. All requirements of Section II, Minimum Standards, apply to this section.

N/A O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

XIII. References

(The James City County Record Drawing and Construction Certification Forms and Checklists for Stormwater Management / BMP facilities were developed using the following sources and references.)

- ☐ Baltimore County, Maryland Soil Conservation District, As-Built Stormwater Management Pond Checklist.
- ☐ James City County, Virginia, Guidelines for Design and Construction of Stormwater Management BMP's (October 1999).
- ☐ James City County, Virginia, Stormwater Detention/Retention Basin Design Checklist and Erosion and Sediment Control and Stormwater Management Design Plan Checklists.
- ☐ James City County Stormwater Policy Framework, Final Report of the James City County BMP Policy Project, October 1998, The Center for Watershed Protection.
- ☐ Prince Georges County, Maryland, As-Built Requirements Retention or Detention Pond/Basin.
- ☐ Prince William County, Virginia, Stormwater Management Fact Sheet.
- ☐ Stafford County, Virginia, As-Built Plan Checklist.
- ☐ Stormwater Management Design Manual, NRCS Maryland Code No. 378, Pond Standards and Specifications.
- ☐ USEPA/Watershed Management Institute, Stormwater Management Inspection Forms.
- ☐ Virginia Impounding Structure Regulations (Dam Safety), Department of Conservation & Recreation, 1997.
- ☐ Virginia Erosion and Sediment Control Handbook, Third Edition 1992, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.
- ☐ Virginia Stormwater Management Handbook, 1999 edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.

File: Shared\SWMProg\BMP\Certif\RDCC_fillable.wpd

Vanasse Hangen Brustlin, Inc.

TRANSMITTAL

Transportation
Land Development
Environmental Services

351 McLaws Circle, Suite 3
Williamsburg, VA 23185-6316
757 220 0500
FAX 757 220 8544

Date: 01/18/2013	**VHB Project No.:** 33516.00

Re: Wythe-Will Distribution Center
At Stonehouse Commerce Park

Environmental Division
JAN 18 2013

To: Bill Cain, Chief Engineer
Engineering and Resource Protection Division
101-E Mounts Bay Road
Williamsburg, VA 23185

We are sending you: ☐ Attached ☐ Under Separate cover via Regular Mail the following items:

RECEIVED

☐ Shop drawings ☐ Prints ☐ Plans ☐ Diskettes ☐ Specifications ☐ Copy of Letter ☐ Change Order
☒ Other

Copies	Date	No.	Description
1	01/17/2013		Record Drawing
1	01/15/2013		Record Drawing and Construction Certification Forms
1			Site Photos During Construction

These are transmitted as checked below:

☐ For approval
☐ For your use
☒ As requested
☐ For review and comment
☐ Returned prints on loan to VHB
☐ Approved as submitted
☐ Approved as noted
☐ Return for corrections
☐ For bids due
☐ Resubmit ____ Copies for approval
☐ Submit ____ Copies for distribution
☐ Return ____ Corrected prints

REMARKS:

If VHB provides materials to the Client that are stored electronically, the Client recognizes that data, plans, specifications, reports, documents, or other information recorded on or transmitted as electronic media ("CADD Documents") are subject to undetectable alteration, either intentional or unintentional, due to, among other causes, transmission, conversion, media degradation, software error, or human alteration. Accordingly, the CADD Documents are provided to the Client for informational purposes only and not as an end product. VHB makes no warranties, either express or implied, regarding the fitness or suitability of the CADD Documents.

The CADD Documents are instruments of professional service, and shall not be used, in whole or in part, for any project other than that for which they were created, without the express written consent of VHB and without suitable compensation to VHB. Accordingly, the Client agrees to waive any and all claims against VHB resulting in any way from the unauthorized alternation, misuse or reuse of the CADD documents and to defend, indemnify, and hold VHB harmless for any claims, losses, damages, or costs, including attorneys fees, arising out of the alteration, misuse or reuse of any CADD Documents.

Copy to: 33516.00

By: Piotr Swietuchowski, PE
VHB, Inc.

Environmental Division

JAN 18 2013

RECEIVED

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities
Record Drawing and Construction Certification Forms

(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)

Section 1 - Site Information:

Project Name: WYTHE - WILL DISTRIBUTION
Structure/BMP Name: INFILTRATION BASIN / RETENTION BASIN
Project Location: TOANO, VIRGINIA
BMP Location: BETWEEN SIX MOUNT ZION ROAD AND LA GRANGE PARKWAY
County Plan No.: SP - 0130 - 2003

Project Type:
- ☐ Residential
- ☐ Business
- ☑ Commercial
- ☐ Office
- ☐ Institutional
- ☐ Industrial
- ☐ Public
- ☐ Roadway
- ☐ Other _____

Tax Map/Parcel No.: 1220100026
BMP ID Code (if known): WC-097
Zoning District:: PUD-C PLANNED UNIT-DEVELOPMENT
Land Use: COMMERCIAL WITH PROFFERS
Site Area (sf or acres): 15.58

Brief Description of Stormwater Management/BMP Facility:

EXTENDED WET DETENTION BASIN WITH PARTIAL INFILTRATION, AND NO PLANTING BENCH

Nearest Visible Landmark to SWM/BMP Facility: _____

Nearest Vertical Ground Control (if known):
- ☒ JCC Geodetic Ground Control
- ☐ USGS
- ☐ Temporary
- ☐ Arbitrary
- ☐ Other

Station Number or Name: 340
Datum or Reference Elevation: 123.20 NGVD (29)
Control Description: DISK IN CONCRETE STAMPED STATION NO. 340
Control Location from Subject Facility: 7,600 LF, PAST THE ON RAMP AT THE INTERSECTION OF ROUTE 30 AND INTERSTATE 64

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☑ Unknown
Approx. Construction Start Date for SWM/BMP Facility: JANUARY 2004
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☑ Unknown
Name of Site Work Contractor Who Constructed Facility: R.L. CROWDER CONSTRUCTION
Name of Professional Firm Who Routinely Monitored Construction: UNKNOWN
Date of Completion for SWM/BMP Facility: MARCH 2004 / DECEMBER 2012 (REPAIRS)
Date of Record Drawing/Construction Certification Submittal: 01/15/2013

(Note: Record Drawing and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. Record Drawings and Construction Certifications must be reviewed and approved by the James City County Environmental Division prior to final inspection, acceptance and bond or surety release.)

Section 3 - Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*

Name: LIBERTY PROPERTY TRUST
Mailing Address: 12 SOUTH THIRD STREET
RICHMOND, VA 23219
Business Phone: 757-644-9111 Fax: 757-783-9969
Contact Person: Title:

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*

Firm Name: LANDMARK DESIGN GROUP A WHOLLY OWN SUBSIDIARY OF VHB, INC
Mailing Address: 351 McLAWS CIRCLE, SUITE 3
Business Phone: 757-220-0500
Fax: 757-220-8544
Responsible Plan Preparer: STEPHEN A. ROMEO, LS
Title: PRINCIPAL
Plan Name: WHOLE-WILL DISTRIBUTION CENTER
Firm's Project No. 2003151-000.09 / 3351600
Plan Date: 08/20/2004
Sheet No.'s Applicable to SWM/BMP Facility: C-2 / C-4 / C-5 / C-7 / C-8

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*

Name: R.L. CROWDER CONSTRUCTION
Mailing Address: P.O. BOX 2125
PETERSBURG, VIRGINIA 23804
Business Phone: 804-748-8448
Fax: 804-861-1361
Contact Person: ROBERT LETCHWORTH
Site Foreman/Supervisor: ROBERT LETCHWORTH
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 - Professional Certifications:

Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional Engineer is responsible for the inspection, monitoring and certification of Stormwater Management / BMP facilities during its construction.)*

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: VANASSE HANGEN BRUSTLIN
Mailing Address: 351 MCLAWS CIR. STE 3
WILLIAMSBURG, VA 23185
Business Phone: 757-220-0500
Fax: 757-220-8544

Name: STEPHEN ROMEO, LS
Title: PRINCIPAL

Signature: Stephen Romeo
Date: 1/15/13

I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

Construction Certification

Firm Name: VANASSE HANGEN BRUSTLIN, INC
Mailing Address: 351 McLAWS CIRCLE, SUITE 3
WILLIAMSBURG, VA 23185
Business Phone: 757-220-0500
Fax: 757-220-8544

Name: PIOTR SWIETUCHOWSKI, PE.
Title: PROJECT MANAGER

Signature:
Date: 01/15/13

I hereby certify to the best of my knowledge and belief that this Stormwater Management/BMP facility was monitored and constructed in accordance with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically noted.

WHERE WE WERE NOT UNDER CONTRACTUAL OBLIGATION TO PROVIDE CONSTRUCTION OVERSIGHT, AND WHILE STAFF WAS NOT PRESENT DURING CONSTRUCTION, SITE INESTIGATION REVEALS THAT TO THE BEST OF MY KNOWLEDGE AND UNDERSTANDING ALL MATERIALS AND APPURTENANCES APPEAR TO HAVE BEEN INSTALLED GENERALLY IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS.

COMMONWEALTH OF VIRGINIA
Stephen Romeo
STEPHEN A. ROMEO (Seal)
Lic. No. 1448-B
Virginia Registered Professional Engineer
or Certified Land Surveyor
1/15/13
LAND SURVEYOR

COMMONWEALTH OF VIRGINIA
PIOTR SWIETUCHOWSKI
Lic. No. 044606 (Seal)
Virginia Registered 01/15/13
Professional Engineer
PROFESSIONAL ENGINEER

Section 5 - Record Drawing and Construction Certification Requirements and Instructions:

☑ PreConstruction Meeting - Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.

☑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM*** and ***RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.

☑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.

☑ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.

☑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

Dual Purpose Facilities - Completion of construction also includes an interim stage for Stormwater Management / BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction, once development and stabilization are substantially complete. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Final record drawing and construction certification of additional permanent components is required once permanent facility construction is complete.

Interim Construction Certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height (*) and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land Disturbance permit for construction.

Interim or final record drawing and construction certifications are not required for temporary sediment basins which are designed and constructed in accordance with current minimum standards and specifications for temporary sediment basins per the Virginia Erosion and Sediment Control Handbook (VESCH); have a temporary service life of less than eighteen (18) months; and will be removed completely once associated disturbed areas are stabilized, unless a distinct hazard to the public's health, safety and welfare is determined by the Environmental Division due to the size or presence of the structure or due to evidence of improper construction.

(*Note: Dam Height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure in accordance with 4VAC50-20-30, Virginia Impoundment Structure Regulations and the Virginia Dam Safety Program.)

☑ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*

☑ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate **"RECORD DRAWING "** in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, ***or similar forms thereof***, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducibles.

☑ Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

I. Methods and Presentation: *(Required for all Stormwater Management / BMP facilities.)*

XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.

XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.

XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).

XX 4. All plan sheet revision blocks modified to indicate date and record drawing status.

XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

II. Minimum Standards: *(Required for all Stormwater Management / BMP facilities, as applicable.)*

XX 1. All requirements of Section I (Methods and Presentation) apply to this section.

XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.

XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.

N/A 4. Top widths, berm widths and embankment side slopes.

XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

N/A 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

N/A 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

N/A 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.

N/A 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

N/A 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.

N/A 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**

N/A 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**

XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.

XX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.

XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.

N/A 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.

N/A 18. Maintenance plan taken from approved design plan transposed onto record drawing set.

N/A 19. Fencing location and type, if applicable to facility.

XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.

XX 21. No visual signs of erosion or channel degradation immediately downstream of facility.

N/A 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

EXTENDED WET DETENTION BASIN WITH PARTIAL INFILTRATION AND NO PLANTING BENCH

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

III. Group A - Wet Ponds *(Includes A-1 Small Wet Ponds; A-2 Wet Ponds; A-3 Wet Ext Det Ponds.)*

INC A1. All requirements of Section II, Minimum Standards, apply to Group A facilities.

N/A A2. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

N/A A3. Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.

N/A A4. Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.

N/A A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.

N/A A6. Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.

N/A A7. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).

N/A A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.

XX A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.

N/A A10. Low flow orifice has a non-clogging mechanism.

N/A A11. A pond drain pipe with valve was provided.

XX A12. Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.

N/A A13. End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IV. Group B - Wetlands *(Includes B-1 Shallow Marsh; B-2 Ext Det Shallow Wetlands; B-3 Pond Wetland System and B-4 Pocket Wetland)*

_____ B1. Same requirements as Group A Wet Ponds.

_____ B2. Minimum 2:1 length to width flow path provided across the facility.

_____ B3. Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).

_____ B4. Wetland type landscaping provided in accordance with approved plan. Includes correct pondscaping zones, plant species, planting arrangements, wetland beds, etc. Wetland plants include 5 to 7 emergent wetland species. Individual plants at 18 inches on center in clumps.

_____ B5. Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).

_____ B6. No more than one-half (½) of the wetland surface area is planted.

_____ B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

_____ B8. Planting zones staked or flagged in field and locations subsequently established by appropriate field surveying methods for record drawing presentation.

EXTENDED WET DETENTION BASIN WITH PARTIAL INFILTRATION AND NO PLANTING BENCH

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

V. Group C - Infiltration Practices

(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)

INC. C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.

XX C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.

XX C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.

N/A C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel; grass filter strip; bottom sand layer; upper filter fabric layer; use of washed bank run gravel aggregate.

N/A C5. Sides of infiltration practice lined with filter fabric.

XX C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

XX C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

XX C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.

XX C9. Minimum twenty-five (25) foot separation down gradient from any structure.

XX C10. Stormwater outfalls provided for overflow associated with larger design storms.

INC. C11. No visual signs of erosion or channel degradation immediately downstream of facility.

XX C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.

N/A C13. Observation well provided.

XX C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VI. Group D - Filtering Systems *(Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters)*

_____ D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

_____ D2. Sediment pretreatment devices provided.

_____ D3. For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.

_____ D4. For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.

_____ D5. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ D6. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed .

_____ D7. Filtering system is off-line from storm drainage conveyance system.

_____ D8. Overflow outlet has adequate erosion protection.

_____ D9. Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.

_____ D10. Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.

_____ D11. Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.

_____ D12. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

_____ D13. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ D14. Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VII. Group E - Open Channel Systems *(Includes E-1 Wet Swales (Check Dams); E-2 Dry Swales;and E-3 Biofilters)*

_____ E1. All requirements of Section II, Minimum Standards, apply to Group E facilities as applicable.

_____ E2. Open channel system has constructed longitudinal slope of less than four (4) percent.

_____ E3. No visual signs of erosion in the open channel system's soil and/or vegetative cover.

_____ E4. Open channel side slopes are no steeper than 2H:1V at any location. Preferred channel sideslope is 3H:1V or flatter.

_____ E5. No visual signs of ponding are present at any location in the open channel system, except at rock check dam locations for E-1 systems (Wet Swales).

_____ E6. For E-2 BMPs (Dry Swales), an underdrain system was provided.

_____ E7. Treated timber or rock check dams provided as pretreatment devices for the open channel system.

_____ E8. Gravel diaphragm provided in areas where lateral sheet flow from impervious surfaces are directly connected to the open channel system.

_____ E9. Grass cover/stabilization in the open channel system appears adaptable to the specific soils and hydric conditions for the site and along the channel system.

_____ E10. Open channel system areas with grass covers higher than four (4) to six (6) inches were properly mowed.

_____ E11. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

_____ E12. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

_____ E13. For E-3 BMPs (Biofilters), the bottom width is six (6) feet maximum at any location.

_____ E14. For E-3 BMPs (Biofilters), sideslopes are 3H:1V maximum at any location.

_____ E15. For E-3 BMPs (Biofilters), the constructed channel slope is less than or equal to three (3) percent at any location.

_____ E16. For E-3 BMPs (Biofilters), the constructed grass channel is approximately equivalent to the constructed roadway length.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

VIII. Group F - Extended Dry Detention *(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)*

_____ F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

_____ F2. Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.

_____ F3. Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)

_____ F4. Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.

_____ F5. A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging.

_____ F6. Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

_____ F7. Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.

_____ F8. Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.

_____ F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

_____ F10. Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.

_____ F11. Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.

_____ F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

_____ F13. Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide, slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.

_____ F14. No visual signs of undercutting of timber walls or clogging of the low orifice were present.

_____ F15. No visual signs of erosion or channel degradation immediately downstream of facility.

_____ F16. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

N/A

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

IX. Group G - Open Spaces *(Includes All Open Space Types G-1; G-2; and G-3)*

_____ G1. All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.

_____ G2. Constructed impervious areas appear to conform with locations indicated on the approved plan and appear less than sixty (60) percent impervious in accordance with the requirements of the James City County Chesapeake Bay Preservation Ordinance.

_____ G3. Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.

_____ G4. Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).

_____ G5. Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.

_____ G6. Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

(Key for Checklist is as follows: XX Acceptable N/A Not Applicable Inc Incomplete)

X. Storm Drainage Systems (Associated with BMP's Only)

(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)

INC. SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

XX SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.

XX SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).

XX SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.

XX SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XII. Other Systems

(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception .)

N/A O1. All requirements of Section II, Minimum Standards, apply to this section.

N/A O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

XIII. References *(The James City County Record Drawing and Construction Certification Forms and Checklists for Stormwater Management / BMP facilities were developed using the following sources and references.)*

- ☐ Baltimore County, Maryland Soil Conservation District, As-Built Stormwater Management Pond Checklist.
- ☐ James City County, Virginia, Guidelines for Design and Construction of Stormwater Management BMP's (October 1999).
- ☐ James City County, Virginia, Stormwater Detention/Retention Basin Design Checklist and Erosion and Sediment Control and Stormwater Management Design Plan Checklists.
- ☐ James City County Stormwater Policy Framework, Final Report of the James City County BMP Policy Project, October 1998, The Center for Watershed Protection.
- ☐ Prince Georges County, Maryland, As-Built Requirements Retention or Detention Pond/Basin.
- ☐ Prince William County, Virginia, Stormwater Management Fact Sheet.
- ☐ Stafford County, Virginia, As-Built Plan Checklist.
- ☐ Stormwater Management Design Manual, NRCS Maryland Code No. 378, Pond Standards and Specifications.
- ☐ USEPA/Watershed Management Institute, Stormwater Management Inspection Forms.
- ☐ Virginia Impounding Structure Regulations (Dam Safety), Department of Conservation & Recreation, 1997.
- ☐ Virginia Erosion and Sediment Control Handbook, Third Edition 1992, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.
- ☐ Virginia Stormwater Management Handbook, 1999 edition, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation.

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James City County Environmental Division
Stormwater Management / BMP Inspection Report
Subsurface - Detention and Infiltration Facilities

County BMP ID Code (if known): WC097

Name of Facility: Wythe-Will Distribution BMP No.: 1 Date: 4/15/13

Location: Between Six Mount Zion Rd and La Grange Parkway

Name of Owner: Liberty Property Trust

Name of Inspector: Tina Creech

Type of Facility: Infiltration/Retention Basin

Weather Conditions: Cloudy Type: ☑ Final Inspection ☐ County BMP Inspection Program ☐ Owners Inspection

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
Urgent - The item checked requires immediate attention to keep the BMP operational and prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
Accessibility:				
Roads	✓			
Parking Areas	✓			
Gates				
Locks				
Safety Fencing				
Access Points:				
Trap Doors				
Manholes/ Vaults	✓			
Grates				
Observ Wells				
Pretreatment Devices: ☑ **Inlet** ☐ **Sump** ☐ **Forebay** ☐ **Other**				
Sediment	✓			
Trash & Debris	✓			
Structure	✓			
Other Erosion		✓		

Facility Item	O.K.	Routine	Urgent	Comments
Primary Storage/ Infiltration Area Structure (Pipe, Stone, etc):				
Trash & Debris	✓			
Sediment	✓			
Ponding / Drawdown	✓			
Cracks				
Joints				
Seams				
Coating				
Aesthetics	✓			
Other				
Inlet Structure # 1 (Describe Location): NW of Basin				
Condition of Structure	✓			
Erosion		✓		Rill erosion - minor
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				
Inlet Structure # 2 (Describe Location): SE of Basin				
Condition of Structure	✓			
Erosion		✓		Rill erosion - minor
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				
Inlet Structure # 3 (Describe Location):				
Condition of Structure				
Erosion				
Trash and Debris				
Sediment				
Aesthetics				
Other				
Outlet - Principal Overflow or Bypass Structure (Describe Location): SE of Basin				
Condition of Structure	✓			
Erosion	✓			* minor Rill's
Trash and Debris	✓			
Sediment	✓			
Other				

Facility Item	O.K.	Routine	Urgent	Comments
Nusiance Type Conditions:				
Mosquito Breeding	✓			
Animals, Rodents	✓			
Graffiti	✓			
Other				
Perimeter (Contributing Drainage Area) Conditions:				
Stabilization		✓		minor rill erosion/inlets & outlet
Vegetation Condition				
Trash and Debris	✓			
Aesthetics	✓			
Other				

Remarks:

Overall Environmental Division Internal Rating: 4

Signature: Nina Creech **Date:** 4/15/13

Title: Env Insp

SWMProg\BMP\CoInspProg\SubDetInfil.wpd

Environmental Division

JAN 18 2013

RECEIVED

Environmental Division

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Environmental Division

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JAN 18 2013

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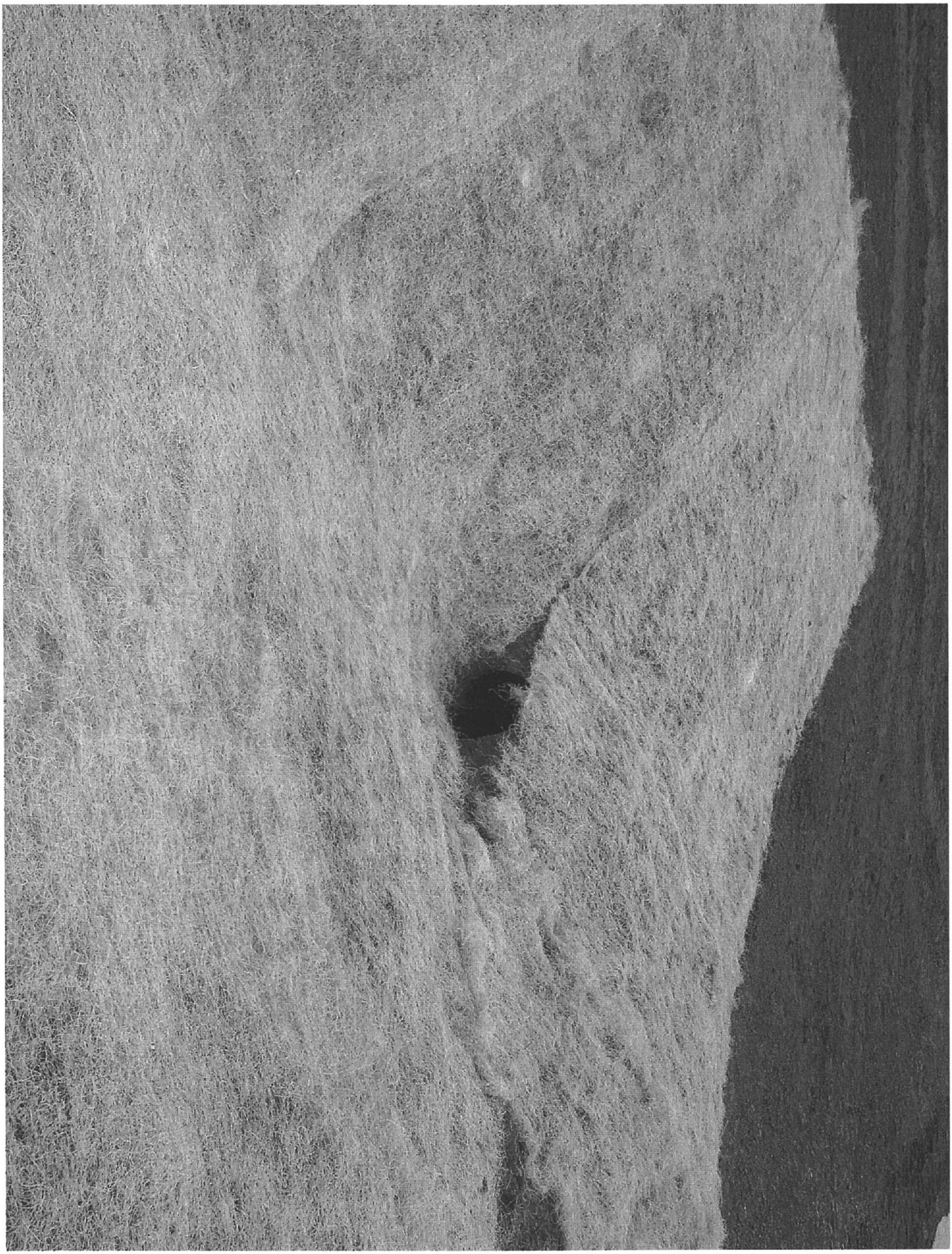

Environmental Division

JAN 18 2013

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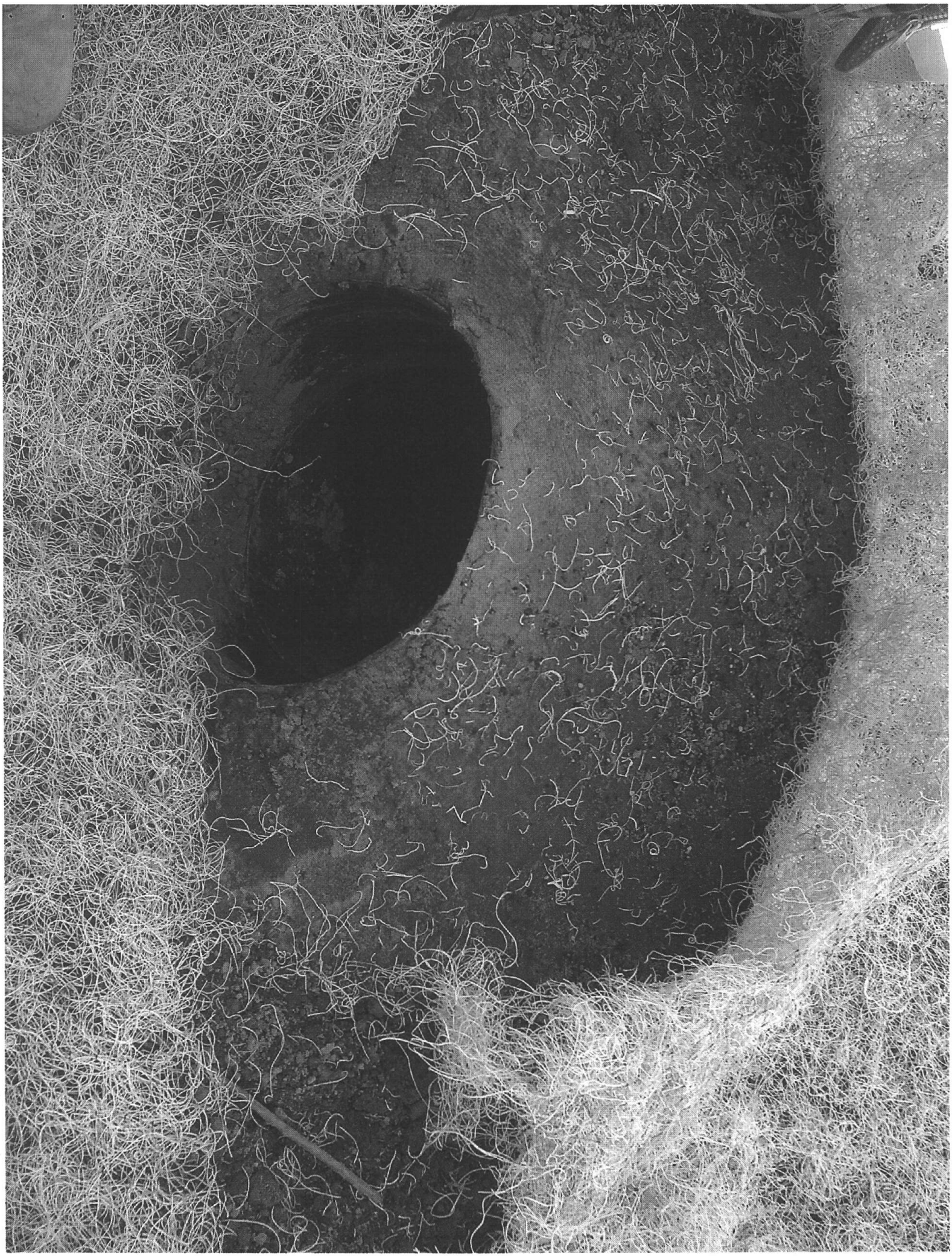

Environmental Division

JAN 18 2013

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JAN 18 2013

RECEIVED

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 4th day of December, 2003, between Liberty Property Limited Partnership, and all successors in interest, ("COVENANTOR(S),") owner(s) of the following property: Wythe-Will Distribution Center, project name, Section A Parcel A-2, Stonehouse Commerce Park, Document No. _____, Deed Book _____, Page No. _____; Instrument No. 0300 34818, and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

Instrument # 040001268
Recorded on Jan. 12, 2004

Revised 01/02

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

9. This COVENANT shall be recorded in the County Land Records.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)
LIBERTY PROPERTY LIMITED PARTNERSHIP

By: _____

Print Name/Title ALAN T. LINGERFELT, SR. V.P.

ATTEST:

_____

COVENANTOR(S)

_____

Print Name/Title _____

ATTEST:

_____

COMMONWEALTH OF VIRGINIA
CITY/~~COUNTY~~ OF Richmond

I hereby certify that on this 4th day of December, 20 03, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of Richmond, aforesaid personally appeared Alan T. Lingerfelt and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 4th day of December, 2003.

Rita B. Gillespie
Notary Public

My Commission expires: November 30, 2004

Approved as to form:

Leo P. Rogers
County Attorney

This Declaration of Covenants prepared by:

DANA DAME
(Print Name)
PROJECT MANAGER
LIBERTY PROPERTY TRUST
(Title)
12 SOUTH THIRD ST
(Address)
RICHMOND, VA 23219
(City) (State) (Zip)

drainage.pre

AES CONSULTING ENGINEERS
Engineering, Surveying, and Planning
5248 Olde Towne Road, Suite 1
WILLIAMSBURG, VIRGINIA 23188

Phone: (757) 253-0040
Fax: (757) 220-8994

LETTER OF TRANSMITTAL

WC097 SP-130-03

ATTN: **Scott Thomas**

CO.: James City County Environmental

Address:

cc:

DATE	JOB NO.
8/25/05	9356

FROM: Frank Sluss

RE
BMP Asbuilt at Wythe Will Distribution Center

RECEIVED AUG 26 2005 ENVIRONMENTAL

WE ARE SENDING YOU THE FOLLOWING ITEMS: ☒ Attached ☐ Under separate cover via

☒ Original(s) ☐ Print(s) ☐ Plan(s) ☐ Specification(s) ☐ Change Order

☐ Copy of letter(s) ☐ Other:

COPIES	DATE	No. of Pages	DESCRIPTION
3	4/30/04	2	As-builts for BMP at Wythe Will Distribution Center

THESE ARE TRANSMITTED as checked below:

☒ For your approval ☐ For your signature ☐ For review and comment

☒ For your use ☐ As you requested ☐ As requested by:

☐ Other:

1220100026
3612 LAGRANGE PKWY
15.58 AC

REMARKS:

Scott,
These survey as-builts reflect the condition of the site on April 22, 2004. The as-builts were prepared by AES and given to the contractor but were not submitted to the county. Please refer to the approved site plan by Landmark Design Group or to Landmark Design Group for questions pertaining to the design of the BMP and to Rob Letchworth of Richard Crowder Construction for questions concerning the construction of the BMP. The telephone number for Richard Crowder Construction is 804-748-8448.
Thank you,
Frank Sluss

If enclosures are not as noted, kindly notify us at once.

WYTHE-WILL DISTRIBUTION CENTER

WYTHE-WILL DISTRIBUTING COMPANY, INC.

AT

STONEHOUSE COMMERCE PARK

OCTOBER 24, 2003
REVISED APRIL 23, 2004

Legend

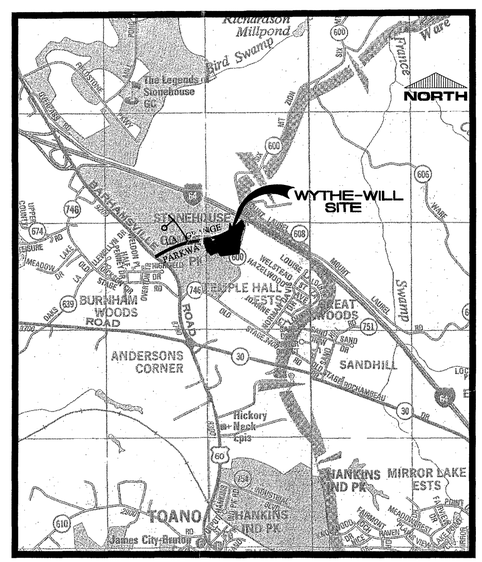
(UG) INDICATES UNDERGROUND UTILITY
(OH) INDICATES OVERHEAD UTILITY

EXISTING	DESCRIPTION	PROPOSED
SAN	SANITARY SEWER	SAN
W	WATER	W
S	STORM SEWER	S
E	ELECTRIC LINE	E
G	GAS LINE	G
T	TELEPHONE	T
TV	CABLE TV LINE	TV
CO	CLEANOUT	CO
FM	FORCE MAIN	FM
MH	MANHOLE	MH
CB	CATCH BASIN/CURB BASIN	CB
DI	DROP INLET	DI
PI	PLASTIC YARD DROP INLET	PI
	HEADWALL (W/ WINGS)	
FES	FLARED END SECTION	FES
	WATER METER	
W	METER VAULT	W
YH	YARD HYDRANT (SIAMESE CONNECTION)	YH
FH	FIRE HYDRANT	FH
	VALVE	
	TELEPHONE PEDESTAL	
	TELEPHONE POLE	
	POLE W/ LIGHT	
	POWER POLE	
	GUY WIRE	
	POLE MOUNTED SIGN	
18.50	GROUND ELEVATION	18.50
20	GROUND CONTOUR	20
	CONCRETE CURB (CG-2)	
	CURB & GUTTER (CG-6)	
	REV. CONC. CURB & GUTTER	
	MARPED CURB & GUTTER	
	GRAVEL PAVEMENT	
	CEMENT CONCRETE	
	BITUMINOUS CONCRETE	
	BUILDING	
	PROJECT LIMITS	
	RIGHT-OF-WAY	
	CENTERLINE/BASELINE	
	PROPERTY LINE	
	DITCH, SWALE LINE	
	TREE LINE	
	FENCE	X X X X X
	GUARDRAIL	
B-12	BORING LOCATION W/ No.	B-12
	BENCHMARK	

NOTE: SOME SYMBOLS SHOWN IN THIS LEGEND MAY NOT NECESSARILY BE USED FOR THIS PROJECT.

SHEET INDEX

SHEET NO.	DESCRIPTION
C-1	COVER SHEET
C-2	EROSION AND SEDIMENT CONTROL PLAN AND ENVIRONMENTAL INVENTORY
C-3	LAYOUT PLAN
C-4	GRADING AND DRAINAGE PLAN
C-5	UTILITY PLAN
C-6	UTILITY PROFILES
C-7	BMP DETAIL AND NOTES
C-8	GENERAL NOTES AND DETAILS
C-9	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
C-10	VDOT NOTES AND DETAILS
C-11	RAMP DETAILS
C-12	TRAFFIC MARKING DEMOLITION AND PROPOSED MARKINGS AND DETAILS
C-13	PUMP STATION NOTES AND DETAILS
L-1	PLANTING PLAN
L-2	PLANTING SCHEDULE, NOTES AND DETAILS
F-1	LIGHTING PLAN



COPYRIGHT ADC THE MAP PEOPLE PERMITTED USE NO. 20203118

VICINITY MAP

SCALE: 1" = 2000'

STATISTICAL DATA

PARCEL I.D. NUMBER:	ALL OF GPIN 1220100023 PART OF GPIN 0640100001
ZONING:	PUD-C, PLANNED UNIT DEVELOPMENT - COMMERCIAL WITH PROFFERS
BUILDING AREA:	100,000 S.F. (FUTURE EXPANSION - 43,200 S.F.)
BUILDING HEIGHT:	26'-0" (MIN CLEAR HEIGHT)
TOTAL AREA:	15.58 Ac.
TOTAL DEVELOPABLE AREA:	13.88 Ac.
PROJECT AREA:	15.58 Ac.
AREA DISTURBED:	15.58 Ac.
-IMPERVIOUS AREA:	4.67 Ac. (30%)
-OPEN SPACE:	10.91 Ac. (70%)
PARKING SPACES:	
REQUIRED:	40 SPACES (1 SPACE PER 2 EMPLOYEES ON LARGEST SHIFT: LARGEST SHIFT - 80 EMPLOYEES)
-STANDARD:	38 SPACES
-DISABLED PERSONS:	2 SPACES (1 VAN ACCESSIBLE)
PROVIDED:	80 SPACES
-STANDARD:	75 SPACES
-DISABLED PERSONS:	5 SPACES (5 VAN ACCESSIBLE)
F.E.M.A. PANEL NUMBER:	5102010010B
F.E.M.A. F.I.R.M. ZONE	ZONE X

OWNER:
WYTHE-WILL DISTRIBUTING COMPANY, INC.
6623 RICHMOND ROAD
LIGHTFOOT, VA 23090
TELEPHONE: (757) 565-0351
FAX: (757) 565-3754

DEVELOPER:
LIBERTY PROPERTY TRUST
12 SOUTH THIRD STREET
RICHMOND, VA 23219
TELEPHONE: (757) 644-9111
FAX: (757) 783-9969

SITE ENGINEER:
LANDMARK DESIGN GROUP
4029 IRONBOUND ROAD, SUITE 100
WILLIAMSBURG, VA 23188
TELEPHONE: (757)-253-2975
FAX: (757)-229-0049
ATTN: STEPHEN A. ROMEO

MAY 2004 RECEIVED PLANNING DEPARTMENT

APPROVED PLAN.

APR 2004 APPROVED PLANNING DEPARTMENT

COUNTY OF JAMES CITY
FINAL SITE PLAN
APPROVALS DATE
MHH(CHY) 12/16/03
ACH(CHY) 4/23/04
DEC(CHY) 4/23/04
TOF(CHY) 5/7/04
WB(CHY) 10/20/03
Date:

SP-130-03

NOTES:

JAMES CITY COUNTY PLANNING COMMISSION REVIEWED THIS PROJECT ON DEC. 8, 2003 IN ACCORDANCE WITH THE REQUIREMENTS OF SECTIONS 24-147 AND 24-498(a)(1)(f) OF THE ZONING ORDINANCE.

THIS PROJECT IS SITUATED IN THE YORK RIVER - FRANCE SWAMP WATERSHED.

ANY EXISTING UNUSED WELLS SHALL BE ABANDONED IN ACCORDANCE WITH STATE PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE.

WETLANDS AND LAND WITHIN RESOURCES PROTECTION AREAS SHALL REMAIN IN A NATURAL UNDISTURBED STATE EXCEPT FOR THOSE ACTIVITIES PERMITTED BY SECTION 23-9 (C)(1) OF THE JAMES CITY COUNTY CODE.

Miss Utility of Virginia
204 RIVERS BEND BOULEVARD
CHESTER, VIRGINIA 23831

72 HOURS BEFORE YOU DIG CALL MISS UTILITY OF VIRGINIA

BEFORE YOU DIG ANYWHERE IN VIRGINIA! CALL 1-800-552-7001

VA LAW REQUIRES 72 HOURS NOTICE BEFORE YOU EXCAVATE.

LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

4029 Ironbound RD. Suite 100
Williamsburg, VA 23188
Tel: (757) 253-2975
Fax (757) 229-0049
Email: lmdg@landmarkdgvb.com

5544 Greenwich Road - Suite 200
Virginia Beach, VA 23464
Tel. (757) 473-2000
Fax (757) 497-7933
Email: lmdg@landmarkdg.com

COMMONWEALTH OF VIRGINIA
4-22-04
STEPHEN A. ROMEO
No. 1448-B
LAND SURVEYOR

RESPONSIBLE LAND DISTURBER:
THE RESPONSIBLE LAND DISTURBER FOR THIS PROJECT WILL BE STEPHEN A. ROMEO, L.S. NO. 1448-B, OF LANDMARK DESIGN GROUP, UP TO THE TIME OF THE PRECONSTRUCTION MEETING FOR LAND DISTURBING PERMIT. AT THAT TIME THE OWNER WILL REDESIGNATE THAT RESPONSIBILITY.

Project Number: 2003/01-000.00	Dwg. File No.: 14768W
Drawing Number	C-1

SEQUENCE OF CONSTRUCTION

1. ESTABLISH TREE PROTECTION AND CLEARING LIMITS FLAGGING.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCES. THE CONSTRUCTION ENTRANCES SHALL BE IN PLACE IMMEDIATELY (NO LATER THAN 24 HOURS) UPON START OF CONSTRUCTION.
3. INSTALL PERIMETER SILT FENCE, TEMPORARY FILL DIVERSIONS, DIVERSIONS, AND DIVERSION DIKES K–L AND M–N.
4. PERFORM LIMITED CLEARING TO FACILITATE INSTALLATION OF TEMPORARY SEDIMENT BASIN AND TEMPORARY FILL DIVERSIONS/DIVERSIONS A–B–C–D–E.
5. UPON ACHIEVING COMPLETION OF INSTALLATION OF TEMPORARY FILL DIVERSIONS, DIVERSION DIKES, DIVERSIONS AND TEMPORARY SEDIMENT BASIN, COMMENCE MASS EARTHWORK ACTIVITIES AND CONSTRUCTION OF IMPROVEMENTS UPLAND OF THESE MEASURES. INSTALL APPROPRIATE SUPPLEMENTAL MEASURES CONCURRENTLY WITH CONSTRUCTION OF IMPROVEMENTS (IE. INLET PROTECTION, & ETC). DRAINAGE SYSTEM DISCHARGE SHALL NOT BE REDIRECTED FROM TEMPORARY SEDIMENT BASIN TO PERMANENT BMP UNTIL RECEIPT OF APPROVAL BY COUNTY.
6. CLEAR REMAINING AREA BELOW FILL DIVERSIONS/DIVERSIONS (A–B–C–D), AND INSTALL TEMPORARY SEDIMENT TRAP.
7. UPON COMPLETION OF SEDIMENT TRAP COMMENCE EARTHWORK BELOW FILL DIVERSION AND DIVERSION A–B–C.
8. UPON ACHIEVING FILL TO EDGE OF LOADING AREA UPLAND OF SEDIMENT TRAP INSTALL FILL DIVERSION G–H AND REMOVE FILL DIVERSION C–D.
9. UPON ACHIEVING SUBGRADE REPLACE FILL DIVERSIONS AND DIVERSIONS WITH DIVERSION DIKES AND INSTALL DIVERSION DIKE J–K.
10. THE CONTRACTOR SHALL AT ALL TIMES MAINTAIN PROPER SIZE AND SHAPE OF FILL DIVERSIONS, DIVERSIONS, AND DIVERSION DIKES AND ENSURE POSITIVE DRAINAGE FROM ALL DISTURBED AREAS ON SITE TO SEDIMENT BASIN.
11. UPON ACHIEVEMENT OF FINAL SITE STABILIZATION – AS DETERMINED BY THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION – EROSION CONTROL MEASURES MAY BE REMOVED.
12. DURING ALL PHASES OF CONSTRUCTION, THE CONTRACTOR SHALL PERFORM DAILY INSPECTIONS OF ALL RECEIVING DRAINAGE OUTFALLS, AND EROSION CONTROL MEASURES FOR SEDIMENT TRANSPORT FROM THE CONSTRUCTION SITE. ACCUMULATED SEDIMENT BUILD UP IS TO BE REMOVED AND DISPOSED OF ON–SITE AFTER EACH STORM EVENT. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY ADDITIONAL SEDIMENT CONTROLS AND REMOVAL OF SEDIMENT CAUSED BY CONSTRUCTION ACTIVITIES.

EROSION AND SEDIMENT CONTROL MEASURES

THE FOLLOWING CONTROL MEASURES ARE ANTICIPATED FOR THIS SITE:

1. TEMPORARY CONSTRUCTION ENTRANCE (VESCH 3.02)
2. SILT FENCE (VESCH 3.05)
3. STORM DRAIN INLET PROTECTION (VESCH 3.07)
4. TEMPORARY DIVERSION DIKE (VESCH 3.09)
5. TEMPORARY SEDIMENT BASIN (VESCH 3.14)
6. RIPRAP PROTECTION (VESCH 3.19)
7. TEMPORARY SEEDING (VESCH 3.31)
8. PERMANENT SEEDING (VESCH 3.32)
9. SOIL STABILIZATION BLANKET (VESCH 3.36)
10. TREE PROTECTION (VESCH 3.38)
11. DUST CONTROL (VESCH 3.39)
12. TEMPORARY SEDIMENT TRAP (VESCH 3.13)
13. OUTLET PROTECTION (VESCH 3.18)
14. CULVERT INLET PROTECTION (VESCH 3.08)
15. LEVEL SPEADER (VESCH 3.21)
16. DIVERSION (VESCH 3.12)
17. TEMPORARY FILL DIVERSION (VESCH 3.10)
18. TEMPORARY DIVERSION DIKE (VESCH 3.09)

VESCH = VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

ENVIRONMENTAL INVENTORY

PER ONSITE TOPOGRAPHIC SURVEY, WETLAND DELINEATION AND COUNTY GIS INFORMATION:

THE FOLLOWING ITEMS ARE NOT PRESENT WITHIN THE LIMITS OF CONSTRUCTION:

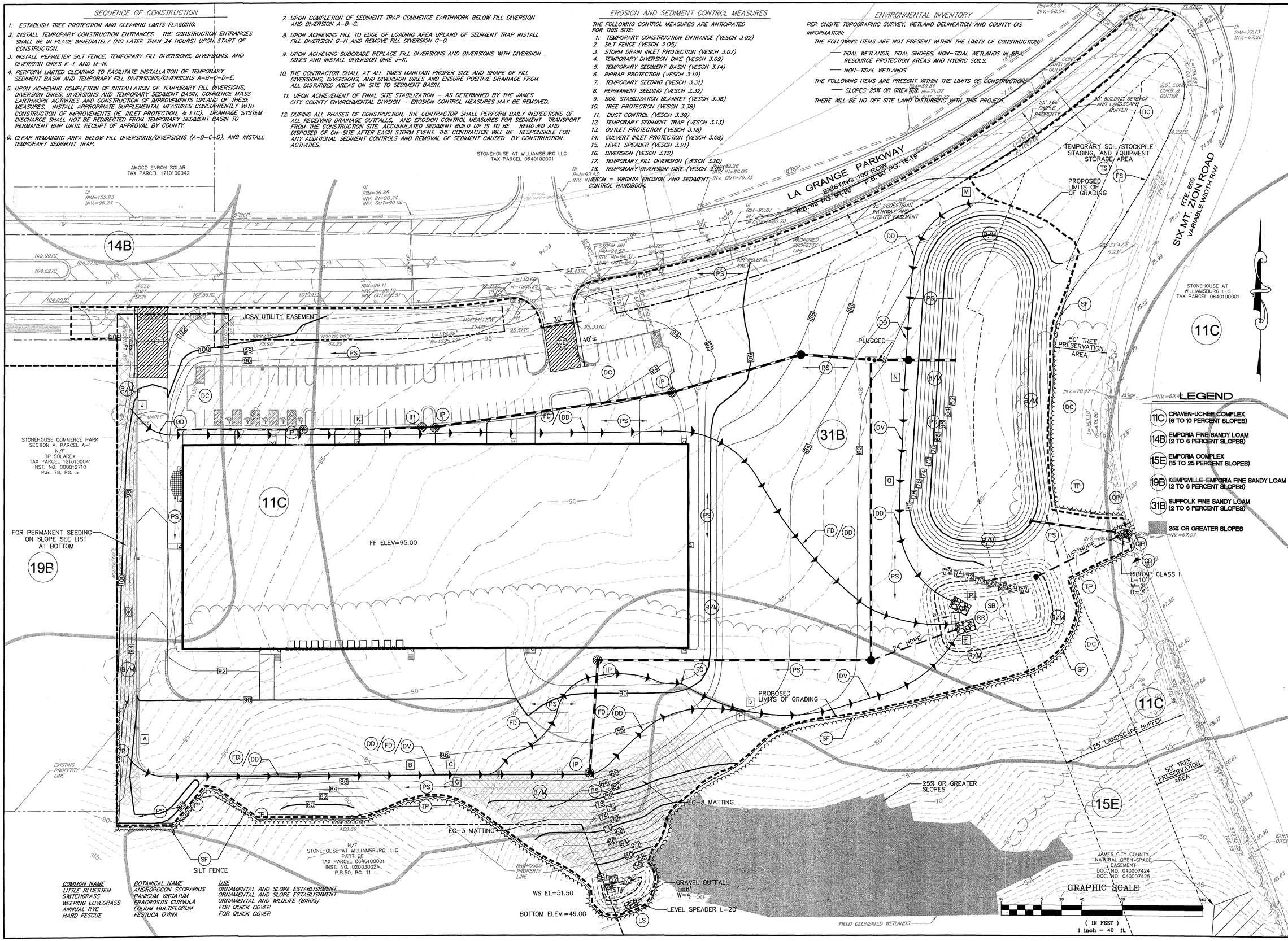
— TIDAL WETLANDS, TIDAL SHORES, NON–TIDAL WETLANDS IN RPA, RESOURCE PROTECTION AREAS AND HYDRIC SOILS.

— NON–TIDAL WETLANDS

THE FOLLOWING ITEMS ARE PRESENT WITHIN THE LIMITS OF CONSTRUCTION:

— SLOPES 25% OR GREATER.

THERE WILL BE NO OFF SITE LAND DISTURBING WITH THIS PROJECT.



COMMON NAME	BOTANICAL NAME	USE
LITTLE BLUESTEM	ANDROPOGON SCOPARIUS	ORNAMENTAL AND SLOPE ESTABLISHMENT
SWITCHGRASS	PANICUM VIRGATUM	ORNAMENTAL AND SLOPE ESTABLISHMENT
WEEPING LOVEGRASS	ERAGROSTIS CURVULA	ORNAMENTAL AND WILDLIFE (BIRDS)
ANNUAL RYE	LOLIUM MULTIFLORUM	FOR QUICK COVER
HARD FESCUE	FESTUCA OVINA	FOR QUICK COVER

COMMONWEALTH OF VIRGINIA
4-22-04
STEPHEN A. ROMEO
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LAND SURVEYOR

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Tel (757) 490-2020
Fax (757) 497-7933
Email: lmdg@landmarkdg.com

LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Scientists

REVISIONS:

No.	Date	Comment	By

DRAWING STATUS: Interoffice Review; Client for Review; Pre Approval Bidding

COUNTY APPROVAL: 10/27/03 1st Submittal; 11/26/03 2nd Submittal; 3rd Submittal; Approved

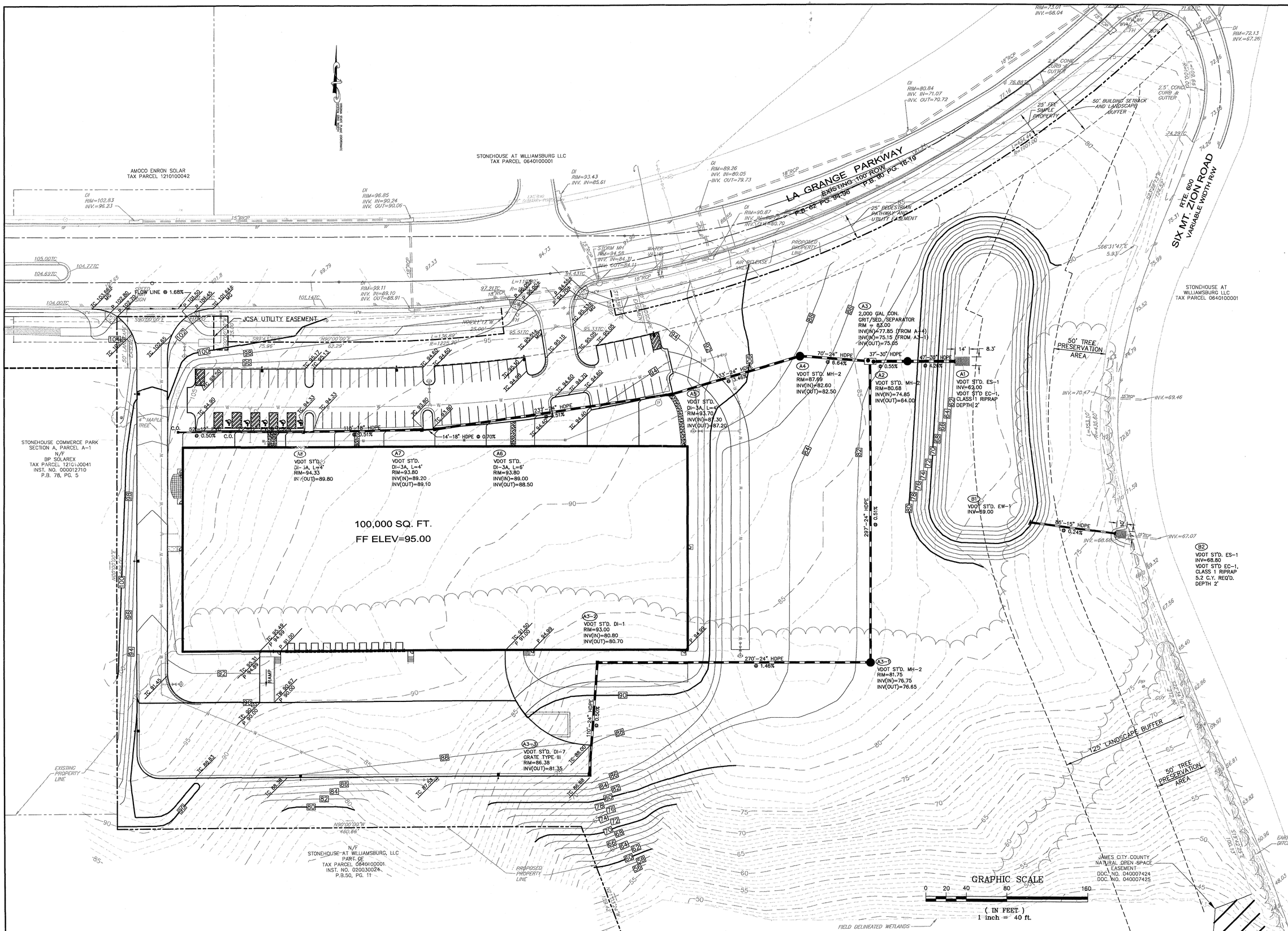
EROSION AND SEDIMENT CONTROL PLAN AND ENVIRONMENTAL INVENTORY

WYTHE–WILL DISTRIBUTION STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY VIRGINIA

Designed: SAR/WDF	Date: 10/14/03
Checked: WDF/SAR	Scale: 1"=40'
File Mgr./Drawn: CCC	CADD File name: C2-Erosion
Project Number: 2003151-000.09	Dwg. File No.: 14/767W
Drawing Number	C-2

2 OF 16



COMMONWEALTH OF VIRGINIA
4-22-04
STEPHEN A. ROMEO
No. 1448-B
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Fax (757) 473-2035
Email: lmsg@landmarkdg.com

LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Scientists

REVISIONS:

No.	Date	Comment	By

DRAWING STATUS
- Interoffice Review
- Client for Review
- Pre Approval Bidding

COUNTY APPROVAL
- 10/27/03 1st Submittal
- 2nd Submittal
- 3rd Submittal
- Approved

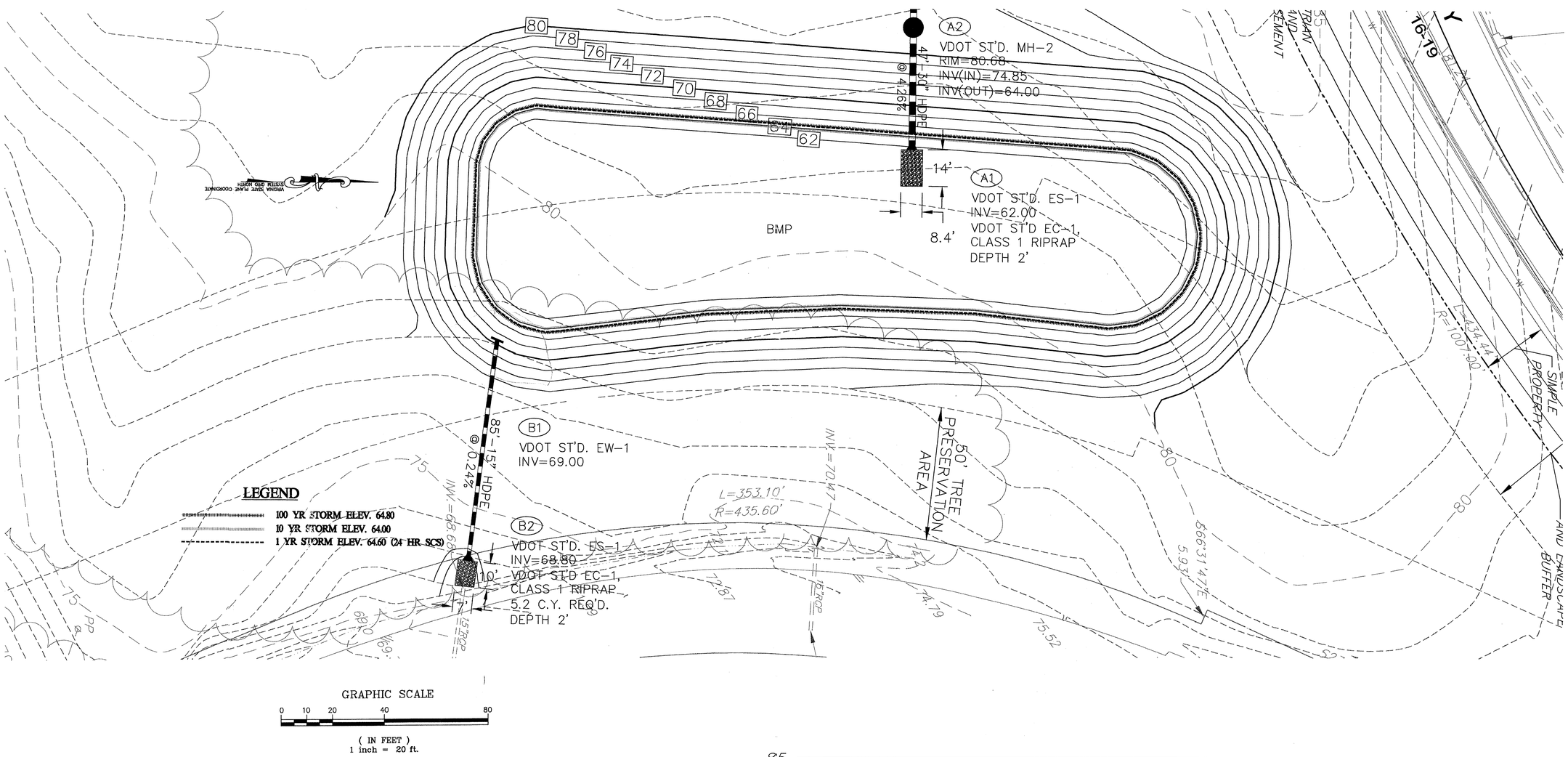
GRADING AND DRAINAGE PLAN

WYTHE-WILL DISTRIBUTION STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY VIRGINIA

Designed: SAR/WDF	Date: 10/14/03
Checked: WDF/SAR	Scale: 1"=40'
File Mgr./Drawn: CCC	CADD File name: C4-Grading
Project Number: 2003151-000.09	Dwg. File No.: 14765W

Drawing Number C-4



BMP MAINTENANCE NOTES AND REQUIREMENTS

1) THE OWNER SHALL MAINTAIN 1 HP PORTABLE SUBMERSIBLE SUMP PUMP AND SUFFICIENT HOSE TO DEWATER THE BMP IN THE EVENT OF AN INFILTRATION FAILURE. TEMPORARY PUMPING OF THE BMP WILL BE NECESSARY UNTIL APPROPRIATE ACTION CAN BE TAKEN TO CORRECT THE INFILTRATION PROBLEM OR CONVERTED THE BASIN TO ANOTHER TYPE OF APPROVED BMP FACILITY.

2) WHEN CONSTRUCTION OF THE INFILTRATION BASIN IS COMPLETE IT SHALL BE INSPECTED MONTHLY AND AFTER EVERY MAJOR STORM EVENT. AFTER IT IS DETERMINED THAT THE INFILTRATION BASIN IS OPERATING PROPERLY, INSPECTIONS SHALL BE CONDUCTED SEMIANNUALLY AND AFTER LARGE STORM EVENTS. ALL INSPECTIONS SHALL SEARCH FOR POTENTIAL SOURCES THAT COULD ADVERSELY AFFECT THE BASIN'S ABILITY TO INFILTRATE STORMWATER. THE INSPECTIONS SHALL EXAMINE THE BASIN FOR ERODED AREAS THAT ARE BARE OF VEGETATION. IF SEDIMENT AND/OR BARE SPOTS ARE FOUND IN THE BASIN, STEPS MUST BE TAKEN IMMEDIATELY TO RESOLVE THE PROBLEM. TRASH AND OTHER DEBRIS SHALL BE REMOVED FROM THE BASIN AT THE SAME TIME AS THE INSPECTION.

3) ALL FUTURE STORM SEWERS THAT DISCHARGE INTO THE INFILTRATION BASIN MUST FIRST BE ROUTED THROUGH A PRETREATMENT STRUCTURE.

4) THE DRAINAGE SYSTEM MUST BE DEWATER AND FLUSH PRIOR TO REDIRECTING DISCHARGE FROM TEMPORARY SEDIMENT BASIN TO THE BMP. THE WATER FROM THE DEWATERING AND FLUSHING SHALL BE DISCHARGED INTO THE TEMPORARY SEDIMENT BASIN.

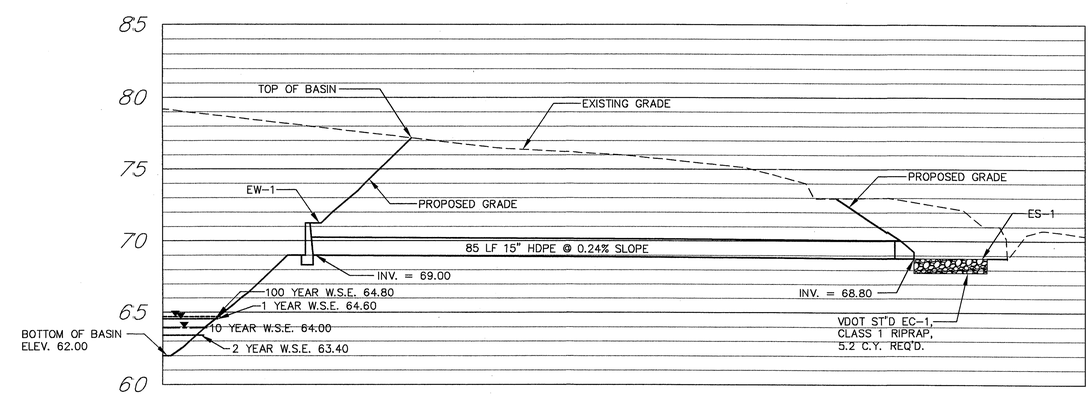
5) THE INFILTRATION BASIN SHALL NOT BE PLACED INTO SERVICE UNTIL THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED AND THE INFILTRATION BASIN HAS ESTABLISHED A COMPLETE COVER OF VEGETATIVE TURF.

6) THE BASIN SHALL BE CLEANED OUT UPON SEDIMENT ACCUMULATION EXCEEDING 12 INCHES IN DEPTH.

7) THE PRETREATMENT STRUCTURE SHALL BE CLEANED OUT UPON SEDIMENT ACCUMULATION EXCEEDING 6 INCHES IN DEPTH.

8) VDOT DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION/RETENTION POND OR ITS STRUCTURE, AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES.

9) THE OWNER SHALL COORDINATE THE INSTALLATION OF THE LANDSCAPING AROUND THE PERIMETER OF THE BMP SO AS TO FACILITATE ACCESS FOR MAINTENANCE PURPOSES.



PIPE PROFILE

VERTICAL 1"=5'
HORIZONTAL 1"=10'

COMMONWEALTH OF VIRGINIA
4-22-04
STEPHEN A. ROMEO
No. 1448-B
LAND SURVEYOR

4029 Ironbound Road
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LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Scientists

REVISIONS:			
No.	Date	Comment	By

DRAWING STATUS
- Interoffice Review
- Client for Review
- Pre Approval Bidding

COUNTY APPROVAL
- 10/27/03 1st Submittal
- 11/26/03 2nd Submittal
- 3rd Submittal
- Approved

BMP DETAIL AND NOTES

WYTHE-WILL DISTRIBUTION
STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY VIRGINIA

Designed: SAR	Date: 10/24/03
Checked: WAB	Scale: 1"=20'
File Mgr./Drawn: WAB	CADD File name: C-7.dwg
Project Number: 2003151-000.09	Dwg. File No.: 14762 W
Drawing Number	C-7

7 OF 16

STONE CONSTRUCTION ENTRANCE (CE)

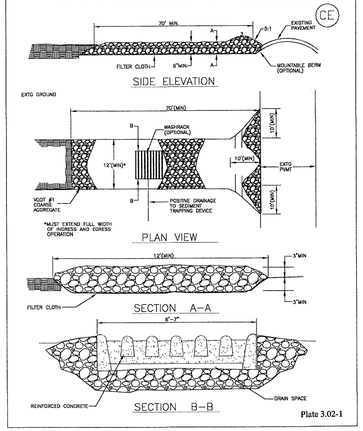


Plate 3.02-1

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT) (SF)

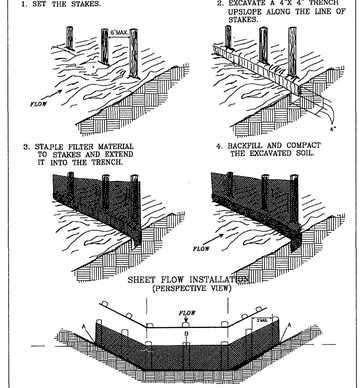
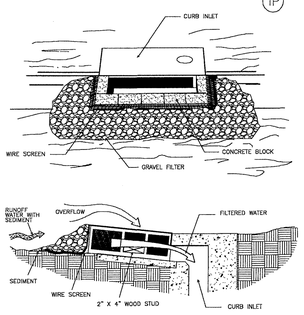


PLATE. 3.05-2

BLOCK & GRAVEL CURB INLET SEDIMENT FILTER (IP)



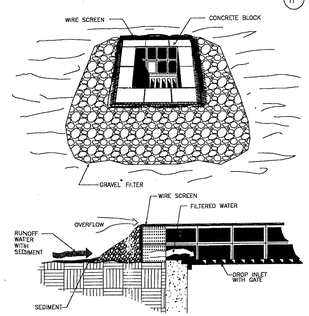
SPECIAL APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING IN FRONT OF THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE

PLATE 3.07-8

BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER (IP)



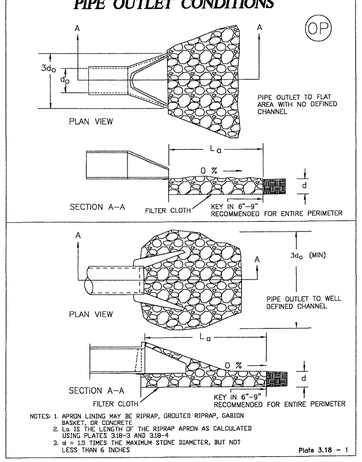
SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE.

PLATE. 3.07-3

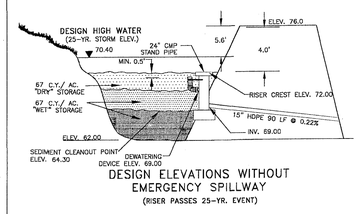
PIPE OUTLET CONDITIONS (OP)



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

Plate 3.18 - 1

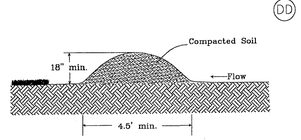
(SB)



DESIGN ELEVATIONS WITHOUT EMERGENCY SPILLWAY
(RISER PASSES 25-YR. EVENT)

SOURCE: VA. DSWC — PLATE. 3.14-2

TEMPORARY DIVERSION DIKE (DD)



SOURCE: VA. DSWC — PLATE 3.09-1

STORMWATER GENERAL PERMIT NOTES

THE CONTRACTOR SHALL ENSURE COMPLIANCE WITH THE REQUIREMENTS OF VR 680-14-19 – VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (VPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES, INCLUDING BUT NOT LIMITED TO THE FOLLOWING ITEMS:

IMPLEMENTATION, DOCUMENTATION, AND INSPECTIONS NECESSARY FOR COMPLIANCE WITH STORM WATER GENERAL PERMIT

1. IMPLEMENTATION OF THE STORM WATER POLLUTION PREVENTION PLAN AS DEVELOPED FOR THE SITE AND IN ACCORDANCE WITH THE GENERAL PERMIT REQUIREMENTS WITH REGARD TO EROSION AND SEDIMENT CONTROL, POST-CONSTRUCTION STORM WATER MANAGEMENT, AND OTHER CONTROLS REGARDING SOLID MATERIALS, SEDIMENTS AND DUST, AND THE DEMONSTRATED COMPLIANCE WITH APPLICABLE STATE AND/OR LOCAL WASTE DISPOSAL, SANITARY SEWER OR SEPTIC SYSTEM REGULATIONS.

2. RETENTION OF THE STORM WATER POLLUTION PREVENTION PLAN AT THE CONSTRUCTION SITE. THE PLAN AND OTHER RELATED DOCUMENTS SHALL BE MADE AVAILABLE UPON REQUEST TO AUTHORIZED LOCAL, STATE, OR FEDERAL REPRESENTATIVES.

3. AMENDMENT OF THE STORM WATER POLLUTION PREVENTION PLAN WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE, WHICH HAS A SIGNIFICANT EFFECT ON THE POTENTIAL FOR THE DISCHARGE OF POLLUTANTS TO THE SURFACE WATERS OF THE STATE, OR IF THE STORM WATER POLLUTION PREVENTION PLAN PROVES TO BE INEFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING POLLUTANTS FROM THE CONSTRUCTION ACTIVITY.

4. DOCUMENTATION OF THE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR, WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE, AND WHEN STABILIZATION MEASURES ARE IMPLEMENTED.

5. INSPECTIONS OF DISTURBED AREAS OF THE CONSTRUCTION SITE AND AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION THAT HAVE NOT BEEN FINALLY STABILIZED, STRUCTURAL CONTROL MEASURES, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE SHALL BE CONDUCTED AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT THAT PRODUCES SURFACE RUNOFF AS REQUIRED BY THE GENERAL PERMIT REGULATIONS. REPORTS SUMMARIZING THE INSPECTIONS SHALL BE MADE IN ACCORDANCE TO THE REGULATIONS AND RETAINED AS PART OF THE STORM WATER POLLUTION PREVENTION PLAN.

6. ALL CONTRACTORS AND SUBCONTRACTORS SHALL SIGN A COPY OF THE CERTIFICATION STATEMENT AS DESCRIBED IN THE GENERAL PERMIT BEFORE CONDUCTING ANY PROFESSIONAL SERVICES AT THE SITE IDENTIFIED IN THE POLLUTION PREVENTION PLAN. ALL CERTIFICATIONS SHALL BE INCLUDED IN THE STORM WATER POLLUTION PREVENTION PLAN.

7. ALL DOCUMENTS, RECORDS, REPORTS, AND OTHER INFORMATION RELEVANT TO THE GENERAL PERMIT REGULATIONS SHALL BE GIVEN TO THE OWNER FOLLOWING FINAL STABILIZATION OF THE SITE.

8. WHERE THE SITE HAS BEEN FINALLY STABILIZED AND ALL STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES THAT ARE AUTHORIZED BY THE GENERAL PERMIT ARE ELIMINATED, A NOTICE OF TERMINATION SHALL BE PREPARED FOR THE OWNER TO SIGN AND SUBMIT TO THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY, WATER DIVISION.

9. THE STRUCTURAL STABILITY OF THE PERMITTED FACILITIES SHALL BE ENSURED.

PROHIBITION AND REPORTING OF RELEASES OF SUBSTANCES OTHER THAN STORM WATER

10. EXECUTION OF REPORTING REQUIREMENTS IN THE EVENT OF NONCOMPLIANCE OF THE GENERAL PERMIT OR IF ANY UNPERMITTED, UNUSUAL OR EXTRAORDINARY DISCHARGE ENTERS OR COULD BE EXPECTED TO ENTER SURFACE WATERS OF THE STATE.

11. PROHIBITION OF NON-STORMWATER DISCHARGES EXCEPT AS PROVIDED FOR IN THE GENERAL PERMIT. APPROPRIATE POLLUTION PREVENTION MEASURES FOR NON-STORM WATER COMPONENTS OF DISCHARGE SHALL BE IMPLEMENTED.

12. EXECUTION OF REPORTING REQUIREMENTS OF 40 CFR PART 117 (1992) AND 40 CFR PART 302 (1992). IN ADDITION, THE DISCHARGE OF HAZARDOUS SUBSTANCES OR OIL IN THE STORM WATER DISCHARGE FROM THE CONSTRUCTION SITE SHALL BE PREVENTED OR MINIMIZED IN ACCORDANCE WITH THE STORM WATER POLLUTION PREVENTION PLAN.

13. PROHIBITION OF DISCHARGE OF HAZARDOUS SUBSTANCES, OIL, OR POLLUTANTS RESULTING FROM ON-SITE SPILLS OR RELEASES.

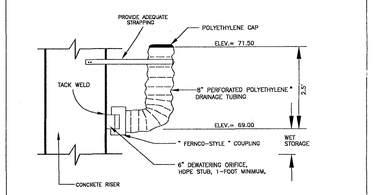
MANAGEMENT MEASURES AND RESPONSE TO UNINTENTIONAL RELEASES

14. ALL WASTE COLLECTING, CONTROL, TREATMENT, MANAGEMENT OF POLLUTANT ACTIVITIES AND DISPOSAL FACILITIES SHALL BE OPERATED IN A MANNER CONSISTENT WITH THE GENERAL PERMIT REGULATIONS.

15. ALL FEASIBLE STEPS TO MINIMIZE ANY ADVERSE IMPACTS TO STATE WATERS RESULTING FROM NON-COMPLIANCE WITH CONDITIONS SPECIFIED IN THE GENERAL PERMIT SHALL BE TAKEN.

16. ALL REASONABLE STEPS TO MINIMIZE, CORRECT OR PREVENT ANY DISCHARGE IN VIOLATION OF THE GENERAL PERMIT WHICH HAS A REASONABLE LIKELIHOOD OF ADVERSELY AFFECTING HUMAN HEALTH OR THE ENVIRONMENT SHALL BE TAKEN.

RECOMMENDED DEWATERING SYSTEM FOR SEDIMENT BASINS



*DRAINAGE TUBING SHALL COMPLY WITH ASTM F667 AND AASHTO M294

SOURCE: VA. DSWC — PLATE. 3.14-15

JAMES CITY COUNTY ENVIRONMENTAL DIVISION
EROSION AND SEDIMENT CONTROL NOTES – REVISED 7/6/01

THE PURPOSE OF THE EROSION MEASURES SHOWN ON THESE PLANS SHALL BE TO PRECLUDE THE TRANSPORT OF ALL WATERBORNE SEDIMENTS RESULTING FROM CONSTRUCTION ACTIVITIES FROM ENTERING ONTO ADJACENT PROPERTIES OR STATE WATERS. IF FIELD INSPECTION REVEALS THE INADEQUACY OF THE PLAN TO CONFINE SEDIMENT TO THE PROJECT SITE, ALL APPROPRIATE MODIFICATIONS WILL BE MADE TO CORRECT ANY PLAN DEFICIENCIES. IN ADDITION TO THESE NOTES, ALL PROVISIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS SHALL APPLY TO THIS PROJECT.

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, 3RD EDITION, 1992. THE CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH ALL APPLICABLE MEASURES CONTAINED THEREIN THAT MAY BE PERTINENT TO THIS PROJECT, INCLUDING MINIMUM STANDARDS 1 THROUGH 19. IF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS FOUND TO BE INADEQUATE IN THE FIELD, THE MINIMUM STANDARDS WILL APPLY IN ADDITION TO THE PROVISIONS OF THE APPROVED PLAN.

2. AS A PERQUISITE TO APPROVAL OF AN EROSION AND SEDIMENT CONTROL PLAN FOR LAND-DISTURBING ACTIVITIES, THE NAME OF A RESPONSIBLE LAND-DISTURBER SHALL BE PROVIDED. THE RESPONSIBLE LAND-DISTURBER SHALL BE AN INDIVIDUAL WHO HOLDS A VALID CERTIFICATE OF COMPETENCE ISSUED BY THE VIRGINIA DEPARTMENT OF CONSERVATION AND IS DEFINED AS THE PERSON IN CHARGE OF AND RESPONSIBLE FOR CARRYING OUT THE LAND-DISTURBING ACTIVITY. PERMITS OR PLANS WITHOUT THIS INFORMATION ARE DEEMED INCOMPLETE AND WILL NOT BE APPROVED UNTIL PROPER NOTIFICATION IS RECEIVED. ALSO, IF THE PERSON DESIGNATED AS RESPONSIBLE LAND-DISTURBER CHANGES BETWEEN THE TIME OF PLAN APPROVAL AND THE SCHEDULED PRECONSTRUCTION MEETING, THE ENVIRONMENTAL DIVISION SHALL BE INFORMED OF THE CHANGE, IN WRITING, 24-HOURS IN ADVANCE OF THE PRECONSTRUCTION MEETING.

3. A PRECONSTRUCTION MEETING SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE DEVELOPER, THE PROJECT ENGINEER, THE RESPONSIBLE LAND-DISTURBER AND THE CONTRACTOR PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT. THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF CONSTRUCTION TO THE COUNTY FOR APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING. THE DESIGNATED RESPONSIBLE LAND-DISTURBER IS REQUIRED TO ATTEND THE PRECONSTRUCTION MEETING FOR THE PROJECT.

4. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED BY A TEMPORARY CONSTRUCTION ENTRANCE TO PREVENT TRACKING OF MUD ONTO PUBLIC RIGHT-OF-WAYS. AN ENTRANCE PERMIT FROM VDOT IS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN STATE RIGHT-OF-WAYS. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE THOROUGHLY CLEANED AT THE END OF EACH DAY (STD. & SPEC. 3.02).

5. SEDIMENT BASINS AND TRAPS (STD. & SPEC. 3.13 AND 3.14), PERIMETER DIKES (STD. & SPEC. 3.09 AND 3.12), SEDIMENT FILTER BARRIERS (STD. & SPEC. 3.05) AND OTHER MEASURES INTENDED TO TRAP SEDIMENT ON-SITE MUST BE CONSTRUCTED AS A FIRST STEP IN GRADING AND MUST BE MADE FUNCTIONAL PRIOR TO ANY UPSLOPE LAND DISTURBANCE TAKING PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS MUST BE SEEDED AND MULCHED IMMEDIATELY AFTER INSTALLATION. PERIODIC INSPECTIONS OF THE EROSION CONTROL MEASURES BY THE OWNER OR OWNER'S REPRESENTATIVE SHALL BE MADE TO ASSESS THEIR CONDITION. ANY NECESSARY MAINTENANCE OF THE MEASURES SHALL BE ACCOMPLISHED IMMEDIATELY AND SHALL INCLUDE THE REPAIR OF MEASURES DAMAGED BY ANY SUBCONTRACTOR INCLUDING THOSE OF THE PUBLIC UTILITY COMPANIES.

6. SURFACE FLOWS OVER CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER REDIRECTING FLOWS FROM TRANSVERSING THE SLOPES OR BY INSTALLING MECHANICAL DEVICES TO SAFELY LOWER WATER DOWNSLOPE WITHOUT CAUSING EROSION. A TEMPORARY FILL DIVERSION (STD. & SPEC. 3.10) AND SLOPE DRAIN (STD. & SPEC. 3.15) SHALL BE INSTALLED PRIOR TO THE END OF EACH WORKING DAY.

7. SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT TIME OF CONSTRUCTION TO INSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED. ENVIRONMENTAL DIVISION APPROVAL WILL BE REQUIRED FOR OTHER DEVIATIONS FROM THE APPROVED PLAN.

8. THE CONTRACTOR SHALL PLACE SOIL STOCKPILES AT THE LOCATIONS SHOWN ON THE PLAN. SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. OFF-SITE WASTE OR BORROW AREAS SHALL BE APPROVED BY THE ENVIRONMENTAL DIVISION PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.

9. THE CONTRACTOR SHALL COMPLETE DRAINAGE FACILITIES WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT. THE INSTALLATION OF DRAINAGE FACILITIES SHALL TAKE PRECEDENCE OVER ALL UNDERGROUND UTILITIES. OUTFALL DITCHES FROM DRAINAGE STRUCTURES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION OF THE SAME (STD. & SPEC. 3.18). THIS INCLUDES INSTALLATION OF EROSION CONTROL STONE OR PAVED DITCHES WHERE REQUIRED. ANY DRAINAGE OUTFALLS REQUIRED FOR A STREET MUST BE COMPLETED BEFORE STREET GRADING OR UTILITY INSTALLATION BEGINS.

10. 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 BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

11. NO MORE THAN 300 FEET OF SANITARY SEWER, STORM DRAIN, WATER OR UNDERGROUND UTILITY LINES ARE TO BE OPEN AT ONE TIME. FOLLOWING INSTALLATION OF ANY PORTION OF THESE ITEMS, ALL DISTURBED AREAS ARE TO BE IMMEDIATELY STABILIZED (I.E., THE SAME DAY).

12. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING (STD. & SPEC. 3.35). SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.

13. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABILIZATION ON THIS PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED CONTAINING THE SPECIFIED AMOUNTS OF SEED, LIME AND FERTILIZER (STD. & SPEC. 3.32). IRRIGATION SHALL BE REQUIRED AS NECESSARY TO ENSURE ESTABLISHMENT OF GRASS COVER.

14. ALL SLOPES STEEPER THAN 3H:1V SHALL REQUIRE THE USE OF EROSION CONTROL BLANKETS AND MATTINGS TO AID IN THE ESTABLISHMENT OF A VEGETATIVE COVER. INSTALLATION SHALL BE IN ACCORDANCE WITH STD. & SPEC. 3.35, MULCHING, STD. & SPEC. 3.36, SOIL STABILIZATION BLANKETS AND MATTING AND MANUFACTURERS INSTRUCTIONS. NO SLOPES SHALL BE CREATED STEEPER THAN 2H:1V.

15. INLET PROTECTION (STD. & SPEC., 3.07 AND 3.08) SHALL BE PROVIDED FOR ALL STORM DRAIN AND CULVERT INLETS FOLLOWING CONSTRUCTION OF THE SAME.

16. TEMPORARY LINERS, SUCH AS POLYETHYLENE SHEETS, SHALL BE PROVIDED FOR ALL PAVED DITCHES UNTIL THE PERMANENT CONCRETE LINER IS INSTALLED.

17. PAVED DITCHES SHALL BE REQUIRED WHEREVER ACCELERATED EROSION IS EVIDENT. PARTICULAR ATTENTION SHALL BE PAID TO THOSE AREAS WHERE GRADES EXCEED 3 PERCENT.

18. TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCE ARE NOT TO BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. TRAPPED SEDIMENT SHALL BE SPREAD, SEEDED AND MULCHED. AFTER THE PROJECT AND STABILIZATION IS COMPLETE, ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS.

19. NO SEDIMENT TRAP OR SEDIMENT BASIN SHALL BE REMOVED UNTIL A) AT LEAST 75 PERCENT OF THE LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN SOLD TO A THIRD PARTY (UNRELATED TO THE DEVELOPER) FOR THE CONSTRUCTION OF HOMES AND/OR B) 60 PERCENT OF THE SINGLE FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN COMPLETED AND THE SOIL STABILIZED. A BULK SALE OF THE LOTS TO ANOTHER BUILDER DOES NOT SATISFY THIS PROVISION. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL NOT BE REMOVED WITHOUT THE EXPRESS AUTHORIZATION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION.

20. RECORD DRAWINGS (AS-BUILTS) AND CONSTRUCTION CERTIFICATIONS ARE BOTH REQUIRED FOR NEWLY CONSTRUCTED OR MODIFIED STORMWATER MANAGEMENT/BMP FACILITIES. CERTIFICATION ACTIVITIES SHALL BE ADEQUATELY COORDINATED AND PERFORMED BEFORE, DURING AND FOLLOWING CONSTRUCTION IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER MANAGEMENT/BMP FACILITIES, RECORD DRAWINGS AND CONSTRUCTION CERTIFICATION, STANDARD FORMS & INSTRUCTIONS.

21. DESIGN AND CONSTRUCTION OF PRIVATE-TYPE SITE DRAINAGE SYSTEMS OUTSIDE VDOT RIGHTS-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER DRAINAGE CONVEYANCE SYSTEMS (NON-BMP RELATED), GENERAL DESIGN AND CONSTRUCTION GUIDELINES.

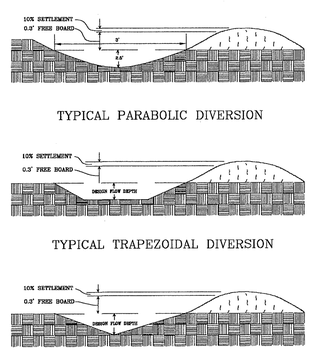
SEDIMENT TRAP SIZING
OUTFALL SIZING

TRAP NUMBER	DRY DEPTH (FT)	H	Ho	W	L
ST#1	1.5	2.5'	1.5'	4.0'	6.0'

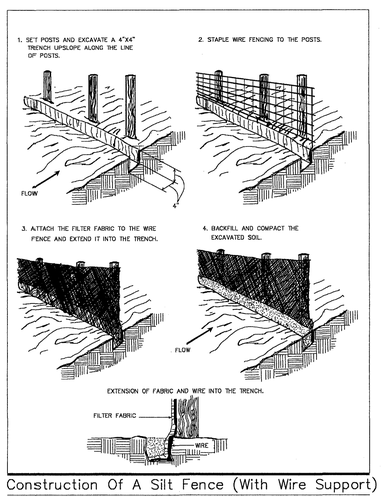
SEDIMENT TRAP SIZING

TRAP NUMBER	DISTURBED DRAINAGE AREA (AC)	TRAP DRAINAGE AREA (AC)	DESIGN VOLUME REQUIRED (134CY/AC)	WET DEPTH (FT)	WATER SURFACE DIMENSIONS LENGTH (FT)	WATER SURFACE DIMENSIONS WIDTH (FT)	AREA OF WATER SURFACE (SF)	DRY DEPTH (FT)	WET VOLUME PROVIDED (CY)	DRY VOLUME PROVIDED (CY)	TOTAL VOLUME PROVIDED (CY)	TRAP NUMBER	TOP OF BERM ELEVATION	DRY VOL. ELEVATION	WET VOL. ELEVATION	CLEANOUT ELEVATION	BOTTOM ELEVATION
ST#1	.8	.8	108 CY	2.3	46	20	890	1.5	58.04	56.52	114.56	ST#1	54.00	53.00	51.50	50.45	49.00

DIVERSIONS

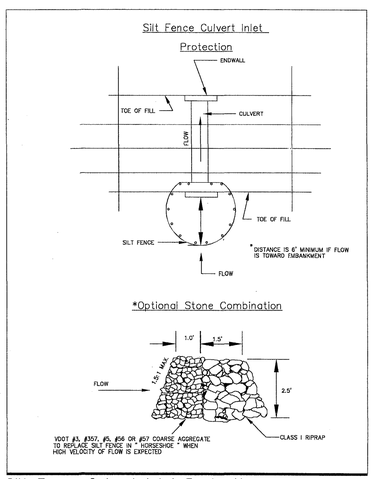


Source: Va. DSWC — Plate 3.12-1



Construction Of A Silt Fence (With Wire Support)

N.T.S. — Source: Sherwood & Wyant — Plate 3.05-1



Silt Fence Culvert Inlet Protection

N.T.S. — Source: Adopted from VDOT Standard Sheets And VA. DSWC — Plate 3.08-1

TEMPORARY SEDIMENT TRAP (ST)

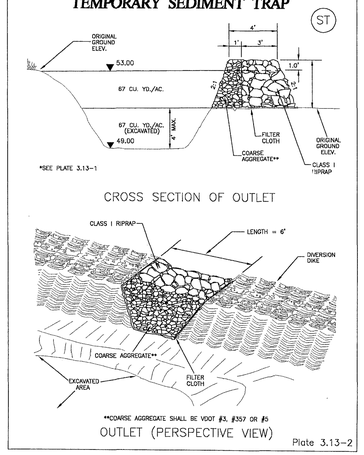


Plate 3.13-2

COMMONWEALTH OF VIRGINIA
4-22-04
STEPHEN A. ROMEO
No. 1448-B
LANDSCAPE ARCHITECT AND SURVEYOR

LANDMARK DESIGN GROUP
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Landscape Architects • Environmental Scientists

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Tel. (757) 473-2000
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REVISIONS:

No.	Date	Comment	By

DRAWING STATUS: Interoffice Review / Client for Review / Pre Approval Bidding

COUNTY APPROVAL: 1st Submittal / 2nd Submittal / 3rd Submittal / Approved

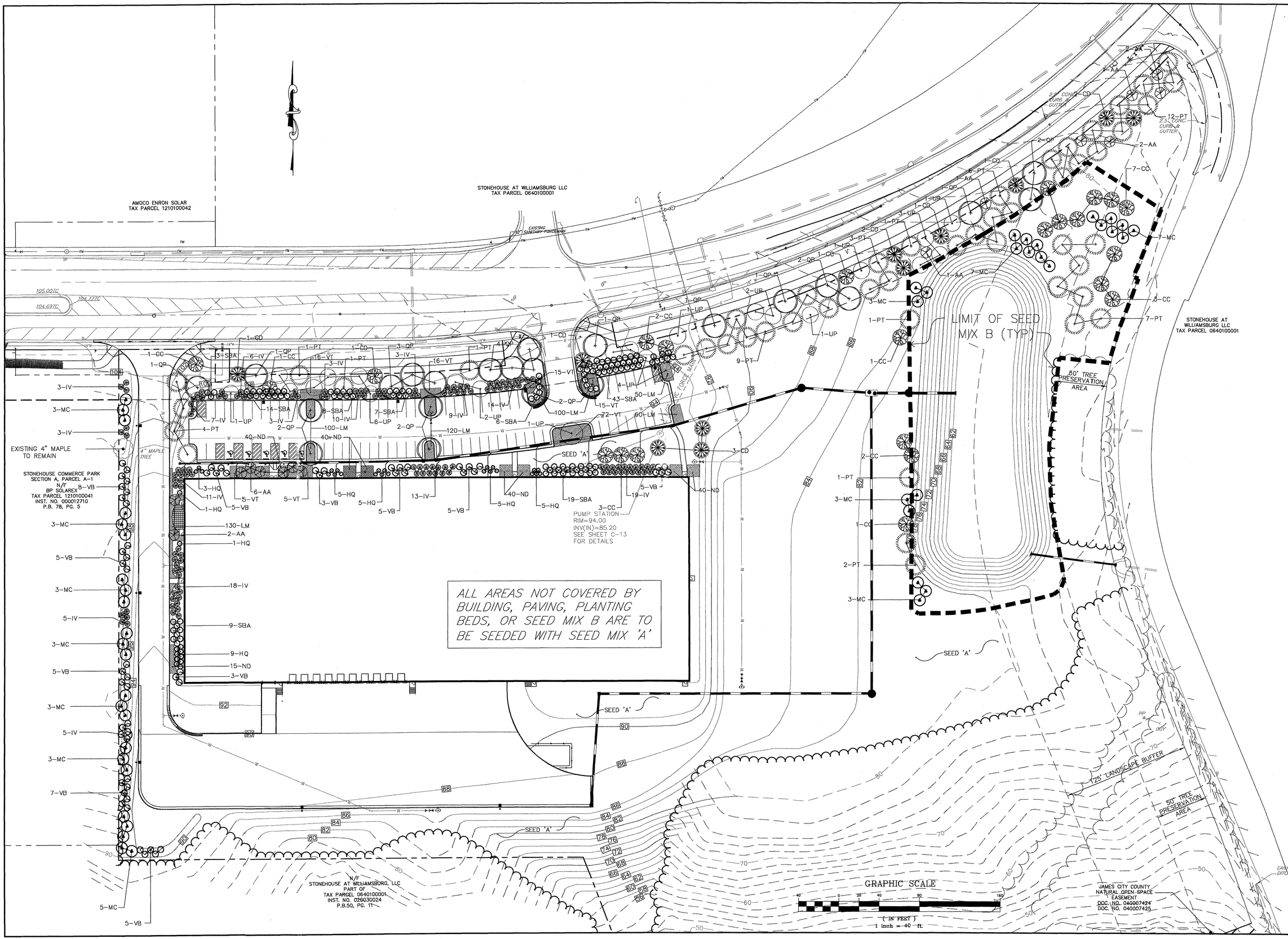
EROSIONS AND SEDIMENT CONTROL NOTES AND DETAILS

WYTHE-WILL DISTRIBUTION STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY — VIRGINIA

Designed: CBN	Date: 10/27/03
Checked: WDF	Scale: NTS
File Mgr./Drawn: CCC/CBN	CADD File name: C9-ES..dwg
Project Number: 200315I-000.09	Dwg. File No.: 14760W

Drawing Number C-9



COMMONWEALTH OF VIRGINIA
4-22-04
STEPHEN A. ROMEO
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LANDMARK DESIGN GROUP
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1	11/26/03	REV. PER JCC COMMENTS	GBW
2			
3			
4			
5			
6			

DRAWING STATUS
- Interoffice Review
- Client for Review
- Pre Approval Bidding

COUNTY APPROVAL
- 9/12/2003 1st Submittal
- 2nd Submittal
- 3rd Submittal
- Approved

PLANTING PLAN

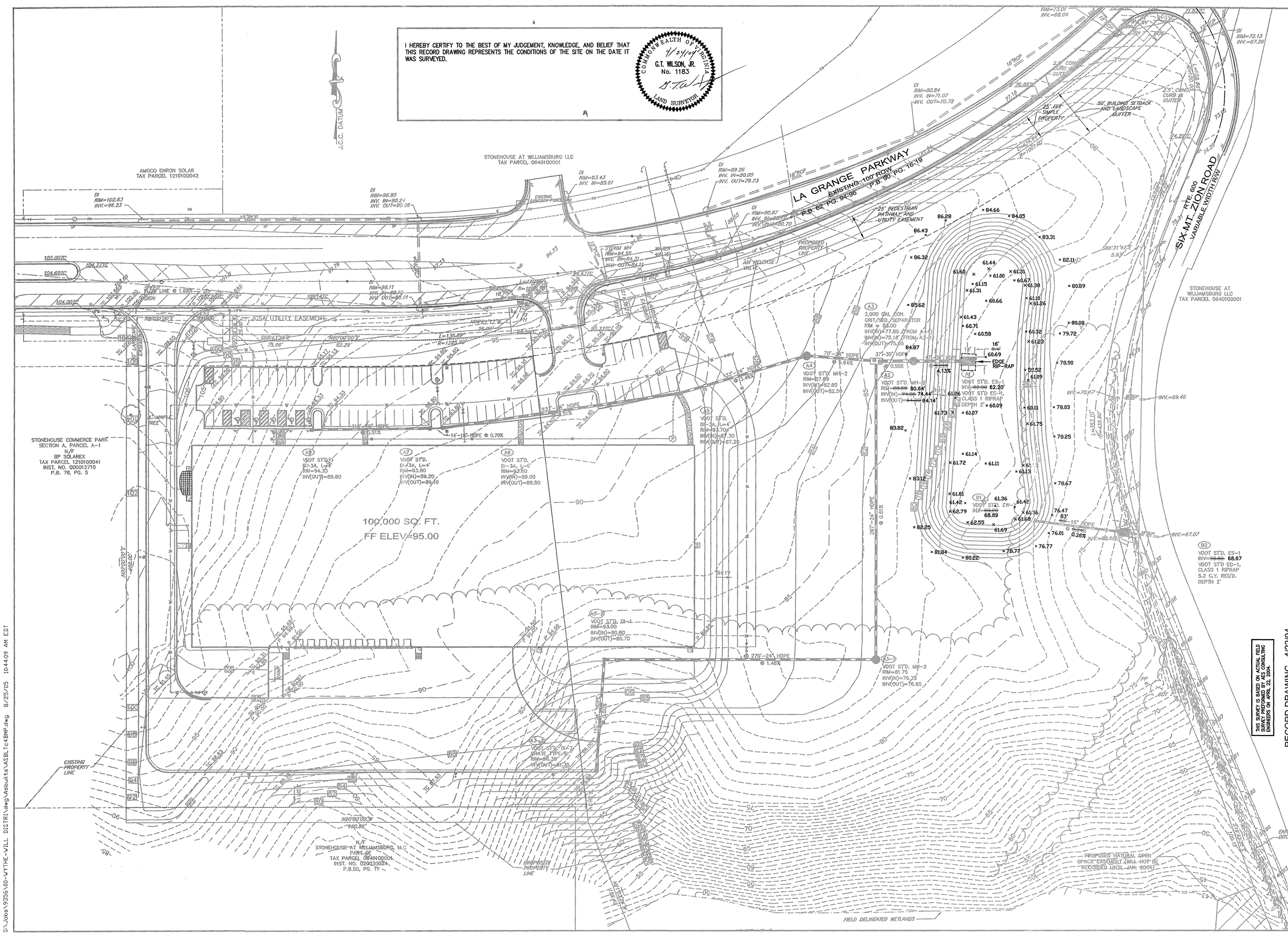
WYTHE-WILL DISTRIBUTION STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY VIRGINIA

Designed: NJC	Date: 10/22/03
Checked: VBR	Scale: 1"=40'
File Mgr./Drawn: NJC/MDK	CADD File name: L-1.dwg
Project Number: 2003151-000.09	Dwg. File No.: 14753 W
Drawing Number	L-1

I HEREBY CERTIFY TO THE BEST OF MY JUDGEMENT, KNOWLEDGE, AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE CONDITIONS OF THE SITE ON THE DATE IT WAS SURVEYED.

COMMONWEALTH OF VIRGINIA
4/23/04
G.T. WILSON, JR.
No. 1183
LAND SURVEYOR



THIS SURVEY IS BASED ON ACTUAL FIELD SURVEYS PERFORMED BY AES CONSULTING ENGINEERS ON APRIL 22, 2004.

RECORD DRAWING - 4/22/04

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RECORD DRAWING INFORMATION SHOWN PREPARED BY
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AND BASED ON
ORIGINAL DESIGN AS PREPARED BY
LANDMARK DESIGN GROUP

No.	Date	Comment	By

REVISIONS:

DRAWING STATUS
- Interoffice Review
- Client for Review
- Pre Approval Bidding
- NOTE

COUNTY APPROVAL
APPROVED
- 1st Submittal
- 2nd Submittal
- 3rd Submittal
- Approved

GRADING AND DRAINAGE PLAN
WYTHE-WILL DISTRIBUTION
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY VIRGINIA

Designed: BAR/WDF	Date: 10/14/03
Checked: WDF/BAR	Scale: 1"=40'
File Mgr./Drawn: CCC	CADD File name: C4-GRADING
Project Number: 2003181-000.00	Dwg. File No.: 14765W
Drawing Number	C-4

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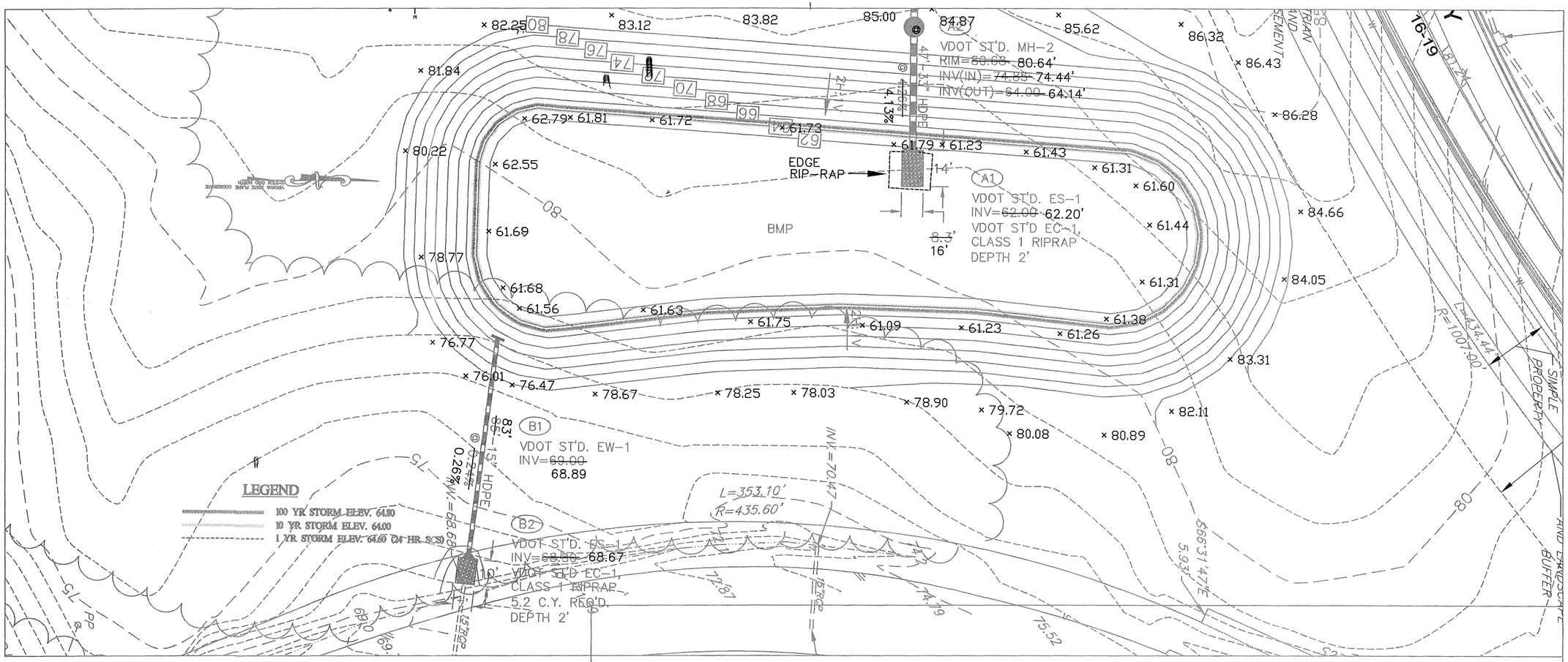


GRAPHIC SCALE

0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

BMP MAINTENANCE NOTES AND REQUIREMENTS

1) THE OWNER SHALL MAINTAIN 1 HP PORTABLE SUBMERSIBLE SUMP PUMP AND SUFFICIENT HOSE TO DEWATER THE BMP IN THE EVENT OF AN INFILTRATION FAILURE. TEMPORARY PUMPING OF THE BMP WILL BE NECESSARY UNTIL APPROPRIATE ACTION CAN BE TAKEN TO CORRECT THE INFILTRATION PROBLEM OR CONVERTED THE BASIN TO ANOTHER TYPE OF APPROVED BMP FACILITY.

2) WHEN CONSTRUCTION OF THE INFILTRATION BASIN IS COMPLETE IT SHALL BE INSPECTED MONTHLY AND AFTER EVERY MAJOR STORM EVENT. AFTER IT IS DETERMINED THAT THE INFILTRATION BASIN IS OPERATING PROPERLY, INSPECTIONS SHALL BE CONDUCTED SEMIANNUALLY AND AFTER LARGE STORM EVENTS. ALL INSPECTIONS SHALL SEARCH FOR POTENTIAL SOURCES THAT COULD ADVERSELY AFFECT THE BASIN'S ABILITY TO INFILTRATE STORMWATER. THE INSPECTIONS SHALL EXAMINE THE BASIN FOR ERODED AREAS THAT ARE BARE OF VEGETATION. IF SEDIMENT AND/OR BARE SPOTS ARE FOUND IN THE BASIN, STEPS MUST BE TAKEN IMMEDIATELY TO RESOLVE THE PROBLEM. TRASH AND OTHER DEBRIS SHALL BE REMOVED FROM THE BASIN AT THE SAME TIME AS THE INSPECTION.

3) ALL FUTURE STORM SEWERS THAT DISCHARGE INTO THE INFILTRATION BASIN MUST FIRST BE ROUTED THROUGH A PRETREATMENT STRUCTURE.

4) THE DRAINAGE SYSTEM MUST BE DEWATER AND FLUSH PRIOR TO REDIRECTING DISCHARGE FROM TEMPORARY SEDIMENT BASIN TO THE BMP. THE WATER FROM THE DEWATERING AND FLUSHING SHALL BE DISCHARGED INTO THE TEMPORARY SEDIMENT BASIN.

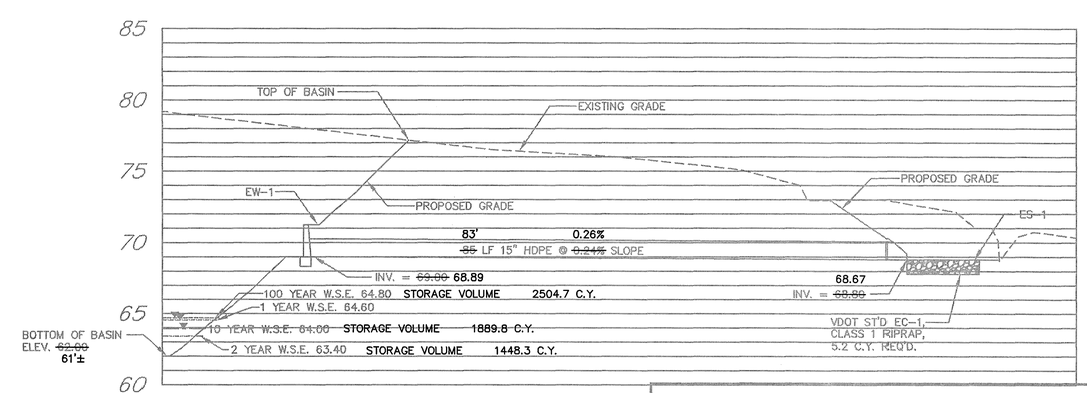
5) THE INFILTRATION BASIN SHALL NOT BE PLACED INTO SERVICE UNTIL THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED AND THE INFILTRATION BASIN HAS ESTABLISHED A COMPLETE COVER OF VEGETATIVE TURF.

6) THE BASIN SHALL BE CLEANED OUT UPON SEDIMENT ACCUMULATION EXCEEDING 12 INCHES IN DEPTH.

7) THE PRETREATMENT STRUCTURE SHALL BE CLEANED OUT UPON SEDIMENT ACCUMULATION EXCEEDING 6 INCHES IN DEPTH.

8) VDOT DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION/RETENTION POND OR ITS STRUCTURE, AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES.

9) THE OWNER SHALL COORDINATE THE INSTALLATION OF THE LANDSCAPING AROUND THE PERIMETER OF THE BMP SO AS TO FACILITATE ACCESS FOR MAINTENANCE PURPOSES.



PIPE PROFILE

VERTICAL 1"=5
HORIZONTAL 1"=10'

THIS SURVEY IS BASED ON ACTUAL FIELD SURVEY PERFORMED BY AES CONSULTING ENGINEERS ON APRIL 22, 2004.

RECORD DRAWING - 4/22/04

I HEREBY CERTIFY TO THE BEST OF MY JUDGEMENT, KNOWLEDGE, AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE CONDITIONS OF THE SITE ON THE DATE IT WAS SURVEYED.

COMMONWEALTH OF VIRGINIA
4/24/04
G.T. WILSON, JR.
No. 1183
LAND SURVEYOR

RECORD DRAWING
RECORD DRAWING INFORMATION SHOWN PREPARED BY AES CONSULTING ENGINEERS
ORIGINAL DESIGN PREPARED BY LANDMARK DESIGN GROUP

REVISIONS:

No.	Date	Comment	By

DRAWING STATUS
Interoffice Review
Client for Review
Pre Approval Bidding
NOTE
COUNTY APPROVAL
03/27/03 1st Submittal
10/24/03 2nd Submittal
3rd Submittal
Approved

BMP DETAIL AND NOTES
WYTHE-WILL DISTRIBUTION
STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY VIRGINIA

Designed: SAR	Date: 10/24/03
Checked: WAB	Scale: 1"=20'
File Mgr./Drawn: WAB	CADD File name: C-7.dwg
Project Number: 2003193-000.00	Dwg. File No.: 14782-W
Drawing Number C-7	

7 OF 18

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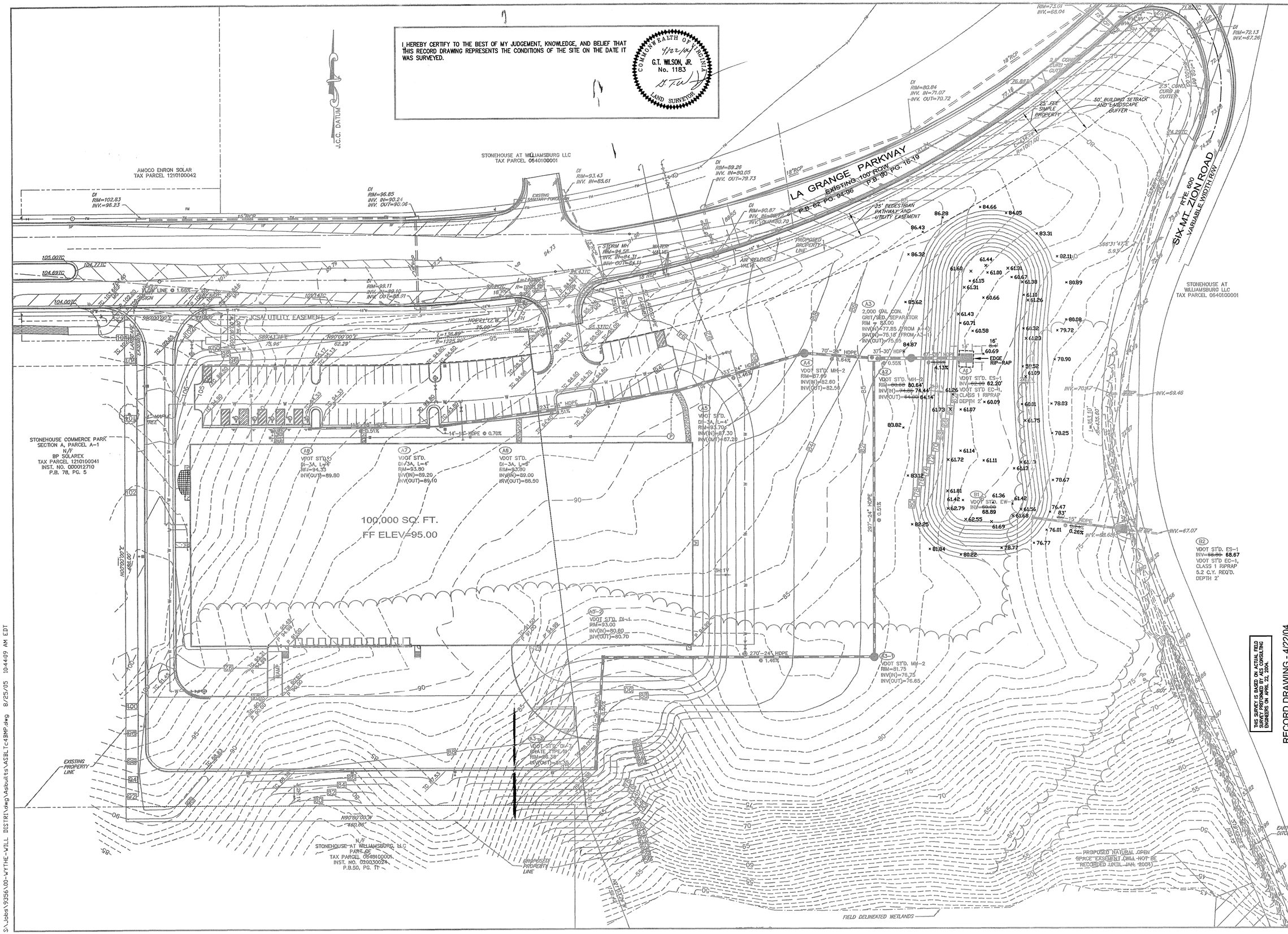
COMMONWEALTH OF VIRGINIA
4/22/04
G.T. WILSON, JR.
No. 1183
LAND SURVEYOR



THIS SURVEY IS BASED ON ACTUAL FIELD SURVEYS PERFORMED BY AES CONSULTING ENGINEERS ON APRIL 22, 2004.

RECORD DRAWING - 4/22/04

RECORD DRAWING
RECORD DRAWING INFORMATION SHOWN PREPARED BY
AES CONSULTING ENGINEERS
AND BASED ON
ORIGINAL DESIGN AS PREPARED BY
LANDMARK DESIGN GROUP

REVISIONS:			
No.	Date	Comment	By

DRAWING STATUS
- Interactive Review
- Client for Review
- Pre Approval Bidding
- NOTE

COUNTY APPROVAL
- 1st Submittal
- 2nd Submittal
- Approved

GRADING AND DRAINAGE PLAN
WYTHE-WILL DISTRIBUTION
STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY VIRGINIA

Designed: SAR/WDF	Date: 10/14/03
Checked: WDF/SAR	Scale: 1"=40'
File Mgr./Drawn: CCC	CADD File name: C4-GRADING
Project Number: 2003161-000.09	Dwg. File No.: 14765W
Drawing Number	C-4

4 of 18

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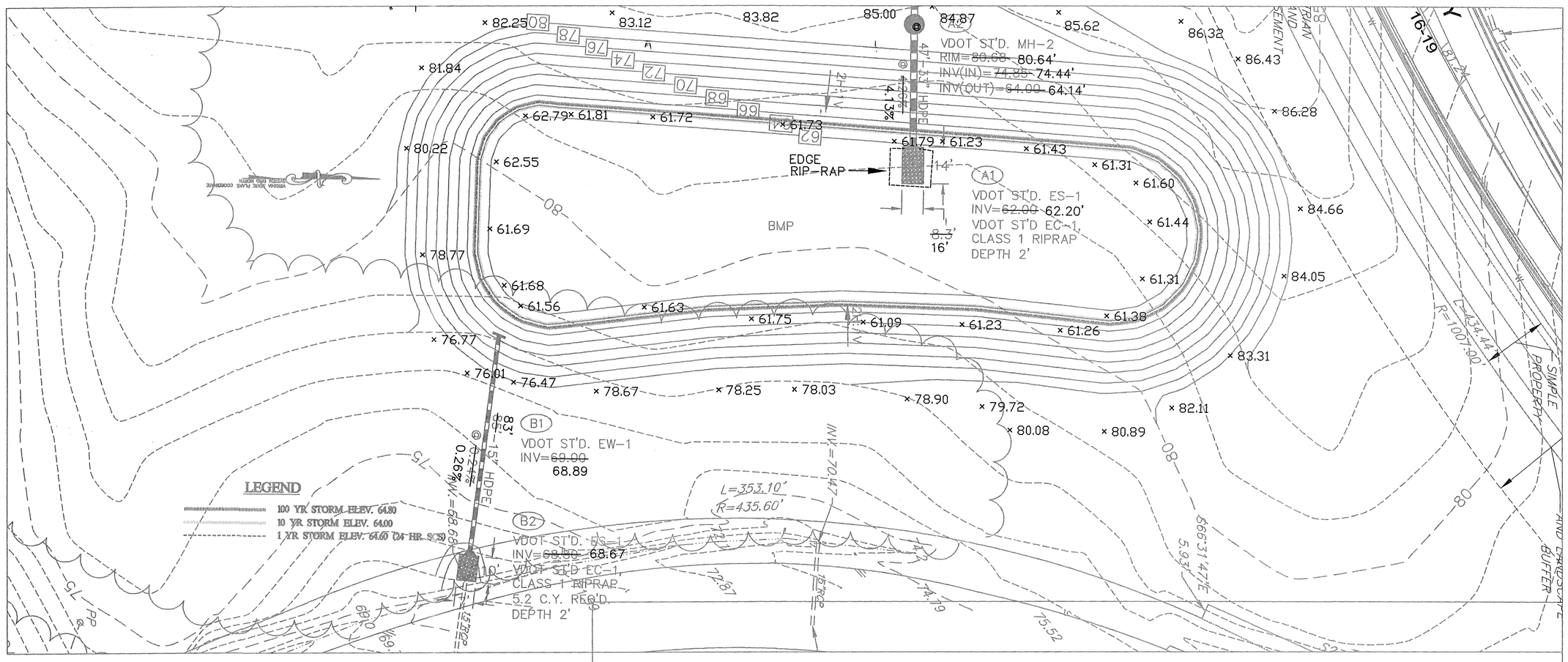

GRAPHIC SCALE

0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

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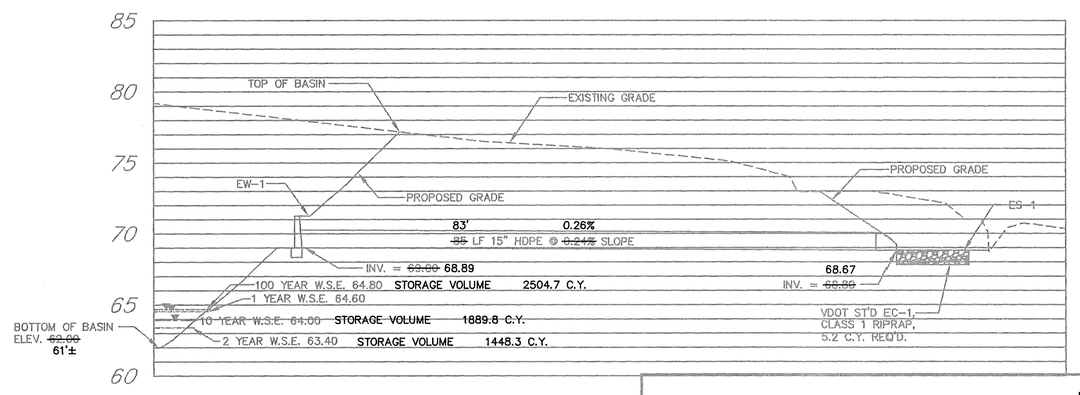

PIPE PROFILE

VERTICAL 1"=5'
HORIZONTAL 1"=10'

THIS SURVEY IS BASED ON ACTUAL FIELD SURVEY PERFORMED BY AES CONSULTING ENGINEERS ON APRIL 22, 2004.

RECORD DRAWING - 4/22/04

I HEREBY CERTIFY TO THE BEST OF MY JUDGEMENT, KNOWLEDGE, AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE CONDITIONS OF THE SITE ON THE DATE IT WAS SURVEYED.

COMMONWEALTH OF VIRGINIA
4/23/04
G.T. WILSON, JR.
No. 1183
LAND SURVEYOR

RECORD DRAWING
RECORD DRAWING INFORMATION SHOWN PREPARED BY
AES CONSULTING ENGINEERS
AND BASED ON
ORIGINAL DESIGN AS PREPARED BY
LANDMARK DESIGN GROUP

No.	Date	Comment	By

REVISIONS:

DRAWING STATUS: Interoffice Review / Client for Review / Pre Approval Bldng / NOTE

COUNTY APPROVAL: 1st Submittal 10/27/03; 2nd Submittal 3/19/03; 3rd Submittal; Approved

BMP DETAIL AND NOTES

WYTHE-WILL DISTRIBUTION
STONEHOUSE COMMERCE PARK

JAMES CITY COUNTY — VIRGINIA

Designed: GAR	Date: 10/24/03
Checked: WAB	Scale: 1"=20'
File Mgr./Drawn: WAB	CADD File name: C-7.dwg
Project Number: 2003151-000.09	Dwg. File No.: 14762-W
Drawing Number	C-7

7 OF 18

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WYTHE-WILL DISTRIBUTION WAREHOUSE
AT
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

LMDG# 2003151-000.09

SITE DEVELOPMENT PLAN
PROJECT NARRATIVE
AND
CALCULATIONS

Revised December 11, 2003
November 25, 2003
October 28, 2003

SP-130-03
WC 097

LANDMARK
DESIGN GROUP

Engineers ♦ Planners ♦ Surveyors ♦ Landscape Architects ♦ Environmental Scientists
4029 Ironbound Road, Suite 100, Williamsburg, VA 23188 (757) 253-2975 FAX: (757) 229-0049 lmdg@landmarkdg.com

SITE DEVELOPMENT PLAN
PROJECT NARRATIVE AND CALCULATIONS

WYTHE-WILL DISTRIBUTION WAREHOUSE
AT
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA
LMDG# 2003151-000.09

Project Narrative

The proposed Wythe-Will Distribution Warehouse is located in Stonehouse Commerce Park in James City County, Virginia. The proposed 15.6-acre parcel fronts on LaGrange Parkway and is adjacent to Route 600, Six Mount Zion Road. The existing land is undeveloped, and is covered by uncultivated fields and stands of mature trees.

The proposed construction is a warehouse and distribution facility, with offices, having an overall footprint of approximately 100,000 square feet. The current interior configuration calls for 94,400 s.f. of warehouse, and 11,200 s.f. of office split over two stories. There are dock-height doors provided for the warehouse, as well as small area for staging of trailers and turning movements adjacent to the loading docks. There is an area of the site identified for an additional 43,200 square foot warehouse expansion. 95 parking spaces will be provided in a separate employee/visitor lot along the LaGrange Parkway side of the building. An on-site stormwater management facility will be constructed for this project, which is sized to serve the current and the anticipated future expansion.

Adjacent Areas

Adjacent areas include active and fallow fields, wooded areas, ravines, and existing commercial/industrial developed land. No residential areas are immediately adjacent to the work area. At the bottom of the ravine along the south border of the site, there exist wetlands and streambed.

Off-Site Areas

Any off-site borrow operations will be required to be in conformance with State and Local regulations. Off-site disposal shall be in conformance with State and Local regulations, i.e. disposal in an approved landfill or borrow site.

Critical Areas

Along the south border of the property, there exist steep slopes and wetland areas. Along the eastern property line, there exists a 125-foot landscape buffer, and within this buffer the 50 feet nearest to the road right-of-way are to be preserved undisturbed. The project has been engineered to avoid all impacts to these critical areas.

Soils

The site is covered with sandy, loamy soils with a low shrink/swell potential. The soils observed in-situ are in general agreement with the soils mapped in the Soil Survey. Mapped soils include:

- 11C Craven-Uchee Complex (6 to 10 Percent Slopes)
- 14B Emporia Fine Sandy Loam (2 to 6 Percent Slopes)
- 15E Emporia Complex (15 to 25 Percent Slopes)
- 19B Kempsville-Emporia Fine Sandy Loam (2 to 6 Percent Slopes)
- 31B Suffolk Fine Sandy Loam (2 to 6 Percent Slopes)

A complete geotechnical report is being prepared for this project by Schnabel Engineering Associates. That report should be referred to for further specific information regarding soil characteristics at the site.

Sanitary Sewer

Gravity sewer is not available at the site, so an on-site private wastewater pump station will be installed. This station will pump via small diameter force main to an existing force main stub to the east of the eastern entrance to the site. This stub leads to an existing sanitary force main that runs roughly parallel to LaGrange Parkway, north of the road. This site will utilize an on-site gravity sewer system that will tie into the on-site pump station. Operation, maintenance, and emergency procedures will be in compliance with Local and State regulations.

Domestic Water & Fire Protection

An existing 16" water main runs along the east side of LaGrange Parkway behind the curb. The proposed project will be served from this water main for both domestic water and fire protection needs.

The proposed construction will tap the existing 16" line to the east of the truck entrance. An 8" tapping sleeve and valve will be used for this purpose. The domestic service will be obtained via a corporation connection from the 8" extension. A detector check valve and vault will be installed and then the 8" fire protection service extended to the building. The building will be sprinkled, and hydrants will be extended in a partial loop around the building for added fire protection.

Stormwater

Existing Conditions

The site is currently occupied by fallow fields and mature stands of trees. Topography is rolling with several guts and ravines around the east and south borders of the site. The site generally drains from northwest to southeast via overland flow, with no defined channels cutting through the site. To the east, two culverts pass under Rte 600 providing relief from both roadway drainage and overland flow from the site. To the south, the overland flows end up in the ravine bordering the south end of the site. These outfalls drain into an un-named tributary of France Swamp, to Ware Creek, and eventually to the York River. The site is located in the Chesapeake Bay Preservation Area, but not within any Resource Protection Area boundaries.

Proposed Stormwater Management System

On-site stormwater management for the 15.6-acre parcel will be accomplished with a storm drain system consisting of gutters, inlets, pipes and sediment filters. The entire developed area of the site will be collected in the storm sewer system. This storm sewer will outfall into an on-site Storm Water Management Pond to accomplish storm water quantity mitigation. The on-site Storm Water Management Pond overflows into an existing 15" culvert under Rte. 600, at the eastern boundary of the site.

Stormwater Management

Two 30' deep borings were advanced at the north and south ends of the proposed Storm Water Management Facility at the center of the Facility. The approximate existing ground elevation at each boring location in 80.0. Stabilized water surface occurs at a depth of 25' or approximate elevation 55.0. The soil profile derived from the boring information yields a zone of Sandy Loam (SC) and Loamy Sand (SM) approximately 15' thick, followed by a 3' thick Layer of Clay, then returning to the Sandy Loam - Loamy Sand mix and then ground water. The Clay layer occurs at approximate elevation 65.0 and extends to approximate elevation 62.0. Overflow will be provided for by installation of a 15" diameter culvert between the Facility and an existing 15" diameter culvert at Six Mount Zion Road. The Sandy Loam - Loam Sand soil yields an infiltration rate of approximately 1.7"/hour. The Facility is sized to over control the runoff from the 1, 2, 10, 25 and 100-year storms as shown in the Appendix A calculations. The over control results in total attenuation and containment of these storms. This Facility, while not required to provide runoff water quality improvement pursuant to the Master Stormwater Management and Chesapeake Bay Preservation Ordinance Compliance Plan and calculations attached herewith, will provide runoff water quality improvements.

Stormwater Pollution Prevention Controls

Virginia Pollutant Discharge Elimination System Permit

The Contractor shall ensure compliance with the requirements of VR 680-14-19 Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Storm Water Discharges from Construction Sites, including but not limited to procurement, implementation, documentation, and inspections.

Responsible Land Disturber

Upon award of the contract, and before any land disturbing activity can begin, the Contractor shall execute and submit information shown on the Responsible Land Disturber form to the James City County Environmental Division (see Appendix C for a copy of the form).

Erosion and Sediment Control

Erosion control measures will be constantly maintained during construction and only removed once final stabilization of the site is achieved. Construction-phase erosion and sediment controls are designed to retain sediment on site to the maximum extent possible. The control measures selected will be installed, inspected, and maintained by the Contractor in accordance with the manufacturer's specifications, County codes, the *Virginia Erosion and Sediment Control Handbook*, latest edition, and good engineering practices.

Stabilization practices that will be utilized on the site include, but are not limited to, temporary seeding, mulching, and permanent seeding. These practices will be implemented as soon as possible upon cessation of construction activities in their respective areas. In no case shall an area remain un-stabilized more than 7 days after disturbance in that area has ended, unless construction in that area is to resume within 30 days of initial cessation.

When temporary stabilization is needed, it shall be applied in accordance with the VESCH section 3.31 for the Coastal Plain area. The quantities for Temporary Seeding are as follows:

Seeding Mixture per Acre (refer to Table 3.31-B, VESCH)
Sept. 1 – Feb. 15
    100 lbs of 50/50 mix of Annual Ryegrass and Winter Rye
Feb. 16 – Apr. 30
    100 lbs of Annual Ryegrass
May 1 – Aug. 31
    50 lbs of German Millet
Lime 6000 lbs per Acre (unless pH test suggests less per VESCH guidelines)
Fertilizer 600 lbs per Acre of 10-20-10
Mulch 2000 lbs per Acre

Once the clearing and filling operations are completed, permanent stabilization will be applied to the entire site in accordance with the practices outlined in the VESCH section 3.32 for the Coastal Plain area, and as specified on the Landscaping Plan developed for this project. The quantities for Permanent Seeding can be found on the Landscape Plan.

Several structural practices will be implemented on the site. Construction Entrances will be installed prior to allowing construction traffic egress from the site. The entrances will keep construction traffic from transporting site sediment to off-site streets or adjacent on-site paved areas that could result in silt-laden runoff entering the existing storm system. Silt Fence will enclose the entire site and will prevent the travel of sediments via overland flow from exiting the site as well as prevent erosion due to storm water runoff. A temporary Sediment Trap will be installed along the southern toe of slope where silt fence is inadequate to trap and filter runoff from the site. Inlet Protection will be installed at all existing and proposed inlets to prevent sediments from entering the drainage systems. Rock Outlet Protection will be placed at the end of exposed drainage pipes to reduce velocities and discourage scour. Temporary Diversion Dikes will break up the overland flow into smaller drainage areas and will direct runoff to the Temporary

Sediment Basin. Sediment must be removed from barriers, traps, and basins when design capacity has been reduced by 50%.

Storm Water Management

Storm Water Management for this site is accomplished through an onsite storm water management facility. The pond has an overflow structure, however, the runoff from the 1, 2, 10, 25 and 100-year storms will be contained below the overflow structure. The Storm Water Management Facility will be an infiltration basin, providing for additional water quality as well as quantity improvements.

Other Controls

All waste materials, including solid, hazardous, and sanitary waste, will be disposed of in a manner specified by Local or State regulation or by the manufacturer.

Public roadways will be kept clear of accumulated sediment. Bulk clearing of accumulated sediment will be achieved by sweeping or shoveling, and will not include flushing the areas with water. Cleared sediment will be returned to the point of likely origin or other suitable sediment control disposal location.

Other potential pollution sources such as vehicle fueling, sanitary water facilities, and the like shall be managed in a manner consistent with local and state regulations.

Maintenance and Inspection

Disturbed areas of the construction site and areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, structural control measures, and locations where vehicles enter or exit the site will be inspected at least once every seven calendar days and within 24 hours of the end of any storm event measuring .5 inches of rainfall or greater. Where areas have been finally stabilized, such inspections shall be made at least once every month. Copies of the report forms for Inspection and Maintenance can be found in Appendix D.

Based on the results of the inspection, the site description and pollution prevention measures identified on the plan, in accordance with the permit, shall be revised, maintained, or repaired prior to the next anticipated storm event. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. In no case shall these modifications be completed later than seven (7) calendar days following the inspection.

An Inspection and Maintenance Report will be made after each inspection. Copies of the report forms to be completed by the inspector are attached. The inspection reports shall be signed in accordance with the permit requirements. Major observations of the report will include:

- The location(s) of discharges of sediment or other pollutants from the site
- The location(s) of BMPs that need to be maintained
- The location(s) of BMPs that failed to operate as designed or proved inadequate for a particular need that did not exist at the time of inspection.

The report will identify any incidence of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility complies with the storm water pollution plan and the permit. These signed reports can be provided to the County's inspector at the completion of the project.

Non-Storm Water Discharges

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred, and the pavement has been cleared in accordance with the procedures outlined in this document and applicable County ordinances).
- Uncontaminated groundwater.

All downstream sedimentation and erosion controls shall be in place prior to any non-storm water discharges. These discharges will be directed to areas that are stabilized and protected to minimize erosion.

Cessation of Work

A VPDES General Permit Notice of Termination must be submitted when an operator no longer wishes to be covered under a VPDES General Permit for Storm Water Discharges from Construction Activities. The form is attached to this document and must be completed and submitted by the contractor.

STONEHOUSE COMMERCE PARK

	BMP	AREA SERVED ACRES	BMP POINTS	FRACTION SERVED BY BMP		WEIGHTED BMP POINTS	Rv	Rm	V (Ac-Ft)	V (C.F.)	HxV (C.F.)
1	WET POND	32.6	9	0.201	=	1.808	0.50	0.45	0.611	26626	106504
2	WET POND	25.1	9	0.155	=	1.392	0.50	0.45	0.471	20500	82002
	R.M. POND	68.0	8	0.419	=	3.352	0.50	0.45	1.275	55539	138848
	TOTAL	125.7				6.551					
	NATURAL OPENSPACE OUTSIDE OF R.M. POND(AC)	85	10	0.344	=	3.437		Rv=0.05+1.009I, ASSUME I=50% V=(Rm)(Rv)/12*AREA H=2.5 FOR 8 POINT WET POND H=4 FOR 9 POINT WET POND			
	TOTAL BMP POINTS				=	10.0					
	AREA SERVED BY RICHARDSONS MILL (ACRES)				=	68.0					
	DEVELOPABLE AREA (ACRES) (247.3-85.0)				=	162.3					
	AREA THROUGH BMPS				=	125.7					
	TOTAL AREA OF SITE (ACRES)				=	247.3					

APPENDIX A

Runoff and Basin Routing Calculations

DRAINAGE CALCULATIONS

THE LOWEST VALUE IN NESCH IS .30 FOR MEADOW 'A' SOIL
31 B = B SOIL SO 0.48 IS LOWEST
11 C = C SOIL SO 0.65 IS LOWEST

Area = 7.8 Acres
C pre = 0.2
tc pre = 30 min.
i_2 pre = 2.7 in./hr. ; Q_2 pre = 4.3 cfs
i_{10} pre = 3.5 in./hr. ; Q_{10} pre = 5.6 cfs
i_{25} pre = 4.4 in./hr. ; Q_{25} pre = 7.0 cfs
i_{100} pre = 5.3 in./hr. ; Q_{100} pre = 8.5 cfs

Site Development Reduces tc ~~to~~ 5 min. and Increases C to ~~0.6~~, NOPE
[2.5 ac landscaped @ 0.35+(4.3 ac roof & paving @ 0.9)÷7.8]
Q_{25} post = 15.5 cfs
Q_2 post = 12.2 cfs
Q_{10} post = 15.9 cfs
Q_{100} post = 22.3 cfs

PLAN COVER 4.67AC
4.3AC

Summary of Peak Storage Elevations (Bottom @ 62.0)
1 yr. 2.6'
2 yr. 1.4'
10 yr. 2'
100 yr. 2.8'

Infiltration Rate 1.02"/hr. & 2.41"/hr.
Average = 1.7"/hr.

Drawdown Summary
1 yr. 2.6'x12"/'÷1.7"/hr.=18.4 hours
2 yr. 1.4'x12"/'÷1.7"/hr.=9.9 hours
10 yr. 2'x12"/'÷1.7"/hr.=14.1 hours
100 yr. 2.8'x12"/'÷1.7"/hr.=19.8 hours

POND-2 Version: 5.20
S/N:

Wythe-Will@StonehouseCommercePark
Final Infiltration Basin Stage

CALCULATED 12-10-2003 15:05:12
DISK FILE: A:WYTHE4 .VOL

Planimeter scale: 1 inch = 1 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	* Volume (cubic-ft)	Volume Sum (cubic-ft)
62.00	16,200.00	16,200	0	0	0
64.00	18,800.00	18,800	52,452	34,968	34,968
66.00	21,400.00	21,400	60,258	40,172	75,140
68.00	24,200.00	24,200	68,357	45,571	120,711
70.00	27,100.00	27,100	76,909	51,273	171,984
72.00	30,000.00	30,000	85,613	57,075	229,059
74.00	33,100.00	33,100	94,612	63,075	292,134
76.00	36,200.00	36,200	103,915	69,277	361,411

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where: E1, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Area1,Area2 = Areas computed for E1, E2, respectively
IA = Interpolated area for Ei

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Executed 11-25-2003 17:02:40
Constructed file:
A:WYTHE1 .HYD

1 YEAR
24 HOUR

Input Data for Hydrograph

VOLUME = 46,809 cu.ft. = 1.07 ac-ft

Time (hrs)	Flow (cfs)
0.00	0.0
9.50	0.0
10.00	0.0
10.50	0.1
11.00	0.2
11.50	0.6
12.00	15.5
12.50	1.7
13.00	1.0
13.50	0.8
14.00	0.6
14.50	0.5
15.00	0.5
16.00	0.4
17.00	0.3
18.00	0.3
19.00	0.3
20.00	0.2
21.00	0.2
22.00	0.2
23.00	0.2
24.00	0.0

Executed 11-25-2003 17:02:40
Constructed file:
A:WYTHE1 .HYD

File Summary for Constructed Hydrograph

VOLUME = 46,809 cu.ft. = 1.07 ac-ft

Time (hrs)	Flow (cfs)
0.00	0.0
0.50	0.0
1.00	0.0
1.50	0.0
2.00	0.0
2.50	0.0
3.00	0.0
3.50	0.0
4.00	0.0
4.50	0.0
5.00	0.0
5.50	0.0
6.00	0.0
6.50	0.0
7.00	0.0
7.50	0.0
8.00	0.0
8.50	0.0
9.00	0.0
9.50	0.0
10.00	0.0
10.50	0.1
11.00	0.2
11.50	0.6
12.00	15.5
12.50	1.7
13.00	1.0
13.50	0.8
14.00	0.6
14.50	0.5
15.00	0.5
15.50	0.4
16.00	0.4
16.50	0.4
17.00	0.3
17.50	0.3
18.00	0.3
18.50	0.3

Executed 11-25-2003 17:02:40
Constructed file:
A:WYTHE1 .HYD

File Summary for Constructed Hydrograph

VOLUME = 46,809 cu.ft. = 1.07 ac-ft

Time (hrs)	Flow (cfs)
19.00	0.3
19.50	0.2
20.00	0.2
20.50	0.2
21.00	0.2
21.50	0.2
22.00	0.2
22.50	0.2
23.00	0.2
23.50	0.1
24.00	0.0

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

```
*****************************************************************
*  RETURN FREQUENCY:   2 yr      |  Allowable Outflow:     4.30 cfs    *
*  'C' Adjustment: 1.000         |  Required Storage:    16,175 cu.ft. *
*---------------------------------------------------------------------*
*  Peak Inflow:   12.17 cfs        Inflow .HYD stored: WYTHE2  .HYD    *
*****************************************************************
```

```
|                Td =  34 minutes                  |  Return Freq:     2 yr
/------- Approx. Duration for Max. Storage ------/  C adj.factor: 1.00
|                                                  |
|                Tc=    5.00  minutes              |
|                I =   5.700  in/hr                |  Area (ac):      7.80
|              . Q =   26.68  cfs                  |  Weighted C:     0.60
|            .|.                                   |  Adjusted C:     0.60
F           .   .
L          .  |  .            Required Storage    |
O         .       .       .--    16,175 cu.ft.    |  Td=       34 minutes
W        .    |    .                              |  I =    2.600 in/hr
        .     x x x x x x x|x x x x x x x x x x x  Q =    12.17 cfs
c      .                   |
f     .    x                                       x
s    .                 o o o o o o o o o o o o o o o o   Q=    4.30 cfs
    .   x          o   |.                         |x  (Allow.Outflow)
   .            o       |.                         |
  .  x    o              |.      NOT TO SCALE       |   x
 .   o                   |.      ============       |
 o                       |.                         |      x
`----------------------|----------------------------|------------
                      9.19 minutes               37.23 minutes
```

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

```
*****************************************************************
*  RETURN FREQUENCY:  10 yr      |  Allowable Outflow:     5.60 cfs    *
*  'C' Adjustment: 1.000         |  Required Storage:    22,326 cu.ft. *
*---------------------------------------------------------------------*
*  Peak Inflow:   15.87 cfs        Inflow .HYD stored: WYTHE10 .HYD   *
*****************************************************************
```

```
|                Td =  36 minutes                  |  Return Freq:    10 yr
/------- Approx. Duration for Max. Storage ------/  C adj.factor: 1.00
|                                                  |
|                Tc=    5.00  minutes              |
|                I =   7.000  in/hr                |  Area (ac):      7.80
|              . Q =   32.76  cfs                  |  Weighted C:     0.60
|            .|.                                   |  Adjusted C:     0.60
F          .   .                                   |
L         .  |  .            Required Storage      |
O        .       .        .--    22,326 cu.ft.    |  Td=       36 minutes
W       .    |    .                               |  I =    3.390 in/hr
       .     x x x x x x x|x x x x x x x x x x x   |  Q =    15.87 cfs
c     .                   |                        |
f    .    x                                        |  x
s   .                 o o o o o o o o o o o o o o o o o   |  Q=     5.60 cfs
   .   x          o    |.                         |x  (Allow.Outflow)
  .            o        |.                         |
 .  x    o               |.       NOT TO SCALE      |   x
.   o                    |.       ============      |
o                        |.                         |       x
\-----------------------|---------------------------|------------
                      9.15 minutes                39.24 minutes
```

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

```
*****************************************************************
*  RETURN FREQUENCY: 100 yr      |  Allowable Outflow:     8.50 cfs    *
*  'C' Adjustment: 1.000         |  Required Storage:    30,828 cu.ft. *
*---------------------------------------------------------------------*
*  Peak Inflow:   22.28 cfs        Inflow .HYD stored: WYTHE100.HYD    *
*****************************************************************
```

```
|                Td =  37 minutes                    |  Return Freq:   100 yr
/------- Approx. Duration for Max. Storage ------/  C adj.factor: 1.00
|                                                   |
|                Tc=    5.00  minutes               |
|                I =    9.530 in/hr                 |  Area (ac):      7.80
|              . Q =    44.60 cfs                   |  Weighted C:     0.60
|            .|.                                    |  Adjusted C:     0.60
F           .   .                                   |
L          .  |  .            Required Storage      |
O         .       .        .--    30,828 cu.ft.     |  Td=       37 minutes
W        .    |    .                                |  I =    4.760 in/hr
         .     x x x x x x x|x x x x x x x x x x x  |  Q =    22.28 cfs
c       .                   |                       |
f      .    x                                       x
s     .                 o o o o o o o o o o o o o o o o  Q=     8.50 cfs
     .   x          o   |.                          |x  (Allow.Outflow)
    .            o      |.                          |
   .  x    o             |.       NOT TO SCALE       |   x
  .   o                  |.       ============       |
 o                       |.                          |       x
`-----------------------|---------------------------|------------
                        9.05 minutes                40.09 minutes
```

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

Wythe-Will@StonehouseCommercePark

**** Modified Rational Hydrograph *****

Weighted C = 0.600 Area= 7.800 acres Tc = 5.00 minutes

Adjusted C = 0.600 Td= 34.00 min. I= 2.60 in/hr Qp= 12.17 cfs

RETURN FREQUENCY: 2 year storm Adj.factor = 1.00
Output file: WYTHE2 .HYD

HYDROGRAPH FOR MAXIMUM STORAGE
For the 2 Year Storm

Time increment = 1.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	2.43	4.87	7.30	9.73	12.17	12.17
7.00	12.17	12.17	12.17	12.17	12.17	12.17	12.17
14.00	12.17	12.17	12.17	12.17	12.17	12.17	12.17
21.00	12.17	12.17	12.17	12.17	12.17	12.17	12.17
28.00	12.17	12.17	12.17	12.17	12.17	12.17	12.17
35.00	9.73	7.30	4.87	2.43	0.00		

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

Wythe-Will@StonehouseCommercePark

**** Modified Rational Hydrograph *****

Weighted C = 0.600 Area= 7.800 acres Tc = 5.00 minutes

Adjusted C = 0.600 Td= 36.00 min. I= 3.39 in/hr Qp= 15.87 cfs

RETURN FREQUENCY: 10 year storm Adj.factor = 1.00
Output file: WYTHE10 .HYD

HYDROGRAPH FOR MAXIMUM STORAGE
For the 10 Year Storm

Time increment = 1.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	3.17	6.35	9.52	12.69	15.87	15.87
7.00	15.87	15.87	15.87	15.87	15.87	15.87	15.87
14.00	15.87	15.87	15.87	15.87	15.87	15.87	15.87
21.00	15.87	15.87	15.87	15.87	15.87	15.87	15.87
28.00	15.87	15.87	15.87	15.87	15.87	15.87	15.87
35.00	15.87	15.87	12.69	9.52	6.35	3.17	0.00

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

Wythe-Will@StonehouseCommercePark

**** Modified Rational Hydrograph *****

Weighted C = 0.600 Area= 7.800 acres Tc = 5.00 minutes

Adjusted C = 0.600 Td= 37.00 min. I= 4.76 in/hr Qp= 22.28 cfs

RETURN FREQUENCY: 100 year storm Adj.factor = 1.00
Output file: WYTHE100.HYD

HYDROGRAPH FOR MAXIMUM STORAGE
For the 100 Year Storm

Time increment = 1.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	4.46	8.91	13.37	17.82	22.28	22.28
7.00	22.28	22.28	22.28	22.28	22.28	22.28	22.28
14.00	22.28	22.28	22.28	22.28	22.28	22.28	22.28
21.00	22.28	22.28	22.28	22.28	22.28	22.28	22.28
28.00	22.28	22.28	22.28	22.28	22.28	22.28	22.28
35.00	22.28	22.28	22.28	17.82	13.37	8.91	4.46
42.00	0.00						

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

Wythe-Will@StonehouseCommercePark

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A
Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 2 years
'C' adjustment, k = 1
Adj. 'C' = Wtd.'C' x 1

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
develop site								
	0.600	7.80						
			5.00	0.600	0.600	5.700	7.80	26.68

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

Wythe-Will@StonehouseCommercePark

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A
Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 10 years
'C' adjustment, k = 1
Adj. 'C' = Wtd.'C' x 1

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
develop site								
	0.600	7.80						
			5.00	0.600	0.600	7.000	7.80	32.76

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

Wythe-Will@StonehouseCommercePark

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A
Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 100 years
'C' adjustment, k = 1
Adj. 'C' = Wtd.'C' x 1

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
develop site								
	0.600	7.80						
			5.00	0.600	0.600	9.530	7.80	44.60

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

```
*********************************************************************
*********************************************************************
*                                                                   *
*                                                                   *
*                      MODIFIED RATIONAL METHOD                     *
*          ---- Grand Summary For All Storm Frequencies ----        *
*                                                                   *
*                                                                   *
*********************************************************************
*********************************************************************
```

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

Area = 7.80 acres Tc = 5.00 minutes

Frequency (years)	Adjusted 'C'	Duration minutes	Intens. in/hr	Qpeak cfs	Allowable cfs	VOLUMES Inflow (cu.ft.)	VOLUMES Storage (cu.ft.)
2	0.600	34	2.600	12.17	4.30	24,823	16,175
10	0.600	36	3.390	15.87	5.60	34,269	22,326
25	0.600	50	3.250	15.21	7.00	45,630	24,917
100	0.600	37	4.760	22.28	8.50	49,455	30,828

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

RETURN FREQUENCY: 2 yr 'C' Adjustment = 1.000 Allowable Q = 4.30 cfs

Hydrograph file duration= 34.00 minutes
Hydrograph file: WYTHE2 .HYD Tc = 5.00 minutes

Weighted 'C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (cu.ft.)	Storage (cu.ft.)
0.600	0.600	5	5.700	7.80	26.68	8,003	6,713
0.600	0.600	10	4.650	7.80	21.76	13,057	10,501
0.600	0.600	15	3.950	7.80	18.49	16,637	12,813
0.600	0.600	20	3.500	7.80	16.38	19,656	14,561
0.600	0.600	30	2.800	7.80	13.10	23,587	15,955
********** Storage Maximum							
0.600	0.600	34	2.600	7.80	12.17	24,823	16,175
**********							
0.600	0.600	40	2.300	7.80	10.76	25,834	15,667
0.600	0.600	50	2.000	7.80	9.36	28,080	15,372
0.600	0.600	60	1.800	7.80	8.42	30,326	15,072
0.600	0.600	120	1.150	7.80	5.38	38,750	8,202
0.600	0.600	180	0.750	7.80	3.51	Qpeak < Qallow	

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

RETURN FREQUENCY: 10 yr 'C' Adjustment = 1.000 Allowable Q = 5.60 cfs

Hydrograph file duration= 36.00 minutes
Hydrograph file: WYTHE10 .HYD Tc = 5.00 minutes

Weighted 'C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (cu.ft.)	Storage (cu.ft.)
0.600	0.600	5	7.000	7.80	32.76	9,828	8,148
0.600	0.600	10	6.000	7.80	28.08	16,848	13,512
0.600	0.600	15	5.250	7.80	24.57	22,113	17,121
0.600	0.600	20	4.700	7.80	22.00	26,395	19,745
0.600	0.600	30	3.750	7.80	17.55	31,590	21,634
********** Storage Maximum							
0.600	0.600	36	3.390	7.80	15.87	34,269	22,326
**********							
0.600	0.600	40	3.150	7.80	14.74	35,381	22,116
0.600	0.600	50	2.720	7.80	12.73	38,189	21,615
0.600	0.600	60	2.400	7.80	11.23	40,435	20,550
0.600	0.600	120	1.600	7.80	7.49	53,914	14,078
0.600	0.600	180	1.150	7.80	5.38	Qpeak < Qallow	

Quick TR-55 Ver.5.46 S/N:
Executed: 16:55:20 11-25-2003

MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at Tc hydrograph recession leg.

Wythe-Will@StonehouseCommercePark

RETURN FREQUENCY: 100 yr 'C' Adjustment = 1.000 Allowable Q = 8.50 cfs

Hydrograph file duration= 37.00 minutes
Hydrograph file: WYTHE100.HYD Tc = 5.00 minutes

Weighted 'C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (cu.ft.)	Storage (cu.ft.)
0.600	0.600	5	9.530	7.80	44.60	13,380	10,830
0.600	0.600	10	8.230	7.80	38.52	23,110	18,048
0.600	0.600	15	7.240	7.80	33.88	30,495	22,922
0.600	0.600	20	6.460	7.80	30.23	36,279	26,195
0.600	0.600	30	5.320	7.80	24.90	44,816	29,708
********** Storage Maximum							
0.600	0.600	37	4.760	7.80	22.28	49,455	30,828
**********							
0.600	0.600	40	4.520	7.80	21.15	50,769	30,638
0.600	0.600	50	3.930	7.80	18.39	55,177	30,023
0.600	0.600	60	3.470	7.80	16.24	58,463	28,287
0.600	0.600	120	2.050	7.80	9.59	69,077	8,763
0.600	0.600	180	1.700	7.80	7.96	Qpeak < Qallow	

Outlet Structure File: WYTHE4 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Final Infiltration Basin Stage

****

***** COMPOSITE OUTFLOW SUMMARY ****

Elevation (ft)	Q (cfs)	Contributing Structures
62.00	0.0	
63.00	0.0	
64.00	0.0	
65.00	0.0	
66.00	0.0	
67.00	0.0	
68.00	0.0	
69.00	0.0	1
70.00	2.9	1
71.00	7.4	1
72.00	10.3	1
73.00	12.6	1
74.00	14.5	1
75.00	16.2	1
76.00	17.7	1

Outlet Structure File: WYTHE4 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Final Infiltration Basin Stage

****

Outlet Structure File: A:WYTHE4 .STR
Planimeter Input File: A:WYTHE4 .VOL
Rating Table Output File: A:WYTHE4 .PND

Min. Elev.(ft) = 62 Max. Elev.(ft) = 76 Incr.(ft) = 1

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
CULVERT-CR	1		->	1

Outflow rating table summary was stored in file:
A:WYTHE4 .PND

Outlet Structure File: WYTHE4 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Final Infiltration Basin Stage

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

E1 elev.(ft)?	69
E2 elev.(ft)?	76.001
Diam. (ft)?	1.25
Inv. el.(ft)?	69
Slope (ft/ft)?	.0024
T1 ratio?	
T2 ratio?	
K Coeff.?	.0078
M Coeff.?	2
c Coeff.?	.0292
Y Coeff.?	.74
Form 1 or 2?	1
Slope factor?	-.5

Outlet Structure File: WYTHE4 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Final Infiltration Basin Stage

****

Outflow Rating Table for Structure #1
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
62.00	0.0	E < Inv.El.= 69
63.00	0.0	E < Inv.El.= 69
64.00	0.0	E < Inv.El.= 69
65.00	0.0	E < Inv.El.= 69
66.00	0.0	E < Inv.El.= 69
67.00	0.0	E < Inv.El.= 69
68.00	0.0	E < Inv.El.= 69
69.00	0.0	No headwater
70.00	2.9	Equ.1: HW =1.0 dc=.68 Ac=.682
71.00	7.4	Submerged: HW =2.0
72.00	10.3	Submerged: HW =3.0
73.00	12.6	Submerged: HW =4.0
74.00	14.5	Submerged: HW =5.0
75.00	16.2	Submerged: HW =6.0
76.00	17.7	Submerged: HW =7.0

Used Unsubmerged Equ. Form (1) for elev. less than 70.42 ft
Used Submerged Equation for elevations greater than 70.51 ft
HW=Headwater (ft) dc=Critical depth (ft) Ac=Area (sq.ft) at dc

Transition flows interpolated from the following values:
E1=70.42 ft; Q1=4.8 cfs; Dc=.89 ft; E2=70.51 ft; Q2=5.49 cfs

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*************************************
*                                   *
*   Wythe-Will@StonehouseCommercePark *
*    Final Infiltration Basin Stage   *
*                                   *
*                                   *
*                                   *
*************************************
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Inflow Hydrograph: A:WYTHE1 .HYD
Rating Table file: A:WYTHE4 .PND

----INITIAL CONDITIONS----
Elevation = 62.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
62.00	0.0	0
63.00	0.0	16,834
64.00	0.0	34,968
65.00	0.0	54,404
66.00	0.0	75,140
67.00	0.0	97,225
68.00	0.0	120,711
69.00	0.0	145,622
70.00	2.9	171,984
71.00	7.4	199,796
72.00	10.3	229,059
73.00	12.6	259,821
74.00	14.5	292,134
75.00	16.2	325,997
76.00	17.7	361,411

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
18.7	18.7
38.9	38.9
60.4	60.4
83.5	83.5
108.0	108.0
134.1	134.1
161.8	161.8
191.1	194.0
222.0	229.4
254.5	264.8
288.7	301.3
324.6	339.1
362.2	378.4
401.6	419.3

Time increment (t) = 30.0 min.

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:20

Return Freq: 1 years

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE1 .HYD
Outflow Hydrograph: A:WW1OUT .HYD

INFLOW HYDROGRAPH

TIME (min)	INFLOW (cfs)
0.0	0.00
30.0	0.00
60.0	0.00
90.0	0.00
120.0	0.00
150.0	0.00
180.0	0.00
210.0	0.00
240.0	0.00
270.0	0.00
300.0	0.00
330.0	0.00
360.0	0.00
390.0	0.00
420.0	0.00
450.0	0.00
480.0	0.00
510.0	0.00
540.0	0.00
570.0	0.00
600.0	0.00
630.0	0.10
660.0	0.20
690.0	0.60
720.0	15.50
750.0	1.70
780.0	1.00
810.0	0.80
840.0	0.60
870.0	0.50
900.0	0.50
930.0	0.40
960.0	0.40
990.0	0.40
1020.0	0.30
1050.0	0.30
1080.0	0.30
1110.0	0.30
1140.0	0.30
1170.0	0.20
1200.0	0.20
1230.0	0.20
1260.0	0.20
1290.0	0.20
1320.0	0.20

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
-----	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.0	0.0	0.0	0.00	62.00
0.1	0.1	0.1	0.00	62.01
0.3	0.4	0.4	0.00	62.02
0.8	1.2	1.2	0.00	62.06
16.1	17.3	17.3	0.00	62.92
17.2	34.5	34.5	0.00	63.78
2.7	37.2	37.2	0.00	63.92
1.8	39.0	39.0	0.00	64.01
1.4	40.4	40.4	0.00	64.07
1.1	41.5	41.5	0.00	64.12
1.0	42.5	42.5	0.00	64.17
0.9	43.4	43.4	0.00	64.21
0.8	44.2	44.2	0.00	64.25
0.8	45.0	45.0	0.00	64.28
0.7	45.7	45.7	0.00	64.32
0.6	46.3	46.3	0.00	64.34
0.6	46.9	46.9	0.00	64.37
0.6	47.5	47.5	0.00	64.40
0.6	48.1	48.1	0.00	64.43
0.5	48.6	48.6	0.00	64.45
0.4	49.0	49.0	0.00	64.47
0.4	49.4	49.4	0.00	64.49
0.4	49.8	49.8	0.00	64.51
0.4	50.2	50.2	0.00	64.53
0.4	50.6	50.6	0.00	64.54

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:20

Return Freq: 1 years

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE1 .HYD
Outflow Hydrograph: A:WW1OUT .HYD

INFLOW HYDROGRAPH

TIME (min)	INFLOW (cfs)
1350.0	0.20
1380.0	0.20
1410.0	0.10
1440.0	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.4	51.0	51.0	0.00	64.56
0.4	51.4	51.4	0.00	64.58
0.3	51.7	51.7	0.00	64.59
0.1	51.8	51.8	0.00	64.60

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE2 .HYD
Outflow Hydrograph: A:WW2OUT .HYD

Starting Pond W.S. Elevation = 62.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 12.17 cfs LESS THAN 1-YR.
Peak Outflow = 0.00 cfs
Peak Elevation = 63.44 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	24,831 cu-ft
Total Storage in Pond	=	24,831 cu-ft

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*************************************
*                                   *
*   Wythe-Will@StonehouseCommercePark *
*    Final Infiltration Basin Stage   *
*                                   *
*                                   *
*                                   *
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Inflow Hydrograph: A:WYTHE10 .HYD
Rating Table file: A:WYTHE4 .PND

----INITIAL CONDITIONS----
Elevation = 62.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
62.00	0.0	0
63.00	0.0	16,834
64.00	0.0	34,968
65.00	0.0	54,404
66.00	0.0	75,140
67.00	0.0	97,225
68.00	0.0	120,711
69.00	0.0	145,622
70.00	2.9	171,984
71.00	7.4	199,796
72.00	10.3	229,059
73.00	12.6	259,821
74.00	14.5	292,134
75.00	16.2	325,997
76.00	17.7	361,411

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
561.0	561.0
1165.4	1165.4
1813.1	1813.1
2504.2	2504.2
3240.2	3240.2
4022.9	4022.9
4853.1	4853.1
5731.6	5734.5
6658.5	6665.9
7633.8	7644.1
8659.0	8671.6
9735.8	9750.3
10864.4	10880.6
12044.6	12062.3

Time increment (t) = 1.0 min.

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:20

Return Freq: 10 years

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE10 .HYD
Outflow Hydrograph: A:WW10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	62.00
1.0	3.17	3.2	3.2	3.2	0.00	62.01
2.0	6.35	9.5	12.7	12.7	0.00	62.02
3.0	9.52	15.9	28.6	28.6	0.00	62.05
4.0	12.69	22.2	50.8	50.8	0.00	62.09
5.0	15.87	28.6	79.3	79.3	0.00	62.14
6.0	15.87	31.7	111.1	111.1	0.00	62.20
7.0	15.87	31.7	142.8	142.8	0.00	62.25
8.0	15.87	31.7	174.6	174.6	0.00	62.31
9.0	15.87	31.7	206.3	206.3	0.00	62.37
10.0	15.87	31.7	238.0	238.0	0.00	62.42
11.0	15.87	31.7	269.8	269.8	0.00	62.48
12.0	15.87	31.7	301.5	301.5	0.00	62.54
13.0	15.87	31.7	333.3	333.3	0.00	62.59
14.0	15.87	31.7	365.0	365.0	0.00	62.65
15.0	15.87	31.7	396.7	396.7	0.00	62.71
16.0	15.87	31.7	428.5	428.5	0.00	62.76
17.0	15.87	31.7	460.2	460.2	0.00	62.82
18.0	15.87	31.7	492.0	492.0	0.00	62.88
19.0	15.87	31.7	523.7	523.7	0.00	62.93
20.0	15.87	31.7	555.4	555.4	0.00	62.99
21.0	15.87	31.7	587.2	587.2	0.00	63.04
22.0	15.87	31.7	618.9	618.9	0.00	63.10
23.0	15.87	31.7	650.7	650.7	0.00	63.15
24.0	15.87	31.7	682.4	682.4	0.00	63.20
25.0	15.87	31.7	714.1	714.1	0.00	63.25
26.0	15.87	31.7	745.9	745.9	0.00	63.31
27.0	15.87	31.7	777.6	777.6	0.00	63.36
28.0	15.87	31.7	809.4	809.4	0.00	63.41
29.0	15.87	31.7	841.1	841.1	0.00	63.46
30.0	15.87	31.7	872.8	872.8	0.00	63.52
31.0	15.87	31.7	904.6	904.6	0.00	63.57
32.0	15.87	31.7	936.3	936.3	0.00	63.62
33.0	15.87	31.7	968.1	968.1	0.00	63.67
34.0	15.87	31.7	999.8	999.8	0.00	63.73
35.0	15.87	31.7	1031.5	1031.5	0.00	63.78
36.0	15.87	31.7	1063.3	1063.3	0.00	63.83
37.0	12.69	28.6	1091.8	1091.8	0.00	63.88
38.0	9.52	22.2	1114.0	1114.0	0.00	63.92
39.0	6.35	15.9	1129.9	1129.9	0.00	63.94
40.0	3.17	9.5	1139.4	1139.4	0.00	63.96
41.0	0.00	3.2	1142.6	1142.6	0.00	63.96

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE10 .HYD
Outflow Hydrograph: A:WW10OUT .HYD

Starting Pond W.S. Elevation = 62.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow	=	15.87 cfs
Peak Outflow	=	0.00 cfs
Peak Elevation	=	63.96 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	34,285 cu-ft

Total Storage in Pond	=	34,285 cu-ft

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*                                   *
*   Wythe-Will@StonehouseCommercePark *
*    Final Infiltration Basin Stage   *
*                                   *
*                                   *
*                                   *
*************************************
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Inflow Hydrograph: A:WYTHE100.HYD
Rating Table file: A:WYTHE4 .PND

----INITIAL CONDITIONS----
Elevation = 62.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
62.00	0.0	0
63.00	0.0	16,834
64.00	0.0	34,968
65.00	0.0	54,404
66.00	0.0	75,140
67.00	0.0	97,225
68.00	0.0	120,711
69.00	0.0	145,622
70.00	2.9	171,984
71.00	7.4	199,796
72.00	10.3	229,059
73.00	12.6	259,821
74.00	14.5	292,134
75.00	16.2	325,997
76.00	17.7	361,411

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
561.0	561.0
1165.4	1165.4
1813.1	1813.1
2504.2	2504.2
3240.2	3240.2
4022.9	4022.9
4853.1	4853.1
5731.6	5734.5
6658.5	6665.9
7633.8	7644.1
8659.0	8671.6
9735.8	9750.3
10864.4	10880.6
12044.6	12062.3

Time increment (t) = 1.0 min.

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:20

Return Freq: 100 years

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE100.HYD
Outflow Hydrograph: A:WW100OUT.HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	62.00
1.0	4.46	4.5	4.5	4.5	0.00	62.01
2.0	8.91	13.4	17.8	17.8	0.00	62.03
3.0	13.37	22.3	40.1	40.1	0.00	62.07
4.0	17.82	31.2	71.3	71.3	0.00	62.13
5.0	22.28	40.1	111.4	111.4	0.00	62.20
6.0	22.28	44.6	156.0	156.0	0.00	62.28
7.0	22.28	44.6	200.5	200.5	0.00	62.36
8.0	22.28	44.6	245.1	245.1	0.00	62.44
9.0	22.28	44.6	289.6	289.6	0.00	62.52
10.0	22.28	44.6	334.2	334.2	0.00	62.60
11.0	22.28	44.6	378.8	378.8	0.00	62.68
12.0	22.28	44.6	423.3	423.3	0.00	62.75
13.0	22.28	44.6	467.9	467.9	0.00	62.83
14.0	22.28	44.6	512.4	512.4	0.00	62.91
15.0	22.28	44.6	557.0	557.0	0.00	62.99
16.0	22.28	44.6	601.6	601.6	0.00	63.07
17.0	22.28	44.6	646.1	646.1	0.00	63.14
18.0	22.28	44.6	690.7	690.7	0.00	63.21
19.0	22.28	44.6	735.2	735.2	0.00	63.29
20.0	22.28	44.6	779.8	779.8	0.00	63.36
21.0	22.28	44.6	824.4	824.4	0.00	63.44
22.0	22.28	44.6	868.9	868.9	0.00	63.51
23.0	22.28	44.6	913.5	913.5	0.00	63.58
24.0	22.28	44.6	958.0	958.0	0.00	63.66
25.0	22.28	44.6	1002.6	1002.6	0.00	63.73
26.0	22.28	44.6	1047.2	1047.2	0.00	63.80
27.0	22.28	44.6	1091.7	1091.7	0.00	63.88
28.0	22.28	44.6	1136.3	1136.3	0.00	63.95
29.0	22.28	44.6	1180.8	1180.8	0.00	64.02
30.0	22.28	44.6	1225.4	1225.4	0.00	64.09
31.0	22.28	44.6	1270.0	1270.0	0.00	64.16
32.0	22.28	44.6	1314.5	1314.5	0.00	64.23
33.0	22.28	44.6	1359.1	1359.1	0.00	64.30
34.0	22.28	44.6	1403.6	1403.6	0.00	64.37
35.0	22.28	44.6	1448.2	1448.2	0.00	64.44
36.0	22.28	44.6	1492.8	1492.8	0.00	64.51
37.0	22.28	44.6	1537.3	1537.3	0.00	64.57
38.0	17.82	40.1	1577.4	1577.4	0.00	64.64
39.0	13.37	31.2	1608.6	1608.6	0.00	64.68
40.0	8.91	22.3	1630.9	1630.9	0.00	64.72
41.0	4.46	13.4	1644.3	1644.3	0.00	64.74
42.0	0.00	4.5	1648.7	1648.7	0.00	64.75

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: A:WYTHE4 .PND
Inflow Hydrograph: A:WYTHE100.HYD
Outflow Hydrograph: A:WW100OUT.HYD

Starting Pond W.S. Elevation = 62.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

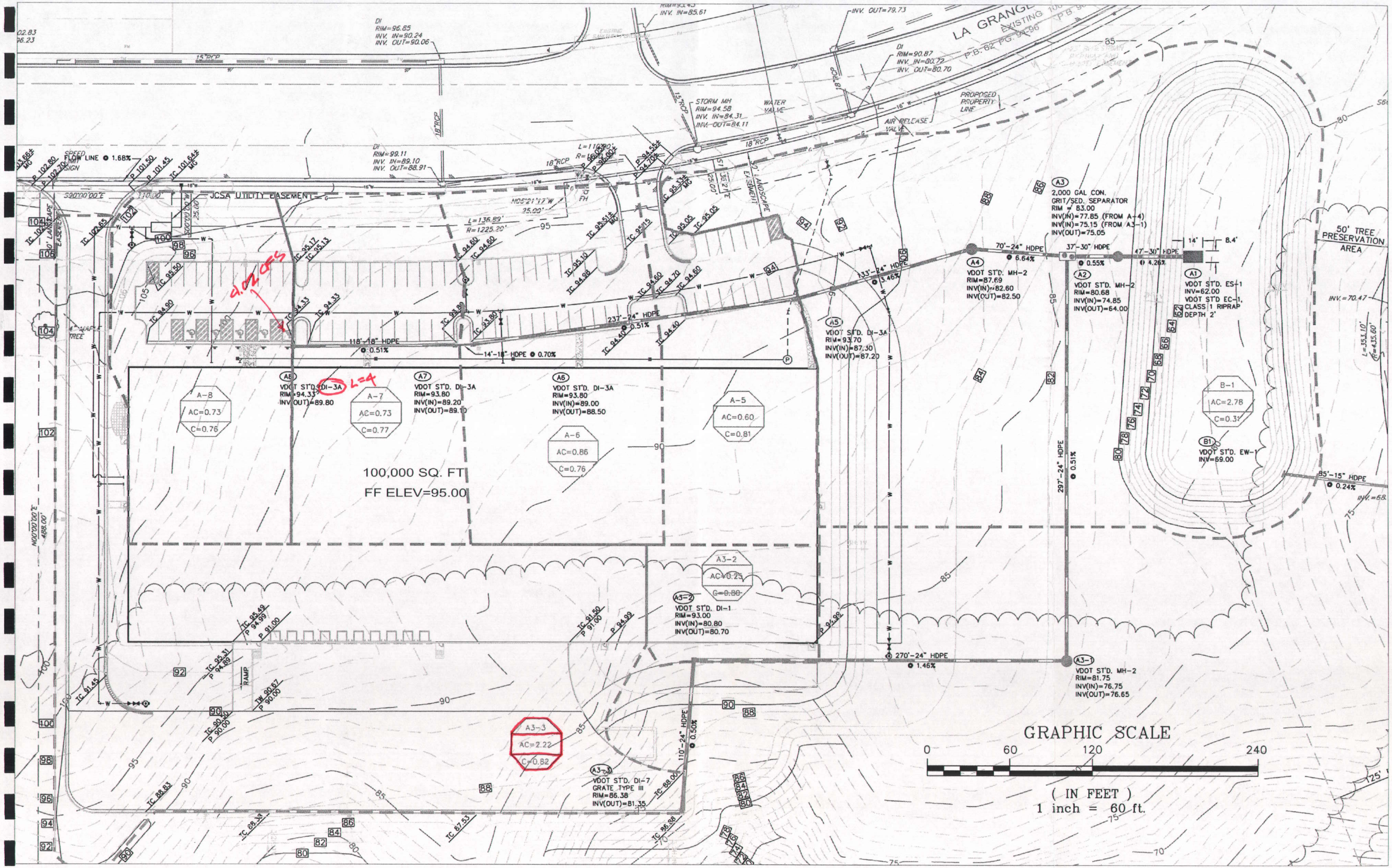
Peak Inflow	=	22.28 cfs
Peak Outflow	=	0.00 cfs
Peak Elevation	=	64.75 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	49,472 cu-ft
Total Storage in Pond	=	49,472 cu-ft

APPENDIX B

Storm Sewer Calculations


LA GRANGE
EXISTING 100' R/W
P.B. 62 PG. 94-96
PROPOSED PROPERTY LINE
JCSA UTILITY EASEMENT
20' LANDSCAPE EASEMENT
50' TREE PRESERVATION AREA
FLOW LINE 1.68%
DI RIM=96.85 INV. IN=90.24 INV. OUT=90.06
DI RIM=99.11 INV. IN=89.10 INV. OUT=88.91
DI RIM=90.87 INV. IN=80.72 INV. OUT=80.70
INV. OUT=79.73
INV. IN=85.61
STORM MH RIM=94.58 INV. IN=84.31 INV. OUT=84.11
WATER VALVE
AIR RELEASE VALVE
18"RCP
L=136.89' R=1225.20'
N05°21'17"W 35.00'
S30°00'00"E 110.00'
N30°00'00"W 25.00'
N30°00'00"E 488.00'
118'-18" HDPE 0.51%
14'-18" HDPE 0.70%
237'-24" HDPE 0.51%
133'-24" HDPE 3.46%
70'-24" HDPE 6.64%
37'-30" HDPE 0.55%
47'-30" HDPE 4.26%
297'-24" HDPE 0.51%
270'-24" HDPE 1.46%
110'-24" HDPE 0.50%
85'-15" HDPE 0.24%
A8 VDOT ST'D. DI-3A RIM=94.33 INV(OUT)=89.80
L=4
A7 VDOT ST'D. DI-3A RIM=93.80 INV(IN)=89.20 INV(OUT)=89.10
A6 VDOT ST'D. DI-3A RIM=93.80 INV(IN)=89.00 INV(OUT)=88.50
A5 VDOT ST'D. DI-3A RIM=93.70 INV(IN)=87.30 INV(OUT)=87.20
A4 VDOT ST'D. MH-2 RIM=87.69 INV(IN)=82.60 INV(OUT)=82.50
A3 2,000 GAL CON. GRIT/SED. SEPARATOR RIM = 83.00 INV(IN)=77.85 (FROM A-4) INV(IN)=75.15 (FROM A3-1) INV(OUT)=75.05
A2 VDOT ST'D. MH-2 RIM=80.68 INV(IN)=74.85 INV(OUT)=64.00
A1 VDOT ST'D. ES-1 INV=62.00 VDOT ST'D EC-1, CLASS 1 RIPRAP DEPTH 2'
B1 VDOT ST'D. EW-1 INV=69.00
A3-1 VDOT ST'D. MH-2 RIM=81.75 INV(IN)=76.75 INV(OUT)=76.65
A3-2 VDOT ST'D. DI-1 RIM=93.00 INV(IN)=80.80 INV(OUT)=80.70
A3-3 VDOT ST'D. DI-7 GRATE TYPE III RIM=86.38 INV(OUT)=81.35
A-8 AC=0.73 C=0.76
A-7 AC=0.73 C=0.77
A-6 AC=0.86 C=0.76
A-5 AC=0.60 C=0.81
A3-2 AC=0.25 C=0.80
A3-3 AC=2.22 C=0.82
B-1 AC=2.78 C=0.37
100,000 SQ. FT
FF ELEV=95.00
RAMP
GRAPHIC SCALE
0 60 120 240
(IN FEET)
1 inch = 60 ft.

DRAINAGE AREA (SUB-AREA)
MAP

Landmark Design Group Inc.
Storm Sewer Design Computations
Wythe-Will

DATE: 12/10/03

PROJECT NO. 2003151-000.09

185.06 = a
20.87 = b
10 YR STM

FROM POINT	VDOT STR.	TO POINT	VDOT STR.	AREA DRAIN. "A" ACRES	RUNOFF COEF. C	CA INCRE-MENT	CA ACCUM-ULATED	INLET TIME MIN-UTES	RAIN FALL IN.\HR	RUNOFF "Q" INCRE-MENT	RUNOFF "Q" ACCUM-ULATED	INVERT ELEVATIONS UPPER END	INVERT ELEVATIONS LOWER END	PIPE LNGTH FT.	SLOPE FT./FT.	DIA IN.	CAPA-CITY C.F.S.	VEL. F.P.S.	MANN. N	Enter Rim Elev. of the Structure Rim	Enter Rim Elev. of the Structure Rim	Curb Inlets Length of curb Inlet	Curb Inlets Depth of Water in feet	Grate Inlets Perimeter of Grate	Grate Inlets Depth of Water in feet
A8	D1-3A	A7	DI-3A	0.73	0.76	0.55	0.55	5.00	7.15	3.97	3.97	89.80	89.20	118	0.0051	18	10.83	6.13	0.009	94.33	93.80	4.00	0.48		
A7	DI-3A	A6	DI-3A	0.73	0.77	0.56	1.12	5.00	7.15	4.02	7.99	89.10	89.00	14	0.0070	18	12.69	7.18	0.009	93.80	93.80	4.00	0.48		
A6	DI-3A	A5	DI-3A	0.86	0.76	0.65	1.77	5.00	7.15	4.68	12.67	88.50	87.30	237	0.0051	24	23.23	7.40	0.009	93.80	93.70	6.00	0.41		
A5	DI-3A	A4	MH-2	0.60	0.80	0.48	2.25	5.00	7.15	3.43	16.10	87.20	82.60	133	0.0346	24	60.75	19.35	0.009	93.70	87.69	4.00	0.43		
A4	MH-2	A3	2000 VAULT	0.00	0.00	0.00	2.25	5.00	7.15	0.00	16.10	82.50	77.85	70	0.0664	24	84.17	26.81	0.009	87.69	83.00				
A3-3	DI-7 GR III	A3-2	DI-1	2.22	0.82	1.82	1.82	5.00	7.15	13.02	13.02	81.35	80.80	110	0.0050	24	23.09	7.35	0.009	86.38	93.00			12	0.51
A3-2	DI-1	A3-1	MH-2	0.25	0.80	0.20	2.02	5.00	7.15	1.43	14.45	80.70	76.75	270	0.0146	24	39.50	12.58	0.009	93.00	81.75				
A3-1	MH-2	A3	2000 VAULT	0.00	0.00	0.00	2.02	5.00	7.15	0.00	14.45	76.65	75.15	297	0.0051	24	23.23	7.40	0.009	81.75	83.00				
A3	2000 VAULT	A2	MH-2	0.00	0.00	0.00	4.27	5.00	7.15	0.00	30.55	75.05	74.85	37	0.0055	30	43.92	8.95	0.009	83.00	80.75				
A2	MH-2	A1	ES-1	0.00	0.00	0.00	4.27	5.00	7.15	0.00	30.55	64.00	62.00	47	0.0426	30	122.16	24.90	0.009	80.75	62.00				

A-2
10.85'
DROP

STORM OK

PROJECT: Wythe-Will
LOCATION: James City County
JOB NO.: 2003151-000.09
DATE: 09-Dec-03
REVISION:

Hydraulic Gradeline

HDPE PIPE n= 0.009

INLET STATION	OUTLET SURFACE ELEV	D(O)	Q(O)	L(O)	SF(O)	H(F)	JUNCTION LOSS														FINAL H	INLET SURFACE ELEV	RIM ELEV
							V(O)	H(O)	Q(I)	D(I)	V(I)	Q*V	V^2/2G	H(I)	ANGLE	E K	H(>)	H(T)	1*3 H(T)	0.5* H(T)			
A4	78.85	24	16.10	70	0.0664	4.65	5.12	0.10	16.10	24	5.12	83	0.41	0.14	20	0.16	0.07	0.31	0.40	0.20	4.85	83.70	87.69
A5	83.70	24	16.10	133	0.0346	4.60	5.12	0.10	12.67	24	4.03	51	0.25	0.09	8	0.00	0.00	0.19	0.25	0.12	4.73	88.42	93.70
A6	88.42	24	12.67	237	0.0051	1.21	4.03	0.06	7.99	24	2.54	20	0.10	0.04	7	0.00	0.00	0.10	0.13	0.06	1.27	89.70	93.80
A7	89.70	24	7.99	14	0.0070	0.10	2.54	0.03	3.97	18	2.25	9	0.08	0.03	3	0.00	0.00	0.05	0.07	0.03	0.13	89.83	93.80
A8	89.83	18	3.97	118	0.0051	0.60	2.25	0.02					0.00	0.00		0.00	0.00	0.02	0.03	0.01	0.61	90.44	94.33
A3-1	76.15	24	14.45	297	0.0050	1.49	4.60	0.08	14.45	24	4.60	66	0.33	0.11	90	0.70	0.23	0.43	0.56	0.28	1.76	77.91	81.75
A3-2	77.91	24	14.50	270	0.0146	3.94	4.62	0.08	13.02	24	4.14	54	0.27	0.09	86	0.68	0.18	0.36	0.46	0.23	4.17	82.09	93.00
A3-3	82.09	24	13.02	110	0.0051	0.56	4.14	0.07					0.00	0.00		0.00	0.00	0.07	0.09	0.04	0.60	82.69	86.38

APPENDIX C

Responsible Land Disturber Form

WYTHE-WILL DISTRIBUTION WAREHOUSE
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

RESPONSIBLE LAND DISTURBER CERTIFICATION

Upon award of the contract, and before any land disturbing activity can begin, the Contractor shall execute and submit the following information to James City County. This information will be placed on the cover sheet of the approved plan.

This designation may only be changed by a plan cover sheet revision that must be submitted to the County for verification and approval.

The County must be contacted at least 48 hours prior to the commencement of any land disturbing activity in order to schedule a pre-construction meeting.

THE PERSON IDENTIFIED BELOW IS DESIGNATED AS THE RESPONSIBLE LAND DISTURBER WHO WILL BE IN CHARGE OF AND RESPONSIBLE FOR CARRYING OUT THE LAND DISTURBING ACTIVITY ASSOCIATED WITH THIS PROJECT. THIS PERSON MEETS THE APPLICABLE REQUIREMENTS OF VIRGINIA CODE SECTION 10.1-563 AND 10.1-566 BY VIRTUE OF THE FOLLOWING:

_____ RESPONSIBLE LAND DISTURBER CERTIFICATE
_____ DCR CERTIFICATION FOR COMBINED ADMINISTRATOR, ADMINISTRATOR, PLAN REVIEWER, INSPECTOR, OR CONTRACTOR
_____ VIRGINIA PROFESSIONAL ENGINEER, LAND SURVEYOR, LANDSCAPE ARCHITECT, OR ARCHITECT

RESPONSIBLE LAND DISTURBER CONTACT INFORMATION:

NAME (SIGN) _____ DATE: _____

NAME (PRINT) _____

CERTIFICATION / REGISTRATION NUMBER _____

COMPANY _____

MAILING ADDRESS _____

TELEPHONE _____ FAX: _____

E-MAIL _____

APPENDIX D

Inspection and Maintenance Report Form

WYTHE-WILL DISTRIBUTION WAREHOUSE
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

EROSION AND SEDIMENT CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

Note: This form (4 pages)
to be completed every 7 days and within 24 hours of
a rainfall event that is 0.5 inches or greater

INSPECTOR:_____ DATE:_____

INSPECTOR'S QUALIFICATIONS:

_____

_____

_____

DAYS SINCE LAST RAINFALL:_____ AMOUNT OF LAST RAINFALL _____ INCHES

VEGETATIVE CONTROLS

AREA	DATE SINCE LAST DISTURBED	DATE OF NEXT DISTURBANCE	STABILIZED? (YES/NO)	STABILIZED WITH	CONDITION

MAINTENANCE REQUIRED:

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

MAINTENANCE PERFORMED ON:_____ CONFIRMED BY:_____

WYTHE-WILL DISTRIBUTION WAREHOUSE
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

EROSION AND SEDIMENT CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

INSPECTOR:_____ DATE:_____

STRUCTURAL CONTROL	CONDITION	ADDITIONAL REMARKS

MAINTENANCE REQUIRED:

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

MAINTENANCE PERFORMED ON:_____ CONFIRMED BY:_____

WYTHE-WILL DISTRIBUTION WAREHOUSE
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

EROSION AND SEDIMENT CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

OTHER CONTROLS

INSPECTOR:_____ DATE:_____

OTHER CONTROL	CONDITION	ADDITIONAL REMARKS

MAINTENANCE REQUIRED:

_____

_____

_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

MAINTENANCE PERFORMED ON:_____ CONFIRMED BY:_____

WYTHE-WILL DISTRIBUTION WAREHOUSE
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

EROSION AND SEDIMENT CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

CHANGES REQUIRED TO THE EROSION AND SEDIMENT CONTROL PLAN:

_____

_____

_____

_____

REASONS FOR CHANGES:

_____

_____

_____

_____

CHANGES MADE BY: _____ ON OR BEFORE: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE: _____ DATE: _____

WYTHE-WILL DISTRIBUTION WAREHOUSE
STONEHOUSE COMMERCE PARK
JAMES CITY COUNTY, VIRGINIA

POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Date: _____

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of this Virginia Pollutant Discharge Elimination system (VPDES) general permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

SIGNATURE (Name and Title)	FOR (Company Address, Telephone)	RESPONSIBLE FOR
_____ Date: _____		General Contractor
_____ Date: _____		
_____ Date: _____		

VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (VPDES)
GENERAL PERMIT NOTICE OF TERMINATION
FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES
PERMIT NUMBER _____

(Please Type or Print All Information)

1. Construction Activity Operator

Name: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____ Phone: _____

2. Location of Construction Activity

Name: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

If street address unavailable: Latitude: _____ Longitude: _____

3. VPDES Storm Water General Permit Number: _____

4. Check appropriate reason for terminating coverage under the General Permit:

_____ I am no longer the operator of the site.

_____ The construction site has undergone final stabilization and the storm water discharges from the construction activity have been terminated.

5. Certification:

"I certify under penalty of law that all storm water discharges from the identified construction activity that are authorized by a VPDES general permit have been eliminated, or that I am no longer the operator of the construction activity. I understand that by submitting this notice of termination, that I am no longer authorized to discharge storm water in accordance with the general permit, and that discharging pollutants to surface waters is unlawful where the discharge is not authorized by a VPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit"

Print Name: _____

Title: _____

Signature: _____ Date: _____

For Department of Environmental Quality Use Only

Accepted/Not Accepted by: _____ Date: _____

APPENDIX E

Erosion & Sediment Control Calculations

E&S DIVERSION
SWALE CALCULATION WORKSHEET

SWALE NO. 1

SWALE SHAPE: PARABOLIC

$Q = (1.486/n)AR^{2/3}S^{1/2}$

R = Hydraulic Radius, $(T^{2D})/(1.5T^2+4D^2)$
A = Area
P = Wetted Perimeter
n = Roughness Coefficient
T = Width of Swale at Top
D = Depth of Swale
S = Slope of Swale, ft/ft

Enter	S	=	0.0200	
Enter	n	=	0.040	
Enter	T	=	3.00	FT.
Enter	D	=	2.50	FT.
	A	=	5.00	S.F.
	R	=	0.584	
	Q	=	18.36	CFS

THE FLOW OF THE CHANNEL

185.06 20.87
10 YEAR STORM

T_C =	5.0	MIN.	ACRE	C
Intensity =	7.15	IN/HR	5.0	0.4

ENTER CA = 2.00 C*AC

Q_{10} = 14.42 CFS THE MAXIMUM FLOW OF A TEN YEAR STORM

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(~~with or~~ without an emergency spillway)

Project Wythe-Will @ Stonehouse Commerce Park

Basin # _____ Location _____

Total area draining to basin: 8 acres.

Basin Volume Design

Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

   67 cu. yds. x 8 acres = 536 cu. yds.

2. Available basin volume = 546 cu. yds. at elevation 66. (From storage - elevation curve)

3. Excavate N/A cu. yds. to obtain required volume*.

   * Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

   33 cu. yds. x 8 acres = 264 cu. yds.

5. Elevation corresponding to cleanout level = 64.3.

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 1.7 ft. (Min. = 1.0 ft.)

Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

   67 cu. yds. x 8 acres = 536 cu. yds.

8. Total available basin volume at crest of riser* = 1108 cu. yds. at elevation 68.7. (From Storage - Elevation Curve)

* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 6 in.

10. Diameter of flexible tubing = 8 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 72

Top of Dam = 76

Design High Water = 70.4

Upstream Toe of Dam = N/A IN CUT ?

Basin Shape

12. Length of Flow / Effective Width — L / We = N/A

If > 2, baffles are not required _____

If < 2, baffles are required _____

Runoff

13. Q_2 = _____ cfs (From Chapter 5)

14. Q_{25} = 5.9 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = _____ cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25}$ = 5.9 cfs. (riser and barrel)

16. ~~With emergency spillway:~~

Assumed available head (h) = _____ ft. (Using Q_2)

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

Without emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_{25})

h = Design High Water Elevation 70.4 - Crest of Riser Elevation 72

17. Riser diameter (D_r) = 24 in. Actual head (h) = N/A ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 90 ft.

Head (H) on barrel through embankment = 0 ft.

(From Plate 3.14-7).

19. Barrel diameter = 15 in.

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

Diameter = 36 inches.

Height = 13 inches.

(From Table 3.14-D).

~~Emergency Spillway Design~~

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = _____ cfs.

22. Bottom width (b) = _____ ft.; the slope of the exit channel (s) = _____ ft./foot; and the minimum length of the exit channel (x) = _____ ft.
(From Table 3.14-C).

Anti-Seep Collar Design N/A

23. Depth of water at principal spillway crest (Y) = ____ ft.

Slope of upstream face of embankment (Z) = _____:1.

Slope of principal spillway barrel (S_b) = _____%

Length of barrel in saturated zone (L_s) = _____ ft.

24. Number of collars required = _____ dimensions = _____

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 76

Design High Water = 70.4

Emergency Spillway Crest = N/A

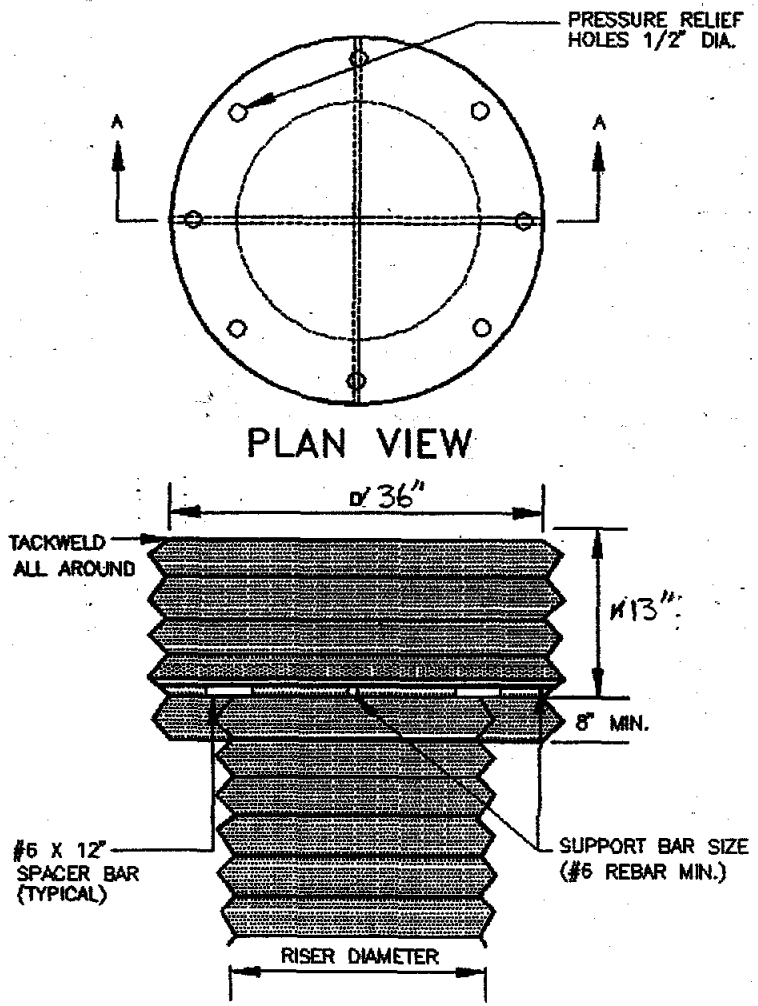
Principal Spillway Crest = 72

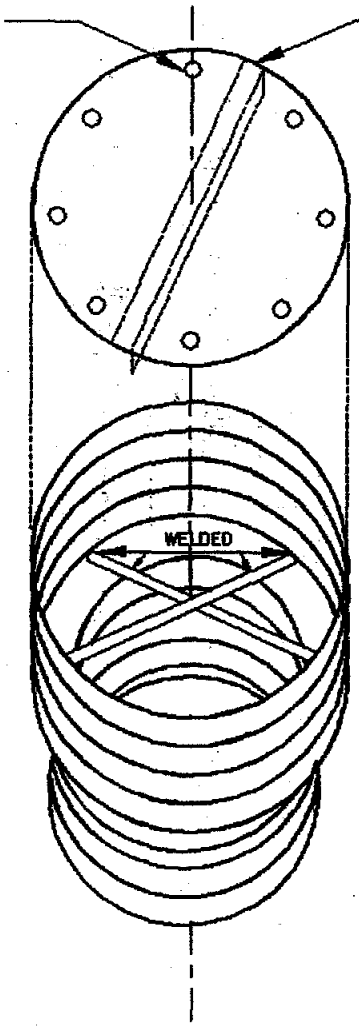
Dewatering Orifice Invert = 69

Cleanout Elevation = 64.3

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 62

ANTI- VORTEX DEVICE DESIGN





Not Required

TOP STIFFENER (IF REQUIRED) IS___X__X___ ANGLE WELDED TO TOP AND ORIENTED PERPENDICULAR TO CORRUGATIONS.

TOP IS 16 GAGE CORRUGATED METAL OR 1/8" STEEL PLATE. PRESSURE RELIEF HOLES MAY BE OMMITTED, IF ENDS OF CORRUGATIONS ARE LEFT FULLY OPEN WHEN THE TOP IS ATTACHED.

CYLINDER IS 16 GAGE CORRUGATED METAL PIPE OR FABRICATED FROM 1/8" STEEL PLATE.

NOTES:

1. THE CYLINDER MUST BE FIRMLY FASTENED TO THE TOP OF THE RISER.
2. SUPPORT BARS ARE WELDED TO THE TOP OF THE RISER OR ATTACHED BY STRAPS BOLTED TO TOP OF RISER.

Source: USDA-SCS

Plate 3.14-10

POND-2 Version: 5.20
S/N:

Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

CALCULATED 12-10-2003 15:06:04
DISK FILE: A:WYTHE5 .VOL

Planimeter scale: 1 inch = 1 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	* Volume (cubic-ft)	Volume Sum (cubic-ft)
62.00	2,700.00	2,700	0	0	0
69.00	6,710.00	6,710	13,666	31,888	31,888
70.00	7,360.00	7,360	21,097	7,032	38,921
72.00	8,820.00	8,820	24,237	16,158	55,079
74.00	10,370.00	10,370	28,754	19,169	74,248
76.00	11,850.00	11,850	33,305	22,204	96,451

Elevations With Areas Interpolated From
The Closest Two Planimeter Readings

64.30	-----	3,820	9,731	7,460	7,460
66.00	-----	4,772	11,061	14,748	14,748
68.70	-----	6,501	13,391	29,907	29,907
71.00	-----	8,073	23,142	7,714	46,635
72.70	-----	9,348	27,249	6,358	61,437
73.00	-----	9,579	27,591	9,197	64,276
75.00	-----	11,098	32,195	10,732	84,980

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where: E1, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Area1,Area2 = Areas computed for E1, E2, respectively
IA = Interpolated area for Ei

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

***** COMPOSITE OUTFLOW SUMMARY ****

Elevation (ft)	Q (cfs)	Contributing Structures
62.00	0.0	
63.00	0.0	
64.00	0.0	
65.00	0.0	
66.00	0.0	
67.00	0.0	
68.00	0.0	
69.00	0.0	3
70.00	3.9	1 +3
71.00	8.7	1 +3
72.00	11.7	1 +2 +3
73.00	29.2	1 +2 +3
74.00	37.5	1 +2 +3
75.00	44.2	1 +2 +3
76.00	49.8	1 +2 +3

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

Outlet Structure File: A:WYTHE5 .STR
Planimeter Input File: A:WYTHE5 .VOL
Rating Table Output File: A:WYTHE5 .PND

Min. Elev.(ft) = 62 Max. Elev.(ft) = 76 Incr.(ft) = 1

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
ORIFICE-VC	1		->	1
STAND PIPE	2		->	2
CULVERT-CR	3		->	3

Outflow rating table summary was stored in file:
A:WYTHE5 .PND

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

ORIFICE-VC
Orifice - Vertical Circular

E1 elev.(ft)?	69.5
E2 elev.(ft)?	76.001
Orifice coeff.?	.6
Invert elev.(ft)?	69
Datum elev.(ft)?	69
Diameter (ft)?	.5

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

>>>>>> Structure No. 2 <<<<<<
(Input Data)

STAND PIPE
Stand Pipe with weir or orifice flow

E1 elev.(ft)?	72
E2 elev.(ft)?	76.001
Crest elev.(ft)?	72
Diameter (ft)?	2
Weir coefficient?	3.3
Orifice coefficient?	.6
Start transition elev.(ft) @ ?	
Transition height (ft)?	

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

>>>>>> Structure No. 3 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

E1 elev.(ft)?	69
E2 elev.(ft)?	76.001
Diam. (ft)?	1.25
Inv. el.(ft)?	69
Slope (ft/ft)?	.004
T1 ratio?	
T2 ratio?	
K Coeff.?	.0045
M Coeff.?	2.0
c Coeff.?	.0317
Y Coeff.?	.69
Form 1 or 2?	1
Slope factor?	-.5

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

Outflow Rating Table for Structure #1
ORIFICE-VC Orifice - Vertical Circular

Elevation (ft)	Q (cfs)	Computation Messages
62.00	0.0	E < E1=69.5
63.00	0.0	E < E1=69.5
64.00	0.0	E < E1=69.5
65.00	0.0	E < E1=69.5
66.00	0.0	E < E1=69.5
67.00	0.0	E < E1=69.5
68.00	0.0	E < E1=69.5
69.00	0.0	E < E1=69.5
70.00	0.9	H =1.0
71.00	1.3	H =2.0
72.00	1.6	H =3.0
73.00	1.9	H =4.0
74.00	2.1	H =5.0
75.00	2.3	H =6.0
76.00	2.5	H =7.0

C = .6 A = .1963496 sq.ft.
H (ft) = Table elev. - Datum elev. (69 ft)
Q (cfs) = C * A * sqr(2g * H)

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages	
62.00	0.0	E < Inv.El.= 72	
63.00	0.0	E < El=72	
64.00	0.0	E < El=72	
65.00	0.0	E < El=72	
66.00	0.0	E < El=72	
67.00	0.0	E < El=72	
68.00	0.0	E < El=72	
69.00	0.0	E < El=72	
70.00	0.0	E < El=72	
71.00	0.0	E < El=72	
72.00	0.0	Weir:	H =0.0
73.00	15.1	Orifice:	H =1.0
74.00	21.4	Orifice:	H =2.0
75.00	26.2	Orifice:	H =3.0
76.00	30.3	Orifice:	H =4.0

12.2 · 0.94 = 11.47 CFS MAX
W/S 1' HEAD AT OUTFALL
@ [redacted]

Weir Cw = 3.3 Weir length = 6.283186 ft
Orifice Co = .6 Orifice area = 3.141593 sq.ft.
Q (cfs) = (Cw * L * H**1.5) or (Co * A * sqr(2*g*H))
No transition used, transition height = 0.0
Weir equation = Orifice equation @ elev.= 72.72955 ft

14.48 CFS
W/S 1' HEAD

— BARREL IS CONTROLLING
IF OUTFALL IS BELOW DITCH
— Q_{MAX} IN BARREL (IF INV. IN = 72 PIPE SLOPE = 4.4%)
= 13.61 CFS

FROM CONTROLS
Q_2 = 5.49

Outlet Structure File: WYTHE5 .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Wythe-Will@StonehouseCommercePark
Independent Sediment Basin

****

Outflow Rating Table for Structure #3
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
62.00	0.0	E < Inv.El.= 69
63.00	0.0	E < Inv.El.= 69
64.00	0.0	E < Inv.El.= 69
65.00	0.0	E < Inv.El.= 69
66.00	0.0	E < Inv.El.= 69
67.00	0.0	E < Inv.El.= 69
68.00	0.0	E < Inv.El.= 69
69.00	0.0	No headwater
70.00	3.0	Equ.1: HW =1.0 dc=.690 Ac=.695
71.00	7.3	Submerged: HW =2.0
72.00	10.1	Submerged: HW =3.0
73.00	12.2	Submerged: HW =4.0
74.00	14.0	Submerged: HW =5.0
75.00	15.6	Submerged: HW =6.0
76.00	17.1	Submerged: HW =7.0

Used Unsubmerged Equ. Form (1) for elev. less than 70.37 ft
Used Submerged Equation for elevations greater than 70.49 ft
HW=Headwater (ft) dc=Critical depth (ft) Ac=Area (sq.ft) at dc

Transition flows interpolated from the following values:
E1=70.37 ft; Q1=4.8 cfs; Dc=.89 ft; E2=70.49 ft; Q2=5.49 cfs

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*   Wythe-Will@StonehouseCommercePark *
*      Independent Sediment Basin   *
*                                   *
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Inflow Hydrograph: A:WYTHE2 .HYD
Rating Table file: A:WYTHE5 .PND

----INITIAL CONDITIONS----
Elevation = 62.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
62.00	0.0	0
63.00	0.0	2,929
64.00	0.0	6,338
65.00	0.0	10,266
66.00	0.0	14,748
67.00	0.0	19,822
68.00	0.0	25,523
69.00	0.0	31,888
70.00	3.9	38,921
71.00	8.7	46,635
72.00	11.7	55,079
73.00	29.2	64,276
74.00	37.5	74,248
75.00	44.2	84,979
76.00	49.8	96,451

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
97.6	97.6
211.2	211.2
342.1	342.1
491.5	491.5
660.6	660.6
850.6	850.6
1062.7	1062.7
1297.1	1301.0
1554.2	1562.9
1835.6	1847.3
2142.1	2171.3
2474.4	2511.9
2832.1	2876.3
3214.4	3264.2

Time increment (t) = 1.0 min.

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:41

Page
Return Freq: 2 years

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE2 .HYD
Outflow Hydrograph: A:SB2OUT .HYD

WHY ARE CALC'S STARTING AT THE BOTTOM OF THE BASIN WHEN 1/2 IS WET STORAGE?

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	62.00
1.0	2.43	2.4	2.4	2.4	0.00	62.02
2.0	4.87	7.3	9.7	9.7	0.00	62.10
3.0	7.30	12.2	21.9	21.9	0.00	62.22
4.0	9.73	17.0	38.9	38.9	0.00	62.40
5.0	12.17	21.9	60.8	60.8	0.00	62.62
6.0	12.17	24.3	85.2	85.2	0.00	62.87
7.0	12.17	24.3	109.5	109.5	0.00	63.10
8.0	12.17	24.3	133.9	133.9	0.00	63.32
9.0	12.17	24.3	158.2	158.2	0.00	63.53
10.0	12.17	24.3	182.5	182.5	0.00	63.75
11.0	12.17	24.3	206.9	206.9	0.00	63.96
12.0	12.17	24.3	231.2	231.2	0.00	64.15
13.0	12.17	24.3	255.6	255.6	0.00	64.34
14.0	12.17	24.3	279.9	279.9	0.00	64.52
15.0	12.17	24.3	304.2	304.2	0.00	64.71
16.0	12.17	24.3	328.6	328.6	0.00	64.90
17.0	12.17	24.3	352.9	352.9	0.00	65.07
18.0	12.17	24.3	377.2	377.2	0.00	65.24
19.0	12.17	24.3	401.6	401.6	0.00	65.40
20.0	12.17	24.3	425.9	425.9	0.00	65.56
21.0	12.17	24.3	450.3	450.3	0.00	65.72
22.0	12.17	24.3	474.6	474.6	0.00	65.89
23.0	12.17	24.3	498.9	498.9	0.00	66.04
24.0	12.17	24.3	523.3	523.3	0.00	66.19
25.0	12.17	24.3	547.6	547.6	0.00	66.33
26.0	12.17	24.3	572.0	572.0	0.00	66.48
27.0	12.17	24.3	596.3	596.3	0.00	66.62
28.0	12.17	24.3	620.6	620.6	0.00	66.76
29.0	12.17	24.3	645.0	645.0	0.00	66.91
30.0	12.17	24.3	669.3	669.3	0.00	67.05
31.0	12.17	24.3	693.7	693.7	0.00	67.17
32.0	12.17	24.3	718.0	718.0	0.00	67.30
33.0	12.17	24.3	742.4	742.4	0.00	67.43
34.0	12.17	24.3	766.7	766.7	0.00	67.56
35.0	9.73	21.9	788.6	788.6	0.00	67.67
36.0	7.30	17.0	805.6	805.6	0.00	67.76
37.0	4.87	12.2	817.8	817.8	0.00	67.83
38.0	2.43	7.3	825.1	825.1	0.00	67.87
39.0	0.00	2.4	827.5	827.5	0.00	67.88

THIS SHOULD START AT ELEVATION 69.00

INFILTRATION? ASK FIRST THEN SAY NO!

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE2 .HYD
Outflow Hydrograph: A:SB2OUT .HYD

Starting Pond W.S. Elevation = 62.00 ft

NO! THIS IS INCORRECT
HE'S SAYING POND IS EMPTY AT INITIAL STAGE.

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 12.17 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 67.88 ft = 39,920 CFT OF STORAGE

NOT

***** Summary of Approximate Peak Storage *****

Initial Storage = 0 cu-ft
Peak Storage From Storm = 24,831 cu-ft

Total Storage in Pond = 24,831 cu-ft

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*   Wythe-Will@StonehouseCommercePark *
*      Independent Sediment Basin     *
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YEAR STORM?

Inflow Hydrograph: A:WYTHE10 .HYD
Rating Table file: A:WYTHE .PND

50YR 10?

----INITIAL CONDITIONS----
Elevation = 62.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
62.00	0.0	0
63.00	0.0	2,929
64.00	0.0	6,338
65.00	0.0	10,266
66.00	0.0	14,748
67.00	0.0	19,822
68.00	0.0	25,523
69.00	0.0	31,888
70.00	3.9	38,921
71.00	8.7	46,635
72.00	11.7	55,079
73.00	29.2	64,276
74.00	37.5	74,248
75.00	44.2	84,979
76.00	49.8	96,451

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
97.6	97.6
211.2	211.2
342.1	342.1
491.5	491.5
660.6	660.6
850.6	850.6
1062.7	1062.7
1297.1	1301.0
1554.2	1562.9
1835.6	1847.3
2142.1	2171.3
2474.4	2511.9
2832.1	2876.3
3214.4	3264.2

Time increment (t) = 1.0 min.

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE10 .HYD
Outflow Hydrograph: A:OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	62.00
1.0	3.17	3.2	3.2	3.2	0.00	62.03
2.0	6.35	9.5	12.7	12.7	0.00	62.13
3.0	9.52	15.9	28.6	28.6	0.00	62.29
4.0	12.69	22.2	50.8	50.8	0.00	62.52
5.0	15.87	28.6	79.3	79.3	0.00	62.81
6.0	15.87	31.7	111.1	111.1	0.00	63.12
7.0	15.87	31.7	142.8	142.8	0.00	63.40
8.0	15.87	31.7	174.6	174.6	0.00	63.68
9.0	15.87	31.7	206.3	206.3	0.00	63.96
10.0	15.87	31.7	238.0	238.0	0.00	64.20
11.0	15.87	31.7	269.8	269.8	0.00	64.45
12.0	15.87	31.7	301.5	301.5	0.00	64.69
13.0	15.87	31.7	333.3	333.3	0.00	64.93
14.0	15.87	31.7	365.0	365.0	0.00	65.15
15.0	15.87	31.7	396.7	396.7	0.00	65.37
16.0	15.87	31.7	428.5	428.5	0.00	65.58
17.0	15.87	31.7	460.2	460.2	0.00	65.79
18.0	15.87	31.7	492.0	492.0	0.00	66.00
19.0	15.87	31.7	523.7	523.7	0.00	66.19
20.0	15.87	31.7	555.4	555.4	0.00	66.38
21.0	15.87	31.7	587.2	587.2	0.00	66.57
22.0	15.87	31.7	618.9	618.9	0.00	66.75
23.0	15.87	31.7	650.7	650.7	0.00	66.94
24.0	15.87	31.7	682.4	682.4	0.00	67.11
25.0	15.87	31.7	714.1	714.1	0.00	67.28
26.0	15.87	31.7	745.9	745.9	0.00	67.45
27.0	15.87	31.7	777.6	777.6	0.00	67.62
28.0	15.87	31.7	809.4	809.4	0.00	67.78
29.0	15.87	31.7	841.1	841.1	0.00	67.95
30.0	15.87	31.7	872.8	872.8	0.00	68.10
31.0	15.87	31.7	904.6	904.6	0.00	68.25
32.0	15.87	31.7	936.3	936.3	0.00	68.40
33.0	15.87	31.7	968.1	968.1	0.00	68.55
34.0	15.87	31.7	999.8	999.8	0.00	68.70
35.0	15.87	31.7	1031.5	1031.5	0.00	68.85
~~36.0~~ 0.0	15.87	31.7	1063.3	1063.3	0.01	69.00
37.0 1.0	12.69	28.6	1090.9	1091.8	0.48	69.12
38.0 2.0	9.52	22.2	1111.4	1113.1	0.82	69.21
39.0 3.0	6.35	15.9	1125.2	1127.3	1.06	69.27
40.0 4.0	3.17	9.5	1132.3	1134.7	1.18	69.30
41.0 5.0	0.00	3.2	1133.1	1135.5	1.19	69.31

ALREADY FULL OF WATER

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE10 .HYD
Outflow Hydrograph: A:OUT .HYD

Starting Pond W.S. Elevation = 62.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 15.87 cfs
Peak Outflow = 1.19 cfs
Peak Elevation = 69.31 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	34,036 cu-ft
Total Storage in Pond	=	34,036 cu-ft

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:42

Return Freq: 25 years

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*                                   *
*   Wythe-Will@StonehouseCommercePark *
*      Independent Sediment Basin   *
*                                   *
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*                                   *
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Inflow Hydrograph: A:WYTHE25 .HYD
Rating Table file: A:WYTHE5 .PND

----INITIAL CONDITIONS----
Elevation = 62.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
62.00	0.0	0
63.00	0.0	2,929
64.00	0.0	6,338
65.00	0.0	10,266
66.00	0.0	14,748
67.00	0.0	19,822
68.00	0.0	25,523
69.00	0.0	31,888
70.00	3.9	38,921
71.00	8.7	46,635
72.00	11.7	55,079
73.00	29.2	64,276
74.00	37.5	74,248
75.00	44.2	84,979
76.00	49.8	96,451

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
97.6	97.6
211.2	211.2
342.1	342.1
491.5	491.5
660.6	660.6
850.6	850.6
1062.7	1062.7
1297.1	1301.0
1554.2	1562.9
1835.6	1847.3
2142.1	2171.3
2474.4	2511.9
2832.1	2876.3
3214.4	3264.2

Time increment (t) = 1.0 min.

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:42

Return Freq: 25 years

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE25 .HYD
Outflow Hydrograph: A:SB25OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	62.00
1.0	3.04	3.0	3.0	3.0	0.00	62.03
2.0	6.08	9.1	12.2	12.2	0.00	62.12
3.0	9.13	15.2	27.4	27.4	0.00	62.28
4.0	12.17	21.3	48.7	48.7	0.00	62.50
5.0	15.21	27.4	76.1	76.1	0.00	62.78
6.0	15.21	30.4	106.5	106.5	0.00	63.08
7.0	15.21	30.4	136.9	136.9	0.00	63.35
8.0	15.21	30.4	167.3	167.3	0.00	63.61
9.0	15.21	30.4	197.7	197.7	0.00	63.88
10.0	15.21	30.4	228.2	228.2	0.00	64.13
11.0	15.21	30.4	258.6	258.6	0.00	64.36
12.0	15.21	30.4	289.0	289.0	0.00	64.59
13.0	15.21	30.4	319.4	319.4	0.00	64.83
14.0	15.21	30.4	349.8	349.8	0.00	65.05
15.0	15.21	30.4	380.3	380.3	0.00	65.26
16.0	15.21	30.4	410.7	410.7	0.00	65.46
17.0	15.21	30.4	441.1	441.1	0.00	65.66
18.0	15.21	30.4	471.5	471.5	0.00	65.87
19.0	15.21	30.4	501.9	501.9	0.00	66.06
20.0	15.21	30.4	532.4	532.4	0.00	66.24
21.0	15.21	30.4	562.8	562.8	0.00	66.42
22.0	15.21	30.4	593.2	593.2	0.00	66.60
23.0	15.21	30.4	623.6	623.6	0.00	66.78
24.0	15.21	30.4	654.0	654.0	0.00	66.96
25.0	15.21	30.4	684.4	684.4	0.00	67.13
26.0	15.21	30.4	714.9	714.9	0.00	67.29
27.0	15.21	30.4	745.3	745.3	0.00	67.45
28.0	15.21	30.4	775.7	775.7	0.00	67.61
29.0	15.21	30.4	806.1	806.1	0.00	67.77
30.0	15.21	30.4	836.5	836.5	0.00	67.93
31.0	15.21	30.4	867.0	867.0	0.00	68.08
32.0	15.21	30.4	897.4	897.4	0.00	68.22
33.0	15.21	30.4	927.8	927.8	0.00	68.36
34.0	15.21	30.4	958.2	958.2	0.00	68.51
35.0	15.21	30.4	988.6	988.6	0.00	68.65
36.0	15.21	30.4	1019.1	1019.1	0.00	68.79
37.0	15.21	30.4	1049.5	1049.5	0.00	68.94
38.0	15.21	30.4	1079.3	1079.9	0.28	69.07
39.0	15.21	30.4	1108.2	1109.8	0.77	69.20
40.0	15.21	30.4	1136.2	1138.6	1.24	69.32
41.0	15.21	30.4	1163.2	1166.6	1.70	69.44
42.0	15.21	30.4	1189.3	1193.6	2.14	69.55
43.0	15.21	30.4	1214.6	1219.7	2.57	69.66
44.0	15.21	30.4	1239.1	1245.0	2.98	69.77

POND-2 Version: 5.20 S/N:
EXECUTED: 12-10-2003 15:11:42

Return Freq: 25 years

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE25 .HYD
Outflow Hydrograph: A:SB25OUT .HYD

INFLOW HYDROGRAPH

TIME (min)	INFLOW (cfs)
45.0	15.21
46.0	15.21
47.0	15.21
48.0	15.21
49.0	15.21
50.0	15.21
51.0	12.17
52.0	9.13
53.0	6.08
54.0	3.04
55.0	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
30.4	1262.7	1269.5	3.38	69.87
30.4	1285.6	1293.1	3.77	69.97
30.4	1307.7	1316.0	4.17	70.06
30.4	1328.9	1338.1	4.58	70.14
30.4	1349.4	1359.3	4.97	70.22
30.4	1369.1	1379.8	5.34	70.30
27.4	1385.2	1396.5	5.65	70.36
21.3	1394.8	1406.5	5.83	70.40
15.2	1398.2	1410.0	5.90	70.42
9.1	1395.7	1407.4	5.85	70.41
3.0	1387.3	1398.7	5.69	70.37

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: A:WYTHE5 .PND
Inflow Hydrograph: A:WYTHE25 .HYD
Outflow Hydrograph: A:SB25OUT .HYD

Starting Pond W.S. Elevation = 62.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow	=	15.21 cfs
Peak Outflow	=	5.90 cfs
Peak Elevation	=	70.42 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	42,133 cu-ft
Total Storage in Pond	=	42,133 cu-ft

APPENDIX F

Meter Sizing Calculations

Wythe Will Building
Project No.: 2003151-000.09
Date: October 27, 2003
Prepared By: Curt Nordeman

Proposed Fixture Counts

Proposed Building				
Development Area	Design Units	Design Value	[a] Water Fixture Value	Water Supply Fixture Unit (WSFU)
Water Closet (Valve)	# of Units	9	6.00	54.00
Lavatory	# of Units	8	2.00	16.00
Drinking Fountain	# of Units	6	0.25	1.50
Urinal	# of Units	1	3.00	3.00
Kitchen Sink	# of Units	2	1.40	2.80
Total Water Supply Fixture Units (WSFU)				77.30

[a] Reference Table E101B, Load Values Assigned to Fixtures, 2000 International Plumbing Code , page 113

[b] Reference Table E102, Table For Estimating Demand, 2000 International Plumbing Code, Appendix E, Page 114

[b] Table for Estimating Demand	
WSFU	Demand gpm
70	58.00
77.30	60.34
80	61.20

Use 1 **1/2-inch** meter in accordance with TABLE 5.6 *Displacement-Type Meter Meeting AWWA Specifications Flow-Pressure-Loss Average of 1973-Model Meters* page 45 in the AWWA Sizing Water Service Lines and Meters

La Grange Pkwy
Stillwater Rd
100 ft
102 ft
104 ft
106 ft
108 ft
110 ft
112 ft
116 ft
92 ft
94 ft
96 ft
98 ft
86 ft
88 ft
90 ft
82 ft
84 ft
80 ft
78 ft
76 ft
74 ft
72 ft
70 ft
68 ft
66 ft
64 ft
62 ft
60 ft
58 ft
56 ft
54 ft
52 ft
50 ft
48 ft
46 ft
44 ft
42 ft
40 ft
38 ft
36 ft
34 ft
32 ft
30 ft
28 ft
26 ft
24 ft
22 ft
20 ft
18 ft
16 ft
14 ft
12 ft
10 ft
8 ft
6 ft
4 ft
2 ft

STONEHOUSE COMMERCE PARK

	BMP	AREA SERVED ACRES	BMP POINTS	FRACTION SERVED BY BMP		WEIGHTED BMP POINTS	Rv	Rm	V (Ac-Ft)	V (C.F.)	HxV (C.F.)
1	WET POND	32.6	9	0.201	=	1.808	0.50	0.45	0.611	26626	106504
2	WET POND	25.1	9	0.155	=	1.392	0.50	0.45	0.471	20500	82002
	R.M. POND	68.0	8	0.419	=	3.352	0.50	0.45	1.275	55539	138848
	TOTAL	125.7				6.551					
	NATURAL OPENSPACE OUTSIDE OF R.M. POND(AC)	85	10	0.344	=	3.437		Rv=0.05+1.009I, ASSUME I=50% V=(Rm)(Rv)/12*AREA H=2.5 FOR 8 POINT WET POND H=4 FOR 9 POINT WET POND			
	TOTAL BMP POINTS				=	10.0					
	AREA SERVED BY RICHARDSONS MILL (ACRES)				=	68.0					
	DEVELOPABLE AREA (ACRES) (247.3-85.0)				=	162.3					
	AREA THROUGH BMPS				=	125.7					
	TOTAL AREA OF SITE (ACRES)				=	247.3					

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 4th day of December, 2003, between Liberty Property Limited Partnership, and all successors in interest, ("COVENANTOR(S),") owner(s) of the following property: Wythe-Will Distribution Center, project name, Section A Parcel A-2, Stonehouse Commerce Park, Document No. _____, Deed Book _____, Page No. _____; Instrument No. 0300 34818, and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

Instrument # 040001268
Recorded on Jan. 12, 2004

Revised 01/02

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

9. This COVENANT shall be recorded in the County Land Records.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)
LIBERTY PROPERTY LIMITED PARTNERSHIP

By: _____

Print Name/Title ALAN T. LINGERFELT, SR. V.P.

ATTEST:

_____

COVENANTOR(S)

_____

Print Name/Title _____

ATTEST:

_____

Revised 01/02

COMMONWEALTH OF VIRGINIA
CITY/~~COUNTY~~ OF Richmond

I hereby certify that on this 4th day of December, 20 03, before the subscribed, a Notary Public of the State of Virginia, and for the City/~~County~~ of Richmond, aforesaid personally appeared Alan T. Lingerfelt and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 4th day of December, 2003.

Rita B. Gillespie
Notary Public

My Commission expires: November 30, 2004

Approved as to form:

Leo P. Rogers
County Attorney

This Declaration of Covenants prepared by:

DANA DAME
(Print Name)
PROJECT MANAGER
LIBERTY PROPERTY TRUST
(Title)
12 SOUTH THIRD ST
(Address)
RICHMOND, VA 23219
(City) (State) (Zip)

drainage.pre

Revised 01/02

Schnabel
Schnabel Engineering South, LLC

One West Cary Street
Richmond, VA 23220

Phone (804) 649-7035
Fax (804)783-8023
www.schnabel-eng.com

October 29, 2003

SJT Review Copy
SP-130-03

Mr. Dana Dame
Liberty Property Trust
12 South Third Street
Richmond, VA 23219

Subject: Project 03131268, Geotechnical Engineering Study, Wythe-Will Distributing, Stonehouse Commerce Park, LaGrange ~~Parkway,~~ James City County, Virginia

Dear Mr. Dame:

We are pleased to submit three copies of our geotechnical engineering report for this project. This report was prepared according to our proposal P3131366 dated October 16, 2003 dated.

We are pleased to be of service to you on this project. Please call us if you have any questions.

Sincerely,
SCHNABEL ENGINEERING SOUTH, LLC

Edward G. Drahos

Edward G. Drahos, P.E.
Principal

IA:EGD:vw

cc: Landmark Design Group (1)
Attn: Mr. Steve Romeo

✓ MIN TWO BORINGS PER FACILITY
BASIN P. 3.6
✓ NO RECOMMENDED INFIL RATE GIVEN
?

Geotechnical Engineering Study
Wythe-Will Distributing
Stonehouse Commerce Park
LaGrange Parkway
James City County, Virginia

Schnabel Project 03131268

Schnabel

Schnabel Engineering South, LLC

Geotechnical Engineering Study
Wythe-Will Distributing
Stonehouse Commerce Park
LaGrange Parkway
James City County, Virginia

Schnabel Project 03131268

October 29, 2003

Prepared for:

Mr. Dana Dame
Liberty Property Trust
12 South Third Street
Richmond, Virginia 23219

Prepared by:

Schnabel Engineering South, LLC
One West Cary Street
Richmond, Virginia 23220

Phone: (804) 649-7035
Fax: (804) 783-8023

SEAL?

Iliana Alvarado, P.E.
Senior Engineer

Edward G. Drahos, P.E.
Principal

EXECUTIVE SUMMARY

Shallow spread footings have been evaluated for support of the proposed building and are recommended. A net allowable soil bearing pressure of 2,000 psf may be used to design the footings. Footings should be supported on suitable natural soils and on new compacted structural fill.

The borings indicated loose density sands are present at various depths on the site. Some of these soils are not considered suitable for support of compacted structural fill or structures in their present condition. After stripping the site of topsoil, we recommend compacting the subgrades in all fill areas with a heavy vibratory roller. The compacted subgrades should then be proofrolled and undercut as needed. The Geotechnical Engineer should evaluate the proofrolling during construction.

The subsurface conditions at the basin location varied in the two borings completed within the footprint of the basin. At the bottom of the basin, the soils classify as loamy sand or sandy loam, which are suitable for infiltration per the Virginia Stormwater Management Handbook (1999), Section 3.10, Infiltration Practices. However, some materials encountered in the borings above the bottom of the basin are not suitable. The soil types observed at the time of our exploration may vary away from the boring locations. As a result, undercut and replacement of soil, as well as dewatering during construction, may be necessary.

This executive summary is provided solely for purposes of overview. Any party that relies on this report must read the full report. This executive summary omits several details, any one of which could be very important to the proper application of the report.

use FS

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Appendix A: Subsurface Exploration Data
Appendix B: Soil Laboratory Test Results

1 INTRODUCTION

1.1 Scope of Services

The objective of this study is to evaluate the subsurface conditions and to provide recommendations regarding the design of foundations, earthwork, pavements and an infiltration basin for this project. The scope of this study is as defined in our proposal P3131366 dated October 16, 2003. Our services included subsurface exploration, field engineering, soil laboratory testing, and development of geotechnical engineering recommendations.

1.2 Site Description

The project is located at the southwest corner of Lagrange Parkway and Six Mount Zion Road in the Stonehouse Commerce Park. The site is roughly 450 ft by 1,000 ft in plan, containing about 10 acres of land. Most of the northern part of the site is open, with the southern and eastern parts of the site being wooded. Existing grades slope down from about EL 105 at the northwest corner to about EL 70 at the southeast corner.

We obtained the site information from the topographic site plan provided by Landmark Design Group and through our site visits.

1.3 Proposed Construction

The proposed site development consists of a warehouse/distribution building to be constructed in two phases. This report presents recommendations for Phase 1 only, as requested.

The Phase 1 proposed construction includes a 100,000 square foot warehouse/distribution building, with a parking lot north of the building and a loading dock on the south side of the building. This report is based on assumed maximum column loads of 150 kips and maximum wall loads of 4 k/ft. The building is about 26 ft high with tilt-up walls and a 6 inch thick slab on grade.

There are two entrances to the site from Lagrange Parkway: a truck entrance, which is west of the building to get to the loading dock and a second entrance at the east end of the building, which is for general traffic.

The adjacent property along the west side of the site is currently at about El 106 to 90. The proposed truck entrance and roadway range in elevation from EL 104 to EL 90; therefore, a retaining wall up to about 10 ft high will be constructed along the truck drivelane.

The proposed building floor grade will be at about EL 95, making the loading dock pavement grade at EL 91. Up to about 10 ft of cut and fill will be required in the building footprint and pavement areas.

~~A storm water management basis will be excavated between the building site and Six Mount Zion Road. The proposed basin will require cuts up to 20 ft to reach EL 60. The basin is to be designed as an infiltration basin.~~

Liberty Property Trust and Landmark Design Group provided the project details.

2 DATA COLLECTION AND ANALYSIS

2.1 Geology

We reviewed existing geologic data and information in our files. Based on this review, the geologic stratigraphy consists of the Windsor Formation overlying the Sedley Formation. Both formations are alluvial soils that typically consist of a mixture of sand and clay. These soils typically exhibit moderate strength and moderate compressibility.

2.2 Data Collection Techniques

Fishburne Drilling, Inc, Chesapeake, Virginia drilled 16 borings at this site under our observation. Specific observations, remarks, and logs for the borings, classification criteria and sampling protocols are included in Appendix A. Approximate boring locations are shown on Figure A1 in Appendix A. Soil samples will be retained up to 45 days beyond the issuance of this report, unless other disposition is requested.

Our geotechnical laboratory conducted tests on selected samples obtained in the borings. This testing aided in the classification of soils encountered in the subsurface exploration and provided data for use in the development of our geotechnical recommendations. The natural moisture content values of selected soil samples are shown in the logs in Appendix A. The results of the remaining laboratory tests are presented in Appendix B.

2.3 Generalized Subsurface Stratigraphy

We have characterized the following generalized subsurface soil stratigraphy based on the boring data presented in Appendix A:

Stratum/ (Geology)	Stratum Depth (ft)	Generalized Stratum Description
Stratum A/ (Existing Fill)	From the ground surface to depths of about 0.5 to 2 ft in Borings B-2, B-5, B-6, B-9, and B-14.	Fine to coarse silty sand FILL, contains roots, plastic, organic matter, and/or asphalt fragments, generally loose to firm density.
Stratum B/ (Windsor Formation)	Below Stratum A or from the ground surface to depths of about 0.6 to 8.5 ft.	Fine to coarse SILTY SAND (SM), POORLY GRADED SAND WITH SILT (SP-SM), CLAYEY SAND (SC), and POORLY GRADED SAND (SP), generally loose to firm density.
Stratum C1 (Sedley Formation)	Below Stratum B1 and/or inter-layered with Stratum C2 to the maximum depth explored in most of the borings.	Fine to coarse SILTY SAND (SM), POORLY GRADED SAND WITH SILT (SP-SM), CLAYEY SAND (SC), and POORLY GRADED SAND (SP), generally loose to firm density.
Stratum, C2 (Sedley Formation)	Below Stratum B1 and/or inter-layered with Stratum C1 to the maximum depth in Borings B-7, B -11, B-12, B-13.	Fine to coarse sandy LEAN CLAY (CL) and LEAN CLAY (CL) WITH SAND, generally medium to very stiff consistency.

About 0.1 to 0.8 ft of rootmat and topsoil was encountered at the ground surface in the borings. The average topsoil thickness was about 0.4 ft. In Boring B-5, 0.1 ft of rootmat was encountered at the ground surface overlying about 0.5 ft of fill, which was over about 0.4 ft of topsoil.

The group symbols indicated within the parentheses in the above table and on the logs in Appendix A represent the Unified Soil Classification System Group Symbols per ASTM D-2487 based on visual classification and limited laboratory testing of the samples. Criteria for visual classification of soil samples are included in Appendix A. Some variation may be expected between samples visually classified and samples classified in the laboratory.

2.4 Soil Laboratory Testing

2.4.1 Shrink Swell Potential

Laboratory tests conducted on samples from Boring B-2 (2 ft to 4 ft) and Boring B-8 (8 ft to 10 ft), which are from Strata B and C, respectively, indicate these soils exhibit a low potential for moisture-related volume change (shrink/swell behavior).

2.4.2 California Bearing Ratio Tests

Schnabel performed two California Bearing Ratio (CBR) tests on the bulk samples from Borings B-9 and B-16 from Strata C and B, respectively. The table below presents a summary of the CBR test results, including the maximum dry density and optimum moisture contents of the soils.

	Bulk from Boring B-9	Bulk from Boring B-16
Material Classification	SC (A-6)	SC (A-2-6)
CBR Value	20.1	30.1
Swell Value	0.2	0.03
Maximum Dry Density, pcf	113.9	119.5
Optimum Moisture Content (%)	14.1	12.4
Natural Moisture Content	16.6	12.6

2.4.3 Soil Gradation Results for Samples at Basins

Schnabel performed two full sieve and hydrometer tests on soil samples at 18 to 20 ft deep from Borings B-15 and B-16. The purpose of the gradation analyses was to classify the soil in general accordance with USDA soil texture classification. Soil from Boring B-15 classified as sandy loam, and soil from Boring B-16 loamy sand.

2.5 Ground Water

Water level readings obtained in the borings during and after completion are noted on the logs. We observed ground water during drilling in Borings B-15 and B-16 at depths of 22 to 28 ft, about El 51 to 57. Following removal of the augers, borings caved dry at depths of 2.1 to 19.5 ft. We did not obtain long-term water level readings as the borings were backfilled upon completion for safety.

Water observation wells were installed in Borings B-1 and B-16. Boring B-1 was dry three days after completion of the drilling. We recorded a ground water level in the B-16 well at a depth of 25 ft, El 54, three days after completion of the drilling. 6' BELOW POND BOTTOM

The ground water levels on the logs show our estimate of the hydrostatic water table at the time the borings were drilled. Fluctuations in the hydrostatic water table should be anticipated depending on variations in precipitation, surface runoff, pumping, evaporation, leaking utilities, stream levels and similar factors.

3 GEOTECHNICAL RECOMMENDATIONS

3.1 Discussion

Our geotechnical engineering analysis was based on the information developed from our subsurface exploration and soil laboratory testing along with the project development plans, site plans and structural loading furnished to our office. Shallow spread footings are recommended for support of the proposed building based on our analysis. Detailed recommendations are provided in the following sections of the report.

3.2 Earthwork and Grading

3.2.1 Subgrade Preparation

The proposed finished floor grade is at El 95. Based on this finished floor grade, the site will be cut on the west side of the building, and filled for the central and east side of the building.

Subgrades to receive compacted structural fill for building or pavement support should be stripped of vegetation, topsoil and organic matter. Our subsurface exploration indicated topsoil to an average depth of about 0.4 ft below the ground surface. However, stripping of wooded or previously cultivated sites typically results in some disturbance and contamination of near-surface soils, particularly during periods of wet weather. Accordingly, we recommend a topsoil stripping depth of 0.6 ft be considered for the site during the project planning.

Some loose density natural sands were encountered to a depth of about 8 ft below the ground surface. These near-surface soils are not considered suitable for direct support of the proposed structure. We recommend compacting the subgrade in all fill areas with a heavy vibratory roller. In cut areas, most of these loose density soils are above design subgrade elevation, and will likely be excavated during grading activities.

Before any undercutting below design subgrade level, the stripped subgrades should be proofrolled with a loaded dump truck to evaluate their suitability to support the compacted structural fill. Areas that exhibit excessive pumping, weaving, or rutting should be undercut and replaced with additional compacted structural fill. Final pavement subgrades should also be proofrolled to evaluate their suitability to support the pavement. The Geotechnical Engineer should evaluate the suitability of the actual fill

subgrades in the field. Evaluation techniques may include probing with a penetrometer and observation of proofrolling or a combination of these methods.

The soft or loose near-surface soils could possibly be recompacted if earthwork is performed in the drier, warmer summer months. However, some scarifying and drying may be needed to compact these soils.

If stripping and earthwork operations are performed during an extended period of warm, dry weather, the non-organic portions of the undercut materials could possibly be reused as compacted structural fill. The use of these materials as compacted structural fill will depend on the soil moisture content, and the Contractor's ability to limit contamination of these materials with organic matter during stripping and undercutting.

Undercut volumes should be evaluated by cross sectioning. Other methods of calculating volumes of undercut, such as counting trucks, are less accurate and generally result in additional expense.

3.2.2 Compacted Structural Fill

Compacted structural fill should consist of material classifying CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D-2487. Most, non-organic, on-site soils are expected to meet this criterion. If off-site borrow soils are needed, they should classify SC, SM, SP, SW, GC, GM, GP or GW per ASTM D-2487.

Successful reuse of the excavated, on-site soils as compacted structural fill will depend on the natural moisture content of soils encountered during excavation. Natural moisture content values of Strata B and C soils tested in our laboratory varied from about 7.6 to 24.5. These values correspond to 7 percent below to about 12 percent above optimum for the soil types tested. Accordingly, we anticipate that scarifying and drying of portions of the on-site soils will be needed before the recommended compaction can be achieved. Drying of these soils will likely result in some delay, and drying may not be possible during late fall, winter and early spring. Accordingly, we recommend that the earthwork be performed during the warmer, drier times of the year from about May to October.

Compacted structural fill should be placed in maximum 8-inch thick horizontal, loose lifts and should be compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor. Compacted structural fill subgrades steeper than 4H:1V should be benched to allow placement of horizontal lifts.

Compacted structural fill should extend laterally at least 5 ft beyond the building and pavement limits, and then slope as needed to meet existing grades. Compacted structural fill slopes should not be designed and built steeper than 3H:1V.

3.3 Foundations

3.3.1 Spread Footings

Shallow spread footings are considered suitable for support of the proposed structure. Footings should be supported on suitable natural soils of Strata B and C, and on compacted structural fill as described in Section 3.2.2 overlying suitable natural soils of Strata B and C. Footings may be designed for a net allowable soil bearing pressure of 2,000 psf. This bearing pressure provides a factor of safety of at least 3.0 against general shear failure. Minimum widths of 16 and 24 inches should be maintained for wall and column footings, respectively, for shear considerations.

Interior footing grades may be set at nominal depths below the floor slab. The laboratory testing performed on selected samples of Strata B and C indicate that the low plasticity soils of this stratum exhibit a low potential for moisture-related volume change. Accordingly, we recommend perimeter footings be set a minimum depth of 2 ft below final exterior grade. This depth is also considered adequate for frost protection.

Settlements of shallow foundations supported on suitable natural soils and on properly placed compacted structural fill are not expected to exceed about 1 inch. Differential settlements between similarly loaded footings are not expected to exceed about half this value.

Footing concrete should be placed as soon as possible after excavation to limit the potential for moisture changes at foundation levels. Similarly, foundation walls should be backfilled as soon as possible to reduce the potential for infiltration of water into the soils beneath the footings. Backfill should be placed as compacted structural fill.

Final grades should allow positive drainage away from the structure, so that water does not accumulate around the foundation. In addition, gutters and downspouts should be provided to collect and convey roof water well away from the building. Trees should be removed from and should not be planted within 25 ft of the building.

3.3.2 Seismic Site Class and Site Coefficients

We have evaluated the Seismic Site Class for this project according to IBC Section 1615 (2000). Based on the available soil and ground water data on the site, the seismic site class according to IBC Section 1615 (2000) may be either Site Class E or F. To evaluate the site class, Schnabel can perform a liquefaction analyses based on site borings and available geologic information. If the analyses show that the site is liquefiable, we would recommend additional exploration. If the analyses show that the site does not have liquefaction potential, we would recommend Site Class E. If no liquefaction analysis and/or deeper borings are performed, we recommend Site Class F.

3.4 Floor Slabs

Floor slabs may be supported on suitable natural soils or on compacted structural fill as described in Section 3.2.2. Floor slabs may be designed using a modulus of subgrade reaction, k, of 125 pci. Floor slab subgrades should be recompacted immediately before placing moisture barrier materials to repair any disturbance that may occur due to construction operations. Footing and utility excavations should be backfilled with compacted structural fill since floors will be slab on grade. Compaction requirements are the same as described in Section 3.2.2 for compacted structural fill.

A 4-inch crushed stone or washed gravel capillary moisture barrier should underlie floor slabs on grade. Moisture barrier material should consist of VDOT No. 57 crushed stone and should be compacted in place by at least two passes with suitable vibratory compaction equipment.

3.5 Walls Below Grade

3.5.1 Retaining Walls

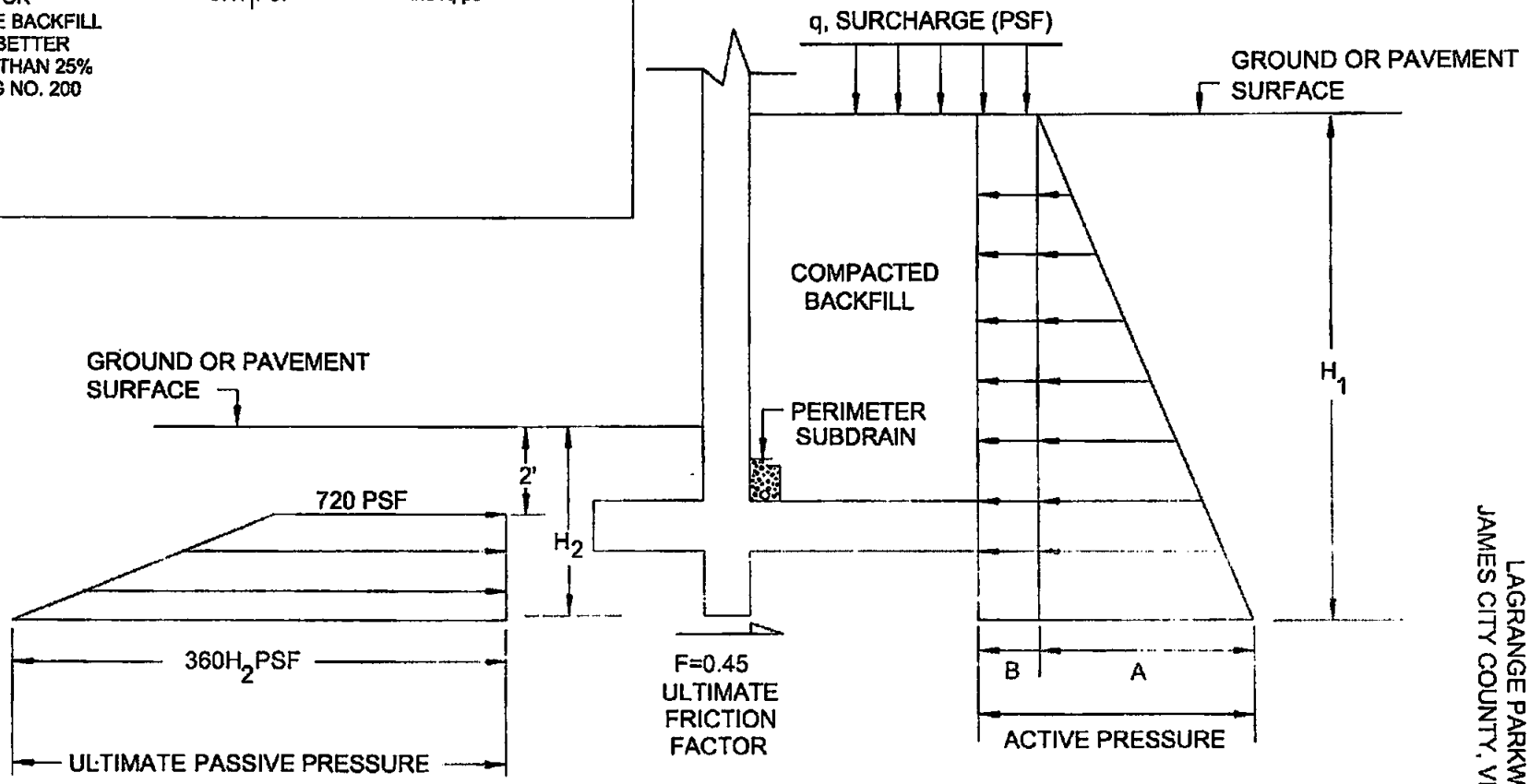
Cantilever retaining walls should be designed for the equivalent active fluid pressure distribution (with the maximum earth pressure at the base of the wall) as shown in Figure 1. Where applicable, surcharge loads should be considered by using a rectangular earth pressure distribution. The surcharge pressure ordinate should be obtained by multiplying the surface surcharge pressure, q, by the factor indicated in Figure 1.

Cantilever retaining walls may be designed to resist sliding based on an ultimate frictional resistance factor, f, between the concrete footing and the soil of Strata B or C. The ultimate passive resistance shown in Figure 1 may also be developed along the face of the footing and a key beneath the wall footing. Passive resistance should not be

EARTH PRESSURE RECOMMENDATIONS FOR CANTILEVER RETAINING WALLS

NOT TO SCALE

COMPACTED BACKFILL	EQUIVALENT ACTIVE FLUID PRESSURE(A)	SURCHARGE FACTOR (B)
ON SITE OR OFF SITE BACKFILL (SM OR BETTER W/LESS THAN 25% PASSING NO. 200 SIEVE)	$37H_1$PSF	0.31q psf



NOTE: A FACTOR OF SAFETY OF 2.0 SHOULD BE USED FOR SLIDING AND OVERTURNING RESISTANCE

WYTHE WILL DISTRIBUTING
LAGRANGE PARKWAY
JAMES CITY COUNTY, VIRGINIA

FIGURE 1

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considered to act against the front face of the wall footing above a depth of 2 ft due to frost considerations. A factor of safety of 2.0 should be used for sliding and overturning resistance. Hydrostatic pressure is not considered since subdrainage is recommended behind the walls.

Foundations for retaining walls should be designed according to the recommendations presented in Section 3.2. Retaining walls should be backfilled as recommended in Section 3.5.4.

3.5.2 Loading Dock Walls

The proposed loading dock walls were considered braced. Loading dock walls should be designed for the equivalent fluid pressure distribution having the maximum earth pressure distribution at the base of the wall as shown in Figure 2. Surcharge loads from the surface should be considered by using a rectangular earth pressure distribution. The surcharge pressure ordinate should be obtained by multiplying the surface surcharge pressure, q, by the appropriate factor indicated in Figure 2. Hydrostatic pressure is not considered since subdrainage is recommended behind the walls. Loading dock walls should be backfilled as recommended in Section 3.5.4.

3.5.3 Wall Subdrainage

Subdrainage should be provided behind below grade walls. Subdrainage should consist of a perimeter subdrain with free draining backfill. Recommended subdrainage details are included in Figure 1.

Subdrains should be located on top of the wall footing, next to the wall. Subdrains should consist of 4-inch slotted, corrugated polyethylene tubing per ASTM F-405 surrounded by at least 6 inches of VDOT No. 78 aggregate. The aggregate should be wrapped in drainage geotextile consisting of Mirafi 140N or equivalent. Subdrain details are included on Figure 1. Subdrains should be daylighted or outlet to a convenient sump or storm sewer.

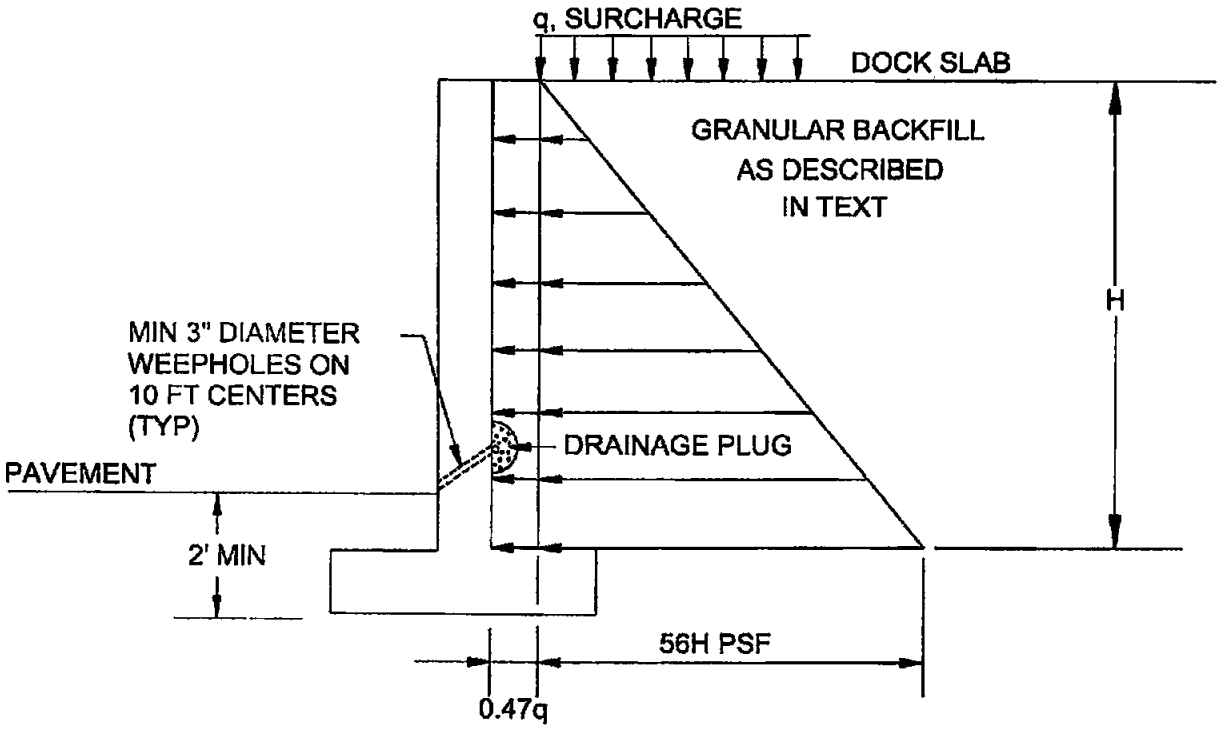
As an alternative to subdrains weepholes can be used as subdrainage. Weepholes should be provided at the base of the wall, on 10 ft centers. The weepholes should consist of 2-inch diameter holes in the walls. A filter consisting of 1 cubic foot of VDOT No. 78 aggregate wrapped in a drainage geotextile such as Mirafi 140N should be placed behind the weepholes.

FIGURE 2

WYTHE WILL DISTRIBUTING
LAGRANGE PARKWAY
JAMES CITY COUNTY, VIRGINIA

EARTH PRESSURE RECOMMENDATIONS FOR LOADING DOCK WALLS

NOT TO SCALE



NOTE: PLUG WEEPHOLE WITH 1 CUBIC FOOT OF CRUSHED STONE WRAPPED WITH DRAINAGE GEOTEXTILE

3.5.4 Wall Backfill

Site retaining walls and loading dock walls should be backfilled with non-plastic material classifying SM, SP-SM, SW-SM, SP, SW, GW-GM, GP-GM, GP or GW according to ASTM D-2487 with less than 25% passing a No. 200 sieve. This classification includes open-graded crushed stone, such as VDOT No. 78 or 57. The wall backfill should be placed in maximum 8-inch thick loose lifts. The wall backfill should be compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor or to 70 percent Relative Density per ASTM D-4253 and D-4254. Crushed stone backfill should be placed in maximum 12-inch thick lifts and compacted using suitable vibratory equipment.

Only light hand-operated equipment should be used to compact backfill against walls. The Structural Engineer of Record should approve the size of the compaction equipment.

3.6 Storm Water Basin

As discussed in the laboratory results section of this report, Schnabel performed two gradation tests, including hydrometer tests, on soil samples from Borings B-15 and B-16. The purpose of the testing was to classify the soil by the USDA classification for estimating the infiltration rate of the soil. The bottom of the basin is to be at EL 60, which corresponds to a cut of about 19 ft.

Schnabel testing samples at a depth of 18 to 20 in both borings. These material classified as a sandy loam and a loamy sand, in Boring B-15 and B-16, respectively. At the time of our exploration, groundwater was measured on the Boring B-16 well about 6 ft below EL 60. Based on the tests and the groundwater level, it appears that the basin may be designed as an infiltration basin. It is important to note that the subsurface conditions in the basin did vary significantly, as discussed below.

Table 1 presents infiltration rates for soils in borings B-15 and B-16. Note that many of the classifications are based on visual classifications.

SUPPORTS USING $f_d = 0.5f$ IN Pg 19 n $FS = 2$

Table 1: Infiltration Data

Boring Sample / Elevation (ft)	ASTM Soil Class	USDA Soil Class	Infiltration Rate (2) (inches/hour)
B-15 / 71-69	SC	Sandy Loam	1.02
B-15 / 66-64	SC	Loamy Sand	2.41
B-15 / 61-59	SC	Sandy Loam (1)	1.02
B-15 / 56-54	SP-SM	Loamy Sand	2.41
B-16 / 71-69	SC	Sandy Loam	1.02
B-16 / 66-64	CL	Clay Loam	0.09
B-16 / 61-59	SM	Loamy Sand (1)	2.41
B-16 / 56-54	SM	Loamy Sand	2.41

Notes: 1. Classification based on sieve and hydrometer tests. The remaining classifications are visual.

2. Infiltration rates are from the Virginia Stormwater Handbook (1999), Section 3.10, Infiltration Practices.

AVG. 1.59 in/HR
LOW 0.09
MEDIAN 1.02"/HR

NO RECOMMENDATIONS GIVEN FOR INFIL RATE.

Based on the varying material near El 60, it is possible that in other areas of the basin unsuitable material may be encountered at El 60. We understand that if unsuitable material is encountered, it is feasible to undercut unsuitable material and replace it with suitable fill. Therefore, it may be prudent that the excavated material that is classified visually as suitable for an infiltration basin, be stockpiled on site for use at the bottom of the basin. If there is a need for undercut, the stockpiles material may be tested and used at the bottom of the basin. If there is no need for undercut at the bottom of the basin, the material can then be used for structural fill under the building.

We recommend that the seasonal high ground water level be considered at EL 56. If undercut is necessary due to unsuitable natural soils, dewatering may be required during construction.

Schnabel may perform additional soil testing, field borings, or infiltration/permeability tests, at your request, as additional work.

3.7 Pavements

Pavement subgrades should be prepared as discussed in Section 3.2.1. Compacted structural fill for pavement support should be placed and compacted as described in Section 3.2.2. Dense-graded aggregate placed as pavement base course should be

compacted to at least 95 percent of maximum dry density per ASTM D-698, Standard Proctor. Dense-graded aggregate should be placed in maximum 8-inch thick loose lifts.

The recommended pavement sections were designed according to the VDOT Vaswani design method for flexible pavements based on a design CBR value of 10. This design CBR value represents two-thirds a CBR of 15. The average CBR from the laboratory tests appears high for these soils. Therefore, we reduced the average to 15. A resiliency factor of 2.5 was also used in this design method. The traffic volumes considered in our analysis were 29 trucks per day and 145 cars per day. Our analysis considers proper grading to provide runoff from the pavement surface and beyond the limits of paved areas will be provided. The following pavement sections are recommended:

Automobile Parking Areas - Type I Section

Asphalt Concrete Surface Course, VDOT SM-9.5A	= 2.0 inches
Dense-Graded Aggregate Base Course, VDOT 21B	= 6.0 inches

Driveways and Service Roadways - Type II Section

Asphalt Concrete Surface Course, VDOT SM-9.5A	= 1.5 inches
Asphalt Concrete Base Course, VDOT BM-25.0	= 3.0 inches
Dense-Graded Aggregate Subbase Course, VDOT 21B	= 6.0 inches

The Type I Section should be used only in automobile parking areas. The Type II Section should be used where truck traffic or high traffic volumes are anticipated.

We recommend that reinforced concrete pavement be used in dumpster pad and dumpster approach pad areas. These pads may be designed based on a modulus of subgrade reaction value, k, of 200 pci.

Adequate control of surface drainage will be a very important consideration for the overall development related to the pavement design. The area surrounding pavements should be graded to direct surface water away from paved areas. Utility excavations within pavement areas should be backfilled with compacted structural fill.

4 CONSTRUCTION CONSIDERATIONS

4.1 Earthwork

The on-site soils are susceptible to moisture changes, will be easily disturbed and difficult to compact under wet weather conditions. Drying and reworking of the soils are likely to be difficult during wetter winter months. We recommend that the earthwork phases of this project be performed during the warmer, drier times of the year to limit the potential for disturbance of on-site soils.

Traffic on stripped or undercut subgrades should be limited to reduce disturbance of underlying soils. Also, using lightweight, track-mounted dozer equipment for stripping will limit the disturbance of underlying soils, and may reduce the undercut volume needed. The Contractor should be responsible for reworking of subgrades and compacted structural fill that were initially considered suitable but were later disturbed by equipment and/or weather.

Site drainage should be provided to maintain subgrades free of water and to avoid saturation and disturbance of the subgrade soils before placing compacted structural fill, pavement base course or moisture barrier material. This will be important during all phases of the construction work. Weakened subgrade soils should be recompacted, or removed and replaced as recommended by the Geotechnical Engineer.

Subgrades and the upper portions of compacted structural fills below floor slabs, pavements or other soil-supported structures can be easily disturbed due to weather conditions and construction operations. Accordingly, disturbed areas should be recompacted before placing additional fill, moisture barrier or base course materials.

4.2 Spread Footings

Care should be exercised during excavation for spread footings so that as little disturbance as possible occurs at the foundation level. Loose or soft soils should be carefully cleaned from the bottom of the excavation before placing concrete. Actual footing subgrades should be observed during construction by the Geotechnical Engineer to evaluate whether subgrade soils are as recommended in this report.

Footing subgrades needing undercut may be concreted at the elevation of undercut or backfilled to the original design subgrade elevation with an open-graded crushed stone

such as VDOT No. 57 aggregate. Crushed stone should extend at least 12 inches laterally beyond the footing in all directions. Concreting should take place the same day as excavation of footings.

The potential for variation of moisture content in foundation soils is probably greatest during construction. If the moisture content of foundation soils is either increased or decreased during construction, a moisture-related change in volume will likely occur as these soils return to their natural moisture content. Therefore, prompt placement of concrete, backfilling and grading will be very important for proper foundation performance.

4.3 Engineering Services During Construction

The engineering recommendations provided in this report are based on the information obtained from the subsurface exploration and laboratory testing. However, conditions on the site may vary between the discrete locations observed at the time of our subsurface exploration. The nature and extent of variations between borings may not become evident until during construction.

To account for this variability, professional observation, monitoring and testing of actual subsurface conditions during construction should be provided as an extension of our engineering services. These services will also help in evaluating the Contractor's conformance with the plans and specifications. Because of our unique position to understand the intent of the geotechnical engineering recommendations, retaining us for these services will allow us to provide consistent service through the project construction.

4.4 General Specification Recommendations

An allowance should be established to account for possible additional costs that may be required to construct earthwork and foundations as recommended in this report. Additional costs may be incurred for various reasons including variation of soil between borings, greater than anticipated unsuitable soils, need for borrow fill material, wet on-site soils, obstructions, temporary dewatering, etc.

We recommend that the construction contract include an allowance for undercutting soft or loose, near-surface soils and replacement with compacted structural fill. Add/deduct unit prices should also be established in the contract so adjustments for the actual volume of undercut can be made.

The project specifications should indicate the Contractor's responsibility for providing adequate site drainage during construction. Inadequate drainage will most likely lead to disturbance of soils by construction traffic and increased volume of undercut.

This report may be made available to prospective bidders for informational purposes. We recommend that the project specifications contain the following statement:

> "A geotechnical engineering report has been prepared for this project by Schnabel Engineering South, LLC. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed represent the Geotechnical Engineer's interpretation of the subsurface conditions, tests, and the results of analyses conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, before bidding, independent exploration, tests and analyses. This report may be examined by bidders at the office of the Owner or copies may be obtained from the Owner at nominal charge."

Boring data included in Appendix A should be included in the contract documents.

5 LIMITATIONS

The analyses and recommendations submitted in this report are based on the information revealed by our exploration. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project. Our recommendations are based on information on the site and proposed construction as described in Section 1. Substantial changes in loads, locations or grades should be brought to our attention so we can modify our recommendations as needed. We would appreciate an opportunity to review the plans and specifications as they pertain to the recommendations contained in this report and to submit our comments to you based on this review.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, or any other instrument of service.

Appendix A

SUBSURFACE EXPLORATION DATA

Subsurface Exploration Procedures
General Notes for Subsurface Exploration Logs
Identification of Soil
Boring Logs, B-1 through B-16
Location Plan, Figure A1

SUBSURFACE EXPLORATION PROCEDURES

Boring Procedures

Drillers advanced the borings using hollow-stem augers. A plug device was used to block off the center opening in the hollow-stem auger to prevent cuttings from entering the augers during drilling. At the designated depth, drillers removed the plug and performed the Standard Penetration Test. Water or drilling fluid was not introduced into the boring using this procedure, unless indicated on individual logs. Water level data are indicated on the logs.

Standard Penetration Test Results

The numbers in the Sampling Data column of the boring logs represent Standard Penetration Test (SPT) results. Each number represents the blows needed to drive a 2-inch O.D., 1-3/8 inch I.D. split-spoon sampler 6 inches, using a 140-pound hammer falling 30 inches. The sampler is typically driven a total of 18 or 24 inches. The first 6 inches are considered a seating interval. The total of the number of blows for the second and third 6-inch intervals is the SPT "N value". The Standard Penetration Test is conducted according to ASTM D-1586.

Soil Classification Criteria

The group symbols on the logs represent the Unified Soil Classification System Group Symbols (ASTM D-2487) based on visual observation and limited laboratory testing of the samples. Criteria for visual identification of soil samples are included in this appendix. Some variation may be expected between samples visually classified and samples classified in the laboratory.

Pocket Penetrometer Results

The values following "PP=" in the sampling data column of the logs represent pocket penetrometer readings. Pocket penetrometer readings provide an estimate of the unconfined compressive strength of fine-grained soils.

Water Observation Wells

Temporary water observation wells were installed in Borings B-1 and B-16 by inserting a hand-slotted, 1¼-inch PVC pipe in each of these borings. Each pipe was capped and the area surrounding the pipe was backfilled with cuttings from the boring.

Boring Locations and Elevations

Our personnel staked the borings by taping from nearby site features, such as the roads and the existing building just west of the site. Approximate boring locations are shown on Figure A1. Ground surface elevations at the boring locations were scaled from the site plan provided by Landmark Design Group on October 9, 2003. These locations and elevations should be considered no more accurate than the methods and plans used to obtain them.

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GENERAL NOTES FOR SUBSURFACE EXPLORATION LOGS

1. Numbers in sampling data column next to Standard Penetration Test (SPT) symbols indicate blows required to drive a 2 inch O.D., 1-3/8 inch I.D. sampling spoon 6 inches using a 140 pound hammer falling 30 inches. The Standard Penetration Test (SPT) N value is the number of blows required to drive the sampler 12 inches, after a 6 inch seating interval. The Standard Penetration Test is performed in accordance with ASTM-1586.

2. Visual classification of soil is in accordance with terminology set forth in "Identification of Soil." The ASTM D-2487 group symbols (e.g. CL) shown in the classification column are based on visual observations.

3. Estimated ground water levels indicated by ▼; these levels are only estimates from available data and may vary with precipitation, porosity of the soil, site topography, etc.

4. Refusal at the surface of rock, boulder, or obstruction is defined as an SPT resistance of 100 blows for 2 inches or less of penetration.

5. The logs and related information depict subsurface conditions only at the specific locations and at the particular time when drilled or excavated. Soil conditions at other locations may differ from conditions occurring at these locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at the test boring, test pit and/or hand auger locations.

6. The stratification lines represent the approximate boundary between soil and rock types as obtained from the subsurface exploration. Some variation may also be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on these logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.

7. Key to symbols and abbreviations:

⧗	5+10+1	- Standard Penetration Test
▥	24/18	- Length Pushed/Recovery (in inches)
	3T	- 2" or 3" Undisturbed Tube Sample
		Rock Core Sample
T	NX	- Core Diameter Size
	REC	- Recovery %
	RQD	- RQD%
	W	- Water Content
	do	- Ditto
	WOW	- Water Observation Well
	PP	- Pocket Penetrometer Reading (tsf)
	FID	- Flame Ionization Detector Reading (ppm)
	PID	- Photoionization Detector Reading (ppm)
	GP	- Geostick Penetration Reading (inches)
	LL	- Liquid Limit
	PL	- Plastic Limit
	TPH	- Total Petroleum Hydrocarbons

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Consulting Geotechnical Engineers
IDENTIFICATION OF SOILS

I. DEFINITION OF SOIL GROUP NAMES (ASTM D-2487-83)

			SYMBOL	GROUP NAME
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels – More than 50% of coarse fraction retained on No. 4 sieve Coarse, ¾" to 3" Fine, No. 4 to ¾"	Clean Gravels Less than 5% fines	GW	Well graded gravel
			GP	Poorly graded gravel
		Gravels with fines More than 12% fines	GM	Silty gravel
			GC	Clayey gravel
	Sands – 50% or more of coarse Fraction passes No. 4 sieve Coarse, No. 40 to No. 4 Medium, No. 40 to No. 10 Fine, No. 200 to No. 40	Clean Sands Less than 5% fines	SW	Well-graded sand
			SP	Poorly graded sand
		Sands with fines More than 12% fines	SM	Silty sand
			SC	Clayey sand
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays – Liquid Limit less than 50 Low to medium plasticity	Inorganic	CL	Lean clay
			ML	Silt
		Organic	OL	Organic clay
				Organic silt
	Silts and Clays – Liquid Limit 50 or more Medium to high plasticity	Inorganic	CH	Fat clay
			MH	Elastic silt
		Organic	OH	Organic clay
				Organic silt
Highly Organic Soils	Primarily organic matter, dark in color and organic odor		PT	Peat

II. DEFINITION OF MINOR SOIL COMPONENT PROPORTIONS

			Examples
Adjective Form	Gravelly Sandy	30% or more coarse grained	Gravelly lean clay
"With"	With gravel With sand	15% or more coarse grained	Fat clay with gravel
	With silt With clay	5% to 12% fine grained	Poorly graded sand with silt
"Trace"	Trace gravel Trace sand	1% to 15% coarse grained	Silty sand, trace gravel
	Trace clay Trace silt	1% to 5% fine grained	Poorly graded sand, trace clay

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS ..... Unified Soil Classification Symbols are shown above as group symbols. Dual symbols are used for borderline classifications.

BOULDERS & COBBLES..... Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inch size.

DISINTEGRATED ROCK .... Residual rock materials with a standard penetration resistance (SPT) between 60 blows per foot and refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.

ROCK FRAGMENTS ..... Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.

QUARTZ ..... A hard silica mineral often found in residual soils.

IRONITE ..... Iron oxide deposited within a soil layer forming cemented deposits.

CEMENTED SAND..... Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other materials.

MICA ..... A soft plate of silica mineral found in many rocks, and in residual or transported soil derived therefrom.

ORGANIC MATERIALS ..... (Excluding Peat)
- Topsoil.....Surface soils that support plant life and which contain considerable amounts of organic matter;
- Organic Matter .....Soil containing organic colloids throughout its structure;
- Lignite .....Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).

FILL..... Man-made deposit containing soil, rock and often foreign matter.

PROBABLE FILL ..... Soils which contain no visually detected foreign matter but which are suspect with regard to origin.

LENSES..... 0 to ½ inch seam of minor soil component.

LAYERS .... ½ to 12 inch seam of minor soil component.

POCKET..... Discontinuous body of minor soil component.

COLOR SHADES..... Light to dark to indicate substantial difference in color.

MOISTURE CONDITIONS ..... Wet, moist or dry to indicate visual appearance of specimen.

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Schnabel Engineering South LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-1** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 104.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	4:50	Dry	---	---
Casing Pulled	10/17	5:05	---	---	---
W.O.W.	10/17	5:10	Dry	---	---
W.O.W.	10/20	4:25	Dry	---	---

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.1	Rootmat		103.9					
	Fine to medium silty sand, moist - yellow brown do, orange brown below 1 ft	SM		B		3+6+4+3 SPT 3+2+2+3 SPT 2+3+2+2 SPT		WINDSOR FORMATION
6.0	Fine to medium poorly graded sand with silt, moist - orange brown	SP-SM	98.0		5	2+2+2+2 SPT 4+3+5+5 SPT	W=24.5%	
9.2	Fine to medium clayey sand, moist - orange brown	SC	94.8		10			
12.0	Fine to medium poorly graded sand with silt, moist - orange brown	SP-SM	92.0	C1	15	5+7+6+7 SPT		SEDLEY FORMATION
					20	5+5+4+5 SPT	W=8.6%	
	do, fine to coarse				25	4+4+5+5 SPT		
25.0	Boring Terminated at 25.0 ft		79.0					

Comments:
1. 1" PVC Water Observation Well (W.O.W.) installed to 25.0 ft upon completion.

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-2** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 93.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	5:50	Dry	---	---
Casing Pulled	10/17	6:00	Dry	---	2.1'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.1	Rootmat		92.9					
	Fine to medium silty sand PROBABLE FILL, contains root fragments, moist - gray brown	FILL		A		3+4+4+2 SPT		FILL
2.0			91.0			2+2+2+2 SPT	W=14.1%	
	Fine to medium clayey sand, contains silty sand layers, moist - orange brown	SC		B				WINDSOR FORMATION
4.3			88.7			2+2+2+2 SPT		
	Fine to medium poorly graded sand, trace silt, moist - brown	SP			5			
6.0			87.0			4+4+4+5 SPT		
	Fine to medium clayey sand, moist - orange brown							
	do, orange brown and red brown	SC				5+8+8+11 SPT		
					10			SEDLEY FORMATION
				C1				
12.0			81.0					
	Fine to medium poorly graded sand with silt, contains silty sand layers, moist - orange brown and yellow brown	SP-SM				6+5+5+5 SPT		
15.0			78.0		15			
	Boring Terminated at 15.0 ft							

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/28/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-3** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 89.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	12:15	Dry	---	---
Casing Pulled	10/17	12:20	Dry	---	2.5'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.1	Rootmat and topsoil		88.9					
	Fine to medium silty sand, contains clayey sand layers, moist - yellow brown do, orange brown	SM				4+4+3+2 SPT 3+2+2+3 SPT		
3.2	Fine to medium poorly graded sand with silt, moist - yellow brown	SP-SM	85.8	B	5	4+3+2+3 SPT		WINDSOR FORMATION
5.5	Fine to medium clayey sand, moist - brown	SC	83.5			5+5+4+5 SPT		
8.0	Fine to medium silty sand, moist - orange brown	SM	81.0	C1	10	7+9+10+11 SPT 9+11+14+15 SPT		SEDLEY FORMATION
15.0	Boring Terminated at 15.0 ft		74.0		15			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P3131388.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South LLC

Schnabel Engineering South LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-4** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: M. New

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-550X (ATV)

SEA Representative: J. Pittman

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 94.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	—	—
Completion	10/17	3:41	Dry	—	—
Casing Pulled	10/17	3:47	Dry	—	9.8'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.5	Forest litter, rootmat and topsoil		93.5					
	Fine to medium poorly graded sand with silt, contains mica, moist - light brown	SP-SM		B		1+2+3+1 SPT		WINDSOR FORMATION
	do, brown					1+1+1+1 SPT		
					5	1+1+3+2 SPT		
						3+3+3+4 SPT		
7.0	Fine to medium clayey sand, contains mica, moist - brown	SC	87.0					
8.0	Fine to medium clayey sand, contains mica, moist - orange brown	SC	86.0	C1		6+11+37+26 SPT		SEDLEY FORMATION
					10			
11.0	Fine poorly graded sand with silt, moist - orange brown	SP-SM	83.0					
						7+9+23+19 SPT		
14.0	Fine to medium silty sand, contains mica, moist - red brown	SM	80.0					
15.0	Boring Terminated at 15.0 ft		79.0		15			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P3131368.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-5** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 88.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	12:45	Dry	---	---
Casing Pulled	10/17	12:50	Dry	---	3.3'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.1	Rootmat	FILL	87.9	A		3+5+7+7 SPT		FILL
0.6	Fine to coarse silty sand FILL, contains root fragments and organic matter, moist - brown		87.4					WINDSOR FORMATION
1.0	Topsoil	SM	87.0	B		5+4+4+3 SPT		
3.5	Fine to medium silty sand, contains root fragments, moist - yellow brown		84.5			3+5+5+4 SPT		
	do, orange brown	SC			5			
6.5	Fine to medium clayey sand, moist - orange brown		81.5			4+3+3+4 SPT		
	Fine to medium poorly graded sand with silt, moist - yellow brown	SP-SM		C1	10	6+5+10+6 SPT		SEDLEY FORMATION
12.0	Fine to medium silty sand, moist - orange brown	SM	76.0			3+4+5+5 SPT		
15.0	Boring Terminated at 15.0 ft		73.0		15			

TEST BORING LOG P3131368.GPJ SCHNABEL.GDT 10/24/03

Comments:
1. Boring backfilled upon completion.

Schnabel
Schnabel Engineering South, LLC

Schnabel Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-6** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: M. New

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-550X (ATV)

SEA Representative: J. Pittman

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 99.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	1:30	Dry	---	---
Casing Pulled	10/17	1:39	Dry	---	14.9'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Forest litter, rootmat and topsoil		98.6	A				
1.0	Fine to medium silty sand FILL, contains plastic fragments and organic matter, moist - brown and gray	FILL	98.0			4+7+10+10 SPT		FILL
	Fine to medium silty sand, contains mica, moist - orange and brown	SM				6+7+5+5 SPT		
4.0	Fine to medium poorly graded sand with silt, contains mica, moist - red brown and white		95.0	B	5	3+3+2+3 SPT		WINDSOR FORMATION
	do, white and brown	SP-SM				2+3+3+4 SPT		
8.0	Fine to medium poorly graded sand with silt, moist - orange brown		91.0		10	5+6+8+12 SPT		
		SP-SM		C1	15	8+7+12+18 SPT		SEDLEY FORMATION
						7+10+12+24 SPT		
20.0	Boring Terminated at 20.0 ft		79.0		20			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P3131368.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-7** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: M. New

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-550X (ATV)

SEA Representative: J. Pittman

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 91.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	12:28	Dry	---	---
Casing Pulled	10/17	12:33	Dry	---	10.5'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Forest litter, rootmat and topsoil		90.6					
0.6	Fine poorly graded sand with silt, contains mica, moist - light brown	SP-SM/SC	90.4	B		1+5+7+5 SPT		WINDSOR FORMATION
2.0	Fine to medium clayey sand, contains mica, moist - red brown	SP-SM	89.0			3+4+6+5 SPT		
3.0	Fine to medium poorly graded sand with silt, contains mica, moist - orange brown		88.0					
	Fine to medium silty sand, contains mica, moist - orange brown	SM		C1	5	8+5+6+5 SPT 2+4+7+6 SPT		
8.0	Fine to medium poorly graded sand with silt, contains mica, moist - orange brown	SP-SM	83.0		10	4+6+7+8 SPT		SEDLEY FORMATION
11.0	Fine sandy lean clay, contains mica, moist - orange brown	CL	80.0	C2		2+4+7+10 SPT	PP=1.5tsf	
15.0	Boring Terminated at 15.0 ft		76.0		15			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P3131386.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-8** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: M. New

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: J. Pittman

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 84.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	—	—
Completion	10/17	11:30	Dry	—	---
Casing Pulled	10/17	11:43	Dry	—	19.5'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.5	Forest litter, rootmat and topsoil		83.5					
	Fine poorly graded sand with silt, contains mica, moist - brown	SP-SM		B	5	1+2+3+6 SPT 3+6+7+6 SPT 3+2+2+3 SPT		WINDSOR FORMATION
6.0	Fine to medium clayey sand, contains mica, moist - red brown	SC	78.0			3+2+2+1 SPT		
8.5	Lean clay, trace sand, contains mica and organic matter and root fragments, moist - orange and brown	CL	75.5	C2	10	2+3+4+7 SPT	PP=2.5tsf W=23.6%	
	do, fine to medium, sandy					3+8+12+12 SPT		
14.0	Fine to coarse clayey sand, trace gravel, contains mica, moist - red brown	SC	70.0	C1	15			SEDLEY FORMATION
	do, contains fat clay pockets				20	5+6+6+7 SPT		
21.0	Fine to coarse silty sand, trace gravel, contains mica, moist - light brown	SM	63.0			6+8+7+7 SPT		
25.0	Boring Terminated at 25.0 ft		59.0		25			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/29/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-9** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 105.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	–	Dry	---	---
Completion	10/17	5:20	Dry	---	---
Casing Pulled	10/17	5:25	Dry	---	1.8'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.1	Rootmat		104.9					
1.2	Fine to medium silty sand FILL, contains root fragments, moist - brown	FILL	103.8	A		10+9+6+7 SPT		FILL
2.3	Fine to medium clayey sand, moist - orange brown	SC	102.7			9+11+15+17 SPT		
4.5	Fine to medium silty sand, moist - orange brown	SM	100.5			6+8+11+16 SPT	W=17.7%	
	Fine to coarse clayey sand, moist - brown, red brown and gray	SC		C1	5			SEDLEY FORMATION
6.3	Fine to medium silty sand, moist - orange brown		98.7			6+7+10+8 SPT		
	do, contains clayey sand and poorly graded sand layers	SM				6+6+7+6 SPT		
10.0	Boring Terminated at 10.0 ft		95.0		10			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/28/03

Schnabel
Schnabel Engineering South LLC

Schnabel Engineering South LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-10** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: M. New

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-550X (ATV)

SEA Representative: J. Pittman

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 104.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	2:45	Dry	---	---
Casing Pulled	10/17	2:53	Dry	---	18.0'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.5	Rootmat and topsoil		103.5	B		2+7+9+10 SPT		WINDSOR FORMATION
2.0	Fine poorly graded sand with silt, contains mica, moist - brown	SP-SM	102.0			3+6+10+13 SPT	W=19.8%	
	Fine to medium clayey sand, contains mica, moist - red and brown	SC			5	4+9+13+14 SPT	PP=4.0tsf	
6.0	Fine to medium silty sand, contains mica, moist - red and brown		98.0			6+9+14+13 SPT		
	do, orange and brown	SM			10	4+8+9+11 SPT		
11.0	Fine to medium poorly graded sand with silt, contains mica, moist - orange and brown	SP-SM	93.0	C1	15	4+5+5+5 SPT		SEDLEY FORMATION
					20	3+4+6+7 SPT		
21.0	Fine to medium poorly graded sand, trace silt, contains mica, moist - white and brown	SP	83.0		25	4+6+19+19 SPT		
25.0	Boring Terminated at 25.0 ft		79.0					

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/29/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC — TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-11** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 94.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	4:00	Dry	---	---
Casing Pulled	10/17	4:10	Dry	---	2.9'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.7	Forest litter, rootmat and topsoil		93.3					
1.8	Fine to medium silty sand, contains root fragments, moist - yellow brown	SM	92.2					
	Fine to medium clayey sand, moist - brown	SC		B		1+2+2+2 SPT 3+3+3+3 SPT	W=10.3%	WINDSOR FORMATION
4.0	Fine to medium poorly graded sand with silt, moist - yellow brown	SP-SM	90.0		5	4+4+3+3 SPT		
6.0	Fine to medium clayey sand, contains silty sand layers, moist - orange brown	SC	88.0			6+5+4+6 SPT		
8.0	Fine to medium poorly graded sand with silt, moist - orange brown	SP-SM	86.0	C1	10 15	6+8+7+7 SPT 5+5+6+5 SPT		SEDLEY FORMATION
17.0	Fine sandy lean clay, moist - orange brown	CL	77.0	C2	20	3+3+3+5 SPT	PP=1.75tsf	
20.0	Boring Terminated at 20.0 ft		74.0					

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/28/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-12** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 82.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	–	Dry	—	—
Completion	10/17	2:55	Dry	—	—
Casing Pulled	10/17	3:00	Dry	—	2.6'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.7	Forest litter, rootmat and topsoil		81.3					
	Fine to medium poorly graded sand with silt, contains root fragments, moist - yellow brown	SP-SM				WOH+1+1+1 SPT		
2.5	Fine to medium silty sand, moist - brown	SM	79.5	B		1+2+1+2 SPT		WINDSOR FORMATION
5.2	Fine to medium clayey sand, moist - brown	SC	76.8		5	3+3+2+2 SPT		
7.0	do, fine sandy, brown and gray		75.0			3+3+5+5 SPT	PP=1.5tsf	
	Fine sandy lean clay, contains ironite, moist - orange brown	CL		C2		3+2+6+6 SPT	PP=2.25tsf	SEDLEY FORMATION
10.0	Boring Terminated at 10.0 ft		72.0		10			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P3131368.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-13** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 80.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	--	Dry	---	---
Completion	10/17	1:25	Dry	---	---
Casing Pulled	10/17	1:30	Dry	---	2.2'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.8	Forest litter, rootmat and topsoil		79.2					
	Fine to medium poorly graded sand with silt, moist - yellow brown	SP-SM		B		1+1+1+2 SPT		WINDSOR FORMATION
	do, brown below 2.5 ft					2+2+2+2 SPT		
					5	2+2+3+3 SPT		
6.0	Lean clay with sand, moist - brown	CL	74.0	C2		3+4+9+17 SPT	PP=1.5tsf	SEDLEY FORMATION
	do, fine sandy contains clayey sand lenses and layers, orange brown and red brown					4+6+8+8 SPT	PP=2.25tsf	
10.0	Boring Terminated at 10.0 ft		70.0		10			

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P3131366.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: **B-14** Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: S. Pond

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 92.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	–	Dry	---	---
Completion	10/17	6:05	Dry	---	---
Casing Pulled	10/17	6:10	Dry	---	---

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
1.7	Fine to coarse silty sand FILL, contains asphalt fragments, moist - brown	FILL	90.3	A		5+10+10 SPT		FILL
3.2	Fine to medium silty sand, moist - brown	SM	88.8	B1		9+5+4 SPT		WINDSOR FORMATION
5.0	Fine to medium poorly graded sand with silt, moist - brown	SP-SM	87.0		5	4+3+2+3 SPT		
	Boring Terminated at 5.0 ft							

Comments:
1. Boring backfilled upon completion.

TEST BORING LOG P313186.GPJ SCHNABEL.GDT 10/24/03

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC	TEST BORING LOG	Project: Wythe-Will Distributing LaGrange Parkway James City County, Virginia	Boring Number: B-15 Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc.
Richmond, Virginia

Boring Foreman: K. Dodson

Drilling Method: 2 1/4 I.D. Hollow Stem Auger

Drilling Equipment: CME-45C (Track Mounted ATV)

SEA Representative: J. Pittman

Dates Started: 10/17/03 **Finished:** 10/17/03

Location: See Location Plan, Figure A1

Ground Surface Elevation: 79.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	9:28	22.0'	—	—
Completion	10/17	9:38	26.5'	—	—
Casing Pulled	10/17	9:48	Dry	—	11.5'

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Forest litter, rootmat and topsoil		78.6					
	Fine silty sand, moist - brown	SM				2+2+5+4 SPT		
2.0	Fine to coarse poorly graded sand with silt, trace gravel, moist - brown		77.0			4+4+4+3 SPT	W=7.6%	
		SP-SM		B	5	4+1+2+1 SPT		WINDSOR FORMATION
	do, orange and brown					1+1+1+2 SPT		
8.0	Fine to medium clayey sand, contains mica, moist - orange and brown		71.0			2+3+2+6 SPT	W=11.5%	
					10			
		SC			15	6+8+10+6 SPT		
	Bottom Basin El 60.0							
				C1	20	1+2+4+5 SPT	W=22.3%	SEDLEY FORMATION
21.0	Fine to medium poorly graded sand with silt, contains mica, wet - brown		58.0					
EL 58						4+2+4+7 SPT	W=23.3%	
		SP-SM			25			
	do, yellow, orange and brown					2+2+1+2 SPT		
30.0	Boring Terminated at 30.0 ft		49.0		30			
EL 49								

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/28/03

Comments:
1. Boring backfilled upon completion.

Schnabel
Schnabel Engineering South, LLC

Schnabel Engineering South, LLC — TEST BORING LOG	Project: Wythe-Will Distributing, LaGrange Parkway, James City County, Virginia	Boring Number: B-16 Contract Number: 03131268 Sheet: 1 of 1

Boring Contractor: Fishburne Drilling, Inc. Richmond, Virginia
Boring Foreman: K. Dodson
Drilling Method: 2 1/4 I.D. Hollow Stem Auger
Drilling Equipment: CME-45C (Track Mounted ATV)
SEA Representative: S. Pond
Dates Started: 10/17/03 **Finished:** 10/17/03
Location: See Location Plan, Figure A1
Ground Surface Elevation: 79.0± (feet)

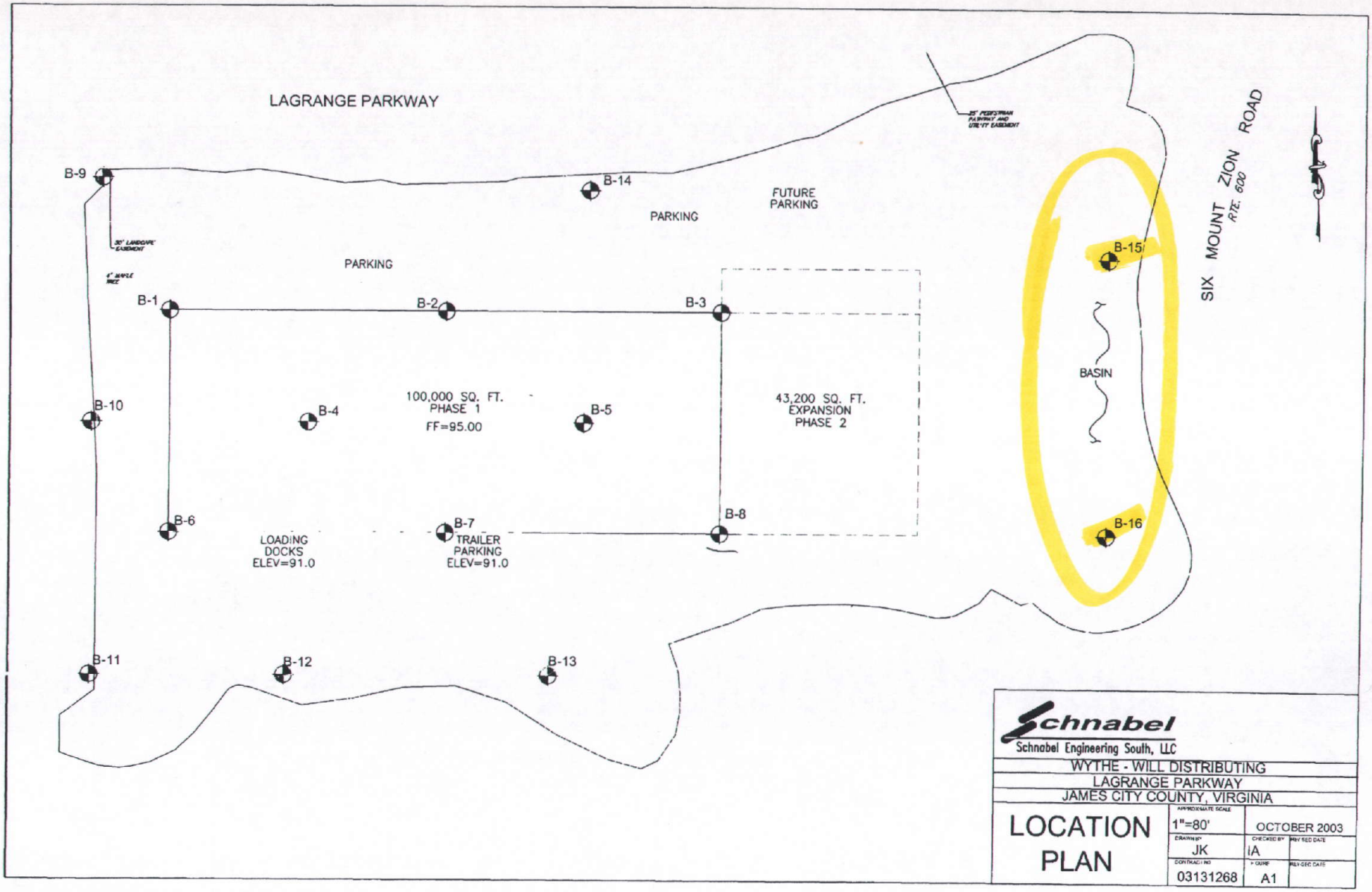
Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	10/17	11:05	23.0'	---	---
Completion	10/17	11:20	28.3'	---	---
Casing Pulled	10/17	11:35	---	---	---
W.O.W.	10/17	11:45	27.8'	---	---
W.O.W.	10/20	4:30	25.0'	---	---

DEPTH (ft)	STRATA DESCRIPTION	CLASS.	ELEV. (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Forest litter, rootmat and topsoil		78.6					
	Fine to medium silty sand, contains root fragments, moist - yellow brown					2+3+2+2 SPT		
	do, orange brown					2+2+2+2 SPT		
		SM		B		3+2+2+2 SPT		WINDSOR FORMATION
					5	4+7+10+10 SPT	W=21.1%	
7.0	Fine to coarse clayey sand, trace gravel, contains ironite, moist - orange brown		72.0					
	do, contains silty sand layers					8+11+11+7 SPT		
		SC		C1	10			
						5+3+2+2 SPT	PP=1.0tsf	
14.0	Fine to coarse sandy lean clay, contains ironite, moist - orange brown		65.0					
				C2	15			
17.0	Fine to medium silty sand, moist - orange brown		62.0					
						5+6+5+4 SPT	W=18.9%	SEDLEY FORMATION
					20			
	do, wet	SM		C1		3+1+1/12" SPT		
					25			
27.0	Fine to medium poorly graded sand with silt, wet - brown	SP-SM	52.0			1+1+1+2 SPT		
30.0	Boring Terminated at 30.0 ft		49.0		30			

Comments:
1. 1" PVC Water Observation Well (W.O.W.) installed to 28 ft upon completion.

TEST BORING LOG 03131268.GPJ SCHNABEL.GDT 10/29/03


LAGRANGE PARKWAY
SIX MOUNT ZION ROAD
RTE. 600
B-9
B-14
FUTURE PARKING
PARKING
PARKING
B-1
B-2
B-3
B-15
BASIN
B-10
B-4
100,000 SQ. FT.
PHASE 1
FF=95.00
B-5
43,200 SQ. FT.
EXPANSION
PHASE 2
B-6
B-7
B-8
B-16
LOADING
DOCKS
ELEV=91.0
TRAILER
PARKING
ELEV=91.0
B-11
B-12
B-13
Schnabel
Schnabel Engineering South, LLC
WYTHE - WILL DISTRIBUTING
LAGRANGE PARKWAY
JAMES CITY COUNTY, VIRGINIA
LOCATION PLAN
APPROXIMATE SCALE
1"=80'
OCTOBER 2003
DRAWN BY
JK
CHECKED BY
IA
REV SED DATE
CONTRACT NO
03131268
FIGURE
A1
REV SED DATE

Appendix B

SOIL LABORATORY TEST RESULTS

Summary of Soil Laboratory Tests (3)
Gradation Test Curve (2)
Moisture Density Relationship (2)

Appendix B
Contract 03131268

SUMMARY OF SOIL LABORATORY TESTS

BORING	B-1	B-2	B-8	B-9
DEPTH	18'-20'	2'-4'	8'-10'	0'-5'
SAMPLE TYPE	JAR	JAR	JAR	BULK
STRATUM	C1	B	C2	C1
SAMPLE DESCRIPTION	FINE TO MEDIUM POORLY GRADED SAND WITH SILT (SP-SM), BROWN	FINE TO COARSE CLAYEY SAND (SC), BROWN	LEAN CLAY (CH), TRACE SAND, BROWN AND RED BROWN	FINE TO COARSE CLAYEY SAND (SC) (A-6), TRACE GRAVEL, RED BROWN
NATURAL MOISTURE CONTENT (%)	8.6	14.1	23.6	16.6
NATURAL WET DENSITY (pcf)	--	--	--	--
LIQUID LIMIT	NP	28	48	39
PLASTIC LIMIT	NP	15	22	18
PLASTICITY INDEX	NP	13	26	21
GRADATION DATA				
(% FINER THAN SIEVE)				
¾"	100.0	--	--	100.0
NO. 4	100.0	--	--	99.8
NO. 40	97.2	93.5	99.4	93.9
NO. 200	9.5	35.9	82.2	40.5
MOISTURE DENSITY RELATION DATA (ASTM D-698)				
MAXIMUM DRY DENSITY (pcf)	--	--	--	113.9
OPTIMUM MOISTURE CONTENT (%)	--	--	--	14.1
CBR TEST DATA (VTM-8)				
BEFORE SOAK CBR	--	--	--	27.2
AFTER SOAK CBR	--	--	--	20.1
% SWELL	--	--	--	0.2
COMPACTED SAMPLE DRY DENSITY (pcf)	--	--	--	115.1
COMPACTED SAMPLE MOISTURE CONTENT (%)	--	--	--	13.1
REMARKS	SEE GRADATION CURVE			SEE GRADATION CURVE AND MOISTURE DENSITY RELATIONSHIP

NOTES: 1. Soil tests in accordance with applicable ASTM, AASHTO and VTM Standards

Appendix B
Contract 03131268

SUMMARY OF SOIL LABORATORY TESTS

BORING	B-10	B-15	B-15	B-16
DEPTH	2'-4'	18'-20'	23'-25'	0'-5'
SAMPLE TYPE	JAR	JAR	JAR	BULK
STRATUM	C1	C1	C1	B
SAMPLE DESCRIPTION	FINE TO COARSE CLAYEY SAND (SC), BROWN AND RED BROWN	FINE TO COARSE CLAYEY SAND (SC), BROWN (VISUAL CLASSIFICATION)	FINE TO MEDIUM POORLY GRADED SAND WITH SILT (SP-SM), BROWN	FINE TO COARSE CLAYEY SAND (SC) (A-2-6), TRACE GRAVEL, BROWN
NATURAL MOISTURE CONTENT (%)	19.8	22.3	23.3	12.6
NATURAL WET DENSITY (pcf)	--	--	--	--
LIQUID LIMIT	48	--	NP	37
PLASTIC LIMIT	20	--	NP	22
PLASTICITY INDEX	28	--	NP	15
GRADATION DATA				
(% FINER THAN SIEVE)				
¾"	--	100.0	--	100.0
NO. 4	--	100.0	--	99.1
NO. 40	--	89.8	98.7	73.7
NO. 200	40.8	24.7	11.3	33.3
MOISTURE DENSITY RELATION DATA (ASTM D-698)				
MAXIMUM DRY DENSITY (pcf)	--	--	--	119.5
OPTIMUM MOISTURE CONTENT (%)	--	--	--	12.4
CBR TEST DATA (VTM-8)				
BEFORE SOAK CBR	--	--	--	37.9
AFTER SOAK CBR	--	--	--	30.3
% SWELL	--	--	--	0.03
COMPACTED SAMPLE DRY DENSITY (pcf)	--	--	--	121.2
COMPACTED SAMPLE MOISTURE CONTENT (%)	--	--	--	11.1
REMARKS		SEE GRADATION CURVE		SEE GRADATION CURVE AND MOISTURE DENSITY RELATIONSHIP

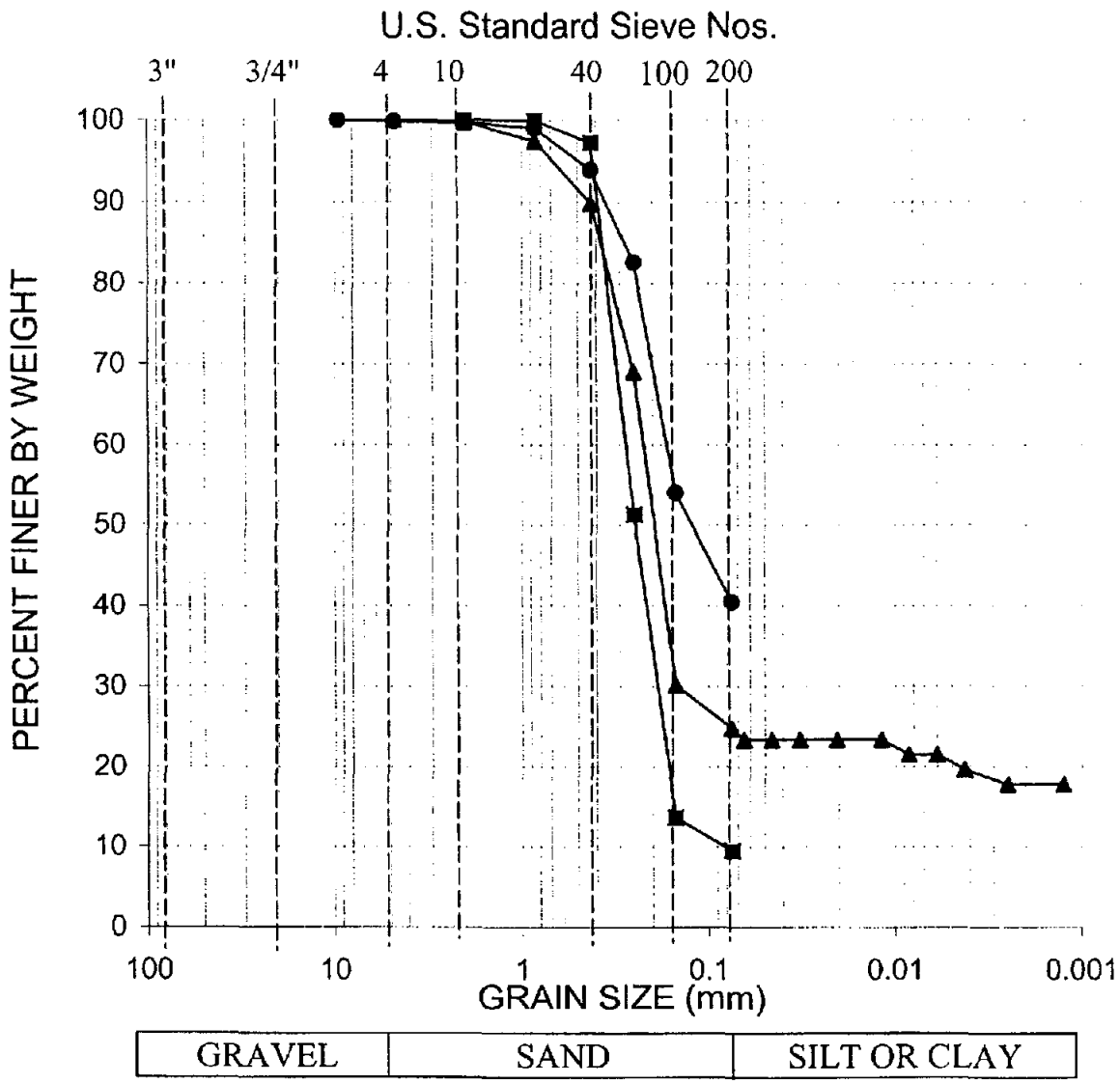
NOTES: 1. Soil tests in accordance with applicable ASTM, AASHTO and VTM Standards

Appendix B
Contract 03131268

SUMMARY OF SOIL LABORATORY TESTS

BORING	B-16	B-16	B-16	
DEPTH	6'-8'	18'-20'	23'-25'	
SAMPLE TYPE	JAR	JAR	JAR	
STRATUM	B/C1	C1	C1	
SAMPLE DESCRIPTION	FINE TO COARSE CLAYEY SAND (SC), CONTAINS ROCK FRAGMENTS, BROWN (VISUAL CLASSIFICATION)	FINE TO MEDIUM SILTY SAND (SM), BROWN	FINE TO MEDIUM SILTY SAND (SM), BROWN	
NATURAL MOISTURE CONTENT (%)	21.1	18.9	--	
NATURAL WET DENSITY (pcf)	--	--	--	
LIQUID LIMIT	--	NP	NP	
PLASTIC LIMIT	--	NP	NP	
PLASTICITY INDEX	--	NP	NP	
GRADATION DATA				
(% FINER THAN SIEVE)				
¾"	100.0	100.0	--	
NO. 4	98.8	100.0	--	
NO. 40	83.6	98.8	98.5	
NO. 200	37.0	16.7	16.3	
MOISTURE DENSITY RELATION DATA (ASTM D-698)				
MAXIMUM DRY DENSITY (pcf)	--	--	--	
OPTIMUM MOISTURE CONTENT (%)	--	--	--	
CBR TEST DATA (VTM-8)				
BEFORE SOAK CBR	--	--	--	
AFTER SOAK CBR	--	--	--	
% SWELL	--	--	--	
COMPACTED SAMPLE DRY DENSITY (pcf)	--	--	--	
COMPACTED SAMPLE MOISTURE CONTENT (%)	--	--	--	
REMARKS	SEE GRADATION CURVE	SEE GRADATION CURVE		

NOTES: 1. Soil tests in accordance with applicable ASTM, AASHTO and VTM Standards

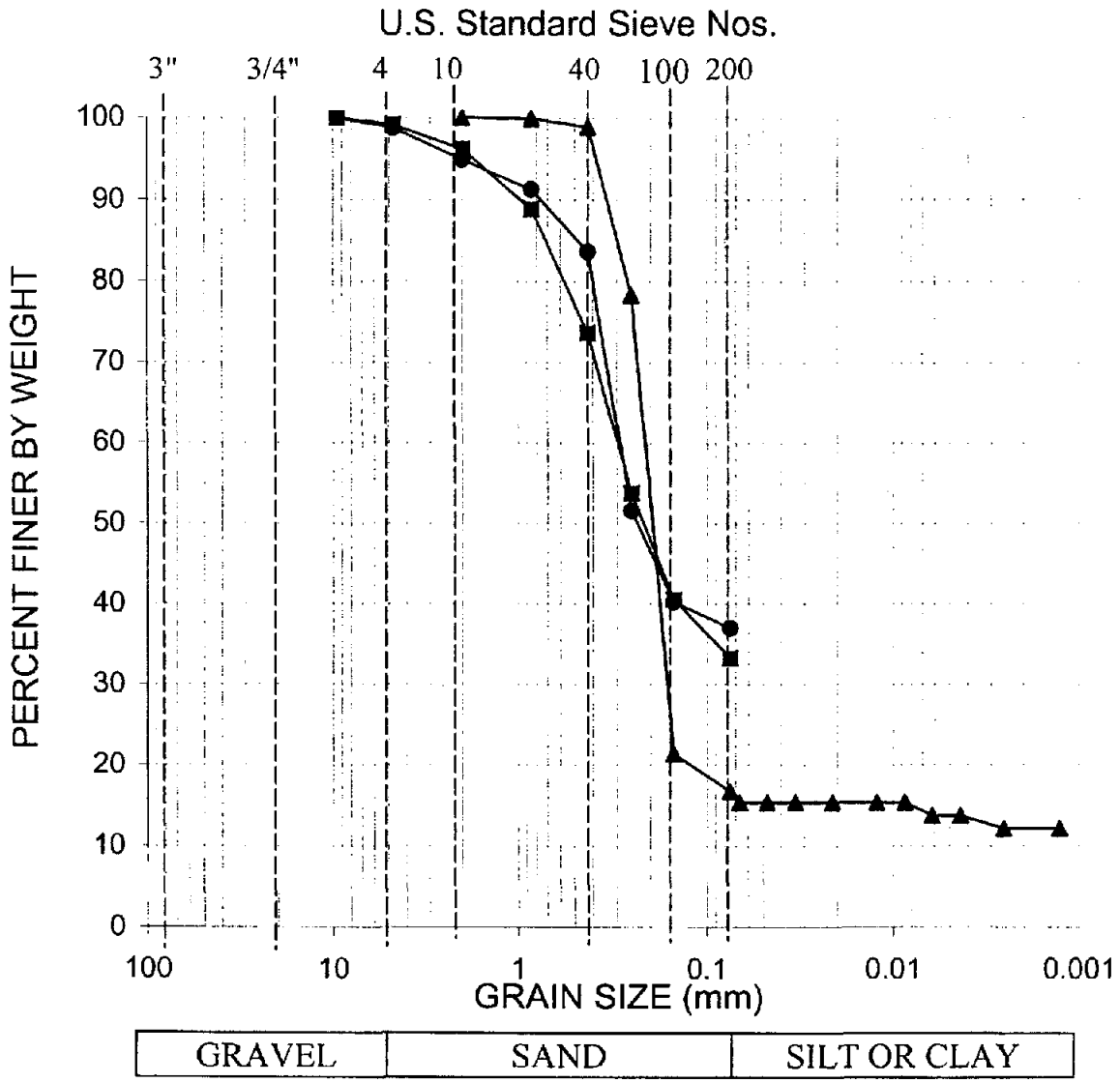


Key	Sample	Depth(ft.)	Sample Description	Class.	LL	PI
■	B-1	18'-20'	FINE TO MEDIUM POORLY GRADED SAND WITH SILT, BROWN	SP-SM	NP	NP
○	B-9	0'-5'	FINE TO COARSE CLAYEY SAND, TRACE GRAVEL, RED BROWN	SC, A-6	39	21
▲	B-15	18'-20'	FINE TO MEDIUM CLAYEY SAND, BROWN (VISUAL CLASSIFICATION)	SC	-	-

Schnabel
Schnabel Engineering
GRADATION CURVES

Project: Wythe Will Distributing, LaGrange Parkway, James City County, Virginia

Contract No. 03131268

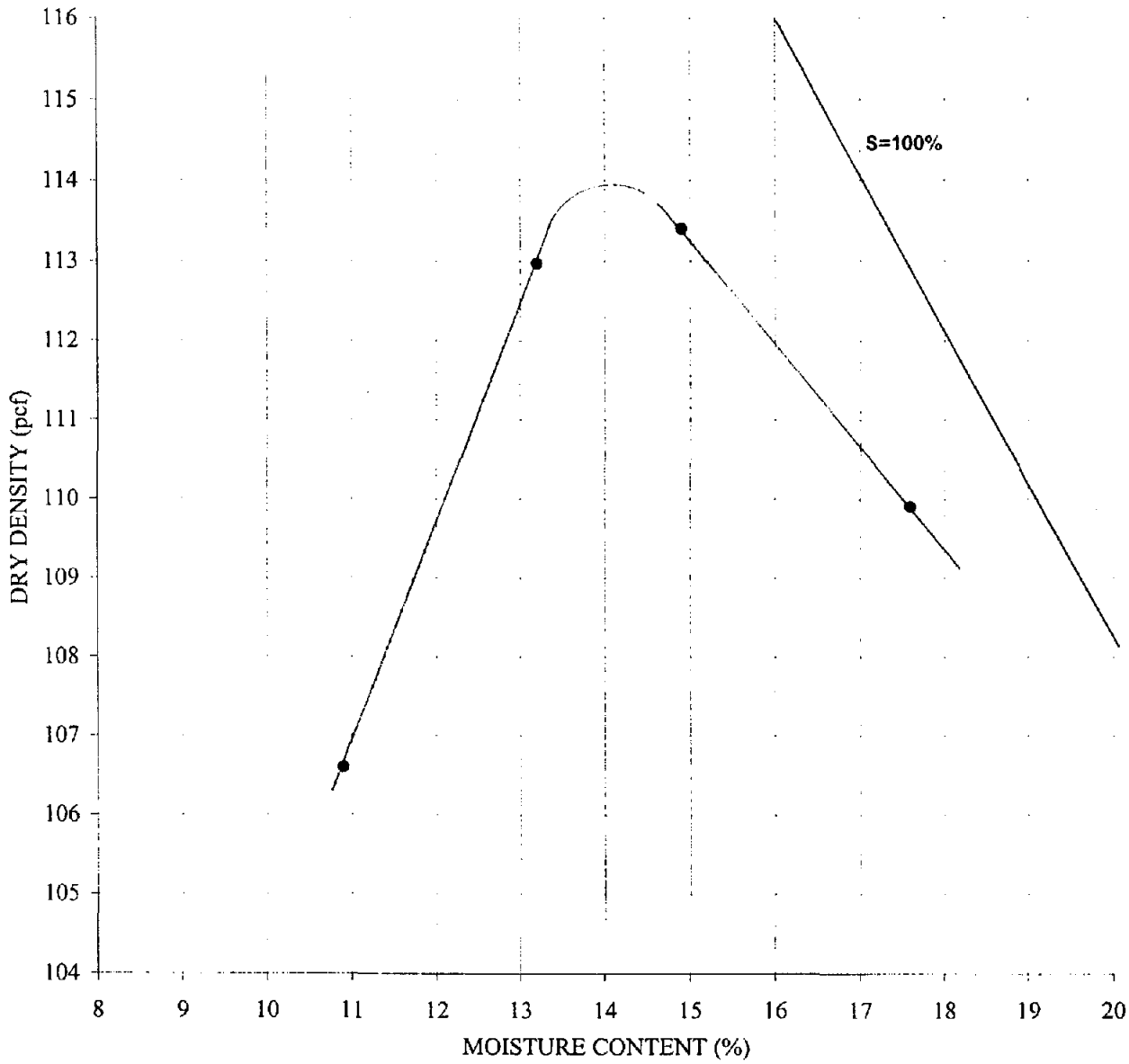


Key	Sample	Depth(ft.)	Sample Description	Class.	LL	PI
■	B-16	0'-5'	FINE TO COARSE CLAYEY SAND, TRACE GRAVEL, BROWN	SC, A-2-6	37	15
○	B-16	6'-8'	FINE TO COARSE CLAYEY SAND, CONTAINS ROCK FRAGMENTS, BROWN (VISUAL CLASSIFICATION)	SC	-	-
▲	B-16	18'-20'	FINE TO MEDIUM SILTY SAND, BROWN	SM	NP	NP

Schnabel
Schnabel Engineering
GRADATION CURVES

Project: Wythe Will Distributing, LaGrange Parkway, James City County, Virginia

Contract No. 03131268



Sample Description:

FINE TO COARSE CLAYEY SAND, TRACE GRAVEL, RED BROWN

Classification:	SC, A-6		
Sample Number:	B-9		
Sample Depth (Ft.):	0'-5'		
Sample Source:	ON-SITE	Assumed Specific Gravity:	2.65
		Liquid Limit (LL):	39
		Plasticity Index (PI):	21
% Passing 3/4" Sieve:	100.0	Max. Dry Density (pcf):	113.9
% Passing #200 Sieve:	40.5	Opt. Moist. Content (%):	14.1

Schnabel

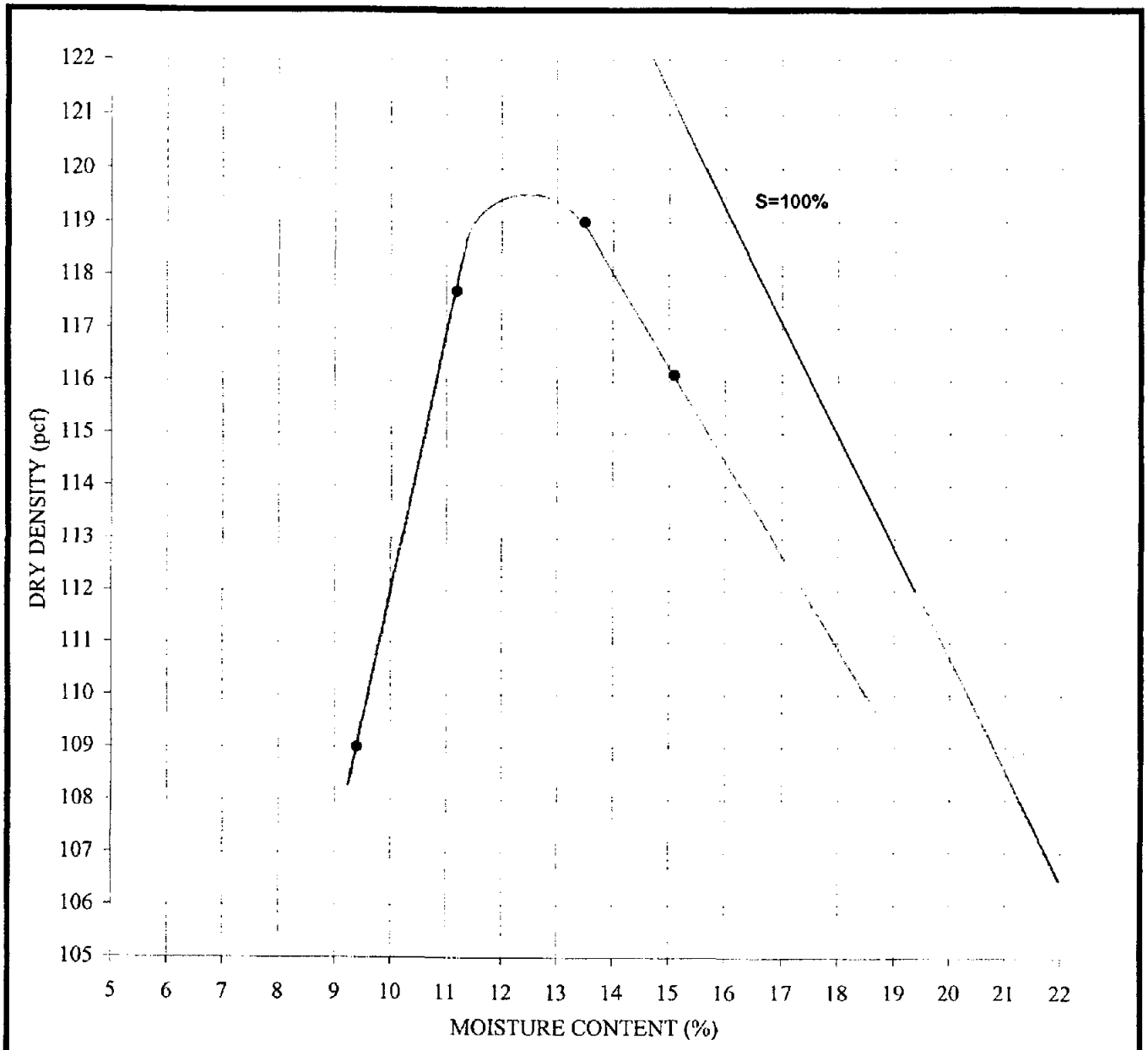
Schnabel Engineering

MOISTURE-DENSITY RELATION

Specification: VTM-1

Project: Wythe Will Distrubuting, LaGrange Parkway, James City County, Virginia

Contract No.: 03131268



Sample Description:

FINE TO COARSE CLAYEY SAND, TRACE GRAVEL, BROWN

Classification:	SC, A-2-6		
Sample Number:	B-16		
Sample Depth (Ft.):	0'-5'		
Sample Source:	ON-SITE	Assumed Specific Gravity:	2.75
		Liquid Limit (LL):	37
		Plasticity Index (PI):	15
% Passing 3/4" Sieve:	100.0	Max. Dry Density (pcf):	119.5
% Passing #200 Sieve:	33.3	Opt. Moist. Content (%):	12.4

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MOISTURE-DENSITY RELATION

Specification: VTM-1

Project: Wythe Will Distrubuting, LaGrange Parkway, James City County, Virginia

Contract No.: 03131268

James City County, Virginia
Environmental Division

Erosion and Sediment Control and Stormwater Management Design Plan Checklists

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IV.	Calculations	4
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I.	General	5
II.	Stormwater Conveyance Systems	7
III.	Stormwater Management / BMP Facilities	8
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V.	Additional Comments and Information	14

GENERAL INFORMATION

Project Name: WYTHE - WILL DISTRIBUTION CENTER @ STONEHOUSE COMMERCE PARK
Owner / Applicant: WYTHE - WILL DISTRIBUTING COMPANY, INC
Plan Preparer: LANDMARK DESIGN GROUP Email: STOMEO@landmarkdg.com
Project Location: STONEHOUSE COMMERCE PARK - LA GRANGE PKWY @ SR 600
Tax Map / Parcel: GPIN 1220100023 & 0640100001
County Plan No. (if known): SP-130-03
County BMP Type: INFILTRATION BASIN (C-4 PLUS) (C - 4)
Other information submitted in addition to this checklist (Check all that apply):

- ☑ Design or Construction Drawings (Plans, Profiles, Details, etc.).
- ☑ Erosion & Sediment Control Plan (Plans, Details, etc.).
- ☑ Erosion & Sediment Control Plan Design Report.
- ☑ Stormwater Management Design Plan (Plans, Profiles, Details, etc.).
- ☑ Stormwater Management Design Report.
- ☐ Other, List: _____

Issue Date
March 1, 2001

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

EROSION AND SEDIMENT CONTROL PLAN CHECKLIST

I. *GENERAL:*

Yes	No	N/A	
☑	☐	☐	*FAMILIARITY* with current versions of Chapter 8, Erosion and Sedimentation Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia and the Virginia Erosion and Sediment Control Handbook (VESCH).
☑	☐	☐	*LAND DISTURBING PERMIT AND SILTATION AGREEMENT* with surety are required for the project.
☐	☑	☐	*VARIANCE* if necessary, requested in writing, for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.

II. *SITE PLAN:*

Yes	No	N/A	
☑	☐	☐	*VICINITY MAP* locating the site in relation to the surrounding area. Include any major landmarks which might assist in physically locating the site.
☑	☐	☐	*INDICATE NORTH* direction in relation to the site.
☑	☐	☐	*LIMITS OF CLEARING AND GRADING* for the site including that required for implementation of erosion and sediment controls, stockpile areas and utilities.
☐	☐	☐	*DISTURBED AREA ESTIMATES* in acres or square feet for the project.
☑	☐	☐	*EXISTING TOPOGRAPHY* or contours for the site at no more than 5 foot contour interval.
☑	☐	☐	*FINAL TOPOGRAPHY*, contours or proposed site grading in accordance with the design plan which indicates changes to existing topography and drainage patterns at no more than 2 foot contour interval (or 1 foot contours where required).
☑	☐	☐	*EXISTING AND PROPOSED SPOT ELEVATIONS* to supplement existing and proposed contours, topography or site grading information. Spot elevations may replace final contours in some instances, especially if terrain is in a low lying area or relatively flat.
☑	☐	☐	*EXISTING VEGETATION* including existing tree lines, grassed or unique vegetation areas.

Yes	No	N/A	
☑	☐	☐	*EXISTING SITE FEATURES* including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.
☑	☐	☐	*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.
☑	☐	☐	*ENVIRONMENTAL INVENTORY* in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.
☐	☑	☐	*100-YEAR FLOODPLAIN LIMITS* or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.
☑	☑	☐	*DRAINAGE AREAS* for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea. SITE IS LIMIT OF DRAINAGE AREA
☐	☑	☐	*CRITICAL EROSION AREAS* which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.
☑	☐	☐	*DEVELOPMENT PLAN* for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.
☑	☐	☐	*LOCATION OF PRACTICES* proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.
☑	☐	☐	*TEMPORARY STOCKPILE AREAS* or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.
☐	☑	☐	*OFFSITE LAND DISTURBING AREAS* including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.
☑	☐	☐	*DETAILS* or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.

Yes	No	N/A	
☑	☐	☐	*MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.
☐	☑	☐	*TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.
☑	☐	☐	*CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.
☑	☐	☐	*PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.
☑	☐	☐	*STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.
☑	☐	☐	*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

III. *NARRATIVE:*

Yes	No	N/A	
☑	☐	☐	*PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.
☑	☐	☐	*EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.
☑	☐	☐	*ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.
☐	☑	☐	*OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.
☑	☐	☐	*SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.
☐	☑	☐	*CRITICAL AREAS* on the site which many have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

☑ ☐ ☐ *PROPOSED EROSION & SEDIMENT CONTROL MEASURES* inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.

☑ ☐ ☐ *STABILIZATION MEASURES* required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.

☑ ☐ ☐ *STORMWATER MANAGEMENT CONSIDERATIONS* for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

IV. *CALCULATIONS:*

Yes No N/A

☑ ☐ ☐ *CALCULATIONS AND COMPUTATIONS* associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.

☑ ☐ ☐ *TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET* submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST

I. *GENERAL:*

Yes	No	N/A	
☑	☐	☐	*FAMILIARITY* with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).
☐	☑	☐	*WAIVER OR EXCEPTION* if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to this review case only.
☐	☑	☐	*VARIANCE REQUEST* if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.
☑	☐	☐	*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved stormwater management plans, drawings, technical reports and specifications.
☐	☐	☑	*WORKSHEET FOR BMP POINT SYSTEM* to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only). STONEHOUSE COMMERCE PARK HAS MET ITS 10 POINT OBLIGATION
☐	☐	☑	*PROPOSED CONSERVATION EASEMENT AREAS* for any natural open space points claimed in the BMP worksheet. NATURAL OPEN SPACE EASEMENT TRADE RECENTLY APPROVED
☐	☐	☐	*INSPECTION/MAINTENANCE AGREEMENT* is required to be prepared and executed with the County for the project.
☑	☐	☐	*FEMA FIRM PANEL* reference with designated special flood hazard areas or zone designations associated with the site, as applicable.
☐	☑	☐	*DRAINAGE AREA MAP* at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map. ENTIRE SITE IS DRAINAGE AREA

Yes	No	N/A	
☑	☐	☐	*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.
☑	☐	☐	*STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.
☑	☐	☐	*TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.
☑	☐	☐	*MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.
☑	☐	☐	*STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and muti-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.
☑	☐	☐	*PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)
☑	☐	☐	North arrow and plan legend.
☑	☐	☐	Property lines.
☑	☐	☐	Adjacent property information.
☑	☐	☐	Existing site features and existing impervious cover areas.
☑	☐	☐	Impervious cover tabulations.
☑	☐	☐	Existing drainage facilities (natural or manmade).
☑	☐	☐	Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.).
☑	☐	☐	Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.
☑	☐	☐	Existing and proposed easement locations.

Yes	No	N/A	
☐	☐	☐	Proposed site improvements and proposed impervious cover areas.
☐	☐	☐	Proposed stormwater conveyance, drainage and management facilities with appropriate labeled construction data and information.
☐	☐	☐	Proposed landscaping and seeding plans (disturbed areas, pond interior, etc.).
☐	☐	☐	Proposed slope stabilization areas (riprap, blankets, mattings, walls, etc.).
☑	☐	☐	Delineation of ~~permanent pools and the 1-~~, 2-, 10- and 100-year Design Water Surface Elevations.
☐	☐	☒	Delineation of ponding, headwater, surcharge or backwater areas which may affect adjacent existing or proposed buildings, structures or upstream adjacent properties.
☑	☐	☐	Test boring locations with reference surface elevations (if known).
☑	☐	☐	Risers, barrels, underdrains, overflows and outlet protections.
☐	☐	☑	Emergency spillway level section and outlet channel.
☑	☐	☐	Existing and proposed site utilities and protection measures.
☑	☐	☐	Erosion and sediment control measures (for site or BMP).
☑	☐	☐	Maintenance or access corridors to permanent stormwater management, BMP or drainage facilities.

FORTHCOMING FROM SCHNADEL

II. *STORMWATER CONVEYANCE SYSTEMS:*

Yes	No	N/A	
☑	☐	☐	*PLAN VIEWS*
☑	☐	☐	Storm drain lengths, sizes, types, classes and slopes for all segments. Label directly on plan or use structure/pipe schedule.
☑	☐	☐	Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.
☑	☐	☐	All structure numbers labeled.
☑	☐	☐	Adequate horizontal clearance from other site utilities or structures.
☐	☑	☐	*PROFILES* generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas.
☑	☐	☐	*DETAILS*
☐	☐	☐	Typical storm drain bedding details or reference note.
☐	☐	☐	Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).
☐	☐	☐	Inlet shaping detail or applicable reference note.
☐	☐	☐	Step detail or applicable reference note (if depth 4 ft. or more).
☐	☐	☐	Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.
☐	☐	☐	Outlet protections at all pipe outfalls.

Yes No N/A

☑ ☐ ☐ *STORMWATER CONVEYANCE SYSTEM COMPUTATIONS*

- ☑ ☐ ☐ Storm Sewer Design computations based on 10-year design event.
- ☑ ☐ ☐ Hydraulic Grade Line computations based on 10-year design event.
- ☑ ☐ ☐ Inlet computations based on current VDOT procedure for spread, ponding depth and grate size required.
- ☐ ☐ ☑ Culvert Headwater computations. Design based on 10-year design storm event and check only for 100-year storm event.
- ☐ ☐ ☑ Open Channel computations based on 2-year design event for velocity and 10-year design event for capacity.
- ☑ ☐ ☐ Standard outlet protection or special energy dissipators.
- ☐ ☐ ☑ Pipe thickness design computations, as required, for selected pipe type (live load, minimum cover, maximum height of cover, etc.).
- ☐ ☐ ☑ Adequate channel computations for receiving channels (based on field measured channel section data).

III. *STORMWATER MANAGEMENT / BMP FACILITIES:*

Yes No N/A

☑ ☐ ☐ *HYDROLOGY* - An SCS based methodology is required for the design of stormwater management/BMP facilities with watersheds exceeding 20 acres. Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. Refer to Chapter 5 of the VESCH or Chapter 5 of the VSMH.

- ☑ ☐ ☐ Runoff Curve Number or Coefficient determinations: predeveloped and ultimate development land use scenarios.
- ☑ ☐ ☐ Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components (200 ft. maximum length for overland flow).
- ☑ ☐ ☐ Hydrograph generation (tabular or graphical): pre- and postdevelopment conditions for the 1-, 2-, 10-, and 100-year design storm events.

☒ ☐ ☐ *FACILITY CONFIGURATION and MINIMUM SEPARATIONS*

- ☑ ☐ ☐ Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).
- ☑ ☐ ☐ Basic considerations for safety and unauthorized entry.
- ☑ ☐ ☐ Proper length to width ratio (Typically 2H:1V).
- ☑ ☐ ☐ Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis.
- ☑ ☐ ☐ Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.
- ☑ ☐ ☐ No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.

Yes	No	N/A	
☒	☐	☐	Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.

Yes	No	N/A	
☒	☐	☐	*HYDRAULIC COMPUTATIONS*
☑	☐	☒	Elevation- or Stage- Storage curve and/or tabular data.
☐	☐	☒	Weir / Orifice Control - Extended Detention.
☐	☐	☒	Weir / Orifice Control - riser 1-year control for channel protection.
☐	☐	☒	Weir / Orifice Control - riser 2-year control for quantity (if required).
☐	☐	☒	Weir / Orifice Control - riser 10-year control for quantity (if required).
☒	☐	☐	Inlet / Outlet (barrel) control - (All Storms).
☐	☐	☒	Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.
☐	☐	☒	Emergency spillway capacity and depth of flow.
☒	☐	☐	Elevation - Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.
☐	☐	☒	Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria.
☒	☐	☐	*POND or RESERVOIR ROUTING*
☑	☐	☐	Storage-Indication Routing of postdeveloped inflow hydrographs for the ~~1-~~, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation.
☐	☐	☒	Downstream hydrographs at established study points, if conditions warrant (ie. facility discharge combined with uncontrolled bypass).
☐	☐	☒	*MISCELLANEOUS COMPUTATIONS*
☐	☐	☐	Water quality volume for permanent pool based on selected BMP treatment volume (WQv).
☐	☐	☐	Water quality volume for extended detention based on selected BMP treatment volume (WQv) with drawdown computations.
☐	☐	☐	Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.
☐	☐	☐	Pond drain computations (within 24 hours).
☐	☐	☐	Anti-seep collar design (concrete preferred) or match material type.
☐	☐	☐	Filter diaphragm design (or alternative method of controlling seepage).

Yes	No	N/A	
☐	☐	☐	Riser / base structure flotation analyses. FS = 1.25 minimum.
☐	☐	☐	Downstream danger reach study and/or emergency action plan (if conditions warrant).
☐	☐	☐	Upstream backwater analyses onto offsite adjacent property (if conditions warrant).
☐	☐	☐	100 year floodplain impacts (if conditions warrant).

Yes	No	N/A	
☒	☐	☐	*GEOTECHNICAL REQUIREMENTS*
	☐	☐	Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit. BY SCHNABEL ENG. ASSOC.
☐	☐	☐	Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
☐	☐	☐	Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
☐	☐	☐	Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.
☐	☐	☐	Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.
☐	☐	☐	Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*
☒	☐	☐	*PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS*
☑	☐	☐	*EXISTING GROUND AND PROPOSED GRADE*
☑	☐	☐	Embankment or excavation side slopes labeled (3H:1V maximum). 2H 1V EXCAV SS
☐	☐	☒	Minimum top width labeled (per VESCH or VSMH requirements).
☒	☐	☐	Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

☐ ☐ ☒ *FILTER DIAPHRAGMS*

☐ ☐ ☐ Design based on latest NRCS design methods and certified by a professional engineer.

Yes No N/A

☑ ☐ ☐ *ELEVATION AND DIMENSIONAL DESIGN DATA*

☒ ☐ ☐ Top of facility - construction height and settled height (10 percent settlement).

☒ ☐ ☐ Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.

☒ ☐ ☐ Minimum freeboard of one (1) foot above the 100-year design high water elevation for facilities <u>with</u> an emergency spillway.

☒ ☐ ☐ Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities <u>without</u> an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).

☒ ☐ ☐ Basin Sediment Clean-Out elevation (permanent mode). Typically 10 to 25 percent of water quality volume.

☑ ☐ ☐ *CROSS SECTION THROUGH FACILITY*

☒ ☐ ☐ Existing Ground.

☒ ☐ ☐ Proposed grade.

☒ ☐ ☐ Top of facility - constructed and settled.

☐ ☐ ☒ Location of emergency spillway with side slopes labeled (emergency spillway in cut).

☐ ☐ ☒ Bottom of core trench (4' minimum).

☐ ☒ ☐ Location of each soil boring.

☒ ☐ ☐ Barrel location.

☐ ☐ ☒ Existing and proposed utility location/protection.

☐ ☐ ☒ *EMERGENCY SPILLWAY PROFILE*

☐ ☐ ☐ Existing ground.

☐ ☐ ☐ Inlet, level (control) and outlet sections per SCS.

☐ ☐ ☐ Spillway and crest elevations.

☑ ☐ ☐ *PRETREATMENT DEVICES* of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

Yes	No	N/A	
☐	☐	☐	*CONSTRUCTION SPECIFICATIONS and NOTES*
☐	☐	☐	Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan).
☐	☐	☐	Provisions to control base stream or storm flow conditions encountered during construction.
☐	☐	☐	Site and subgrade preparation requirements.
☐	☐	☐	Embankment, fill and backfill material soil and placement (lift) thickness requirements.
☐	☐	☐	Compaction and soil moisture content requirements.
☐	☐	☐	Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes.
☐	☐	☐	Clay or synthetic (PVC or HDPE) pond liners.
☐	☐	☐	Storm drain, underdrain and pipe conduit requirements.
☐	☐	☐	Minimum depth of pipe cover for temporary (construction) and final cover conditions.
☐	☐	☐	Permanent shutoff valve and pond drain.
☐	☐	☐	Concrete requirements for structural components.
☐	☐	☐	Riprap and slope protection.
☐	☐	☐	Access or maintenance road surface, base, subbase.
☐	☐	☐	Temporary and permanent stabilization measures.
☐	☐	☐	Temporary or permanent safety fencing.
☐	☐	☐	BMP Landscaping (deep, shallow, fringe, perimeter,etc.)
☐	☐	☐	Dust and traffic control (if warranted).
☐	☐	☐	Construction monitoring and certification by professional.
☐	☐	☐	Other: _____
☐	☐	☐	Other: _____.
☐	☐	☐	*MAINTENANCE PROVISIONS*
☐	☐	☐	Entity responsible for maintenance identified..
☐	☐	☐	Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays
☐	☐	☐	Maintenance access from public right-of-way or publicly traveled road.
☐	☐	☐	Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas.
☐	☐	☐	Minimum 6 foot wide public safety shelf (landing) or alternative fencing.

IV. *OUTLET PROTECTIONS:*

Yes	No	N/A	
☐	☐	☒	Sized for maximum design release (generally 10-year storm).
☐	☐	☒	Flared end section or endwall.
☐	☐	☒	Dimensions.
☐	☐	☒	Rock or riprap size, quantity and placement thickness.
☐	☐	☒	Slope at 0 percent (Level Grade).
☐	☐	☒	Geotextiles (nonwoven).
☐	☐	☒	Special energy dissipators are required for design discharge velocities that exceed eighteen (18) feet per second; or if use of standard outlet protection would result in velocities exceeding permissible channel velocities; or if space restricts or limits their use.

V. *ADDITIONAL COMMENTS OR INFORMATION SPECIFIC TO THE PLAN:*

Plan Preparer: Stephen Romano

Date: 10-24-03

SWMProg/BMP/Checklist/ChkList

EXPEDITED REVIEW

James City County, Virginia
Environmental Division
Stormwater Management Program

Stormwater Management Design Plan
Staff "Quick" Review

Plan No. SP - 130 - 03 Date/Time: 11/5/03 1200 NOON
Project Name: WYTHE-WILL DISTN CENTER
Rough Location: STONEHOUSE COMMERCE PARK
ADC Map: Sheet 1 Grid: J - 5 ☒ First Review
Flood Map / Zone: 510201- 00 10B Zone: X ☐ ____ Review
Description: OUTSIDE 500-YEAR
Drainage Area: ☐ Onsite ☒ Offsite
Submitted:

Y	N		
☐	☒	Demolition Plan (if applicable)	Sheets:
☒	☐	Site, Geometric or Layout Plan	Sheets: C-3
☒	☐	Grading Plan	Sheets: C-4
☒	☐	Storm Drainage Plan	Sheets: C-4, C-5
☒	☐	E&SC Plan	Sheets: C-2, C-4
☐	☒	Profiles (Storm)	Sheets: C-6
☒	☐	Environmental Inventory	Sheets: C-2
☒	☐	Note & Detail Sheets	Sheets: C-8, C-9, C-10
☐	☒	Drainage Map(s)	NONE PROVIDED ON PLANS OR REPORT
☒	☐	Soils Map/Narrative	MAP C-2; SOIL REPORT SCHNABEL
☒	☐	E&SC/SWM Design Plan Checklist (Required).	
☒	☐	E&SC/Stormwater Management / Drainage Narratives.	
☒	☐	E&SC/Stormwater Management Design Report with Calculations (Attachment).	
☒	☐	Geotechnical Report (Attachment). Schnabel 10/29/03	
☐	☐	Waivers, Variances, or Exceptions (Attachments in Writing).	
		☐ VESCH ☐ CBP Ord (RPA, Steep Slope Policy) ☐ JCC BMP Manual	
☐	☐	Other (List):	

LANDSCAPE PLAN L-2

JCC GIS Database: Zoning: PUD - C Tax Parcel/GPIN: (12-2)(01-23) + PART (6-4)(01-01)
Receiving Water: VT FRANKES SWAMP (WC) Site Acreage: 15.58 acres / s.f.
Other Approvals (SUP, etc.): None
Site Plan Information: Owner: WYTHE-WILL DIST CO INC. Rev - Liberty Property Trust
Zoning: PUD - C Description: Planned Unit Dev Commercial
Site Area: 15.58 AC. acres / s.f
Disturbed Area: 15.58 AC acres / s.f. (100.0 %)
☒ Disturbance > 1 acre, VPDES Notice of Intent required.
Impervious Cover: 4.67 AC. acres / s.f. (29.97 %)
☒ Less than or equal to 60 percent. Meets CBPO requirements.
☐ More than 60 percent. Does Not Meet CBPO requirements.
Open / Green Space: ____ acres / s.f. (. %)

Site Development Plan:

☐ Residential, Lots, etc.	☐ Commercial (B / O / R)	☐ Govern./Institutional	☐ Industrial
☐ Roadways or Entrances	☐ Parking or Loading	☐ Water	☐ Sanitary Sewer
☐ Landscaping	☐ SWM/BMP facilities	☐ Manmade Drainage	☐ Parks, Amenities
☐ Pump/Lift Station	☐ Dams (regulated)	☐ Other,	

Description: Retaining Walls; 99,400SF WH; 11,200SF ABOVE OFFICE
FUTURE 43,200SF EXPANSION; 95 spaces provided.

Soils Information: Site: 11C, 14B, 15E, 19B, 31B Hydric: ☐ Yes ☒ No
Soil Survey Sheet DA: SAME HSG: AVG C
BMP: 31B Hydric: ☐ Yes ☐ No
Description of Soils at BMP: Suffolk FSL, 2-6% OWD FOR INFIL.

BMP Control: ☐ None ☒ Onsite ☒ Offsite ☐ Previously Approved ☐ Manufactured BMP
BMP Types: ONSITE QUANTITY OFFSITE - QUALITY.
1- Name: A-3 INFIL (JCC BMP Type A - 3), Points 10 pt.
2- Name: _____ (JCC BMP Type ____ - ____), Points _____
3- Name: _____ (JCC BMP Type ____ - ____), Points _____

Onsite Drainage: ☐ Reinforced Concrete Pipe ☐ Corrugated Metal Pipe ☐ Aluminum Type Pipe
☐ Corrugated Polyethylene Pipe ☐ PVC Type Pipe ☐ Open Channel Type
☐ Storm Drain ☐ Culverts Type: _____
☐ Inlets ☐ Other (Specify): _____

1. VDOT Standards & Specifications Referenced for work **within** R/W: ☒ Yes ☐ No
2. VDOT Standards & Specifications Referenced for work **outside** R/W: ☒ Yes ☐ No

Site Limitations: ☐ RPA ☒ RMA ☒ Steep Slopes ☒ Delineated Wetlands
☐ Hydric Soils ☐ Critical Soils ☒ Vegetated ☐ Buffers: _____
☒ Defined Natural Drainage Features onsite ☒ Downstream Storm/Culv.
☐ Downstream Channel Erosion ☐ Floodplain ☐ Problem Drainage Area
☐ Stormwater Hotspot ☐ Other, _____
☐ Site Activities may warrant a General VPDES Permit for Discharge of Stormwater Associated with Industrial Activities (ie. process water, batch plants, etc.).

Site Stormwater Management / BMP Control (Add sheets if necessary for Multiple Onsite Facilities):

☐ Yes ☐ No	#			
Predev (Present)	DA = 15.6 ac.	C/CN = 0.2	Tc = 30	min / hrs.
2-year 8 TO D/S ANALYSES	8.4	cfs		
10-year	10.9	cfs		
100-year	16.5	cfs		
PostDev w/o Detention (Inflow)	DA = 15.6 ac.	C/CN = 0.6	Tc = 5	min / hrs.
1-year				
2-year	53.35 (24.34)	cfs		
10-year	65.52 (31.17)	cfs		
100-year	89.20 (40.10)	cfs		
PostDev with Detention (Routed)	DA = ac.	C/CN =	Tc =	min / hrs.
2-year 49662 CF STORED	0.00	cfs	at El.	64.70
10-year	0.00	cfs	at El.	65.6
100-year (DHW)	0.00	cfs	at El.	67.15

25-YEAR 74.88 CFS

25-YR 30.42 IN 0.00 OUT EL 66.65

Downstream Tailwater Assumption for Pond Routing: NONE
Routed Peak Discharges (Outflows) from BMP meet Predevelopment Allowables: ☒ Yes ☐ No
Appears to Meet VESCH / E&SC Ordinance / CBP Ordinance Requirements: ☒ Yes ☐ No

IF NO DISCHARGE

VOLUME IN
2- 49645 CF
10- 69115 CF
25- 91260 CF
100- 105859 CF

Pond / BMP Design Data (Add Sheet If Necessary for Multiple Onsite Facilities):

☐ Check if None ☐ Provided: BMP # 1 Type: C-3/C-4 INFAL BASIN

Y N * See Below for Pertinent WQv /Stream CPv Design Information.

☑ ☐ Top of Facility (Dam Crest) El. 76.0

☑ ☐ Design High Water (100-year) El. 67.15 (67.20)

☐ ☐ Emergency Spillway (ES) Crest El. NONE BW: _____ SS: _____

☐ ☐ FreeBoard _____ 1 ft. or > with Emerg. Spillway.

☑ Acceptable ☐ Not Acceptable. 8.8' 2 ft. or > w/o Emerg. Spillway.

☑ ☐ Principal Spillway (Riser) Crest El. 69.0 Size/Type: 15" RCP

☑ ☐ Principal Spillway Crest 1 ft. below Crest of Emergency Spillway. ☐ Yes ☐ No ☐ N/A

☑ ☐ Stage-Storage Curve or Data

☑ ☐ Outlet Rating Curve or Table (Composite Structure) PROBLEM NRCP COMP

☐ ☑ Extended Detention for WQ Provided (Min. 24 hours) N/A ☐ Yes ☐ No ☐ N/A

☑ ☐ 1-year, 24 hour detention criteria for Stream Channel Protection. ☐ Yes ☑ No ☐ N/A

☐ ☐ 1-year design storm El. ? or Volume _____

☐ ☐ Normal/Permanent Pool El. NA ☐ N/A

☑ ☐ Orifice/Weir #1 (Highest El.) El. 69 Type: 15" RCP

☐ ☑ Orifice/Weir #2 El. _____ Type: _____

☐ ☑ Orifice/Weir #3 El. _____ Type: _____

☐ ☑ Orifice/Weir #4 El. _____ Type: _____

☐ ☑ Orifice/Weir #5 (Lowest El.) El. _____ Type: _____

☐ ☑ Low Flow Orifice (ExDet, CPv) El. _____ Type: _____

☐ ☑ Pond Drain w/ Valve (24 hr.) El. _____ Type: _____

☐ ☐ Pond Bottom (Positive Drain) El. 62.00 Riser Height: N/A Single culvert

☐ ☑ Steps or Access Provided (for over 4 ft. depth) ☐ N/A

☐ ☑ Riser Base Bottom El. _____ Type: _____

☐ ☑ Core Trench ☐ N/A

☐ ☑ Anti-Seep Collars or other Acceptable Seepage Control Method. ☐ N/A

☐ ☑ Principal Spillway Anti-Vortex/Trash Rack Device Type: NONE.

☐ ☑ Low Flow Orifice Trash Rack. Type: _____

☐ ☐ Outlet Barrel: Type/Class: RCP Size: 15"

Inv. U/S: 69.00 Inv D/S: 68.80

Slope: 0.2690 Length: 77' (ft.)

☑ ☐ Flared End Section/Wingwalls. Matches Outlet Barrel material type, over 48 inch with fence.

☑ ☐ Outlet Protection.

☐ Standard Riprap Outlet Protection (OP) Type: _____

☐ Special Dissipator Structure (SDS) Type: _____

☑ ☐ BMP Cleanout Elevation El. 63 or Depth 1'

☑ ☐ Adequate Channel Downstream of BMP: ☑ 1-year, 24-hour; or ☐ MS # 19 criteria.

Sketch or Notes, If Necessary:

Need TSB Comps?

* WQv / Stream CPv Design Summary	
Imperv. Area	
WQTV (Per JCC Man)	
WQ Vol. Required	
WQ Vol. Provided	
1-yr SCPv Required	
1-yr SCPv Provided	
Ext Det Orifice Size	

Sediment Trap & Basins

☐ Temporary Sediment Trap # 1 _____ DA = _____ < 3 acres

☐ Temporary Sediment Trap # 2 _____ DA = _____ < 3 acres

☐ Temporary Sediment Basin # 1 _____ DA = _____ ☐ BMP # ____ convert.

☐ Temporary Sediment Basin # 2 _____ DA = _____ ☐ BMP # ____ convert.

E&SC Plan Comments: _____

Plan Review Steps & Components:

Y	N	
☑	☐	County watershed information identified on plan.
☑	☐	First "Look-Thru". Quick look through plan for familiarity and completeness.
☑	☐	Existing Utilities - Notes to contact Miss Utility (1-800-552-7001) or other methods for utility locating.
☑	☐	Disturbed area estimate and Responsible Land-Disturber identified.
☐	☑	Worksheet for BMP Point System. 10 point (New Dev) or Pollutant Load method (Redevelopment).
☑	☐	FEMA Special Flood Hazard Areas. Check location relative to property site and/or development area.
☑	☐	Check JCC Tax Parcel Maps for RPA / RMA locations and Tax Parcel number.
☑	☐	Stormwater hotspot, general layout and/or BMP separation distances (if any) are satisfactory.
☐	☑	Environmental Inventory - Chesapeake Bay Ordinance requirements satisfactory. STEEP SLOPE IMPACTS.
☑	☐	Highlight/check impacts to any Environmental Sensitive Areas (wetlands, RPA, floodplain, steep slopes, etc.).
☐	☑	Offsite borrow, waste areas and onsite stockpiles areas addressed.
☐	☑	Review existing topography to determine adequacy of perimeter E&SC plan (Phase I).
☑	☐	Soils - erodibility and erosion hazard of soils in land-disturbing area..
☑	☐	Current version of Standard JCC Erosion & Sediment Control Notes on plan.
☐	☑	Virginia E&SC Regulations. Minimum Standards # 1 thru # 19 appear satisfied.
☐	☑	Check for Offsite Work; Grading Plan conflicts such as excessive cut-fill slopes, deep excavations, etc.
☑	☐	Review adequacy of onsite E&SC plan (Phase II).
☑	☐	Review layout to check for conflicts (utilities, buildings, parking, buffers, etc.).
☑	☐	Storm Drainage - culverts, inlets, channels, storm drains. (pipe data, cover, conflicts, specs or reference to VDOT).
☐	☑	Proper Outlet Protection or Energy Dissipator information, details and computations.
☐	☑	Review Sequence of Construction (for E&SC and SWM/BMP installation).
☑	☐	Review E&SC Narrative (preferred to be on plan); SWM Narrative (Report).
☐	☑	Review for any Lot-to-Lot or offsite concentration of uncontrolled runoff to adjacent property/structures.
☐	☑	Review plan based on Chapter 19 Subdivision ordinance as it relates to SWM/BMP control.
☑	☐	Review plan based on Chapter 24 Zoning as it relates to SWM/BMP control.
☑	☐	Review plan based on Chapter 23 Chesapeake Bay ordinance requirements.
☑	☐	Review plan based on JCC E&SC/SWM Design Plan Checklist.
☑	☐	Review plan based on Virginia Erosion and Sediment Control Handbook (VESCH).
☑	☐	Review E&SC Plan Design Report and computations (Attached report).
☑	☐	Review plan based on JCC BMP manual for BMP type selected for project.
☑	☐	Review plan based on Virginia Stormwater Management Handbook (VSMH) for BMP type.
☑	☐	Review SWM Design Report and computations (Attached Report).
☐	☑	Review for potential mosquito-vector issues for BMP type and location.
☑	☐	Review plan based on JCC Stormwater Conveyance System Design/Construction Guidelines.
☑	☐	Review plan based on General Knowledge and Experience for Design/Construction.
☐	☑	Review plan based on other BMP design/construction references. List:
☑	☐	Review BMP for Buffer/Setback Requirements (Min 25 ft. from DHW) and Access.
☑	☐	Review BMP Benching (aquatic, safety) & Pondscape Plan (deep pool, shallow water, shoreline fringes, etc.).
☐	☑	Review Maintenance Plan for SWM / BMP facility. Detailed and specific guidance for long-term maintenance.
IF O DISCHARGE ☑	☐	Well-defined, adequate channels downstream of uncontrolled or SWM/BMP areas. (MS # 19 or 1-year criteria).
☐	☑	Adequate conversion plan for TSB to use as permanent BMP.
☑	☐	Geotechnical. Information per Appendix E (infiltration) or to substantiate use of other BMPs (soils-wet pond, etc).
☑	☐	Provisions on plan requiring Record Drawing and Construction Certification of SWM facilities.
☑	☐	Drainage, Maintenance and Open Space Easements (if provided) appear satisfactory.
☐	☑	Wetland permit required prior to issuance of a Land-Disturbance Permit or Final Approval.
☐	☐	Inclusion of H&H and SWM / BMP data into any JCC databases (optional).
☐	☐	Contact ENV DIV inspector if amendment to previously approved plan.
☐	☐	Other: _____

Prepared Environmental Division comments for the following categories based on above review areas:

☑ ☐	***General Comments:***	☑ ☐	***Erosion & Sediment Control Plan:***
☐ ☑	***Floodplain:***	☑ ☐	***Chesapeake Bay Preservation:***
☑ ☐	***Stormwater Management / Drainage:***	☐ ☐	***Other:***

Additional Notes & Comments: _____

(Note: THIS FORM FOR COUNTY USE ONLY.)

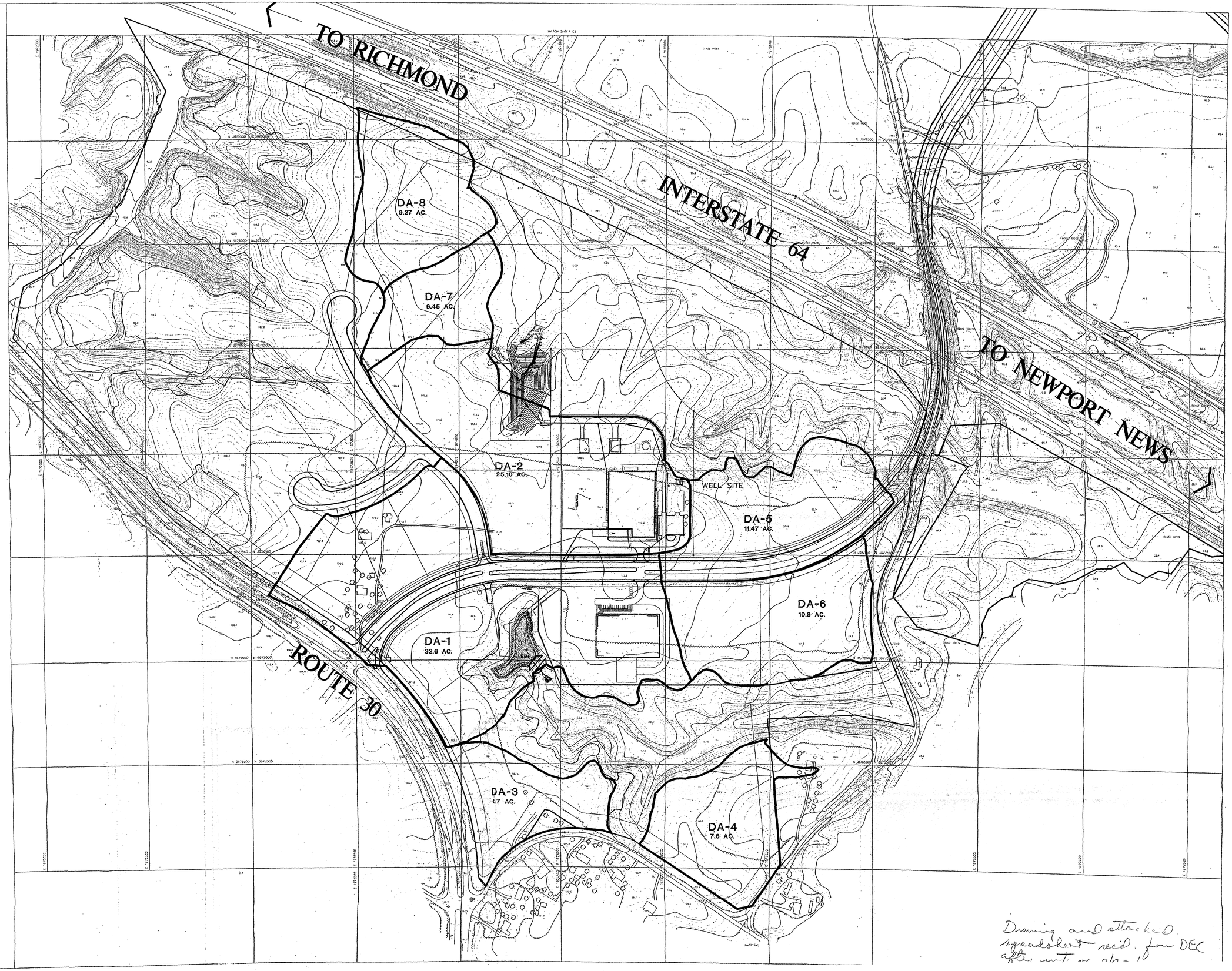
☐ 1st Rev ☐ 2nd Rev

Signature _____ Date 11-13-03 11:15AM

Signature _____ Date _____

STONEHOUSE COMMERCE PARK

MASTER DRAINAGE PLAN



GRAPHIC SCALE: 1"=200'

0' 200' 400' 800'

Drawing and attached spreadsheet rec'd. from DEC after meeting on 2/6-18