



CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE FOLLOWING ELECTRONIC RECORDS ARE TRUE AND ACCURATE REPRODUCTIONS OF THE ORIGINAL RECORDS OF JAMES CITY COUNTY GENERAL SERVICES DEPARTMENT- STORMWATER DIVISION; WERE SCANNED IN THE REGULAR COURSE OF BUSINESS PURSUANT TO GUIDELINES ESTABLISHED BY THE LIBRARY OF VIRGINIA AND ARCHIVES; AND HAVE BEEN VERIFIED IN THE CUSTODY OF THE INDIVIDUAL LISTED BELOW.

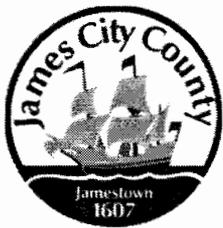
BMP NUMBER: PC244

DATE VERIFIED: October 25, 2012

QUALITY ASSURANCE TECHNICIAN: Leah Hardenbergh

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA



Stormwater Division

MEMORANDUM

DATE: March 13, 2010
TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services
FROM: Jo Anna Ripley, Stormwater
PO: 270712
RE: Files Approved for Scanning

General File ID or BMP ID: PC244

PIN: 3330100003

Subdivision, Tract, Business or Owner

Name (if known):

Olde Towne Road

Property Description:

Retail Shop

Site Address:

5525 Olde Towne Road

(For internal use only)

Box 4

Drawer: 2

Agreements: (in file as of scan date)

Book or Doc#:

Page:

Comments

Contents for Stormwater Management Facilities As-built Files

Each file is to contain:

- ①. As-built plan
- ②. Completed construction certification
- ③. Construction Plan
- ④. Design Calculations
- ⑤. Watershed Map
6. Maintenance Agreement
7. Correspondence with owners
8. Inspection Records
9. Enforcement Actions



**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: 5525 OLDE TOWNE ROAD
 Structure/BMP Name: Bioretention Facility
 Project Location: 5525 Olde Towne Road (north side of road, west of Prime Outlets)
 BMP Location: Along frontage of site
 County Plan No.: SP - 01 - 006

Project Type:	<input type="checkbox"/> Residential	<input type="checkbox"/> Business	Tax Map/Parcel No.:	<u>(33-3) (1-3)</u>
	<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Office	BMP ID Code (if known):	<u></u>
	<input type="checkbox"/> Institutional	<input type="checkbox"/> Industrial	Zoning District:	<u>B-1, General Business</u>
	<input type="checkbox"/> Public	<input type="checkbox"/> Roadway	Land Use:	<u>Commercial, Restaurant, Office</u>
	<input type="checkbox"/> Other		Site Area (sf or acres):	<u>Space</u>
				<u>0.98 acres</u>

Brief Description of Stormwater Management/BMP Facility: Bioretention Facility

Nearest Visible Landmark to SWM/BMP Facility: Intersection of Canterbury Place with Olde Towne Road (SW of site)

Nearest Vertical Ground Control (if known):

JCC Geodetic Ground Control USGS Temporary Arbitrary Other

Station Number or Name: 323
 Datum or Reference Elevation: 112.94
 Control Description: James City County Station No. 323
 Control Location from Subject Facility: Approximately 2,000 feet west of site, north side of Olde Towne Road, in Virginia Power Line Easement

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: April 2009
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: William Cowan
Name of Professional Firm Who Routinely Monitored Construction: AES Consulting Engineers
Date of Completion for SWM/BMP Facility: May 2009
Date of Record Drawing/Construction Certification Submittal: May 2009

(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: Epeus LLC
Mailing Address: 426 Airport Road
Williamsburg, Virginia 23188
Business Phone: 757-565-2669 Fax: 757-565-1617
Contact Person: Mr. John Kniest Title: Owner / Developer

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: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: V. Marc Bennett, P.E.
Title: Senior Project Manager
Plan Name: 5525 OLDE TOWNE ROAD
Firm's Project No. 9557-01
Plan Date: 1/05/06, Revised 12/11/07
Sheet No.'s Applicable to SWM/BMP Facility: 4 / 7 / 10 / / /

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

Name: W. A. Cowan Contractors LLC
Mailing Address: 8105 Richmond Road
Toano, Virginia 23168
Business Phone: 757-566-8199
Fax: _____
Contact Person: William Cowan
Site Foreman/Supervisor: William Cowan
Specialty Subcontractors & Purpose (for BMP Construction Only):
None

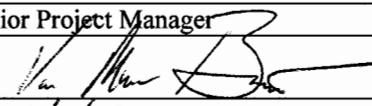
Section 4 – Professional Certifications:

Certifying Professionals: *(Note: A Registered Professional Engineer of 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.)*

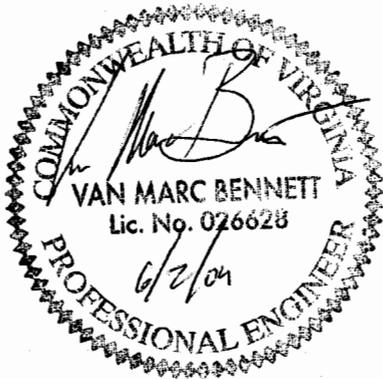
Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: AES Consulting Enigneers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: V. Marc Bennett
Title: Senior Project Manager
Signature: 
Date: 6/2/09

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.

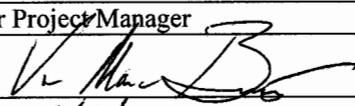


(Seal)

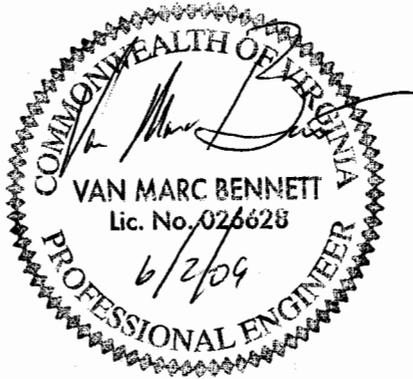
Virginia Registered Professional Engineer
Or Certified Land Surveyor

Construction Certification

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: V. Marc Bennett
Title: Senior Project Manager
Signature: 
Date: 6/2/09

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.



(Seal)

Virginia Registered
Professional Engineer

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 plans 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.
 - XX 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.
 - XX 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.
 - XX 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.

- XX 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.
- XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
- XX 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.
- N/A 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
- XX 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
- XX 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.
- XX 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

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)*
- XX D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.
- XX D2. Sediment pretreatment devices provided.
- XX 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.
- XX 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.
- XX 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.
- XX D6. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed.
- XX D7. Filtering system is off-line from storm drainage conveyance system.
- XX D8. Overflow outlet has adequate erosion protection.
- N/A D9. Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.
- XX D10. Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.
- XX 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.
- XX D12. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.
- XX D13. No visual signs of erosion or channel degradation immediately downstream of facility.
- XX D14. Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

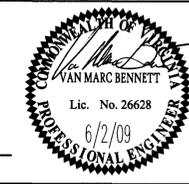
STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

(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)*
- XX E1. All requirements of Section II, Minimum Standards, apply to Group E facilities as applicable.
- N/A E2. Open channel system has constructed longitudinal slope of less than four (4) percent.
- XX E3. No visual signs of erosion in the open channel system's soil and/or vegetative cover.
- XX E4. Open channel side slopes are no steeper than 2H:1V at any location. Preferred channel sideslope is 3H:1V or flatter.
- XX 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).
- N/A E6. For E-2 BMPs (Dry Swales), an underdrain system was provided.
- XX E7. Treated timber or rock check dams provided as pretreatment devices for the open channel system.
- N/A E8. Gravel diaphragm provided in areas where lateral sheet flow from impervious surfaces are directly connected to the open channel system.
- XX 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.
- XX E10. Open channel system areas with grass covers higher than four (4) to six (6) inches were properly mowed.
- XX 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.
- XX 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.
- N/A E13. For E-3 BMPs (Biofilters), the bottom width is six (6) feet maximum at any location.
- N/A E14. For E-3 BMPs (Biofilters), sideslopes are 3H:1V maximum at any location.
- N/A E15. For E-3 BMPs (Biofilters), the constructed channel slope is less than or equal to three (3) percent at any location.
- N/A E16. For E-3 BMPs (Biofilters), the constructed grass channel is approximately equivalent to the constructed roadway length.

I HEREBY CERTIFY TO THE BEST OF MY JUDGEMENT, KNOWLEDGE, AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE CONDITIONS OF THE SITE ON THIS DATE IT WAS SURVEYED. THE SITE APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN.

V. Marc Bennett 6/2/09
 SIGNATURE DATE



EROSION AND SEDIMENTATION CONTROL LEGEND

- SSF ——— SILT FENCE W/ WIRE SUPPORT (SPEC. 3.05)
- SF ——— SILT FENCE W/O WIRE SUPPORT (SPEC. 3.05)
- TP ——— TREE PROTECTION (SPEC. 3.38)
- PS ——— PERMANENT SEEDING (SPEC. 3.32)
- CD ——— ROCK CHECK DAM (SPEC. 3.20)
- SO ——— SODDING (SPEC. 3.33)
- EC-2 ——— SOIL STABILIZATION METHODS (SPEC. 3.36)
- DC ——— DUST CONTROL (SPEC. 3.39)

NOTE:
 SEE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK FOR EROSION CONTROL SPECIFICATIONS (SPEC.) AND DETAILS.

- AREA OF ENGINEERED MEDIA FOR BIORETENTION BASIN
- AREA OF CLASS 1 RIP-RAP IN SEDIMENT FOREBAY
- CONTRACTOR TO PROVIDE DUST CONTROL AS NECESSARY TO PREVENT DUST FROM IMPACTING ADJACENT PROPERTIES
- CONTRACTOR TO PROVIDE ORANGE SAFETY FENCE AROUND PERIMETER OF THE SITE
- PROVIDE SOD OR EC-3 MATTING (AND PERMANENT SEEDING) TO STABILIZE SLOPES ON SITE

NO.	DATE	REVISION / COMMENT / NOTE
3	MAY 2009	BMP RECORD DRAWING
2	12/11/07	REVISION PER JCC COMMENTS DATED 10/24/07
1	8/25/07	REVISION PER JCC COMMENTS DATED 7/29/07

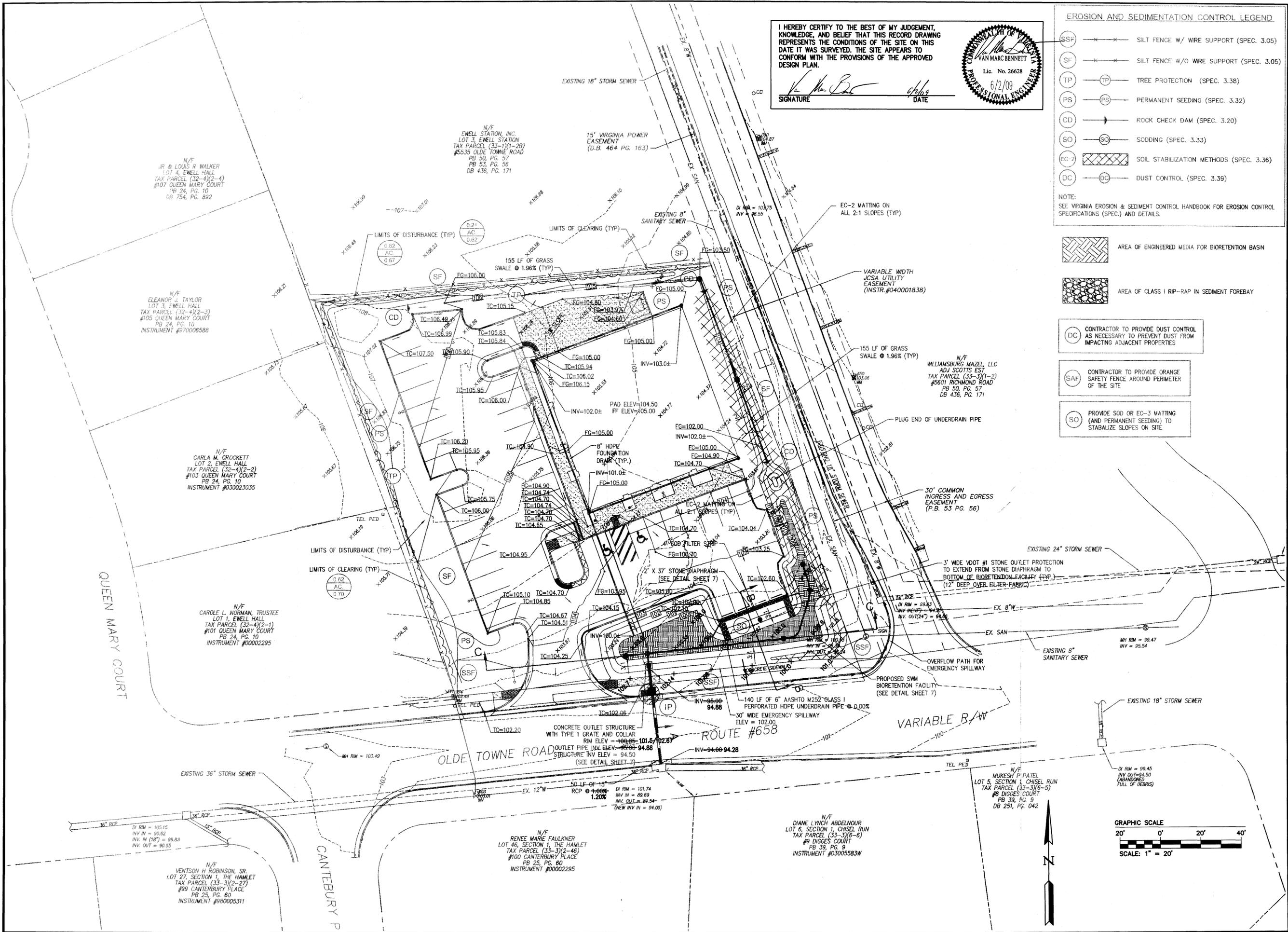


5248 Olde Towne Road, Suite 1
 Williamsburg, Virginia 23188
 (757) 259-0040
 Fax (757) 220-8884

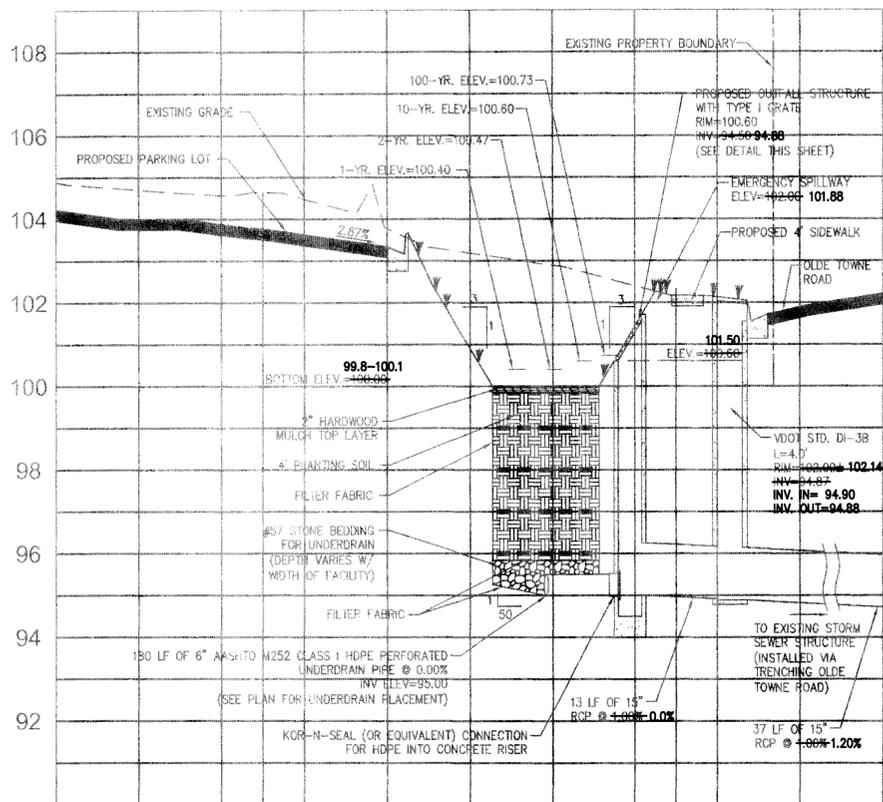


GRADING, DRAINAGE AND PHASE II EROSION AND SEDIMENT CONTROL PLAN
 5525 OLDE TOWNE ROAD
 OWNER - EPEUS LLC
 DEVELOPER - VAN KNIEST, INC.

Designed VMB/JSM	Drawn JSM
Scale 1"=20'	Date 1/5/06
Project No. 9557-01	Drawing No. 4 AS-BUILT

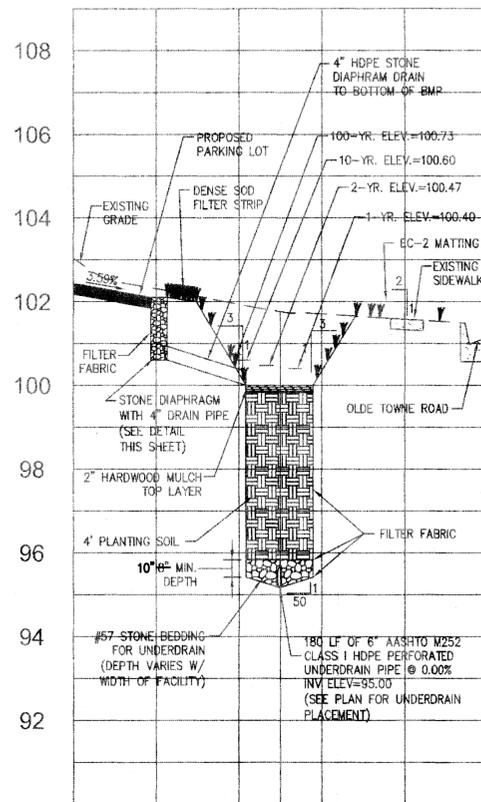


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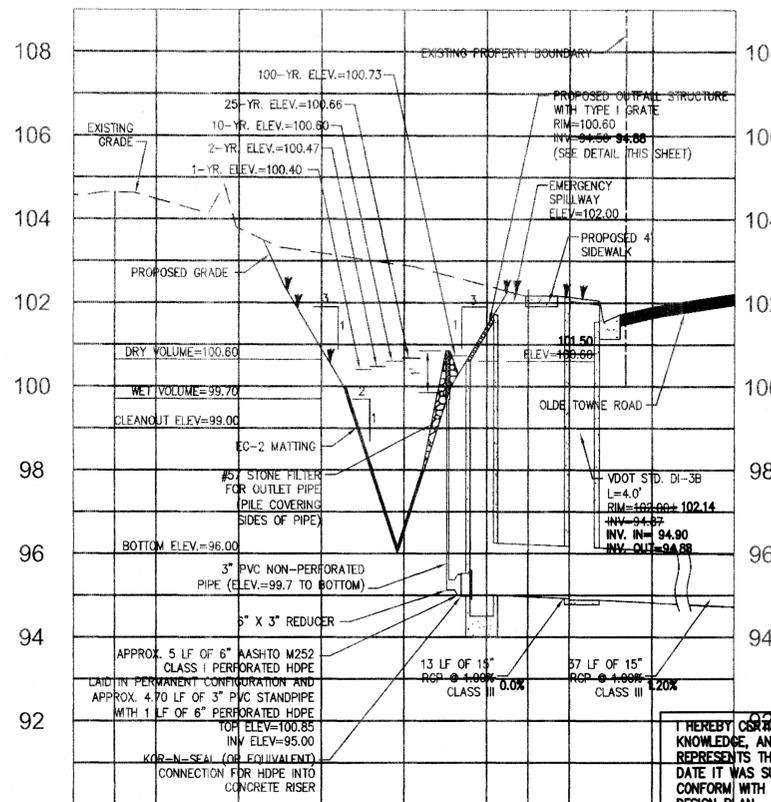
CROSS SECTION A-A

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



CROSS SECTION B-B

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



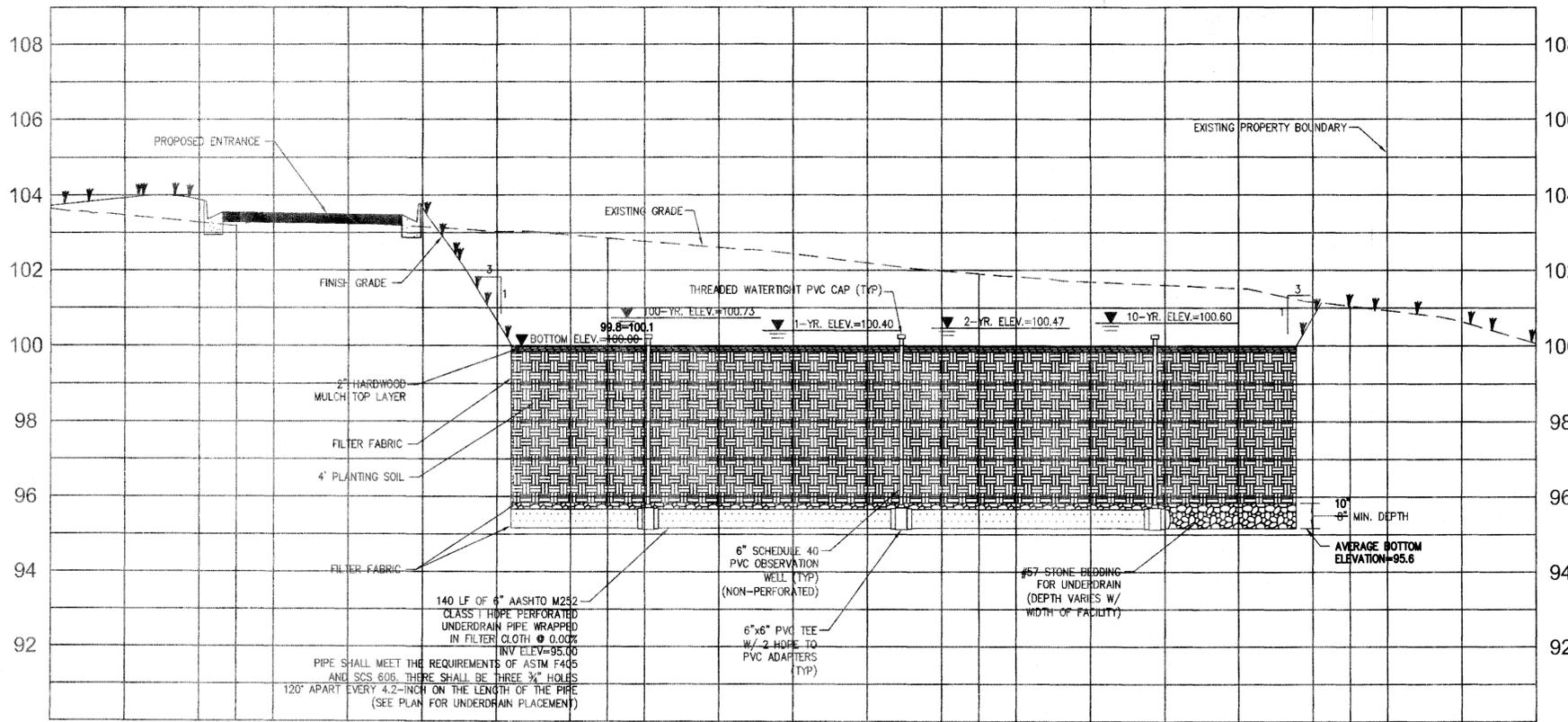
SEDIMENT TRAP DETAIL

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'

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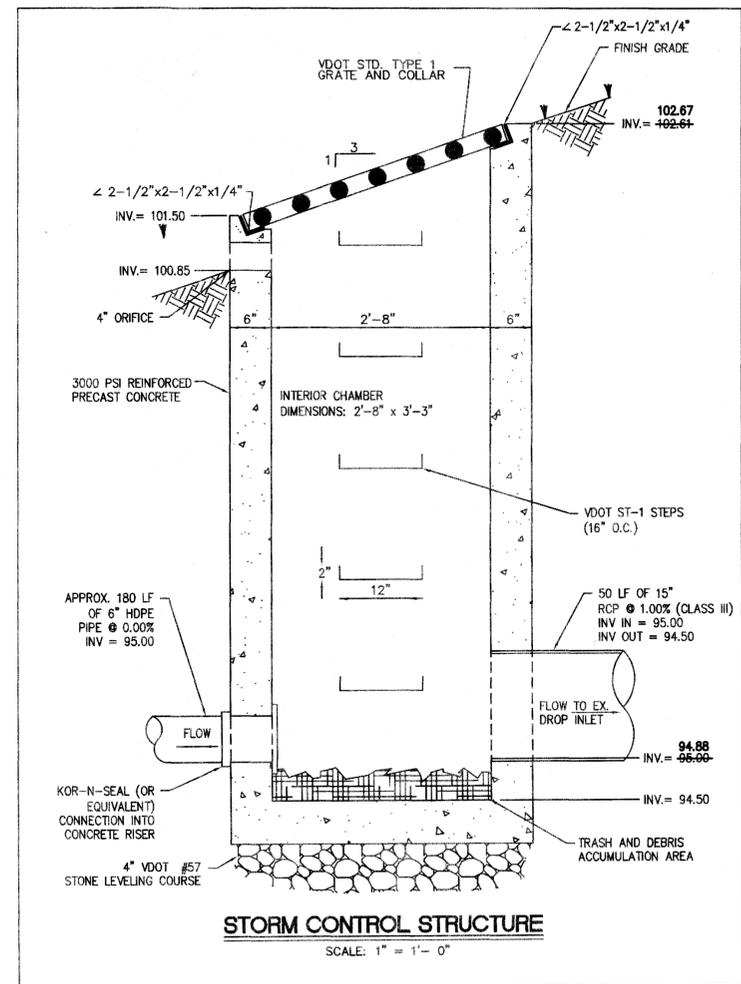
SIGNATURE: *Van Marc Bennett* DATE: 6/2/09

VAN MARC BENNETT
Lic. No. 26628
PROFESSIONAL ENGINEER



CROSS SECTION C-C

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



STORM CONTROL STRUCTURE

SCALE: 1" = 1'-0"

NO.	DATE	REVISION / COMMENT / NOTE
1	8/30/07	REVISION PER JCC COMMENTS DATED 1/24/07
2	12/17/07	REVISION PER JCC COMMENTS DATED 10/24/07
3	MAY 2009	BMP RECORD DRAWING

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994



STORMWATER MANAGEMENT FACILITY DETAILS

5255 OLDE TOWNE ROAD
OWNER - EPEUS LLC
DEVELOPER - VAN KNIEST, INC.

POWATAN DISTRICT
JAMES CITY COUNTY
VIRGINIA

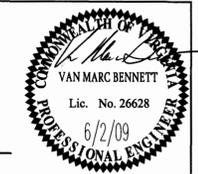
Designed VMB/JSM	Drawn JSM
Scale AS SHOWN	Date 1/5/06
Project No. 9557-01	
Drawing No. 7 AS-BUILT	

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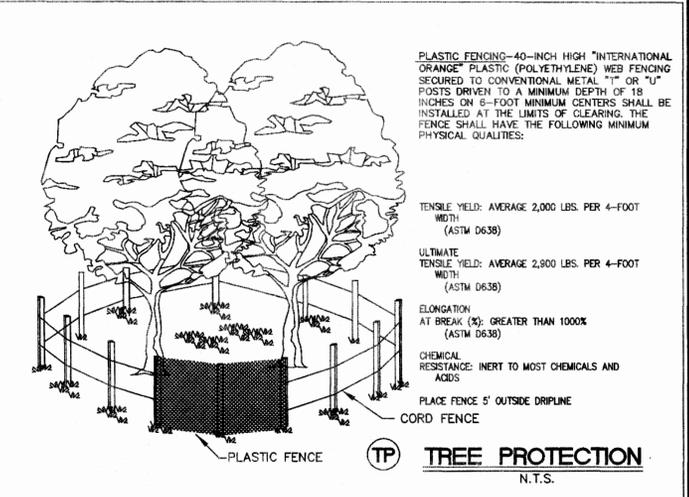
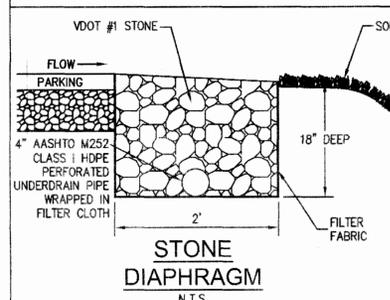
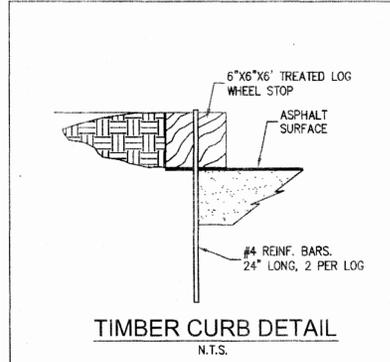
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[Signature]
SIGNATURE

6/2/09
DATE



No.	DATE	REVISION / COMMENT / NOTE
3	MAY 2009	BMP RECORD DRAWING
2	12/11/07	REVISION PER JCC COMMENTS DATED 10/24/07
1	8/20/07	REVISION PER JCC COMMENTS DATED 7/24/07



PLANTING REQUIREMENTS
MIXTURE OF GROUND COVERS, SHRUBS, AND TREES SHALL BE PLANTED IN BIO RETENTION AREAS. LANDSCAPE PLANS ARE FOUND ON SHEET 5 OF THIS PLAN SET. ANY PLANT SUBSTITUTIONS IN THE BIORETENTION BMP REQUIRE PRIOR WRITTEN APPROVAL FROM THE ENVIRONMENTAL DIVISION.

SOIL SPECIFICATIONS
THE BIORETENTION AREAS SHALL CONTAIN A PLANTING SOIL MIXTURE OF 50% SAND, 30% LEAF COMPOST (FULLY COMPOSTED, NOT PARTIALLY ROTTED LEAVES), AND 20% TOPSOIL. TOPSOIL SHALL BE SANDY LOAM OR LOAMY SAND OF UNIFORM COMPOSITION, CONTAINING NO MORE THAN 5% CLAY, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS GREATER THAN ONE INCH, BRUSH, OR ANY OTHER MATERIAL OR SUBSTANCE WHICH MAY BE HARMFUL TO PLANT GROWTH, OR A HINDRANCE TO PLANT GROWTH OR MAINTENANCE. THE TOPSOIL SHALL BE FREE OF PLANTS OR PLANT PARTS OF BERMUDA GRASS, QUACK GRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADIAN THISTLE, CATTAIL, OR OTHERS AS SPECIFIED. IT SHALL NOT CONTAIN TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH.

THE TOP SOIL SHALL BE TESTED AND MEET THE MINIMUM CRITERIA SET FORTH IN SECTION 3.11-28 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (LATEST EDITION).

A MULCH LAYER SHALL BE PROVIDED ON TOP OF THE PLANTING SOIL. AN ACCEPTABLE MULCH LAYER IS SHREDDED HARDWOOD CHIPS.

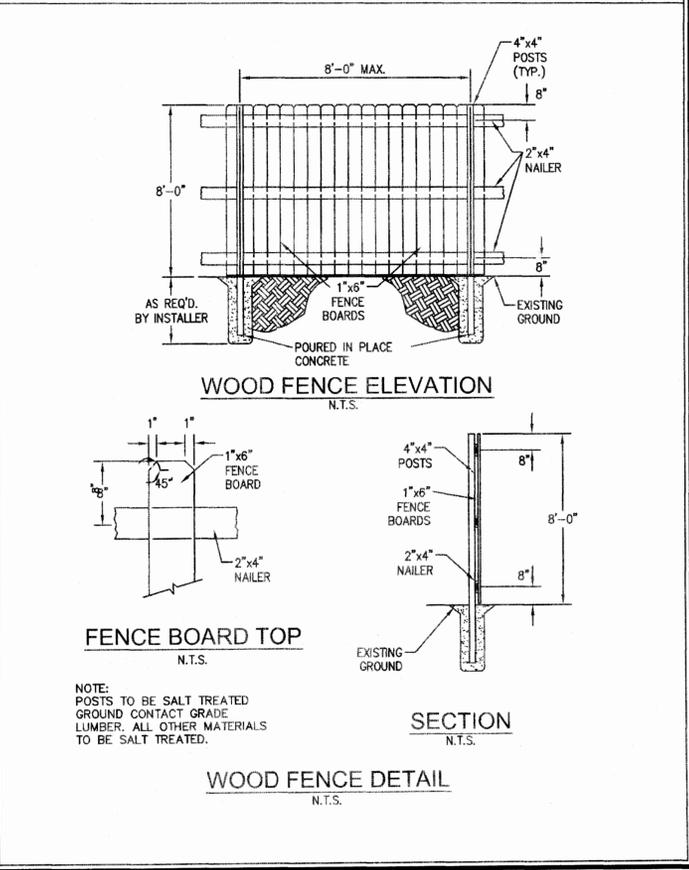
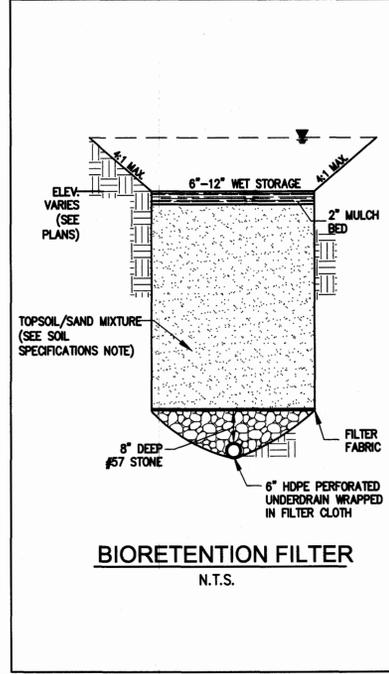
THE SOIL MIXTURE USED IN THE CONSTRUCTION OF THE FILTER IS TO BE APPROVED BY A VIRGINIA LICENSED GEOTECHNICAL ENGINEER AS MEETING THE SPECIFICATION PROVIDED IN THE PLAN SET.

UNDERDRAIN REQUIREMENTS
THE UNDERDRAIN PIPE SHALL MEET THE REQUIREMENTS OF ASTM F405 AND SCS 806. THERE SHALL BE THREE 3/4\"/>

MAINTENANCE PROGRAM & SCHEDULE

INSPECT AND REPAIR EROSION	MONTHLY
RE MULCH ANY VOID AREAS	WHENEVER NEEDED
REMOVE PREVIOUS MULCH AND REAPPLY	EVERY 3 YEARS
ADD FRESH MULCH LAYER	EVERY 6 MONTHS (SPRING/FALL)
REMOVAL AND REPLACEMENT OF ALL DISEASED VEGETATION	WHENEVER NEEDED
CONSIDERED BEYOND TREATMENT	
CHECK FOR ACCUMULATED SEDIMENTS	MONTHLY
SWEEP PAVEMENT SURFACE WITHIN BIORETENTION CELL DRAINAGE AREA	4 TIMES A YEAR
INSPECT AND REMOVE ANY DEBRIS THAT MAY COLLECT AT THE DROP INLET	AFTER MAJOR STORM EVENTS/OR SEMI ANNUALLY

NOTES
WATER PLANT MATERIAL EACH DAY FOR FOURTEEN CONSECUTIVE DAYS AFTER CONSTRUCTION.
CONTRACTOR SHALL REFER TO COUNTY BMP MANUAL (GROUP D, PGS. 48-50) AND MINIMUM STANDARDS 3.11 AND 3.11c OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK FOR METHODS/MATERIAL ASSOCIATED WITH CONSTRUCTION OF THE BIORETENTION CELLS.
STANDING WATER SHOULD NOT BE PRESENT MORE THAN 12 HOURS OR THE BIORETENTION FILTER MAY BE IN NEED OF REPAIR.
ROOT SHALL BE SAVED HARMLESS FROM THE MAINTENANCE RESPONSIBILITY OR LIABILITY ASSOCIATED WITH ANY FAILURE OF THE STORM WATER MANAGEMENT FACILITY AND ITS STRUCTURES.
A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE BASIN DURING CONSTRUCTION SHALL CERTIFY THE CONSTRUCTION OF THE BIORETENTION BASIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE BIORETENTION BASIN CONSTRUCTION SCHEDULE WITH THE ENGINEER TO ENSURE ON SITE MONITORING.



5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 255-0040
Fax (757) 220-8994



NOTES AND DETAILS
5525 OLDE TOWNE ROAD
OWNER - EPEUS LLC
DEVELOPER - VAN KNIEST, INC.
POWhatan DISTRICT
JAMES CITY COUNTY
VIRGINIA

Designed VMB/JSM	Drawn JSM
Scale AS SHOWN	Date 1/5/06
Project No. 9557-01	
Drawing No. 10 AS-BUILT	

COUNTY OF JAMES CITY FINAL SITE PLAN	
APPROVALS	DATE
Prepared: JB/lec	1/16/06
Checked: BAW/lec	1/16/06
Reviewed: R	2/16/06
Approved: SUT/lec	1/24/06
Approved: MWD	2/15/06
Approved: BKL/lec	12/21/07
Approved: WLB/lec	1/12/06



SITE PLAN FOR 5525 OLDE TOWNE ROAD

JAMES COUNTY, VIRGINIA

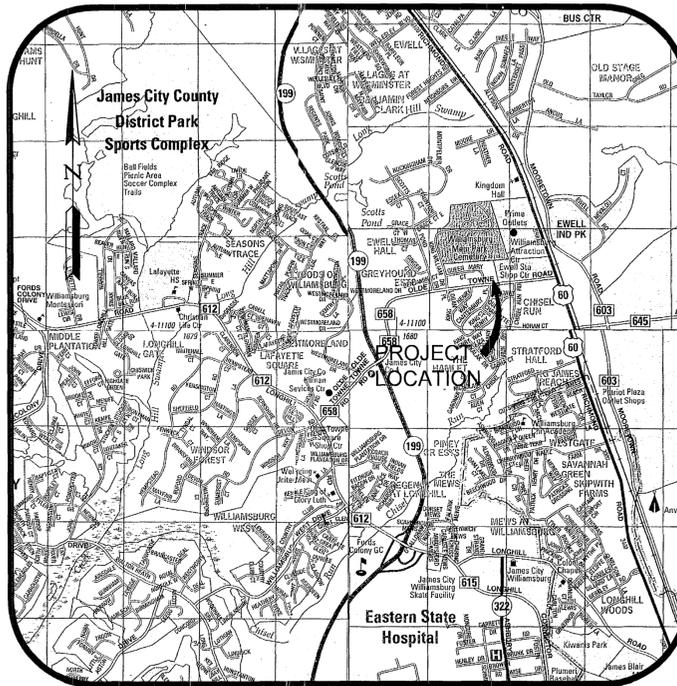
S.P. 0001 - 2006

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	COVER SHEET
2	EXISTING SITE CONDITIONS, DEMOLITION AND PHASE I E&SC PLAN
3	SITE PLAN
4	DRAINAGE, GRADING AND PHASE II E&SC PLAN
5	LANDSCAPE PLAN
6	LIGHTING PLAN
7	STORMWATER MANAGEMENT FACILITY DETAIL SHEET
8	DETAIL SHEET
9	DETAIL SHEET
10	DETAIL SHEET

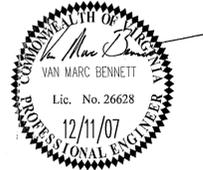
LEGEND

EXISTING		PROPOSED
— EX. W —	WATER	— W —
— EX. S —	SANITARY SEWER	— S —
=====	STORM SEWER	=====
— EX. FM —	FORCE MAIN	— FM —
○	MANHOLE	●
== □ ==	CURB DROP INLET	== □ ==
== □ ==	YARD DROP INLET	== □ ==
== ▽ ==	FLARED END SECTION	== ▽ ==
— M —	VALVE	— M —
— M —	FIRE HYDRANT ASSEMBLY	— M —
— M —	BLOW-OFF VALVE	— M —
⊙	AIR RELEASE ASSEMBLY	⊙
○ SCO	CLEAN OUT	○
⊙ WM	WATER METER	⊙
⊙	STREETLIGHT	⊙
—	CENTERLINE/BASELINE	—
—	RIGHT OF WAY	—
—	PROPERTY LINE	—
—	DITCH/SWALE	—
—	CONCRETE LINED DITCH	—
—	EXISTING TREELINE	—
—	LIMITS OF CLEARING	—
—	RIP RAP	—
—	CURB	—
—	CURB AND GUTTER	—
—	REVERSE GUTTER PAN	—
—	EDGE OF PAVEMENT	—
—	EXISTING GROUND ELEVATION	—
—	PROPOSED SPOT GRADE	—
—	CONTOUR	—
—	HIGH POINT	—
—	LOW POINT	—



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permitted use number 20403119
VICINITY MAP (APPROX. SCALE 1"=2000')
DATE: JANUARY 5, 2006
REVISED: AUGUST 30, 2007
AES PROJECT NO.: 9557-01
JAMES CITY COUNTY CASE NO. SP-1-06

SHEET 1 OF 9



CONSULTING ENGINEERS

WILLIAMSBURG • RICHMOND • GLOUCESTER

5248 Olde Towne Road, Suite 1 • Williamsburg, Virginia 23188
(757) 253-0040 • Fax (757) 220-8994

GENERAL NOTES

- SITE DATA:**
OWNER/DEVELOPER: EPEUS, LLC
428 AIRPORT ROAD
WILLIAMSBURG, VA 23188
P: (757) 565-2699
F: (757) 565-1617
CONTACT: MR. JOHN KNIEST
SITE ADDRESS: 5525 OLDE TOWNE ROAD
WILLIAMSBURG, VA 23188
TAX MAP PARCEL NO: (33-3)(1-3)
ZONING: B-1, GENERAL BUSINESS
PARCEL AREA: 42501 SF = 0.98 ACRES
BUILDING FOOTPRINT: 6037 SF = 0.14 ACRES
BUILDING HEIGHT: NOT TO EXCEED 35'
BUILDING SQUARE FOOTAGE: 6940 SF (2 STORY)
WETLAND DISTURBED AREA: NONE ON SITE
FLOOD HAZARD MAP: F.I.R.M. PANEL NUMBER 510201 0035B - ZONE X
WATERSHED: POWHATAN CREEK WATERSHED, SUBWATERSHED 207-101-1
FLOOR AREA RATIO: 16.3%
- BUILDING SETBACKS:**
FRONT: 50' (CONFLICTING ZONINGS, B-1 ADJACENT TO R-2)
WEST SIDE: 50' (CONFLICTING ZONINGS, B-1 ADJACENT TO R-2)
EAST SIDE: 20' SETBACK
REAR: 20' SETBACK
- THESE CONSTRUCTION PLANS ARE INTENDED FOR USE IN THE REDEVELOPMENT OF A SITE LOCATED AT 5525 OLDE TOWNE ROAD IN WILLIAMSBURG, VIRGINIA.
- ALL UTILITIES SHALL BE PLACED UNDERGROUND.
- CONTACT MISS UTILITY (1-800-552-7001) AT LEAST 48 HOURS IN ADVANCE FOR MARKING OF EXISTING UTILITY LOCATIONS PRIOR TO ANY EXCAVATION OR DEMOLITION.
- EXISTING UTILITY LOCATIONS INDICATED ARE APPROXIMATE. FIELD VERIFY PRIOR TO COMMENCING THE WORK.
- ALL COMPONENTS OF THE WATER DISTRIBUTION AND SANITARY SEWER SYSTEM SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH THE LATEST EDITION OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS, THE HRPDC REGIONAL CONSTRUCTION STANDARDS (THIRD EDITION WITH AMENDMENTS DATED JANUARY 2003), AND THE COMMONWEALTH OF VIRGINIA DEPARTMENT OF HEALTH WATERWORKS AND SEWERAGE REGULATIONS. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS AND PRODUCTS ON ALL PROJECTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK. A COPY OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA AND HRPDC REGIONAL CONSTRUCTION STANDARDS MUST BE KEPT ON-SITE BY THE CONTRACTOR DURING THE FULL TIME OF INSTALLING, TESTING, AND CONVEYING THE FACILITIES TO JCSA.
- VERIFY ALL DIMENSIONS AND COORDINATE WITH AES CONSULTING ENGINEERS FOR RESOLUTION OF ANY UTILITY DISCREPANCIES.
- NOTIFY JAMES CITY SERVICE AUTHORITY AT LEAST 24 HOURS PRIOR TO ANY EXCAVATION OR DEMOLITION WITHIN UTILITY CORRIDORS.
- THIS SITE SHALL BE SERVED BY PUBLIC WATER AND SEWER SYSTEMS OF THE JAMES CITY SERVICE AUTHORITY. JCSA WILL NOT PERFORM ANY TESTING ON THE PROPOSED WATER OR SEWER MAINS UNTIL ALL UTILITIES HAVE BEEN INSTALLED. ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ON THE EXISTING WATER AND SANITARY FORCE MAINS.
- ANY EXISTING, UNUSED WELLS SHALL BE ABANDONED IN ACCORDANCE WITH STATE PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE.
- CONTRACTOR SHALL VERIFY IF A SEPTIC TANK AND DRAIN FIELD CURRENTLY SERVE THE EXISTING SITE IF A SEPTIC SYSTEM IS DISCOVERED, THE GENERAL CONTRACTOR SHALL ABANDON OR REMOVE THE SEPTIC SYSTEM IN ACCORDANCE WITH STATE AND LOCAL HEALTH DEPARTMENT REGULATIONS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH VIRGINIA NATURAL GAS, DOMINION VIRGINIA POWER, VERIZON TELEPHONE, APPROPRIATE TELEVISION CABLE COMPANY, AND OTHERS THAT MAY BE REQUIRED.
- STORM STRUCTURES, SEWER AND BEDDING SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS. ALL PIPE BEDDING SHALL BE IN ACCORDANCE WITH PB-1 AND MANUFACTURER SPECS. AND GUIDELINES, AND MANHOLES DEEPER THAN 4 FEET SHALL HAVE STEPS (ST-1). ALL REINFORCED CONCRETE PIPE (RCP) SHALL BE CLASS III UNLESS OTHERWISE NOTED. ALL CORRUGATED METAL PIPE SHALL BE ALUMINIZED STEEL TYPE 2.
- ALL NEW SIGNS SHALL BE IN ACCORDANCE WITH ARTICLE II, DIVISION 3 OF THE JAMES CITY COUNTY ZONING ORDINANCE.
- CONTOUR INTERVAL IS 1 FOOT.
- VDOT DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION BMP OR ITS STRUCTURE AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES.
- CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FOR THE WORK INDICATED TO INCLUDE, BUT NOT LIMITED TO VSPM, JAMES CITY COUNTY LAND DISTURBANCE, AND VDOT CE-7.
- A LAND DISTURBING PERMIT AND SILTATION AGREEMENT, WITH SURETY ARE REQUIRED FOR THIS PROJECT.
- THE PROFESSIONAL WHOSE SEAL IS AFFIXED HEREON SHALL ACT AS THE "RESPONSIBLE LAND DISTURBER" FOR PURPOSES OF PLAN APPROVAL ONLY. PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT, THE OWNER OR DEVELOPER SHALL PROVIDE THE NAME OF A "RESPONSIBLE LAND DISTURBER" WHO SHALL ASSUME RESPONSIBILITY AS THE "RESPONSIBLE LAND DISTURBER" FOR THE CONSTRUCTION PHASE OF THE PROJECT. THE OWNER OR DEVELOPER SHALL PROVIDE WRITTEN NOTIFICATION SHOULD THE "RESPONSIBLE LAND DISTURBER" CHANGE DURING CONSTRUCTION.
- SOLID WASTE DISPOSAL SHALL BE PROVIDED BY PRIVATE HAULER.
- PREPARATION OF RECORD DRAWINGS AND CONSTRUCTION CERTIFICATIONS AS REQUIRED FOR PROJECT FACILITIES MAY NOT NECESSARILY BE PERFORMED BY THE PLAN PREPARER AND MAY BE PERFORMED BY OTHERS.
- TRIP GENERATION
A.M. PEAK HOUR
RETAIL: 38.3
OFFICE: 3.9
OTHER: —
TOTAL: 42.2
- ALL OBJECTIONABLE AND DELETERIOUS MATERIAL IS TO BE REMOVED FROM THE SITE AND DISPOSED OF IN A STATE APPROVED FACILITY MEETING THE REQUIREMENTS OF ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.
- THE STORMWATER MANAGEMENT/BMP FACILITY WILL REQUIRE SUBMISSION, REVIEW AND APPROVAL OF A RECORD DRAWING (ASBULT) AND A PROFESSIONAL ENGINEER SHALL INSPECT CONSTRUCTION AND ISSUE A CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND/SURETY AS OUTLINED BY COUNTY GUIDELINES.



PARKING CALCULATIONS

PROPOSED USE:	5,164 SF RETAIL AND 1,776 SF OFFICE SPACE
TOTAL:	6,940 SF
TYPE:	TOTAL SPACES REQUIRED TOTAL SPACES PROVIDED
REGULAR (RETAIL) (1/200 S.F. @ 5,164 S.F.)	26 28
REGULAR (OFFICE) (1/250 S.F. @ 1,776 S.F.)	8 10
HANDICAP SPACES	2 2
LOADING SPACES (1/20,000 S.F. @ 6,940 S.F.)	1 1

LAND USE SUMMARY TABLE

ITEM	S.F.	AC.	%
BUILDING FOOTPRINT	6,037	0.14	14
PARKING & ROADS	15,152	0.35	36
SIDEWALKS & LOADING AREA	2,848	0.07	7
TOTAL IMPERVIOUS AREA	24,037	0.56	57
TOTAL OPEN SPACE	18,464	0.42	43
TOTAL SITE	42,501	0.98	100
TOTAL AREA DISTURBED	38,755	0.93	95
FLOOR AREA RATIO	16.3%		

APPROVAL DATE	No.	DATE	REVISION / COMMENT / NOTE	REVISION BY	REVIEWED BY
	2	12/11/07	REVISION PER JCC COMMENTS DATED 10/24/06	GVC	
	1	10/09/07	REVISION PER JCC COMMENTS DATED 01/24/06	JSM	

29B

DEMOLITION LEGEND

EX. CONCRETE AND OTHER SITE FEATURES TO BE REMOVED OR DEMOLISHED

TREES/SHRUBS TO BE REMOVED

CURBING, FENCING TO BE REMOVED

NOTE: OTHER FEATURES DEMOLISHED/REMOVED AS NOTED.

ENVIRONMENTAL INVENTORY IMPACTS

TIDAL WETLANDS:	NONE ON SITE
TIDAL SHORES:	NONE ON SITE
NON-TIDAL WETLANDS IN RPA:	NONE ON SITE
100 FT RPA BUFFER:	NONE ON SITE
NON-TIDAL WETLANDS IN RMA:	NONE ON SITE
HYDRIC SOILS:	NONE ON SITE
25% SLOPES OR GREATER:	NONE ON SITE

SOIL No.	SOIL NAME	TYPICAL SLOPES	EROSION FACTOR (K)	EROSION FACTOR (T)
29B	SLAGLE FINE SANDY LOAM	2-6%	0.24	3

INFORMATION TAKEN FROM "SOIL SURVEY OF JAMES CITY AND YORK COUNTIES AND THE CITY OF WILLIAMSBURG, VIRGINIA" ISSUED IN APRIL, 1985, BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY.

SOIL SUSCEPTIBILITY TO EROSION CLASSIFICATION (K)
 0.23 AND LOWER - LOW ERODIBILITY
 0.23 TO 0.36 - MODERATE ERODIBILITY
 0.36 AND UP - HIGH ERODIBILITY

THE MAP SHOWN IS A "BEST FIT MODEL" OF THE SCS MAPS WITH EXISTING BASE INFORMATION.

Denotes Highly Erodible Soils / Critical Erosion Areas

Denotes 25% or Greater Slopes

NO.	DATE	REVISION / COMMENT / NOTE
1	8/20/07	REVISION PER JCC COMMENTS DATED 1/24/07
2	12/11/07	REVISION PER JCC COMMENTS DATED 10/24/07



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 Williamsburg, Virginia 23188
 (757) 253-0040
 Fax: (757) 220-8994



EXISTING SITE CONDITIONS, DEMOLITION AND PHASE I EROSION AND SEDIMENT CONTROL PLAN

5625 OLDE TOWNE ROAD
 OWNER - EPEUS LLC
 DEVELOPER - VAN KNIEST, INC.
 POWHATAN DISTRICT
 JAMES CITY COUNTY
 VIRGINIA

Designed	VMB/JSM	Drawn	JSM
Scale	1"=20'	Date	1/5/06
Project No.	9557-01		
Drawing No.	2		

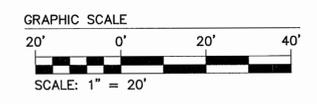
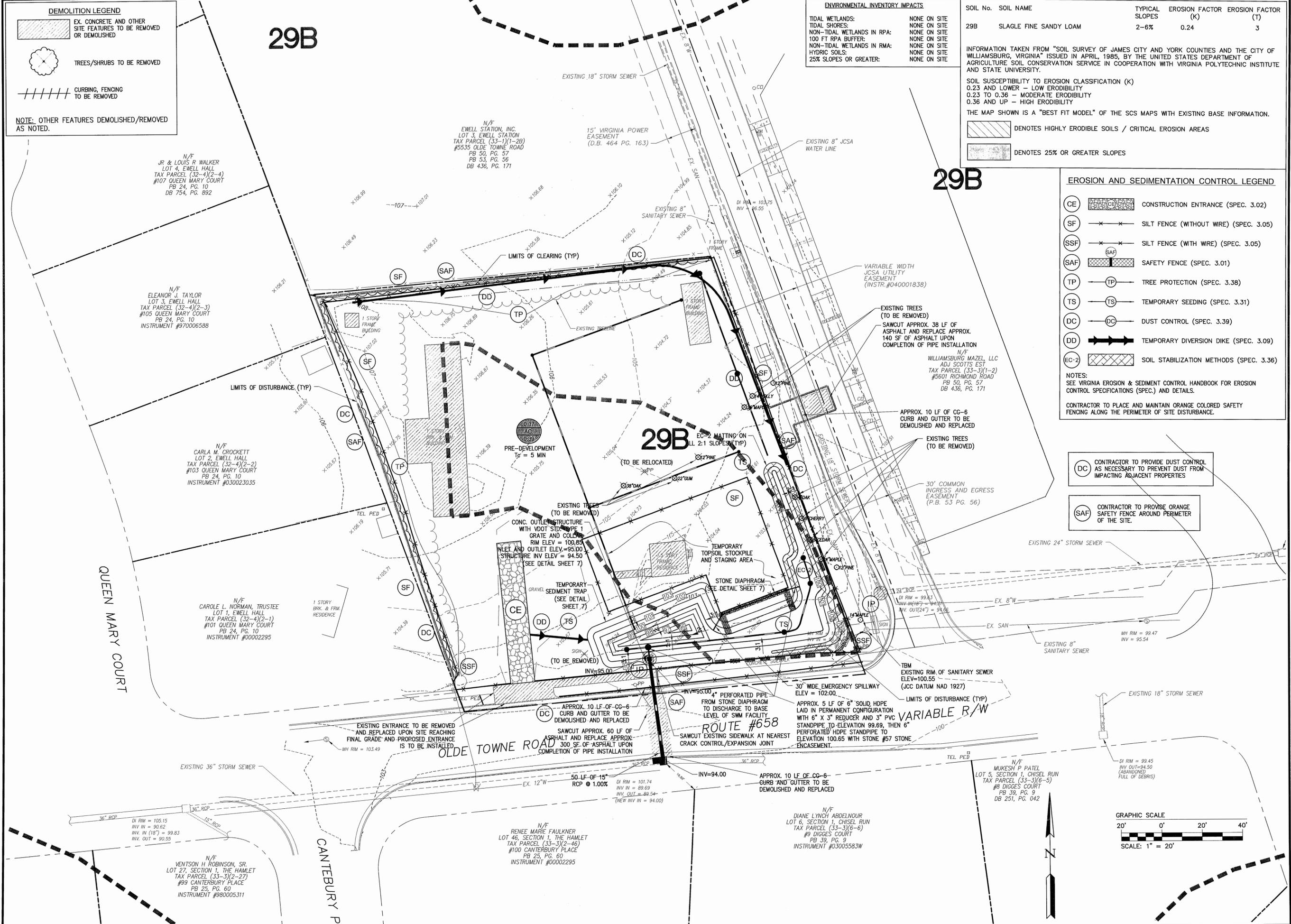
EROSION AND SEDIMENTATION CONTROL LEGEND

- CE CONSTRUCTION ENTRANCE (SPEC. 3.02)
- SF SILT FENCE (WITHOUT WIRE) (SPEC. 3.05)
- SSF SILT FENCE (WITH WIRE) (SPEC. 3.05)
- SAF SAFETY FENCE (SPEC. 3.01)
- TP TREE PROTECTION (SPEC. 3.38)
- TS TEMPORARY SEEDING (SPEC. 3.31)
- DC DUST CONTROL (SPEC. 3.39)
- DD TEMPORARY DIVERSION DIKE (SPEC. 3.09)
- EC-2 SOIL STABILIZATION METHODS (SPEC. 3.36)

NOTES:
 SEE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK FOR EROSION CONTROL SPECIFICATIONS (SPEC.) AND DETAILS.
 CONTRACTOR TO PLACE AND MAINTAIN ORANGE COLORED SAFETY FENCING ALONG THE PERIMETER OF SITE DISTURBANCE.

DC CONTRACTOR TO PROVIDE DUST CONTROL AS NECESSARY TO PREVENT DUST FROM IMPACTING ADJACENT PROPERTIES

SAF CONTRACTOR TO PROVIDE ORANGE SAFETY FENCE AROUND PERIMETER OF THE SITE.



EROSION AND SEDIMENTATION CONTROL LEGEND

- (SSF) — x — x — SILT FENCE W/ WIRE SUPPORT (SPEC. 3.05)
- (SF) — x — x — SILT FENCE W/O WIRE SUPPORT (SPEC. 3.05)
- (TP) — TP — TREE PROTECTION (SPEC. 3.38)
- (PS) — PS — PERMANENT SEEDING (SPEC. 3.32)
- (CD) — CD — ROCK CHECK DAM (SPEC. 3.20)
- (SO) — SO — SODDING (SPEC. 3.33)
- (EC-2) — [Hatched Box] — SOIL STABILIZATION METHODS (SPEC. 3.36)
- (DC) — DC — DUST CONTROL (SPEC. 3.39)

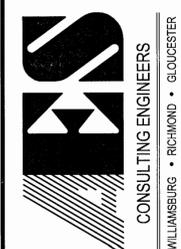
NOTE:
SEE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK FOR EROSION CONTROL SPECIFICATIONS (SPEC.) AND DETAILS.

- [Hatched Box] AREA OF ENGINEERED MEDIA FOR BIORETENTION BASIN
- [Stippled Box] AREA OF CLASS I RIP-RAP IN SEDIMENT FOREBAY
- (DC) CONTRACTOR TO PROVIDE DUST CONTROL AS NECESSARY TO PREVENT DUST FROM IMPACTING ADJACENT PROPERTIES
- (SAF) CONTRACTOR TO PROVIDE ORANGE SAFETY FENCE AROUND PERIMETER OF THE SITE
- (SO) PROVIDE SOD OR EC-3 MATTING (AND PERMANENT SEEDING) TO STABILIZE SLOPES ON SITE

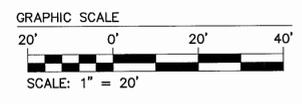
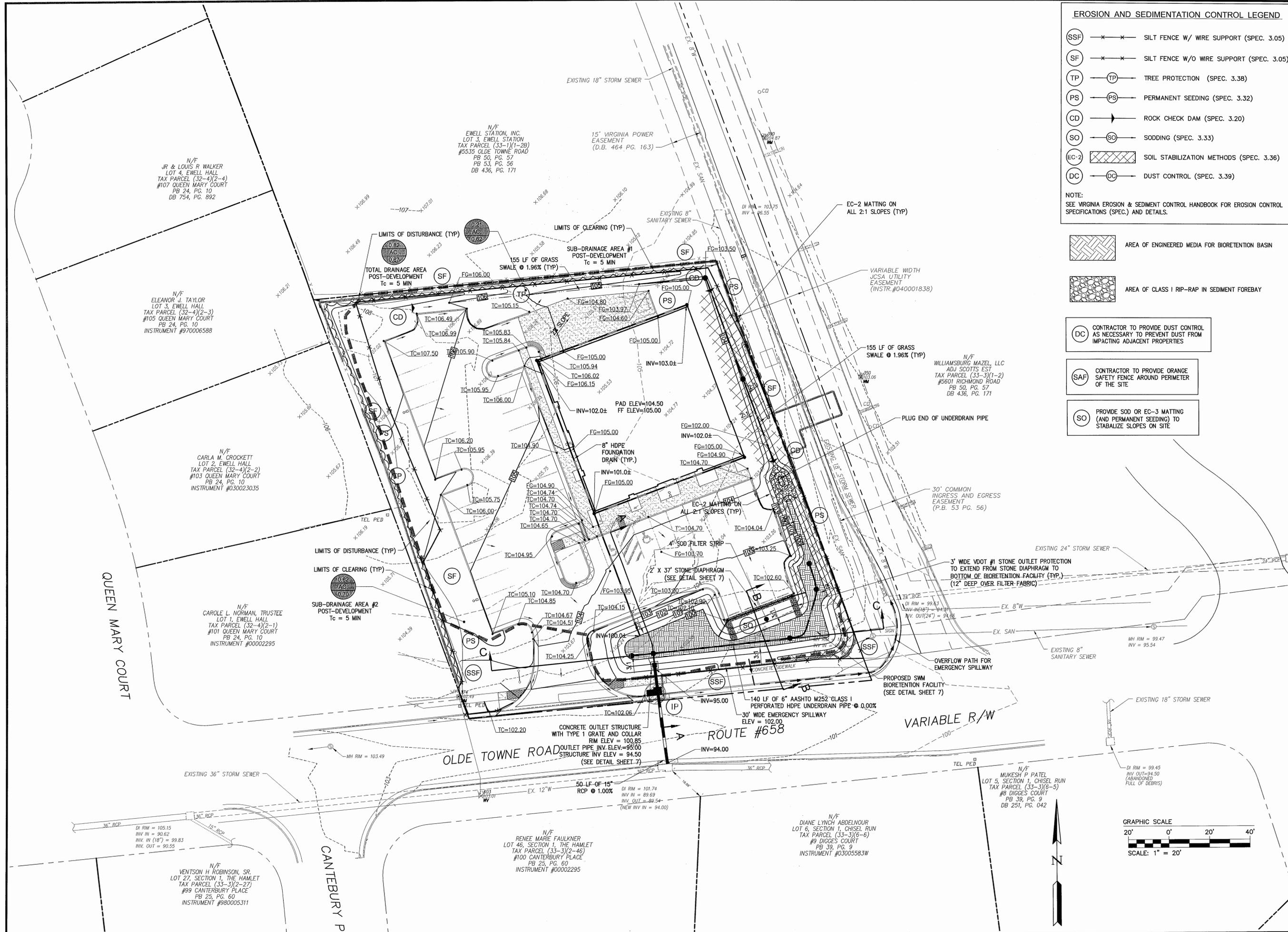
NO.	DATE	REVISION / COMMENT / NOTE
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1	8/30/07	REVISION PER JCC COMMENTS DATED 7/24/07



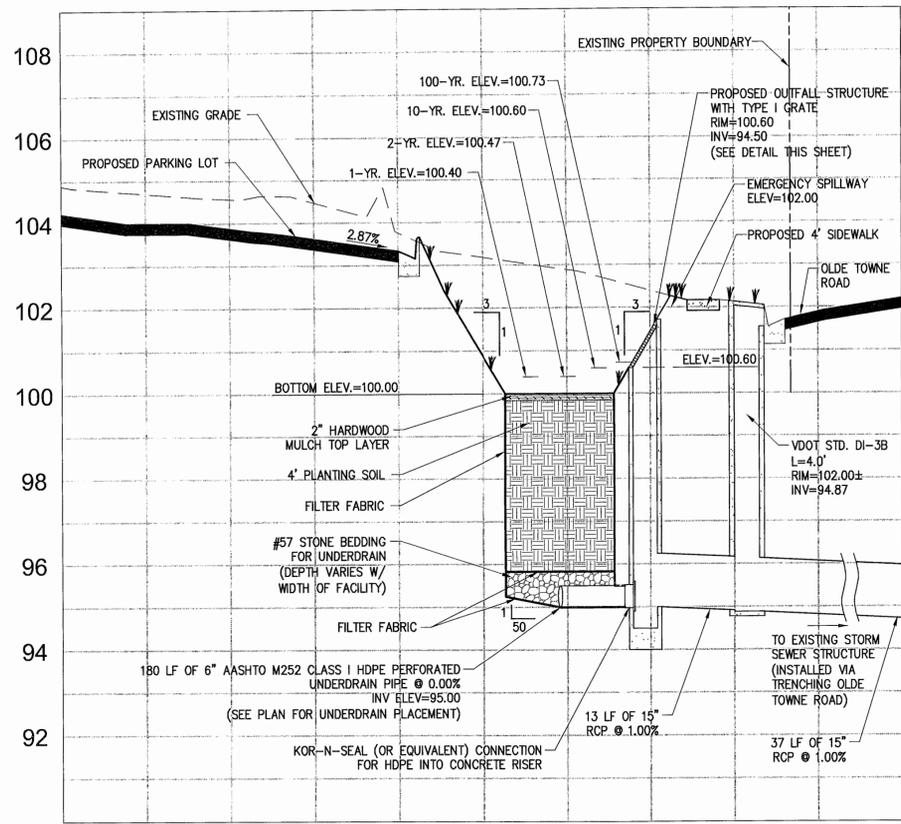
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Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994



GRADING, DRAINAGE AND PHASE II EROSION AND SEDIMENT CONTROL PLAN	
5525 OLDE TOWNE ROAD	
OWNER - EPEUS LLC	
DEVELOPER - VAN KNIEST, INC.	
Designed VMB/JSM	Drawn JSM
Scale 1"=20'	Date 1/5/06
Project No. 9557-01	
Drawing No. 4	

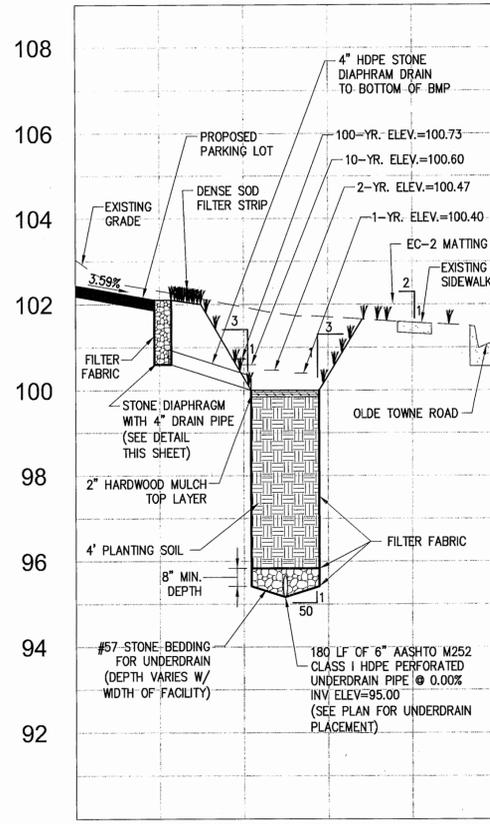


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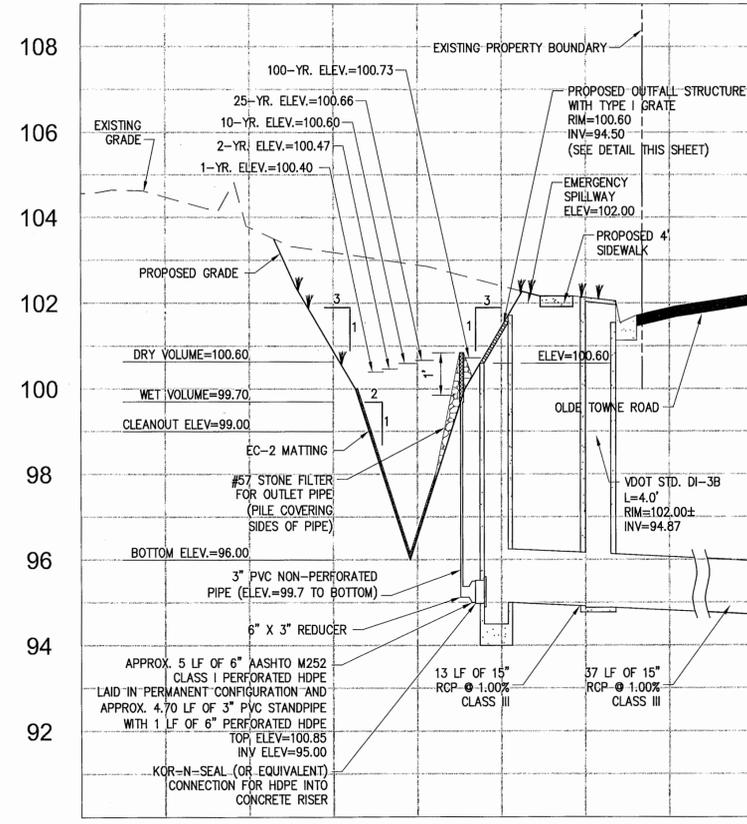
CROSS SECTION A-A

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



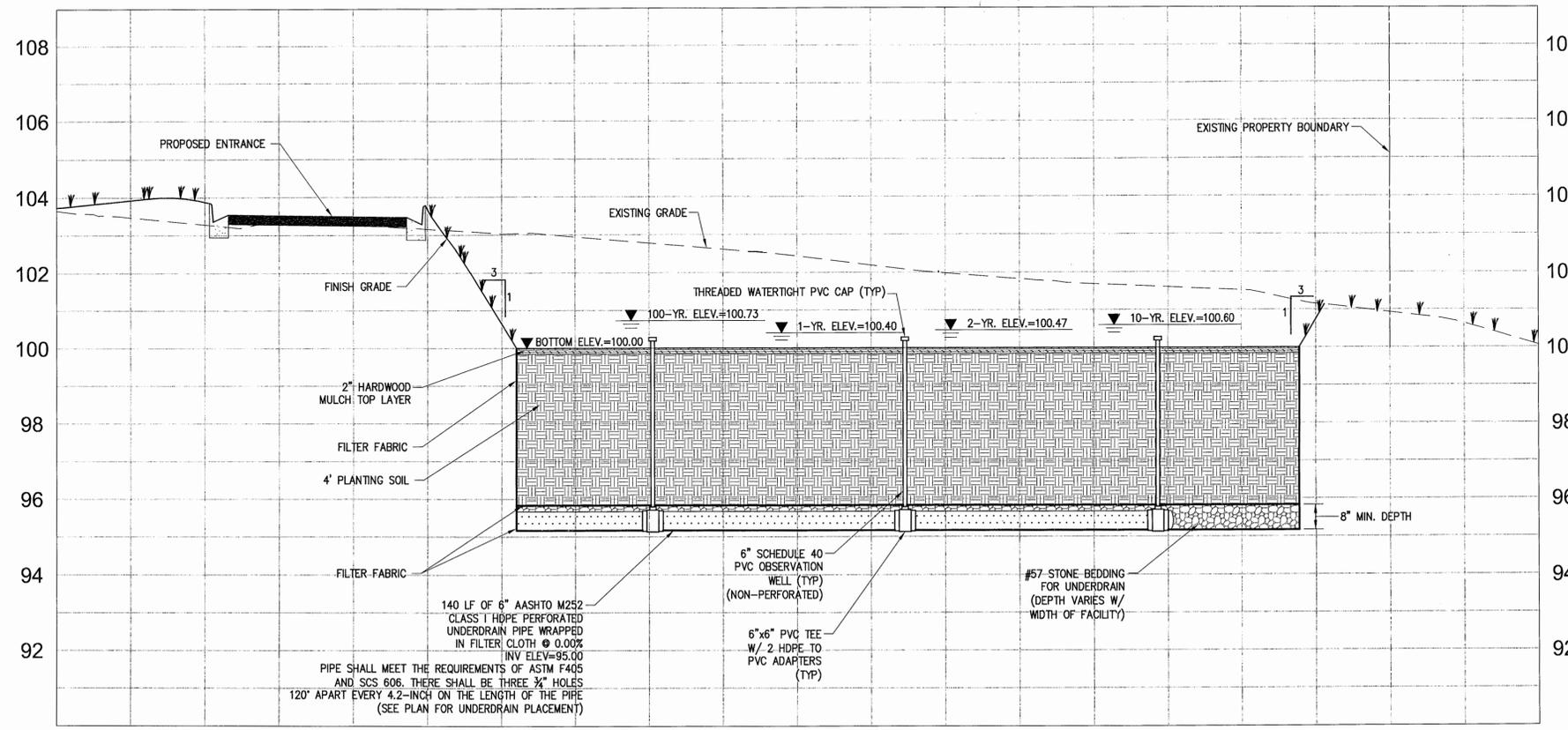
CROSS SECTION B-B

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



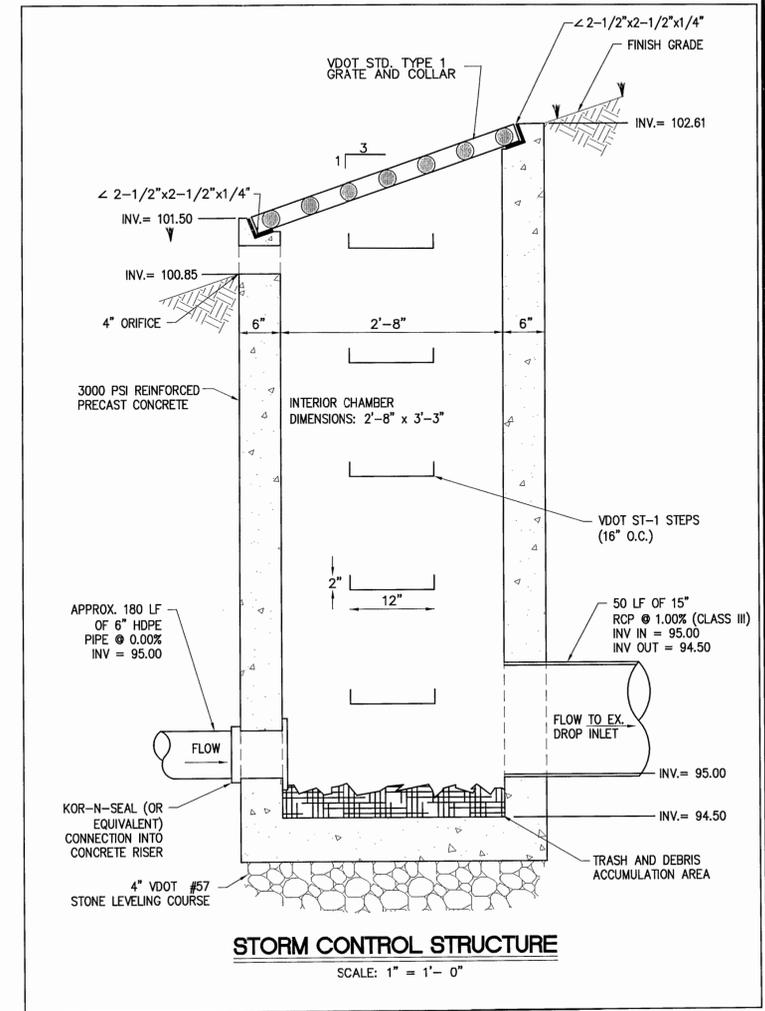
SEDIMENT TRAP DETAIL

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



CROSS SECTION C-C

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=2'



STORM CONTROL STRUCTURE

SCALE: 1" = 1'-0"

NO.	DATE	REVISION / COMMENT / NOTE	DESIGNED BY	DRAWN BY
2	12/11/07	REVISION PER ACC COMMENTS DATED 10/24/07	JSM	JSM
1	8/30/07	REVISION PER ACC COMMENTS DATED 7/24/07	JSM	JSM



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(757) 253-0040
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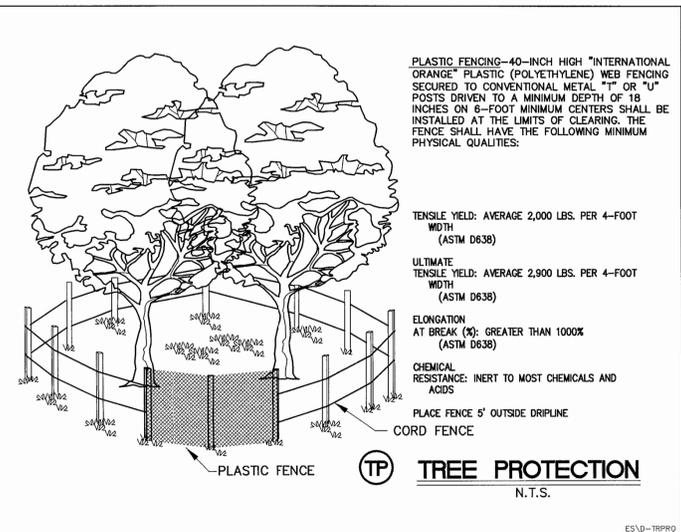
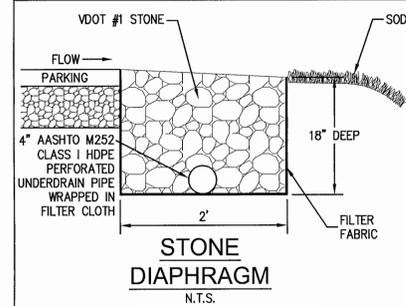
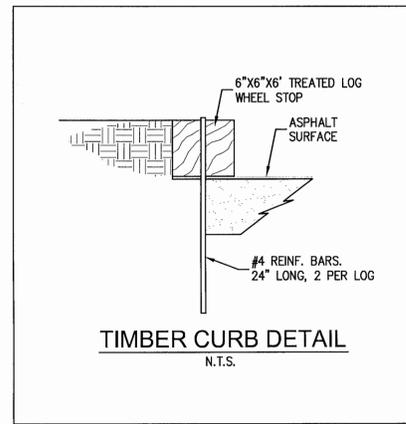


STORMWATER MANAGEMENT FACILITY DETAILS
5248 OLDE TOWNE ROAD
OWNER - EPEUS LLC
DEVELOPER - VAN KNIEST, INC.
POWhatan DISTRICT
JAMES CITY COUNTY
VIRGINIA
WILLIAMSBURG • RICHMOND • GLOUCESTER

Designed	VMB/JSM	Drawn	JSM
Scale	AS SHOWN	Date	1/5/06
Project No.	9557-01	Drawing No.	7

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PLANTING REQUIREMENTS
MIXTURE OF GRASS COVERS, SHRUBS, AND TREES SHALL BE PLANTED IN BIO RETENTION AREAS. LANDSCAPE PLANS ARE FOUND ON SHEET 5 OF THIS PLAN SET. ANY PLANT SUBSTITUTIONS IN THE BIORETENTION BMP REQUIRE WRITTEN APPROVAL FROM THE ENVIRONMENTAL DIVISION.

SOIL SPECIFICATIONS
THE BIORETENTION AREAS SHALL CONTAIN A PLANTING SOIL MIXTURE OF 50% SAND, 30% LEAF COMPOST (FULLY COMPOSTED, NOT PARTIALLY ROTTED LEAVES), AND 20% TOPSOIL. TOPSOIL SHALL BE SANDY LOAM OR LOAMY SAND OF UNIFORM COMPOSITION, CONTAINING NO MORE THAN 5% CLAY, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS GREATER THAN ONE INCH DIAMETER OR ANY OTHER MATERIAL OR SUBSTANCE WHICH MAY BE HARMFUL TO PLANT GROWTH, OR A HINDRANCE TO PLANT GROWTH OR MAINTENANCE. THE TOPSOIL SHALL BE FREE OF PLANTS OR PLANT PARTS OF BERBERIS GRASS, QUACK GRASS, JOHNSON GRASS, MUDDYBUD, BUTTSIDED POISON Ivy, CANADIAN THISTLE, CATTAIL, OR OTHERS AS SPECIFIED. IT SHALL NOT CONTAIN TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH.

THE TOP SOIL SHALL BE TESTED AND MEET THE MINIMUM CRITERIA SET FORTH IN SECTION 3.11-28 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (LATEST EDITION).

A MULCH LAYER SHALL BE PROVIDED ON TOP OF THE PLANTING SOIL. AN ACCEPTABLE MULCH LAYER IS SHREDDED HARDWOOD CHIPS.

THE SOIL MIXTURE USED IN THE CONSTRUCTION OF THE FILTER IS TO BE APPROVED BY A VIRGINIA LICENSED GEOTECHNICAL ENGINEER AS MEETING THE SPECIFICATION PROVIDED IN THE PLAN SET.

UNDERDRAIN REQUIREMENTS
THE UNDERDRAIN PIPE SHALL MEET THE REQUIREMENTS OF ASTM F405 AND SCS 606. THERE SHALL BE THREE 3/4" HOLES 120" APART EVERY 4.2-INCH ON THE LENGTH OF THE PIPE. SEE CROSS-SECTION C-C ON SHEET 7 FOR FITTINGS AND OBSERVATION WELL SPECIFICATIONS.

MAINTENANCE PROGRAM & SCHEDULE

INSPECT AND REPAIR EROSION	MONTHLY
REMUDDEN ANY VOID AREAS	WHENEVER NEEDED
REMOVE PREVIOUS MULCH AND REAPPLY	EVERY 3 YEARS
ADD FRESH MULCH LAYER	EVERY 6 MONTHS (SPRING/FALL)
REMOVAL AND REPLACEMENT OF ALL DISEASED VEGETATION CONSIDERED BEYOND TREATMENT	WHENEVER NEEDED
CHECK FOR ACCUMULATED SEDIMENTS	MONTHLY
SHARP PAVEMENT SURFACE WITHIN BIORETENTION CELL DRAINAGE AREA	4 TIMES A YEAR
INSPECT AND REMOVE ANY DEBRIS THAT MAY COLLECT AT THE DROP INLET	AFTER MAJOR STORM EVENTS/OR SEMI ANNUALLY

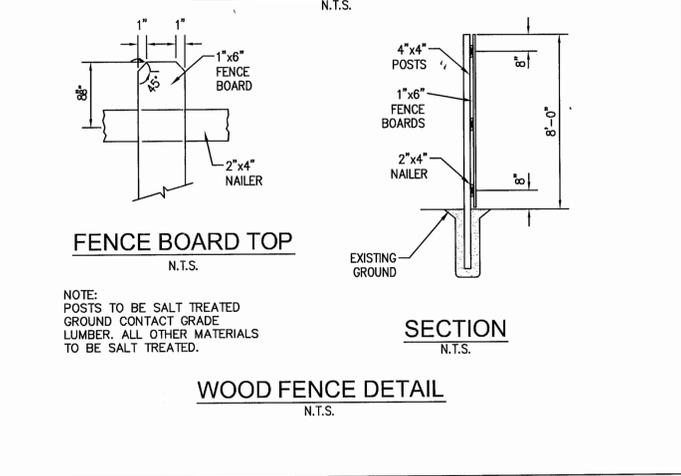
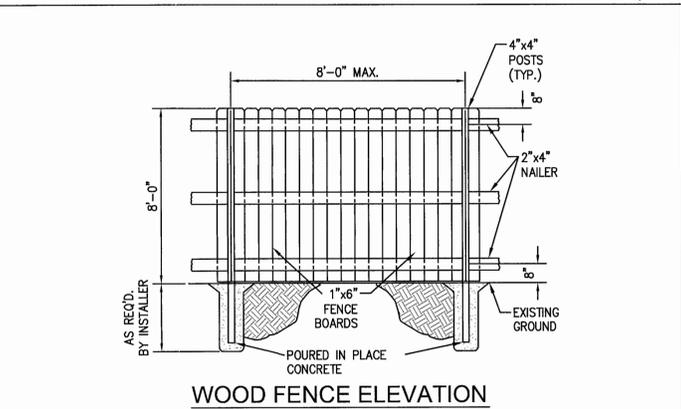
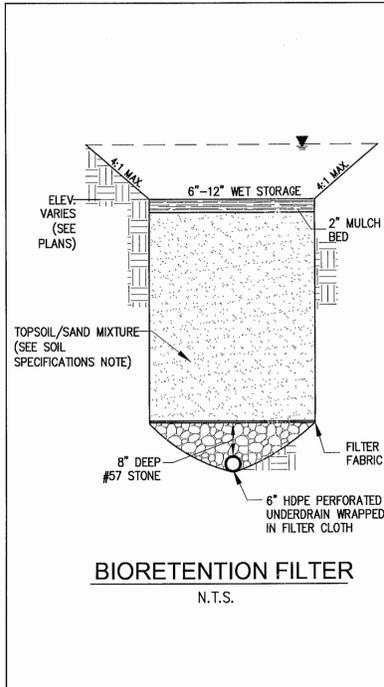
NOTES
WATER PLANT MATERIAL EACH DAY FOR FOURTEEN CONSECUTIVE DAYS AFTER CONSTRUCTION.

CONTRACTOR SHALL REFER TO COUNTY BMP MANUAL (GROUP D, PGS. 48-50) AND MINIMUM STANDARDS 3.11 AND 3.11a OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK FOR METHODS/MATERIAL ASSOCIATED WITH CONSTRUCTION OF THE BIORETENTION CELLS.

STANDING WATER SHOULD NOT BE PRESENT MORE THAN 12 HOURS OR THE BIORETENTION FILTER MAY BE IN NEED OF REPAIR.

ROOT SHALL BE SAVED HARMLESS FROM THE MAINTENANCE RESPONSIBILITY OR LIABILITY ASSOCIATED WITH ANY FAILURE OF THE STORM WATER MANAGEMENT FACILITY AND ITS STRUCTURES.

A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE BASIN DURING CONSTRUCTION SHALL CERTIFY THE CONSTRUCTION OF THE BIORETENTION BASIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE BIORETENTION BASIN CONSTRUCTION SCHEDULE WITH THE ENGINEER TO ENSURE ON SITE MONITORING.



No.	DATE	REVISION / COMMENT / NOTE
2	12/11/07	REVISION PER JCC COMMENTS DATED 10/24/07
1	8/30/07	REVISION PER JCC COMMENTS DATED 1/24/07



5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 263-0040
Fax (757) 220-8994



NOTES AND DETAILS

5248 OLDE TOWNE ROAD
OWNER - EPEUS LLC
DEVELOPER - VAN KNIEST, INC.

DESIGNED: VMB/JSM
DRAWN: JSM
SCALE: AS SHOWN
DATE: 1/5/06
PROJECT NO.: 9557-01
DRAWING NO.: 10

POWATAN DISTRICT
JAMES CITY COUNTY
VIRGINIA

PC244

Stormwater Management Design Calculations

5525 Olde Towne Road

Epeus, LLC

James City County

Prepared by:

AES Consulting Engineers

5248 Olde Towne Rd.

Williamsburg, VA 23188

(757) 253-0040

Date: October 9, 2007



Narrative and Supporting Data

5525 Olde Towne Road

STORMWATER NARRATIVE

General:

The following calculations support a plan of redevelopment entitled Epeus, LLC, which is located at 5525 Olde Towne Road in Williamsburg, Virginia 23188. This project is situated on a single parcel which totals approximately 0.98 acres. The project entails the construction of a commercial entrance, parking lot, sidewalks, bioretention facility, dry swale and a two story building for retail and office space. The project is situated within the County's Primary Service Area and will be served by public water and sewer.

The existing area is gently sloping with elevations ranging from 101 to 108. The majority of the site drains naturally towards Olde Towne Road to the south and a service road to the east which is served by an existing stormwater drainage system. A small portion of the site, located in the northwest corner, drains west into a residential neighborhood and ultimately drains to a stormwater drainage system located on Queen Mary Court. A bio-retention facility is proposed with this project to satisfy water quality requirements. A majority of the site will drain to the stormwater management facility.

Water Quality Considerations:

As noted above, the proposed stormwater management facility is a bioretention facility. The facility has been designed to provide a wet volume two times the water quality volume, which is a total of an inch of runoff per impervious acre of the project. The impervious acreage actually draining to the BMP is approximately 0.49 acres, with a small portion of the entrance draining to Olde Towne Road untreated. The proposed bio-retention facility will provide water quality storage volume for all proposed impervious area in order to offset the portion of untreated area. The impervious area of the proposed site is approximately 0.52 acres which results in approximately 1900 ft³ of required water quality storage volume. Per the James City County BMP Design and Construction Guidelines this facility has 65% target pollutant removal efficiency.

Water Quantity Considerations:

The proposed stormwater management facility will discharge through a 4" orifice and weir wall structure inside the outlet structure before discharging through a 15" reinforced concrete pipe under Olde Towne Road to an existing stormwater conveyance system located in the road right-of-way. Per Virginia Stormwater Management regulations, the 2-yr and 10-yr design storms will be detained in the facility and released through the outlet at lower flow rates than the pre-development conditions. The predevelopment flow rates for the 2-yr and 10-yr design storms are 0.75 cfs and 1.05 cfs, respectively. Upon attenuation, the post development flow rates for the 2-yr and 10-yr design storms are 0.63 cfs and 0.64 cfs, respectively. A 30-foot emergency spillway at elevation 102.00 has been provided, over native soil to prevent erosion, to pass storms greater than the 10-yr design storm over the sidewalk and onto Olde Towne Road.

Additional Information:

The remainder of this report includes calculations for water quality, the stormwater management facility (which also serves as a temporary sediment trap) and appropriate checklists.

From both a water quality and quantity standpoint, the design meets the intent of the Chesapeake Bay Preservation Act, James City County and the Virginia Stormwater Management Regulations.

Water Quality Calculations

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 1

Page 1 of 3

STEP 1 Determine the applicable area (A) and the post-developed impervious cover (I_{post}).

Applicable area (A)* = 0.98 acres

Post-development impervious cover:

structures = 0.13 acres

parking lot = 0.35 acres

roadway = _____ acres

other:

SIDEWALK
+ DUMPSTER PAD = 0.05 acres

_____ = _____ acres

Total = 0.53 acres

$I_{post} = (\text{total post-development impervious cover} \div A) \times 100 = \underline{54} \%$

* The area subject to the criteria may vary from locality to locality. Therefore, consult the locality for proper determination of this value.

STEP 2 Determine the average land cover condition ($I_{watershed}$) or the existing impervious cover ($I_{existing}$).

Average land cover condition ($I_{watershed}$):

If the locality has determined land cover conditions for individual watersheds within its jurisdiction, use the watershed specific value determined by the locality as $I_{watershed}$.

$I_{watershed} = \underline{\quad} \%$

Otherwise, use the Chesapeake Bay default value:

$I_{watershed} = 16\%$

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 1
Page 2 of 3

Existing impervious cover (I_{existing}):

Determine the existing impervious cover of the development site if present.

Existing impervious cover:

structures = 0.06 acres

parking lot = 0.06 acres

roadway = _____ acres

other:

SEWER + CURB = 0.03 acres

_____ = _____ acres

Total = 0.15 acres

$I_{existing} = (\text{total existing impervious cover} \div A^*) \times 100 = \underline{15} \%$

* The area should be the same as used in STEP 1.

STEP 3 Determine the appropriate development situation.

The site information determined in STEP 1 and STEP 2 provide enough information to determine the appropriate development situation under which the performance criteria will apply. Check (•) the appropriate development situation as follows:

_____ **Situation 1:** This consists of land development where the existing percent impervious cover (I_{existing}) is less than or equal to the average land cover condition (I_{watershed}) and the proposed improvements will create a total percent impervious cover (I_{post}) which is less than or equal to the average land cover condition (I_{watershed}).

$I_{post} \text{ _____ } \% \bullet I_{watershed} \text{ _____ } \%$

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 1
Page 3 of 3

✓ **Situation 2:** This consists of land development where the existing percent impervious cover ($I_{existing}$) is less than or equal to the average land cover condition ($I_{watershed}$) and the proposed improvements will create a total percent impervious cover (I_{post}) which is greater than the average land cover condition ($I_{watershed}$).

$I_{existing}$ 15 % \leq $I_{watershed}$ 16 %; and
 I_{post} 54 % $>$ $I_{watershed}$ 16 %

_____ **Situation 3:** This consists of land development where the existing percent impervious cover ($I_{existing}$) is greater than the average land cover condition ($I_{watershed}$).

$I_{existing}$ _____ % $>$ $I_{watershed}$ _____ %

_____ **Situation 4:** This consists of land development where the existing percent impervious cover ($I_{existing}$) is served by an existing stormwater management BMP(s) that addresses water quality.

If the proposed development meets the criteria for development Situation 1, than the low density development is considered to be the BMP and no pollutant removal is required. The calculation procedure for Situation 1 stops here. If the proposed development meets the criteria for development Situations 2, 3, or 4, then proceed to STEP 4 on the appropriate worksheet.

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 2 : Situation 2

Page 1 of 4

Summary of Situation 2 criteria: from calculation procedure **STEP 1** thru **STEP 3**, Worksheet 1:

Applicable area (A)* = 0.98 acres

$I_{\text{post}} = (\text{total post-development impervious cover} \div A) \times 100 = \underline{54} \%$

$I_{\text{watershed}} = \underline{\quad} \%$ or $I_{\text{watershed}} = 16\%$

$I_{\text{existing}} = (\text{total existing impervious cover} \div A^*) \times 100 = \underline{15} \%$

$I_{\text{existing}} \underline{15} \% < I_{\text{watershed}} \underline{16} \%$; and

$I_{\text{post}} \underline{54} \% > I_{\text{watershed}} \underline{16} \%$

STEP 4 Determine the relative pre-development pollutant load (L_{pre}).

$L_{\text{pre(watershed)}} = [0.05 + (0.009 \times I_{\text{watershed}})] \times A \times 2.28$ (Equation 5-16)

where: $L_{\text{pre(watershed)}}$ = relative pre-development total phosphorous load (pounds per year)
 $I_{\text{watershed}}$ = average land cover condition for specific watershed or locality **or** the Chesapeake Bay default value of 16% (percent expressed in whole numbers)
 A = applicable area (acres)

$L_{\text{pre(watershed)}} = [0.05 + (0.009 \times \underline{16})] \times \underline{0.98} \times 2.28$
 $= \underline{0.43}$ pounds per year

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 2 : Situation 2

Page 2 of 4

STEP 5 Determine the relative post-development pollutant load (L_{post}).

$$L_{post} = [0.05 + (0.009 \times I_{post})] \times A \times 2.28 \quad (\text{Equation 5-21})$$

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

$$L_{post} = [0.05 + (0.009 \times \underline{54})] \times \underline{0.98} \times 2.28$$

$$= \underline{1.20} \text{ pounds per year}$$

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

$$RR = L_{post} \rightarrow L_{pre(\text{watershed})}$$

$$RR = \underline{1,20} \rightarrow \underline{0,43}$$

$$= \underline{0,77} \text{ pounds per year}$$

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

1. Determine the required pollutant removal efficiency for the site:

$$EFF = (RR \div L_{post}) \times 100 \quad (\text{Equation 5-22})$$

where: EFF = required pollutant removal efficiency (percent expressed in whole numbers)
 RR = pollutant removal requirement (pounds per year)
 L_{post} = relative post-development total phosphorous load (pounds per year)

$$EFF = (\underline{0,77} \div \underline{1,20}) \times 100$$

$$= \underline{64} \%$$

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 2 : Situation 2

Page 4 of 4

4. Calculate the pollutant load removed by the proposed BMP(s):

$L_{\text{removed}} = \text{Eff}_{\text{BMP}} \times L_{\text{BMP}}$ (Equation 5-24)

where: L_{removed} = Post-development pollutant load removed by proposed BMP (pounds per year)
 Eff_{BMP} = pollutant removal efficiency of BMP (expressed in decimal form)
 L_{BMP} = relative post-development total phosphorous load entering proposed BMP (pounds per year)

$L_{\text{removed/BMP1}} = 0.70 \times 1.10 = 0.77$ pounds per year *L_{BMP}*

$L_{\text{removed/BMP2}} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ pounds per year

$L_{\text{removed/BMP3}} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ pounds per year

5. Calculate the total pollutant load removed by the BMP(s):

$L_{\text{removed/total}} = L_{\text{removed/BMP1}} + L_{\text{removed/BMP2}} + L_{\text{removed/BMP3}} + \dots$ (Equation 5-25)

where: $L_{\text{removed/total}}$ = total pollutant load removed by proposed BMPs
 $L_{\text{removed/BMP1}}$ = pollutant load removed by proposed BMP No. 1
 $L_{\text{removed/BMP2}}$ = pollutant load removed by proposed BMP No. 2
 $L_{\text{removed/BMP3}}$ = pollutant load removed by proposed BMP No. 3

$L_{\text{removed/total}} = 0.77 + 0 + 0 + \dots$
 $= 0.77$ pounds per year

6. Verify compliance:

$L_{\text{removed/total}} \cdot \text{RR}$
 $0.77 \cdot 0.77$

PERFORMANCE-BASED WATER QUALITY CALCULATIONS APPENDIX 5D

Worksheet 2 : Situation 2

Page 3 of 4

2. Select BMP(s) from Table 5-15 and locate on the site:

BMP 1: BIO-RETENTION (1" PER IMPERVIOUS ACRE @ 70% REMOVAL EFF)

BMP 2: _____

BMP 3: _____

3. Determine the pollutant load entering the proposed BMP(s):

$$L_{BMP} = [0.05 + (0.009 \times I_{BMP})] \times A \times 2.28 \quad \text{(Equation 5-23)}$$

where: L_{BMP} = relative post-development total phosphorous load entering proposed BMP (pounds per year)
 I_{BMP} = post-development percent impervious cover of BMP drainage area (percent expressed in whole numbers)
 A = drainage area of proposed BMP (acres)

$$L_{BMP1} = [0.05 + (0.009 \times \underline{60})] \times \underline{0.82} \times 2.28$$

$$= \underline{1.10} \text{ pounds per year}$$

$$L_{BMP2} = [0.05 + (0.009 \times \underline{\hspace{2cm}})] \times \underline{\hspace{2cm}} \times 2.28$$

$$= \underline{\hspace{2cm}} \text{ pounds per year}$$

$$L_{BMP3} = [0.05 + (0.009 \times \underline{\hspace{2cm}})] \times \underline{\hspace{2cm}} \times 2.28$$

$$= \underline{\hspace{2cm}} \text{ pounds per year}$$

* ONLY 0.82 ACRES OF THE TOTAL SITE DRAIN TO THE BMP.
 A BREAKDOWN OF TREATED VS. NON-TREATED DRAINAGE AREAS, IMPERVIOUS ACREAGES AND PERCENTAGES IS AS FOLLOWS:

	Ac.	IMPERV.	% IMPERV.	LBS P (POUNDS OF PHOSPHORUS PRODUCED)
TREATED :	0.82	0.49	60	1.10
NOT TREATED :	0.16	0.04	25	0.10
TOTAL SITE :	0.98	0.53	54	1.20

Pre-Development

Area = 0.62 ac.

$T_c = 5.0$ min.

Description	C factor	Area	CA	
Composite Area	0.42	0.62 ac.	0.26	
	0	0.00 ac.	0.00	
	0	0.00 ac.	0.00	
			0.26	= Σ CA

Storm Event

2 yr.	$I_2 =$	5.53 in/hr	$Q_2 = 1.44$ cfs
10 yr.	$I_{10} =$	7.12 in/hr	$Q_{10} = 1.85$ cfs
25 yr.	$I_{25} =$	7.94 in/hr	$Q_{25} = 2.07$ cfs
100 yr.	$I_{100} =$	9.18 in/hr	$Q_{100} = 2.39$ cfs

Post Development

Area = 0.82 ac.

$T_c = 5.0$ min.

Description	C factor	Area	CA	
Composite Area	0.68	0.82 ac.	0.56	
			0.00	
			0.00	
			0.56	= Σ CA

Critical Storm Event

2 yr.	$I_2 =$	3.02 in/hr	$Q_2 = 1.68$ cfs	Req'd Storage 1115 CF
10 yr.	$I_{10} =$	3.79 in/hr	$Q_{10} = 2.11$ cfs	1717 CF
25 yr.	$I_{25} =$	4.15 in/hr	$Q_{25} = 2.31$ cfs	2069 CF
100 yr.	$I_{100} =$	4.81 in/hr	$Q_{100} = 2.68$ cfs	2675 CF

5525 Olde Towne Road

James City County

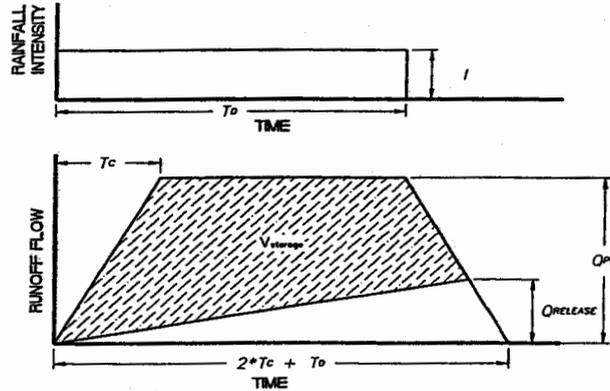
AES Job. No. 9557-01

Stormwater Management Facility Design (Modified Rational Method)



Post-Development Conditions:

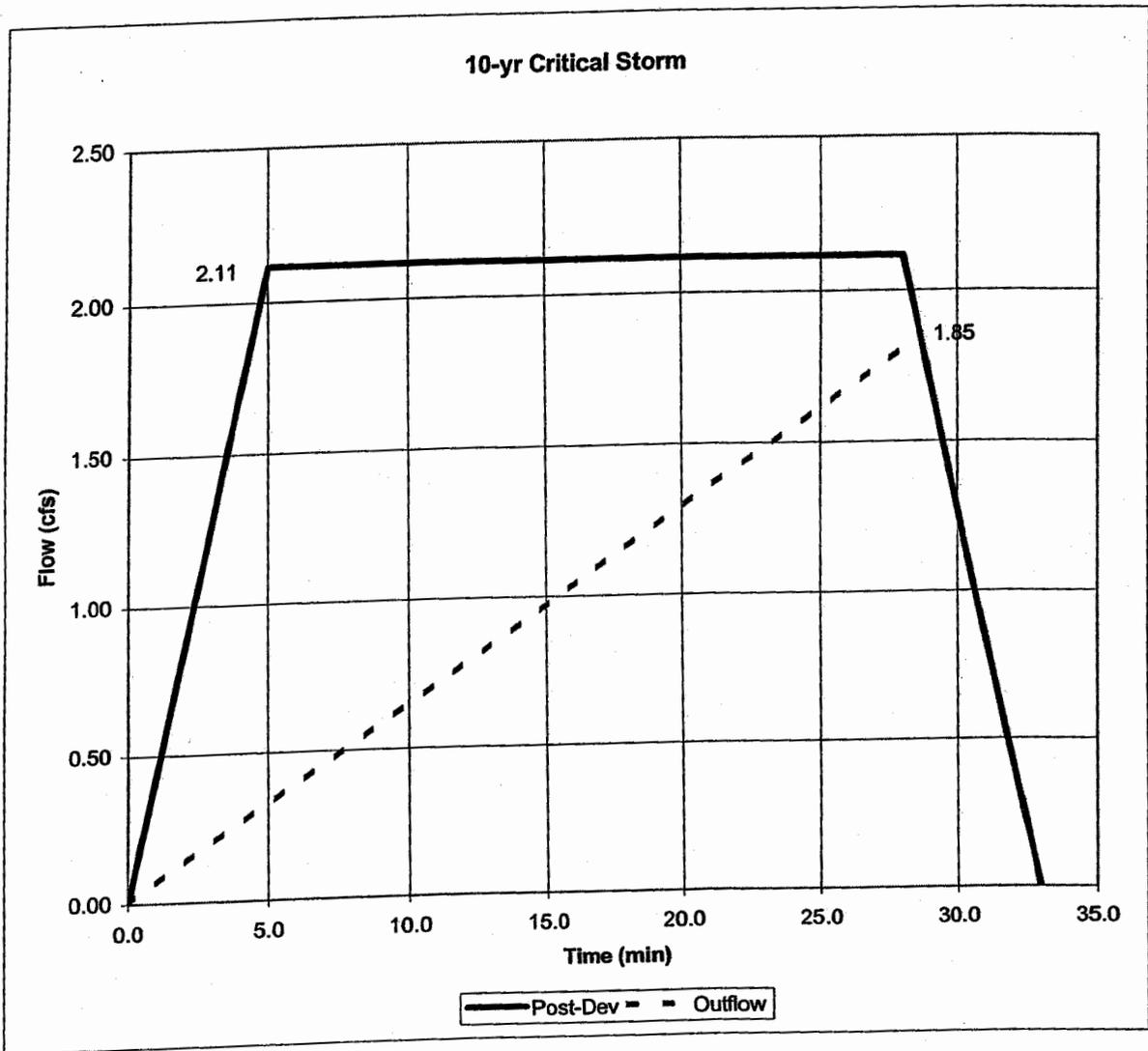
Drainage Area =	0.82 ac.
Rational "C" =	0.68
Time of Conc =	5.0 min.
Release Rate =	1.85 cfs
Rec. Limb Fac. =	1.0
Start Interval =	5 min.
Time Interval =	1 min.



Calculate 10-yr critical storm duration:

Storm Duration	Intensity	Qpk	Storm Runoff Volume (ft ³)	Release Flow Volume (ft ³)	Req'd Storage Volume (ft ³)
5.0	7.12	3.97	1,191	556	635
6.0	6.85	3.82	1,376	612	764
7.0	6.61	3.68	1,547	668	880
8.0	6.38	3.56	1,707	723	984
9.0	6.16	3.44	1,856	779	1,077
10.0	5.97	3.33	1,996	834	1,161
11.0	5.78	3.22	2,127	890	1,237
12.0	5.60	3.12	2,250	946	1,304
13.0	5.44	3.03	2,366	1,001	1,365
14.0	5.29	2.95	2,476	1,057	1,419
15.0	5.14	2.87	2,579	1,113	1,467
16.0	5.00	2.79	2,677	1,168	1,509
17.0	4.87	2.72	2,771	1,224	1,547
18.0	4.75	2.65	2,859	1,280	1,580
19.0	4.63	2.58	2,943	1,335	1,608
20.0	4.52	2.52	3,024	1,391	1,633
21.0	4.41	2.46	3,100	1,446	1,654
22.0	4.31	2.40	3,174	1,502	1,672
23.0	4.22	2.35	3,244	1,558	1,686
24.0	4.12	2.30	3,311	1,613	1,697
25.0	4.04	2.25	3,375	1,669	1,706
26.0	3.95	2.20	3,437	1,725	1,712
27.0	3.87	2.16	3,496	1,780	1,716
28.0	3.79	2.11	3,553	1,836	1,717
29.0	3.72	2.07	3,608	1,892	1,716
30.0	3.65	2.03	3,661	1,947	1,714
31.0	3.58	2.00	3,712	2,003	1,709
32.0	3.51	1.96	3,761	2,058	1,702
33.0	3.45	1.92	3,808	2,114	1,694
34.0	3.39	1.89	3,854	2,170	1,684
35.0	3.33	1.86	3,898	2,225	1,673
36.0	3.27	1.82	3,941	2,281	N/A
37.0	3.22	1.79	3,983	2,337	N/A
38.0	3.16	1.76	4,023	2,392	N/A
39.0	3.11	1.74	4,062	2,448	N/A
40.0	3.06	1.71	4,100	2,503	N/A

==== Critical



Hydrograph Data

10-yr Critical Storm

Post-Dev Inflow	
Time	Flow
0.0	0.00
5.0	2.11
28.0	2.11
33.0	0.00

Outflow	
Time	Flow
0.0	0.00
28.6	1.85
33.0	0.00

SWM Facility Calculations

Pond Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

Pond No. 4 - Bioretention Basin

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 100.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	1,496	0	0
1.00	101.00	2,451	1,974	1,974
2.00	102.00	3,453	2,952	4,926

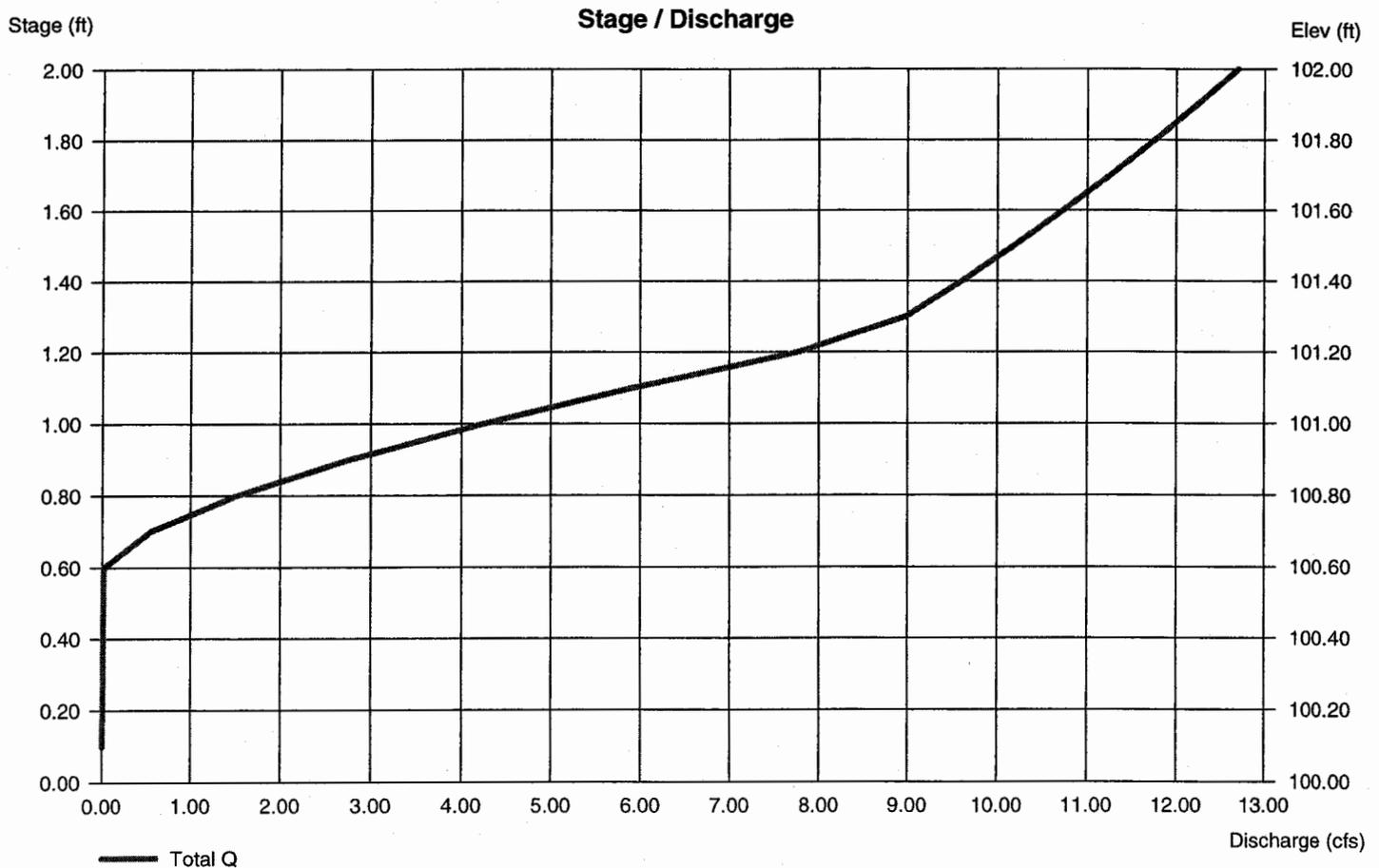
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 95.00	0.00	0.00	0.00
Length (ft)	= 13.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	30.00	0.00	0.00
Crest El. (ft)	= 100.60	102.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	2.60	3.33
Weir Type	= Riser	Broad	Broad	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.520 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

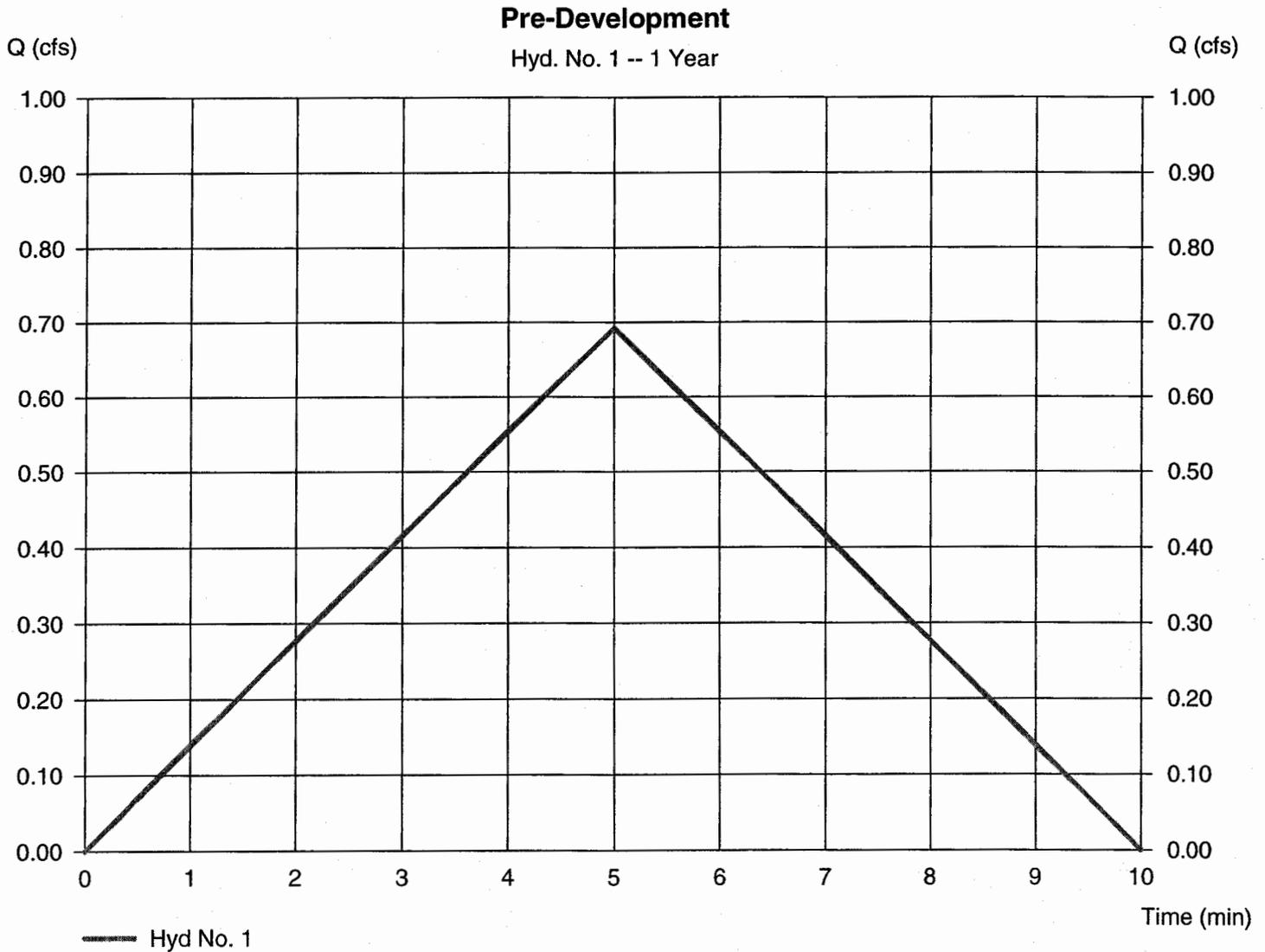
Hyd. No. 1

Pre-Development

Hydrograph type = Mod. Rational
Storm frequency = 1 yrs
Time interval = 1 min
Drainage area = 0.370 ac
Intensity = 4.800 in/hr
IDF Curve = JCCstormsewer.IDF
Target Q = n/a

Peak discharge = 0.693 cfs
Time to peak = 5 min
Hyd. volume = 208 cuft
Runoff coeff. = 0.39*
Tc by User = 5.00 min
Storm duration = 1.0 x Tc
Est. Req'd Storage = n/a

* Composite (Area/C) = [(0.150 x 0.90) + (0.780 x 0.35)] / 0.370



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

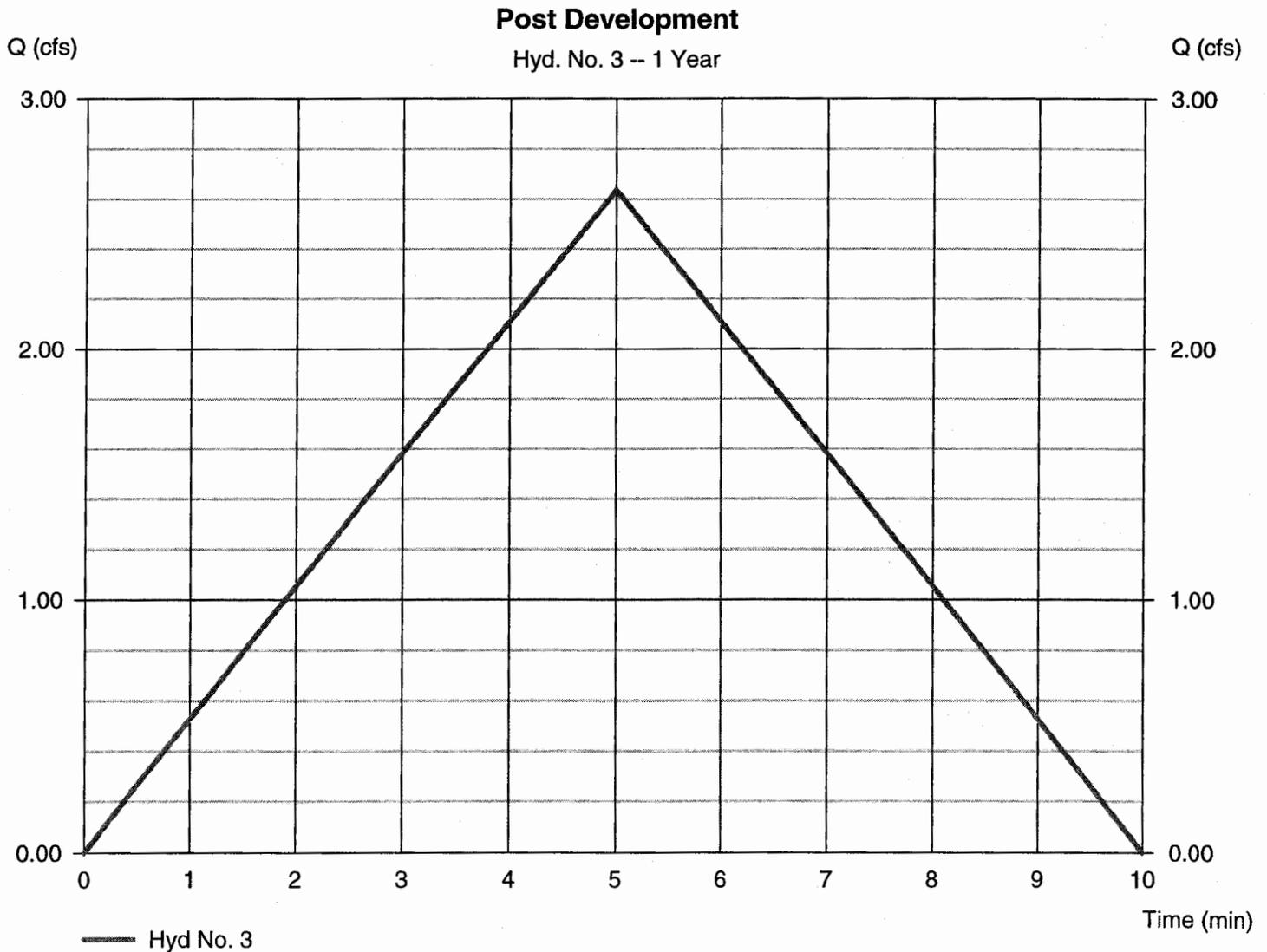
Hyd. No. 3

Post Development

Hydrograph type = Mod. Rational
Storm frequency = 1 yrs
Time interval = 1 min
Drainage area = 0.820 ac
Intensity = 4.800 in/hr
IDF Curve = JCCstormsewer.IDF
Target Q = n/a

Peak discharge = 2.637 cfs
Time to peak = 5 min
Hyd. volume = 791 cuft
Runoff coeff. = 0.67*
Tc by User = 5.00 min
Storm duration = 1.0 x Tc
Est. Req'd Storage = n/a

* Composite (Area/C) = $[(0.550 \times 0.90) + (0.380 \times 0.35)] / 0.820$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

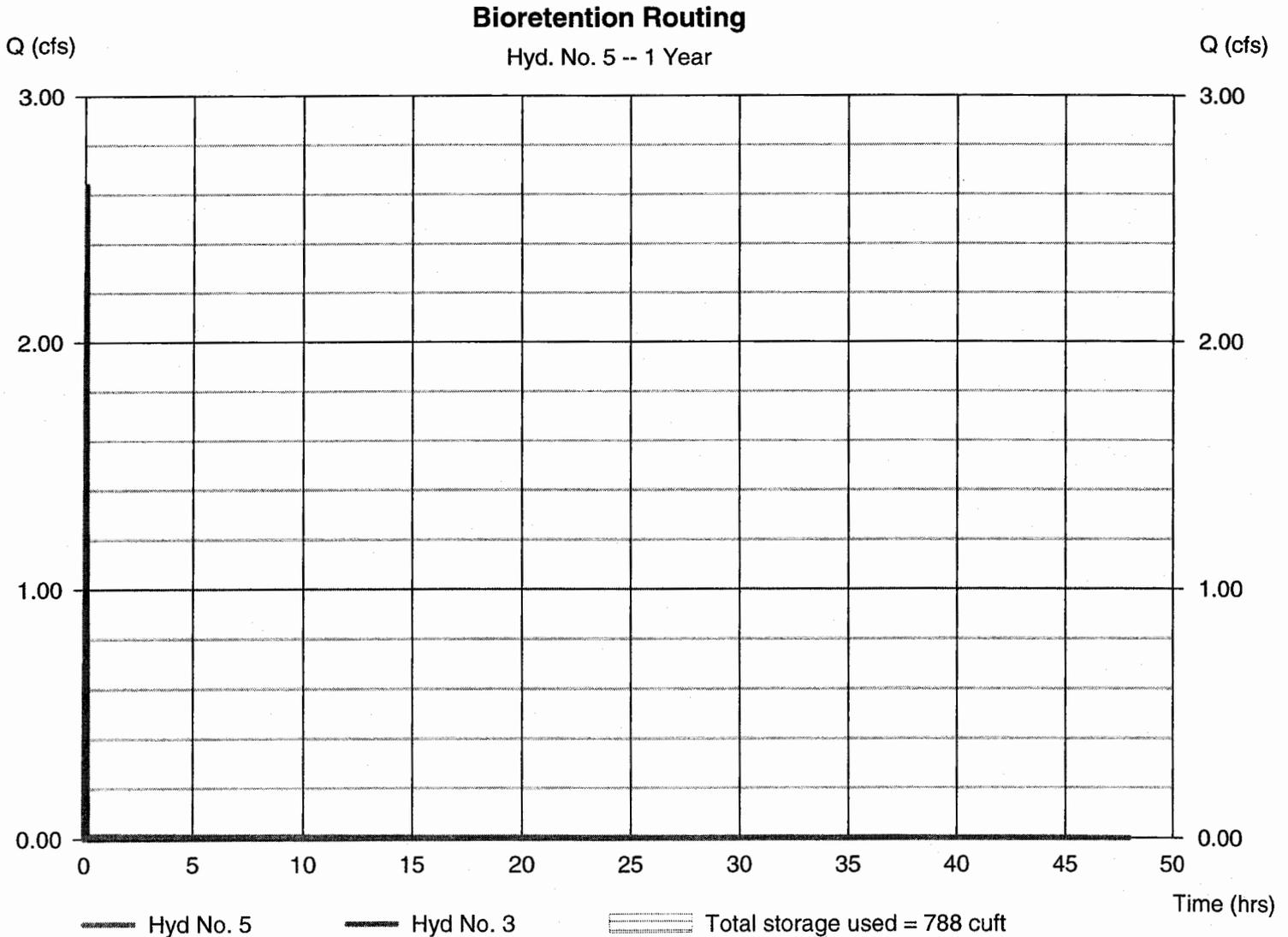
Hyd. No. 5

Bioretention Routing

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Post Development
Reservoir name = Bioretention Basin

Peak discharge = 0.012 cfs
Time to peak = 10 min
Hyd. volume = 724 cuft
Max. Elevation = 100.40 ft
Max. Storage = 788 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

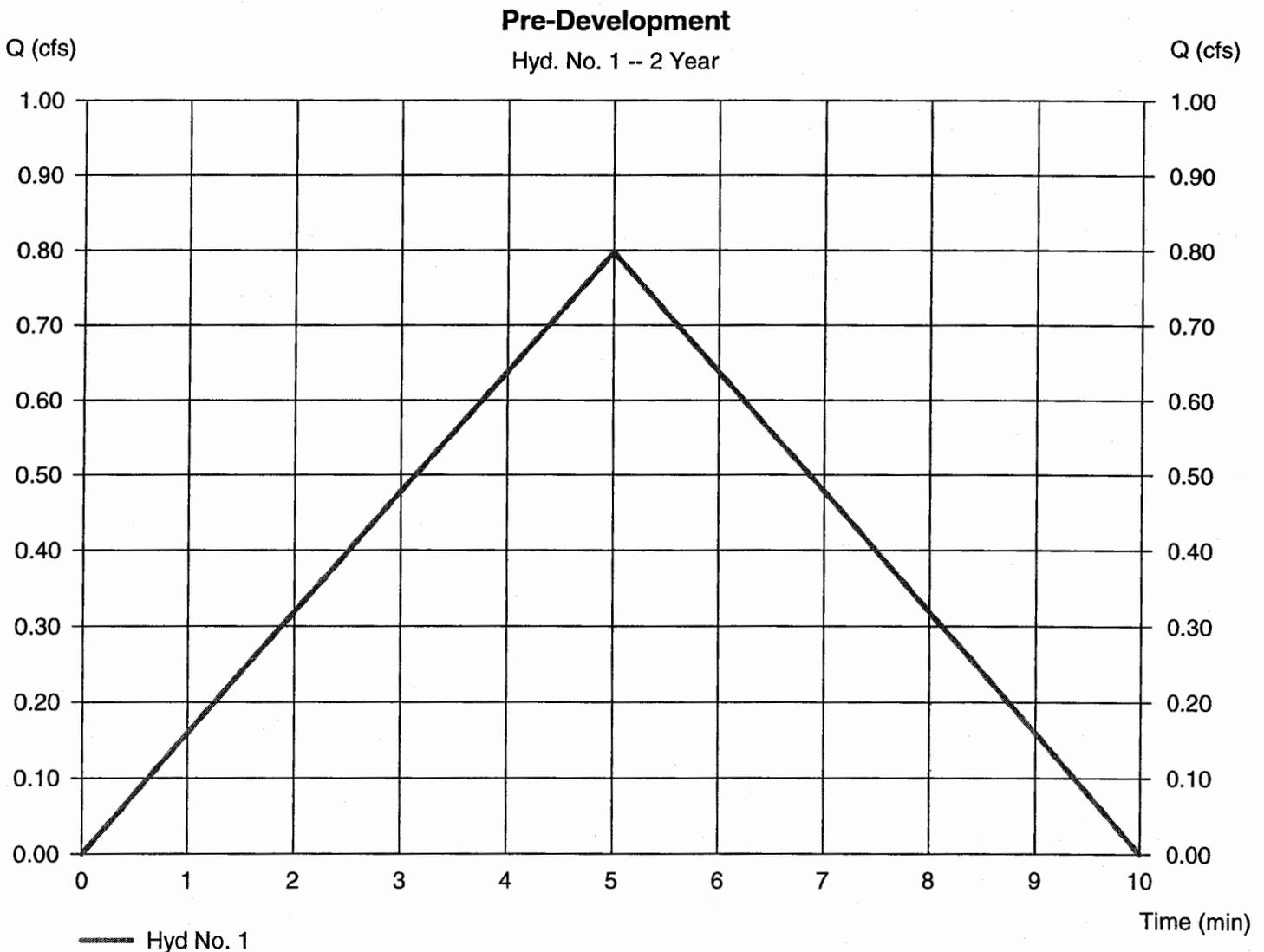
Hyd. No. 1

Pre-Development

Hydrograph type = Mod. Rational
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.370 ac
Intensity = 5.526 in/hr
IDF Curve = JCCstormsewer.IDF
Target Q = n/a

Peak discharge = 0.797 cfs
Time to peak = 5 min
Hyd. volume = 239 cuft
Runoff coeff. = 0.39*
Tc by User = 5.00 min
Storm duration = 1.0 x Tc
Est. Req'd Storage = n/a

* Composite (Area/C) = $[(0.150 \times 0.90) + (0.780 \times 0.35)] / 0.370$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

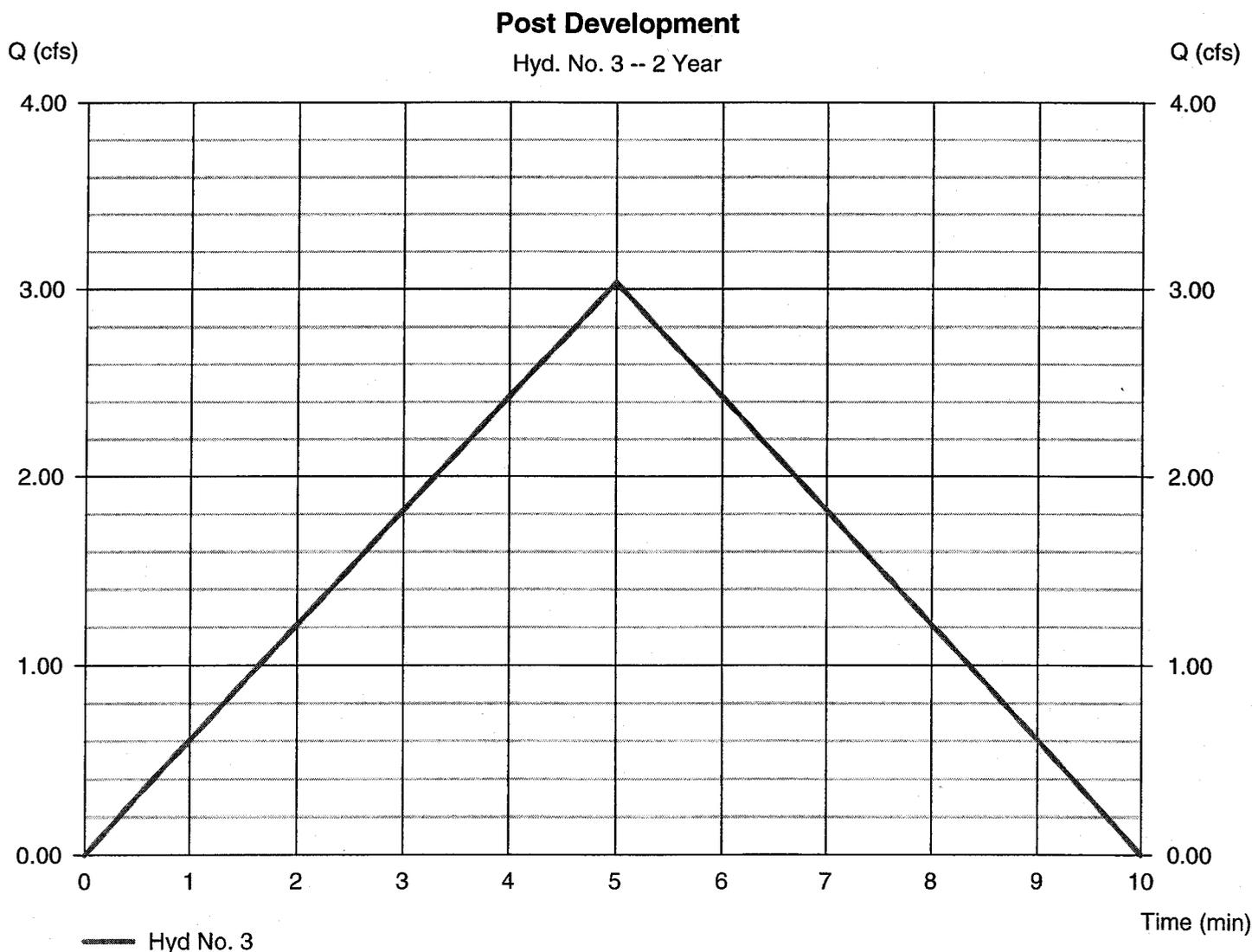
Tuesday, Oct 9, 2007

Hyd. No. 3

Post Development

Hydrograph type	= Mod. Rational	Peak discharge	= 3.036 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 911 cuft
Drainage area	= 0.820 ac	Runoff coeff.	= 0.67*
Intensity	= 5.526 in/hr	Tc by User	= 5.00 min
IDF Curve	= JCCstormsewer.IDF	Storm duration	= 1.0 x Tc
Target Q	= n/a	Est. Req'd Storage	= n/a

* Composite (Area/C) = $[(0.550 \times 0.90) + (0.380 \times 0.35)] / 0.820$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

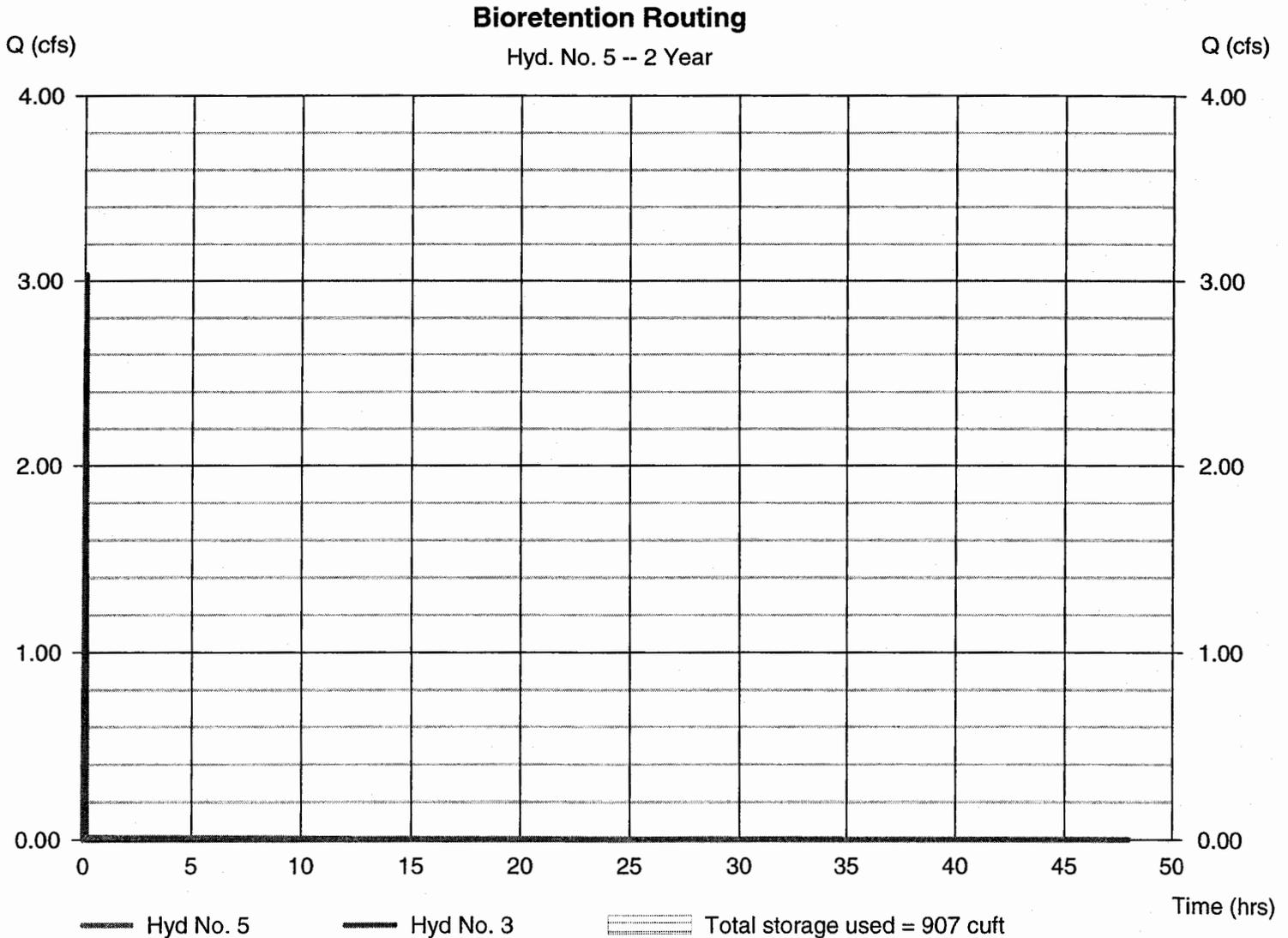
Tuesday, Oct 9, 2007

Hyd. No. 5

Bioretention Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.014 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 842 cuft
Inflow hyd. No.	= 3 - Post Development	Max. Elevation	= 100.46 ft
Reservoir name	= Bioretention Basin	Max. Storage	= 907 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

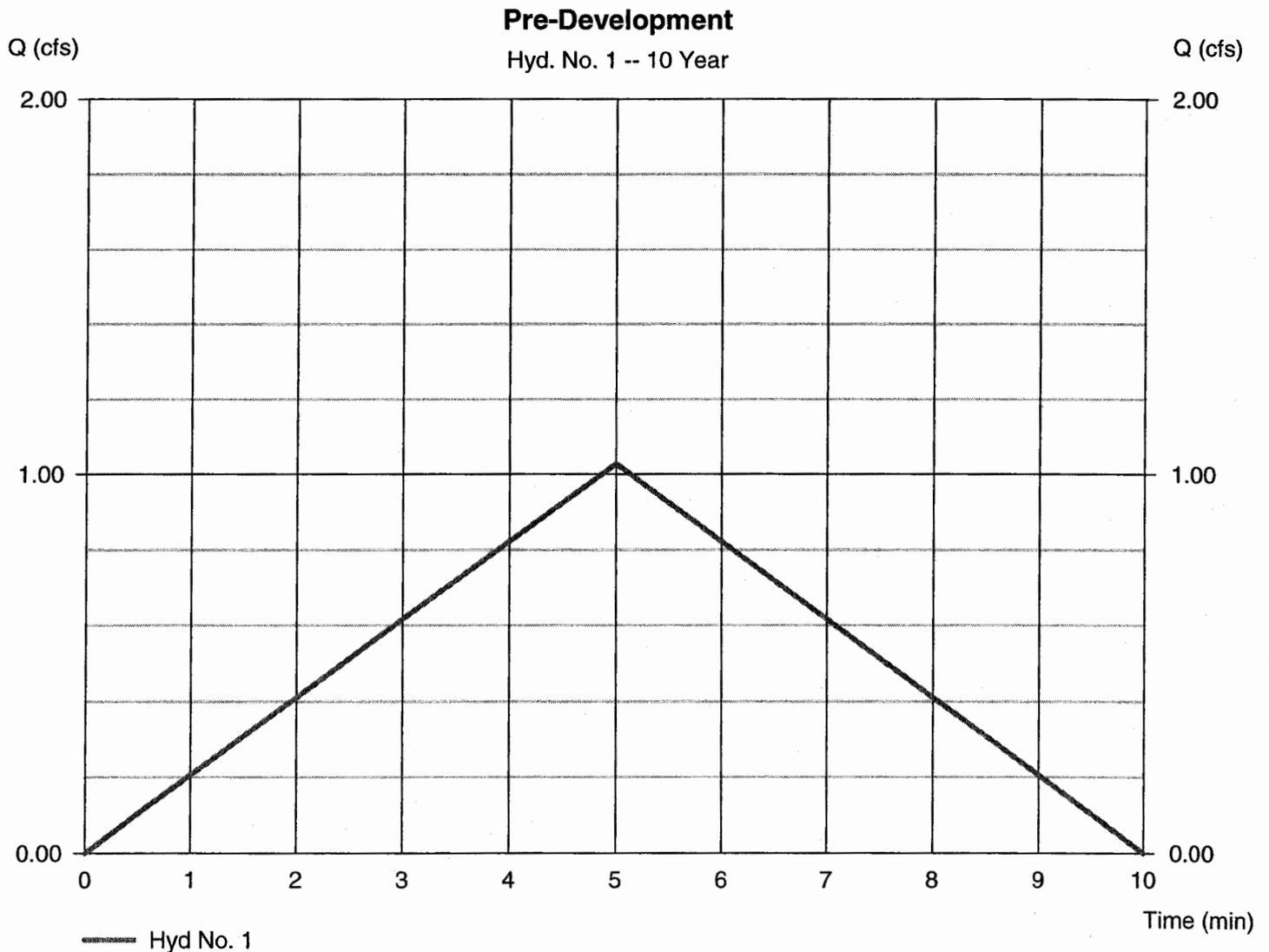
Hyd. No. 1

Pre-Development

Hydrograph type = Mod. Rational
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.370 ac
Intensity = 7.126 in/hr
IDF Curve = JCCstormsewer.IDF
Target Q = n/a

Peak discharge = 1.028 cfs
Time to peak = 5 min
Hyd. volume = 308 cuft
Runoff coeff. = 0.39*
Tc by User = 5.00 min
Storm duration = 1.0 x Tc
Est. Req'd Storage = n/a

* Composite (Area/C) = $[(0.150 \times 0.90) + (0.780 \times 0.35)] / 0.370$



Hydrograph Report

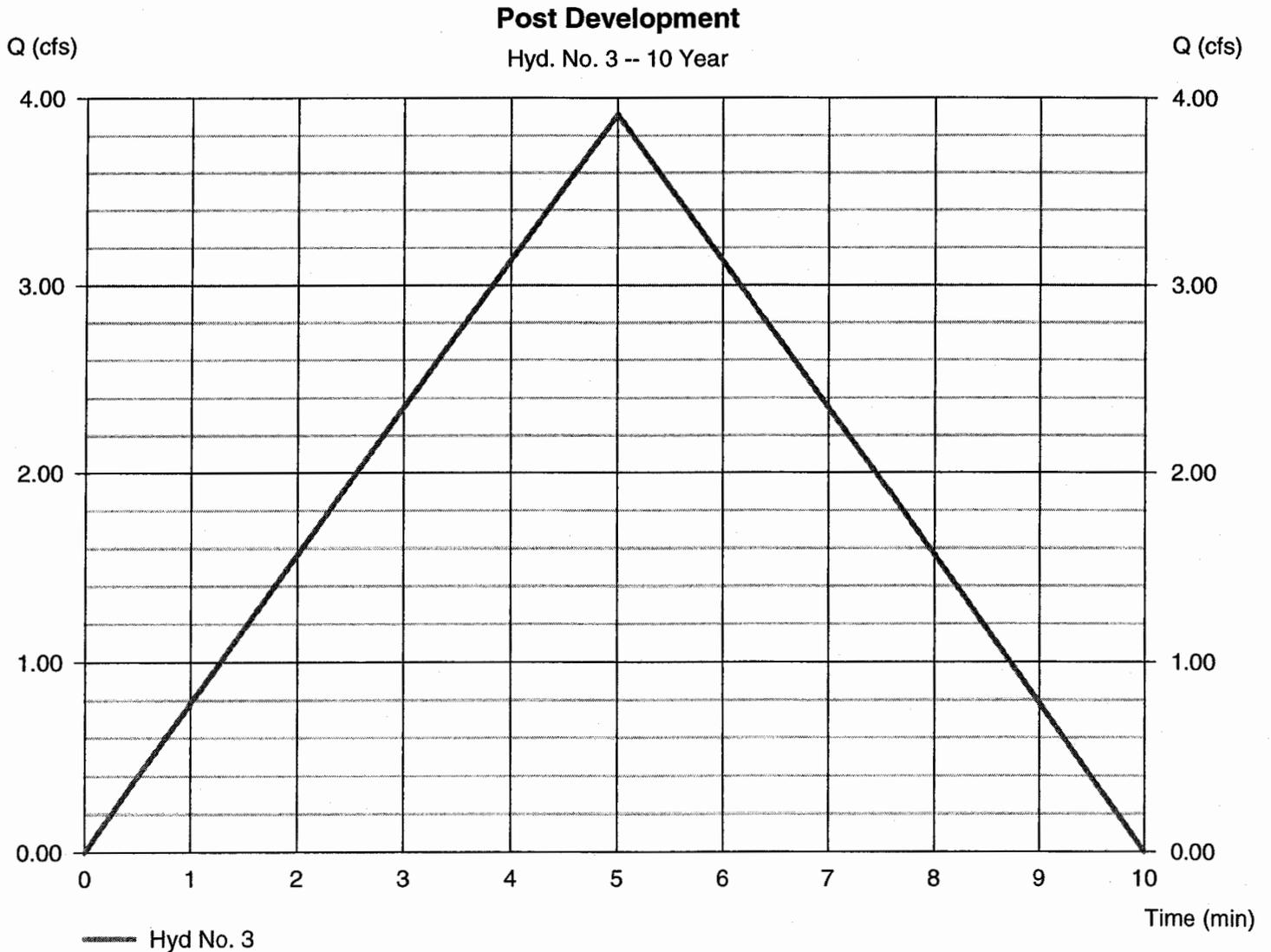
Hyd. No. 3

Post Development

Hydrograph type = Mod. Rational
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.820 ac
Intensity = 7.126 in/hr
IDF Curve = JCCstormsewer.IDF
Target Q = n/a

Peak discharge = 3.915 cfs
Time to peak = 5 min
Hyd. volume = 1,174 cuft
Runoff coeff. = 0.67*
Tc by User = 5.00 min
Storm duration = 1.0 x Tc
Est. Req'd Storage = n/a

* Composite (Area/C) = [(0.550 x 0.90) + (0.380 x 0.35)] / 0.820



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

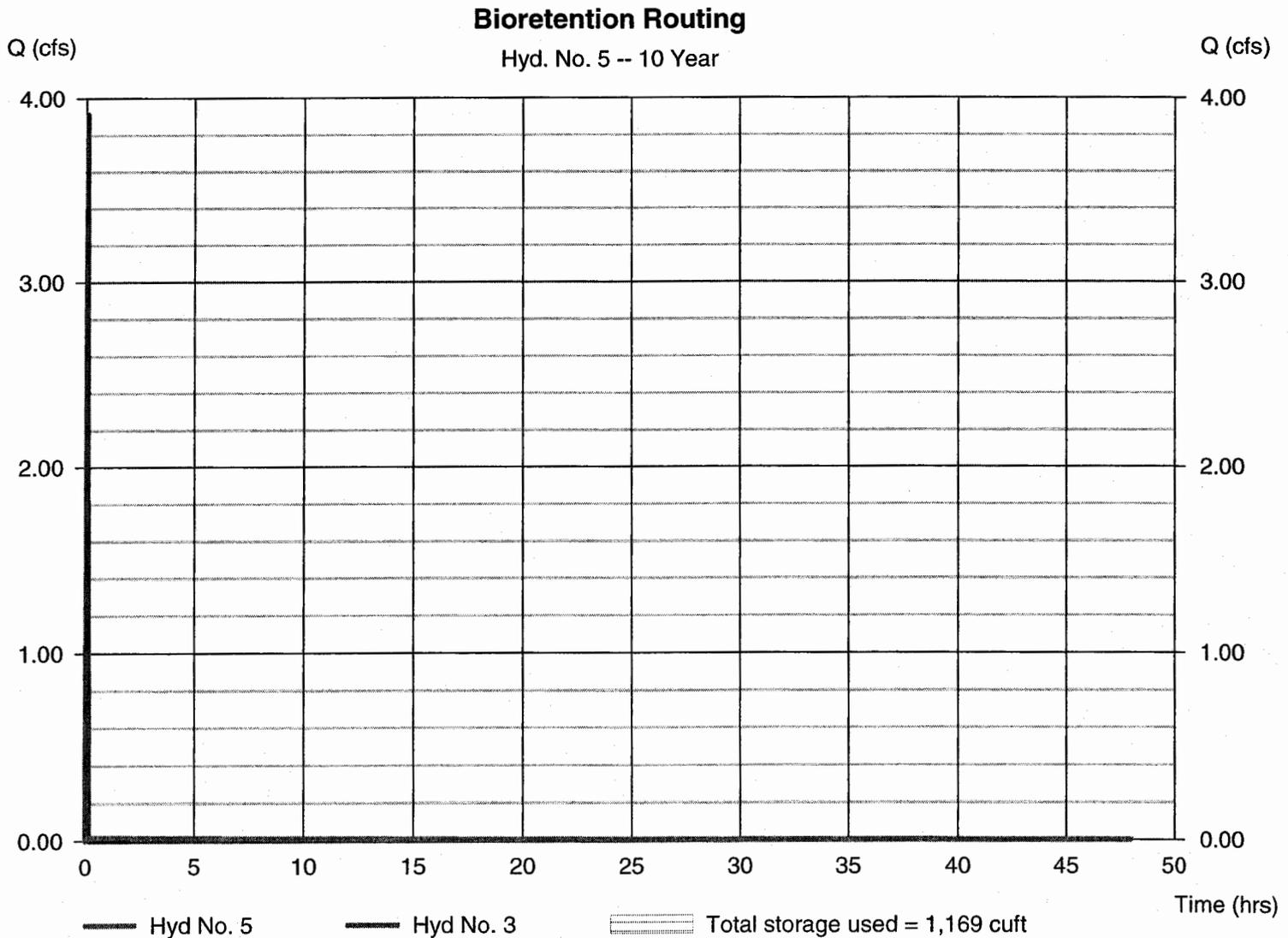
Hyd. No. 5

Bioretention Routing

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Post Development
Reservoir name = Bioretention Basin

Peak discharge = 0.017 cfs
Time to peak = 10 min
Hyd. volume = 1,085 cuft
Max. Elevation = 100.59 ft
Max. Storage = 1,169 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

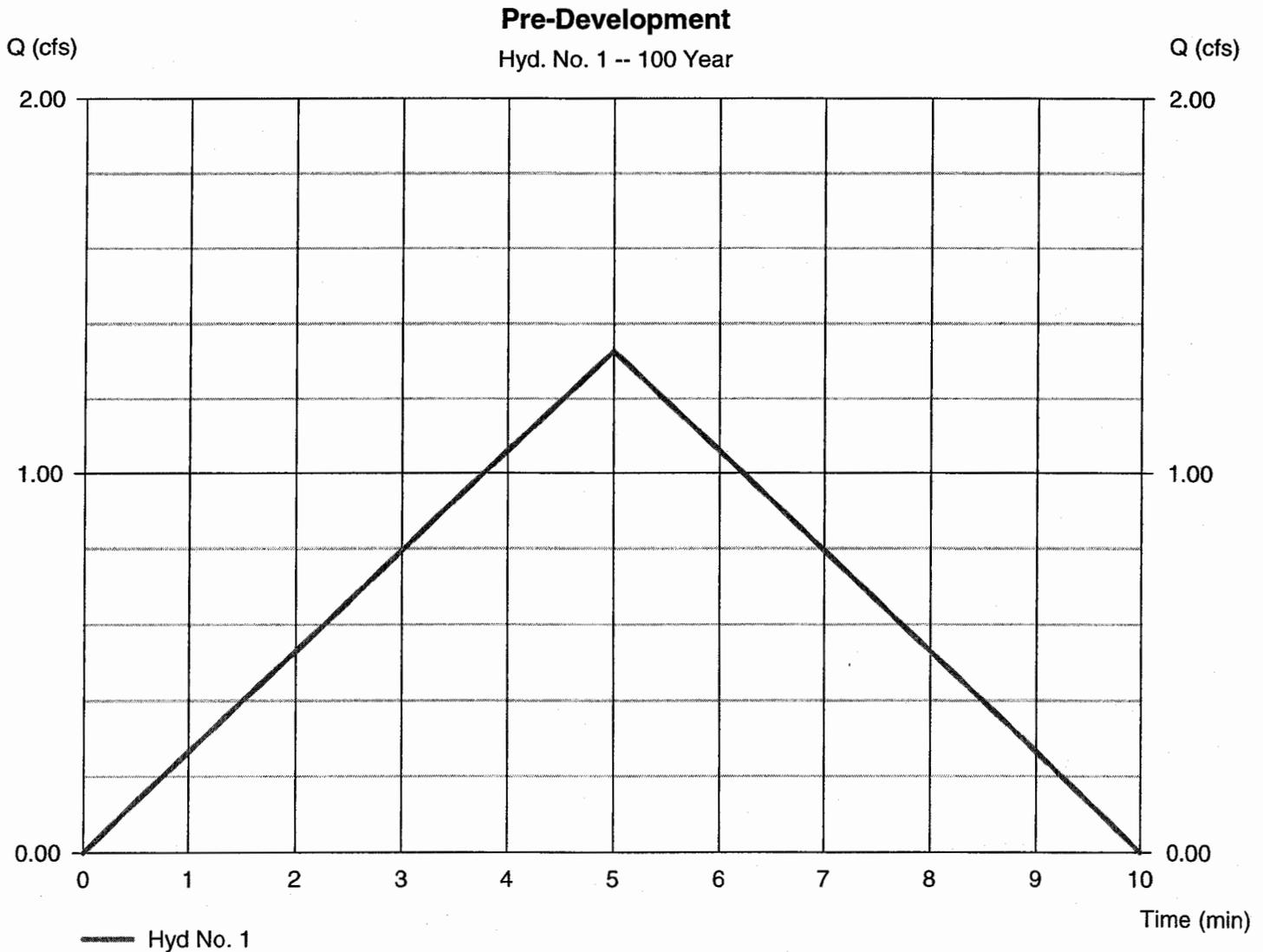
Hyd. No. 1

Pre-Development

Hydrograph type = Mod. Rational
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.370 ac
Intensity = 9.187 in/hr
IDF Curve = JCCstormsewer.IDF
Target Q = n/a

Peak discharge = 1.326 cfs
Time to peak = 5 min
Hyd. volume = 398 cuft
Runoff coeff. = 0.39*
Tc by User = 5.00 min
Storm duration = 1.0 x Tc
Est. Req'd Storage = n/a

* Composite (Area/C) = [(0.150 x 0.90) + (0.780 x 0.35)] / 0.370



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

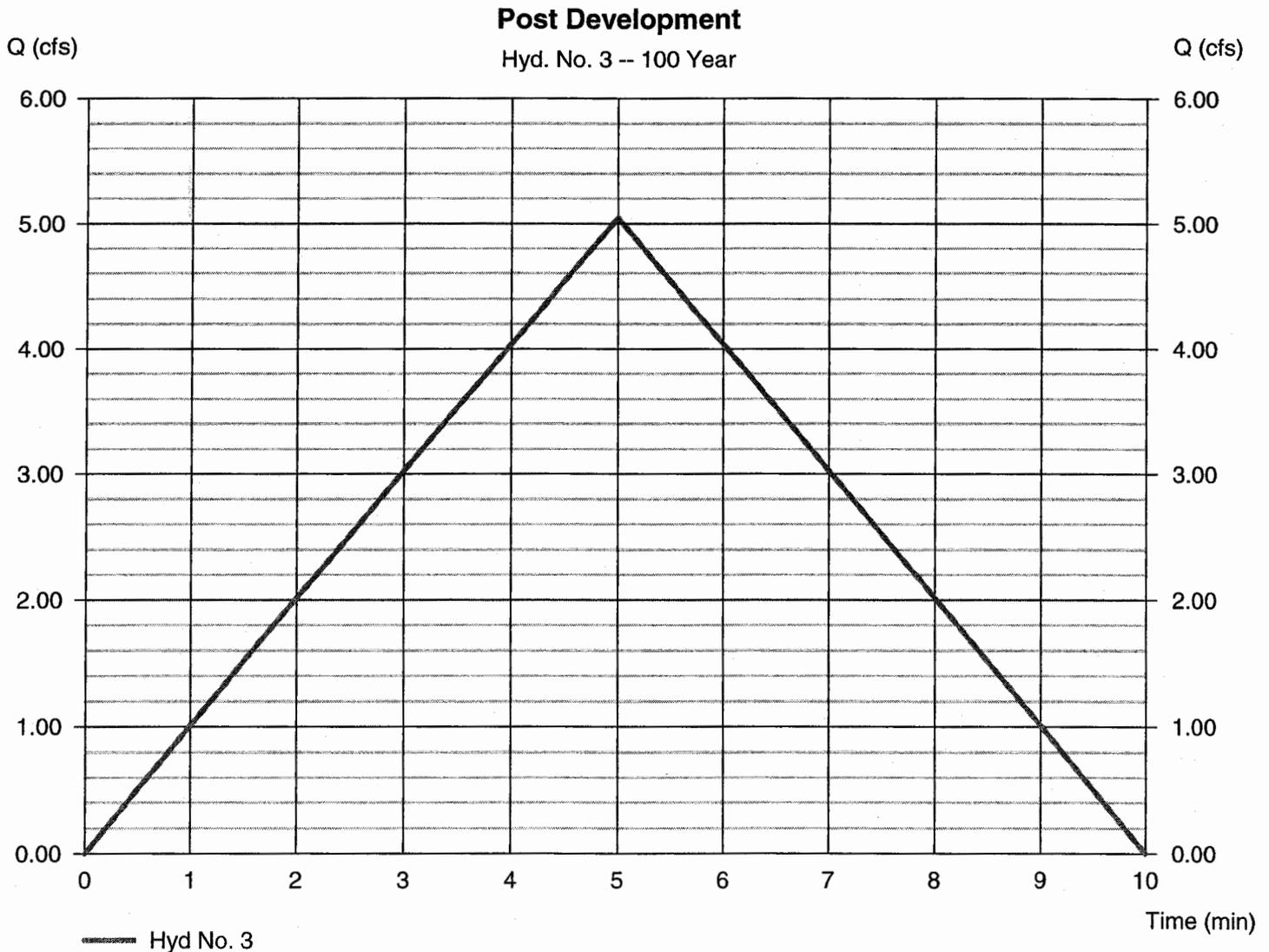
Tuesday, Oct 9, 2007

Hyd. No. 3

Post Development

Hydrograph type	= Mod. Rational	Peak discharge	= 5.047 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 1,514 cuft
Drainage area	= 0.820 ac	Runoff coeff.	= 0.67*
Intensity	= 9.187 in/hr	Tc by User	= 5.00 min
IDF Curve	= JCCstormsewer.IDF	Storm duration	= 1.0 x Tc
Target Q	= n/a	Est. Req'd Storage	= n/a

* Composite (Area/C) = $[(0.550 \times 0.90) + (0.380 \times 0.35)] / 0.820$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Tuesday, Oct 9, 2007

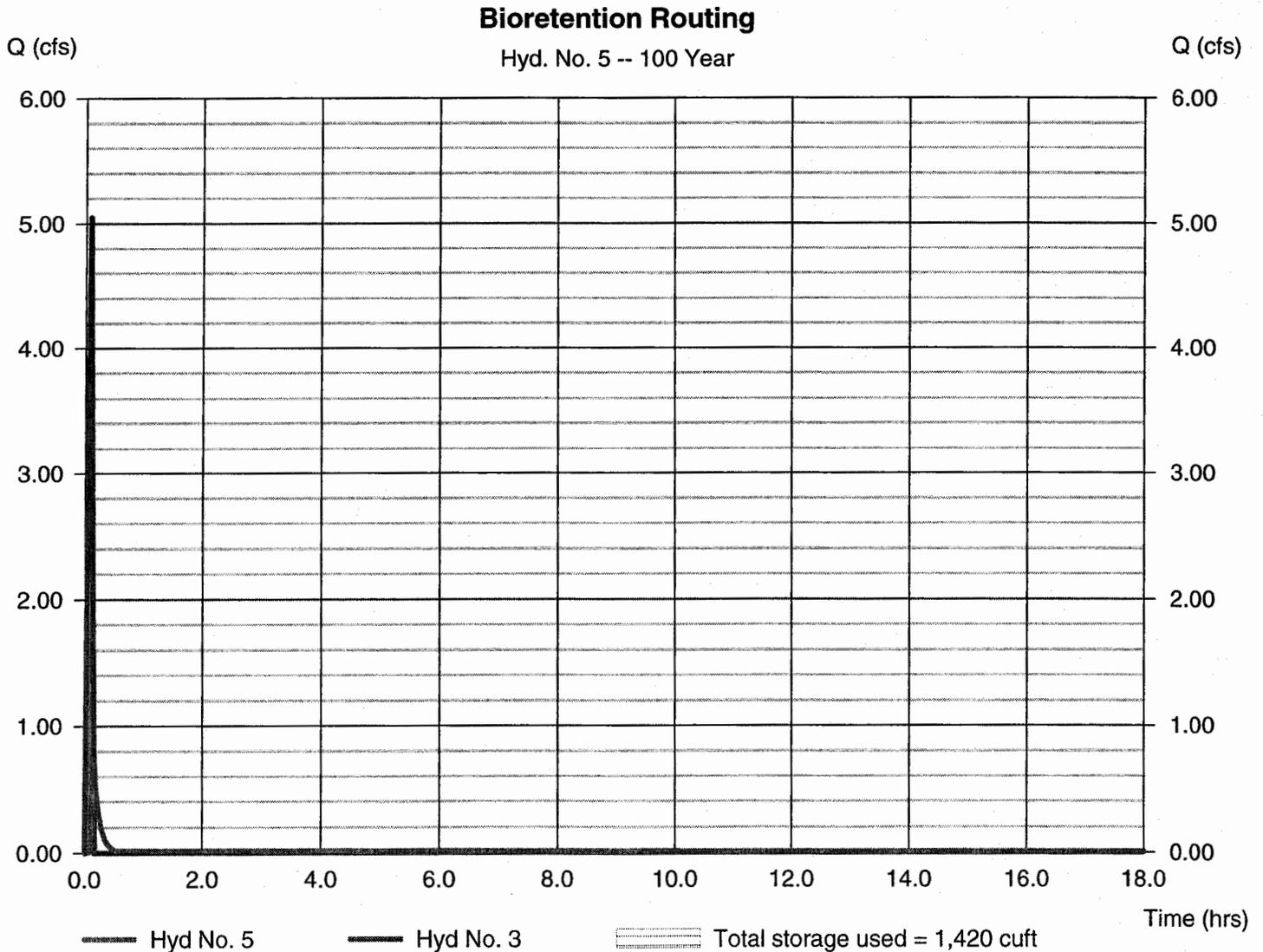
Hyd. No. 5

Bioretention Routing

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Post Development
Reservoir name = Bioretention Basin

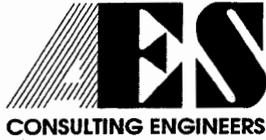
Peak discharge = 0.735 cfs
Time to peak = 9 min
Hyd. volume = 1,422 cuft
Max. Elevation = 100.72 ft
Max. Storage = 1,420 cuft

Storage Indication method used. Outflow includes exfiltration.



E&SC and Stormwater Checklist

Sediment Trap Calculations



Williamsburg (757) 253-0040
 Gloucester (804) 693-4450
 Richmond (804) 330-8040

Project
 Project No.
 Subject
 Sheet No.
 Calculated By

5525 Olde Towne Road		
9557-01		
Sediment Trap #		1
1	Of	1
JSM	Date	1/5/06

Drainage Area to Sediment Trap = 0.82 Acres

Required Wet Storage = 67 cy/acre * (Drainage Area) = 55 cubic yards, or 1,483 cubic feet

Required Dry Storage = 67 cy/acre * (Drainage Area) = 55 cubic yards, or 1,483 cubic feet

Determine Volume of Sediment Trap by Contour:

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
96	0	20	0	0	0	0
97	1	113	66.5	2	67	2
98	1	278	195.5	7	262	10
99	1	490	384	14	646	24
100	1	1571	1030.5	38	1677	62
101	1	2602	2086.5	77	3763	139
102	1	2679	2640.5	98	6404	237

Width of Aggregate Outlet Weir = 6 ft./acre & (Drainage Area) = 4.92 feet

Elevation of Wet Storage Volume = 99.81

Elevation of Dry Storage Volume = 100.62

Elevation of accumulated sediment when sediment removed is required (1/2 wet storage volume) = 99.09

CALCULATION OF DIAMETER OF DEWATERING ORIFICE FOR SEDIMENT BASIN

9557-01

1/5/2006

Revision Date

Sediment Trap #1

Using the equation,

$$\text{Diameter of Dewatering Orifice} = 2 * (Q / ((64.32 * h)^{(1/2)} * 0.6 * 3.14))^{(1/2)}$$

where, Q equals volumetric flowrate through orifice needed for 6-hour drawdown , in cfs

h equals Average Head, in feet

$$h = \frac{\text{Elevation of crest of riser} - \text{Elevation of Wet storage volume}}{2}$$

$$h = \frac{100.5 - 99.7}{2} = 0.405 \text{ feet}$$

$$Q = \text{Total Dry Storage} / 21,600 \text{ seconds}$$

$$\text{Total Dry Storage for sediment basin} = 50 \text{ cubic yards, or } 1,350 \text{ cubic feet}$$

$$Q = 0.1 \text{ cfs}$$

So,

$$\text{Diameter of Orifice} = 0.2 \text{ feet, or } 1.9 \text{ inches}$$

round to 3 inches

$$\underline{D} = \underline{4''} \quad \underline{Q} = \underline{0.62 \text{ CFS}} \quad \underline{L} = \underline{50'} \quad \underline{A} = \underline{\pi r^2} \approx \underline{0.087}$$

$$h_f = \frac{f L V^2}{2 D g} \Rightarrow$$

$$\frac{Q}{A} = V = \frac{0.62}{0.087} \approx \underline{7.1 \text{ FPS}}$$

f (FROM MOODY DIAGRAM)

$$Re = \frac{D V}{\nu}$$

$$\nu_{60} = 1.217 \text{ E}^{-5}$$

$$Re = \frac{(0.33)(7.1)}{1.217 \text{ E}^{-5}} = 1.9 \text{ E}^{-5}$$

$$E_{PVC} = 0.000005 \quad \frac{E}{D} = 2 \text{ E}^{-5}$$

$$D = 4'' = 0.33 \text{ FT}$$

$$Q = 0.62 \text{ CFS}$$

$$L = 50'$$

$$A = 0.087$$

$$V = 7.1 \text{ FPS}$$

$$\nu = 1.217 \text{ E}^{-5}$$

$$Re = 1.9 \text{ E}^{-5}$$

$$e = 2 \text{ E}^{-5}$$

} USE IN MOODY DIAGRAM { $f \approx 0.0155$

BARRY,
I THINK
IT WILL
WORK.
BC

$$\therefore h_f = \frac{(0.0155)(50)(7.1)^2}{(64.4)(0.33)} \approx 1.8'$$

$$\underline{1.8 \leq \text{DESIGN}}$$

DESIGN IS OK.

← CHECK

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MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID JCC.RNQ

JCCSCSdata

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
Dev..1	2.8000	Synthetic Curve	SCSTYPES	TypeII 24hr
Dev..2	3.5000	Synthetic Curve	SCSTYPES	TypeII 24hr
Dev.10	5.8000	Synthetic Curve	SCSTYPES	TypeII 24hr
Dev.25	6.4000	Synthetic Curve	SCSTYPES	TypeII 24hr
Dev100	8.0000	Synthetic Curve	SCSTYPES	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
BIORET BMP	IN POND	1'	.118		11.9000	2.13		
BIORET BMP	IN POND	2'	.161		11.9000	2.90		
BIORET BMP	IN POND	10'	.310		11.9000	5.45		
BIORET BMP	IN POND	25'	.350		11.9000	6.12		
BIORET BMP	IN POND	100'	.457		11.9000	7.87		
BIORET BMP	OUT POND	1	.079		12.1000	.89	101.10	.053
BIORET BMP	OUT POND	2	.122		12.0500	1.83	101.27	.064
BIORET BMP	OUT POND	10	.272		12.0000	4.31	101.59	.087
BIORET BMP	OUT POND	25	.311		12.0000	4.87	101.66	.092
BIORET BMP	OUT POND	100	.418		12.0000	6.34	101.81	.104
*OUTFALL AT INLET	JCT	1	.079		12.1000	.89		
*OUTFALL AT INLET	JCT	2	.122		12.0500	1.83		
*OUTFALL AT INLET	JCT	10	.272		12.0000	4.31		
*OUTFALL AT INLET	JCT	25	.311		12.0000	4.87		
*OUTFALL AT INLET	JCT	100	.418		12.0000	6.34		
SCS UH 10	AREA	1	.118		11.9000	2.13		
SCS UH 10	AREA	2	.161		11.9000	2.90		
SCS UH 10	AREA	10	.310		11.9000	5.45		

Type.... Master Network Summary
 Name.... Watershed
 File.... C:\HAESTAD\PPKW\OLDETOWNDAIRY.PPW

MASTER NETWORK SUMMARY
 SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Return Type Event	HYG Vol		Qpeak	Qpeak	Max WSEL	Max Pond
		ac-ft	Trun	hrs	cfs	ft	ac-ft
SCS UH 10	AREA 25	.350		11.9000	6.12		
SCS UH 10	AREA 100	.457		11.9000	7.87		

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\HAESTAD\PPKW\OLDETOWNEDAIRY.PPW
 Storm... TypeII 24hr Tag: Dev..1

Page 2.01
 Event: 1 yr

NETWORK SUMMARY -- NODES
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev..1
 Description: 1-year event

 Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
 Storm Frequency = 1 yr
 Total Rainfall Depth= 2.8000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
BIORET BMP IN	POND	.118		11.9000	2.13	
BIORET BMP OUT	POND	.079		12.1000	.89	101.10
Outfall	OUTFALL AT INLET	JCT	.079	12.1000	.89	
SCS UH 10	AREA	.118		11.9000	2.13	

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
 Storm... TypeII 24hr Tag: Dev..2

Page 2.02
 Event: 2 yr

NETWORK SUMMARY -- NODES
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev..2
 Description: 2-year storm event

 Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
 Storm Frequency = 2 yr
 Total Rainfall Depth= 3.5000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
BIORET BMP IN	POND	.161		11.9000	2.90	
BIORET BMP OUT	POND	.122		12.0500	1.83	101.27
Outfall	OUTFALL AT INLET	.122		12.0500	1.83	
SCS UH 10	AREA	.161		11.9000	2.90	

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
 Storm... TypeII 24hr Tag: Dev.10

Page 2.03
 Event: 10 yr

NETWORK SUMMARY -- NODES
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev.10
 Description: 10-year storm event

 Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
 Storm Frequency = 10 yr
 Total Rainfall Depth= 5.8000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
BIORET BMP IN	POND	.310		11.9000	5.45	
BIORET BMP OUT	POND	.272		12.0000	4.31	101.59
Outfall	OUTFALL AT INLET	JCT		12.0000	4.31	
SCS UH 10	AREA	.310		11.9000	5.45	

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\HAESTAD\PPKW\OLDETOWNEDAIRY.PPW
 Storm... TypeII 24hr Tag: Dev.25

Page 2.04
 Event: 25 yr

NETWORK SUMMARY -- NODES
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev.25
 Description: 25-year storm event

 Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
 Storm Frequency = 25 yr
 Total Rainfall Depth= 6.4000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID		Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
	BIORET BMP	IN POND	.350	11.9000	6.12	
	BIORET BMP	OUT POND	.311	12.0000	4.87	101.66
Outfall	OUTFALL AT	INLET JCT	.311	12.0000	4.87	
	SCS UH 10	AREA	.350	11.9000	6.12	

Type.... Executive Summary (Nodes)
 Name.... Watershed
 File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
 Storm... TypeII 24hr Tag: Dev100

Page 2.05
 Event: 100 yr

NETWORK SUMMARY -- NODES
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev100
 Description: 100-year storm event

 Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
 Storm Frequency = 100 yr
 Total Rainfall Depth= 8.0000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
BIORET BMP IN	POND	.457		11.9000	7.87	
BIORET BMP OUT	POND	.418		12.0000	6.34	101.81
Outfall OUTFALL AT INLET	JCT	.418		12.0000	6.34	
SCS UH 10	AREA	.457		11.9000	7.87	

Type.... Design Storms
Name.... JCCSCSdata

Page 3.01

File.... C:\HAESTAD\PPKW\RAINFALL\JCC.RNQ
Title... Olde Towne Dairy County Check SCS

DESIGN STORMS SUMMARY

Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev..1
Description: 1-year event

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 1 yr
Total Rainfall Depth= 2.8000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev..2
Description: 2-year storm event

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 3.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev.10
Description: 10-year storm event

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.8000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = Dev.25
Description: 25-year storm event

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 6.4000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Type.... Design Storms
Name.... JCCSCSdata

Page 3.02

File.... C:\HAESTAD\PPKW\RAINFALL\JCC.RNQ
Title... Olde Towne Dairy County Check SCS

DESIGN STORMS SUMMARY

Design Storm File, ID = JCC.RNQ JCCSCSdata

Storm Tag Name = Dev100
Description: 100-year storm event

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 8.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Type.... Runoff CN-Area
Name.... OLDETOWNE

File.... C:\HAESTAD\PPKW\OLDETOWNEDAIRY.PPW

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Impervious, HSG C	98	.500			98.00
Landscaped Yard Area, HSG C	76	.320			76.00

COMPOSITE AREA & WEIGHTED CN ---> .820 89.41 (89)
.....

Type.... SCS Unit Hyd. Summary
Name.... SCS UH 10 Tag: Dev..1
File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
Storm... TypeII 24hr Tag: Dev..1

Page 5.01
Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm
Duration = 24.0000 hrs Rain Depth = 2.8000 in
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\HAESTAD\PPKW\
HYG File - ID = OLDE TOWN.HYG - SCS UH 10 Dev..1
Tc (Min. Tc) = .0833 hrs
Drainage Area = .820 acres Runoff CN= 89

=====
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 2.20 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 11.9000 hrs
Peak Flow, Interpolated Output = 2.13 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
=====

DRAINAGE AREA

ID:OldeTowne
CN = 89
Area = .820 acres
S = 1.2360 in
0.2S = .2472 in

Cumulative Runoff

1.7200 in
.118 ac-ft

HYG Volume... .118 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: None Selected)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 11.15 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

Type.... SCS Unit Hyd. Summary
Name.... SCS UH 10 Tag: Dev..2
File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
Storm... TypeII 24hr Tag: Dev..2

Page 5.02
Event: 2 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration = 24.0000 hrs Rain Depth = 3.5000 in
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\HAESTAD\PPKW\
HYG File - ID = OLDE TOWN.HYG - SCS UH 10 Dev..2
Tc (Min. Tc) = .0833 hrs
Drainage Area = .820 acres Runoff CN= 89

=====
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 2.99 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 11.9000 hrs
Peak Flow, Interpolated Output = 2.90 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%
=====

DRAINAGE AREA

ID: OldeTowne
CN = 89
Area = .820 acres
S = 1.2360 in
0.25 = .2472 in

Cumulative Runoff

2.3572 in
.161 ac-ft

HYG Volume... .161 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: None Selected)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 11.15 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

Type.... SCS Unit Hyd. Summary
Name.... SCS UH 10 Tag: Dev.10
File.... C:\HAESTAD\PPKW\OLDETOWNEDAIRY.PPW
Storm... TypeII 24hr Tag: Dev.10

Page 5.03
Event: 10 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration = 24.0000 hrs Rain Depth = 5.8000 in
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\HAESTAD\PPKW\
HYG File - ID = OLDETOWN.HYG - SCS UH 10 Dev.10
Tc (Min. Tc) = .0833 hrs
Drainage Area = .820 acres Runoff CN= 89

=====
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 5.59 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 11.9000 hrs
Peak Flow, Interpolated Output = 5.45 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%

=====

DRAINAGE AREA

ID:OldeTowne
CN = 89
Area = .820 acres
S = 1.2360 in
0.25 = .2472 in

Cumulative Runoff

4.5419 in
.310 ac-ft

HYG Volume... .310 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: None Selected)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 11.15 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

Type.... SCS Unit Hyd. Summary
Name.... SCS UH 10 Tag: Dev100
File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
Storm... TypeII 24hr Tag: Dev100

Page 5.04
Event: 100 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 8.0000 in
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\HAESTAD\PPKW\
HYG File - ID = OLDE TOWN.HYG - SCS UH 10 Dev100
Tc (Min. Tc) = .0833 hrs
Drainage Area = .820 acres Runoff CN= 89

=====
Computational Time Increment = .01111 hrs
Computed Peak Time = 11.9175 hrs
Computed Peak Flow = 8.05 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 11.9000 hrs
Peak Flow, Interpolated Output = 7.87 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%

DRAINAGE AREA

ID: OldeTowne
CN = 89
Area = .820 acres
S = 1.2360 in
0.25 = .2472 in

Cumulative Runoff

6.6868 in
.457 ac-ft

HYG Volume... .457 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: None Selected)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 11.15 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

Type.... Vol: Elev-Area
Name.... BIORET BMP

File.... C:\HAESTAD\PPKW\OLDE TOWN DAIRY.PPW
Title... Bioret BMP

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
100.00	-----	.0361	.0000	.000	.000
101.00	-----	.0597	.1422	.047	.047
102.00	-----	.0849	.2158	.072	.119

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

$$\text{Volume} = (1/3) * (\text{EL2} - \text{EL1}) * (\text{Area1} + \text{Area2} + \text{sq.rt.}(\text{Area1} * \text{Area2}))$$

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

Type.... Outlet Input Data
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
Title... Riser Structure

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 100.00 ft
Increment = .25 ft
Max. Elev.= 102.00 ft

OUTLET CONNECTIVITY

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-Rectangular	ES	--->	TW	102.000	102.000
Inlet Box	In	--->	CV	100.850	102.000
Culvert-Circular	CV	--->	TW	95.000	102.000
TW SETUP, DS Channel					

Type.... Outlet Input Data
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\OLDE TOWNEDAIRY.PPW
Title... Riser Structure

OUTLET STRUCTURE INPUT DATA

Structure ID = ES
Structure Type = Weir-Rectangular

of Openings = 1
Crest Elev. = 102.00 ft
Weir Length = 30.00 ft
Weir Coeff. = 2.600000

Weir TW effects (Use adjustment equation)

Structure ID = In
Structure Type = Inlet Box

of Openings = 1
Invert Elev. = 100.85 ft
Orifice Area = 4.0000 sq.ft
Orifice Coeff. = .600
Weir Length = 2.00 ft
Weir Coeff. = 3.330
K, Submerged = .000
K, Reverse = 1.000
Kb, Barrel = .000000 (per ft of full flow)
Barrel Length = .00 ft
Mannings n = .0000

Type.... Outlet Input Data
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\OLDE TOWN DAIRY.PPW
Title... Riser Structure

OUTLET STRUCTURE INPUT DATA

Structure ID = CV
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = 1.0000 ft
Upstream Invert = 95.00 ft
Downstream Invert = 94.50 ft
Horiz. Length = 50.00 ft
Barrel Length = 50.00 ft
Barrel Slope = .01000 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0120
Ke = .5000 (forward entrance loss)
Kb = .026647 (per ft of full flow)
Kr = .5000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 1
Inlet Control K = .0098
Inlet Control M = 2.0000
Inlet Control c = .03980
Inlet Control Y = .6700
T1 ratio (HW/D) = 1.155
T2 ratio (HW/D) = 1.302
Slope Factor = -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

At T1 Elev = 96.15 ft ---> Flow = 2.75 cfs
At T2 Elev = 96.30 ft ---> Flow = 3.14 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations = 30
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

S/N: 521502A06A8A
PondPack Ver. 7.5 (767)

James City County
Compute Time: 11:32:04 Date: 03/09/2006

Type.... Composite Rating Curve
Name.... POND ROUTE

File.... C:\HAESTAD\PPKW\OLDE TOWN DAIRY.PPW
Title... Riser Structure

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
100.00	.00	Free Outfall		(no Q: ES, In, CV)
100.25	.00	Free Outfall		(no Q: ES, In, CV)
100.50	.00	Free Outfall		(no Q: ES, In, CV)
100.75	.00	Free Outfall		(no Q: ES, In, CV)
100.85	.00	Free Outfall		(no Q: ES, In, CV)
101.00	.39	Free Outfall		In, CV (no Q: ES)
101.25	1.68	Free Outfall		In, CV (no Q: ES)
101.50	3.49	Free Outfall		In, CV (no Q: ES)
101.75	5.69	Free Outfall		In, CV (no Q: ES)
102.00	8.21	Free Outfall		In, CV (no Q: ES)

Index of Starting Page Numbers for ID Names

----- B -----

BIORET BMP... 6.01

----- J -----

JCCSCSdata... 3.01

----- O -----

OLDETOWNE... 4.01

----- P -----

POND ROUTE... 7.01, 7.04

----- S -----

SCS UH 10 Dev..1... 5.01, 5.02,
5.03, 5.04

----- W -----

Watershed... 1.01, 2.01, 2.02, 2.03,
2.04, 2.05

5525 Olde Towne Rd

Jack Kniest

592-6444 (cell)

- soil certification

- bonding

- CO inspection



YORKTOWN MATERIALS

27 May 2009

W. A. Cowan

W. A. Cowan
P.O. Box 343
8105 Richmond Road
Toano, Virginia 23168

RE: Yorktown BioSoils Certification

This letter is to certify that Yorktown BioSoils is made to the following specification:

- 50% (by volume) Selected Type "A" Fill Sand
- 30% (by volume) HRSD Compost
- 20% (by volume) Sifted Topsoil

The material is mechanical mixed at our site in Yorktown, Virginia on an as needed basis. We store the component materials on site and the technical data on those materials is available.

Thank you for your interest in Yorktown Materials BioSoils.

Sincerely,

Don Boyd
Yorktown Materials

PO BOX 1741 YORKTOWN VA 23091
TEL 757.898.4414
FAX 757.898.4273
WWW.YORKTOWNMATERIALS.COM


**US COMPOSTING
COUNCIL**
*Seal of Testing
Assurance*

Hampton Roads Sanitation District

Rhonda Bowen

P.O. Box 5911

Virginia Beach

VA 23471

(757) 460-4270

Date Sampled/Received: 12 Sep. 08 / 15 Sep. 08

Product Identification Compost

Nutra Green

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hanger Way; Watsonville, CA 95076 tel: 831.724.5422 fax: 831.724.3188			
Compost Parameters	Reported as (units of measure)	Test Results	Test Results
Plant Nutrients:	% weight basis	% wet weight basis	% dry weight basis
Nitrogen	Total N	1.7	2.5
Phosphorus	P ₂ O ₅	3.0	4.3
Potassium	K ₂ O	0.25	0.37
Calcium	Ca	2.8	4.0
Magnesium	Mg	0.17	0.25
Moisture Content	% wet weight basis	31.1	
Organic Matter Content	% dry weight basis	47.0	
pH	units	7.17	
Soluble Salts (electrical conductivity EC _s)	dS/m (mmhos/cm)	14	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	100.0	
Stability Indicator (respirometry)		Stability Rating:	
CO ₂ Evolution	mg CO ₂ -C/g OM/day	1.6	Very Stable
	mg CO ₂ -C/g TS/day	0.74	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	0.0	
Relative Seedling Vigor	average % of control	NA	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	Fecal coliform
		Pass	Salmonella
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	As, Cd, Cr, Cu, Pb, Hg
			Mo, Ni, Se, Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group:

Sep.08 C

Laboratory Number: 8090435-1/1

Analyst: Assaf Sadoh

www.compostlab.com

Report Number:
R09083-0010
Account Number:
78964

A&L EASTERN LABORATORIES, INC.

7621 Whitepine Road • Richmond, Virginia 23237-2214

Phone (804) 743-9401 • Fax (804) 271-6446

Website: www.al-labs-eastern.com • E-mail: office@al-labs-eastern.com



Send To: YORKTOWN MATERIALS LLC
POB 1741
YORKTOWN, VA 23692

Grower: YORKTOWN MATERIALS LLC

Submitted By: DON BOYD

DON BOYD

Farm I D: Field I D:

RECEIVED

MAR 27 2009

SOIL ANALYSIS REPORT

Page: 1 Date Received: 3/24/2009 Date of Analysis: 3/25/2009 Date of Report: 3/26/2009 Analytical Method(s): Mehlich III

Sample Number	Lab Number	Organic Matter			Phosphorus		Potassium		Magnesium		Calcium		Sodium		pH		Acidity	C.E.C.
		%	ENR lbs/A	Rate	Available ppm	Reserve ppm	Rate	K ppm	Rate	MG ppm	Rate	CA ppm	Rate	NA ppm	Rate	Soil pH	Buffer Index	H meq/100g
1	10368	5.8	145	H	314	VH		351	VH	272	M	2672	H		7.0			16.5
2	10367	6.1	150	H	259	VH		295	VH	226	M	2144	H		7.1			13.4
Sample Number	Percent Base Saturation					Nitrate	Sulfur	Zinc	Manganese	Iron	Copper	Boron	Soluble Salts	Chloride	Aluminum			
	K %	Mg %	Ca %	Na %	H %	NO3-N ppm	SO4-S ppm	ZN ppm	MN ppm	FE ppm	CU ppm	B ppm	ms/cm Rate	CL ppm	AL ppm			
1	5.4	13.7	80.8										1.48	H				
2	5.7	14.1	80.2										0.97	M				

ALE-001

Values on this report represent the plant available nutrients in the soil.
Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High).
ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre),
ms/cm (milli-mhos per centimeter), meq/100g (milli-equivalent per 100 grams).
Conversions: ppm x 2 = lbs/A, Soluble Salts ms/cm x 640 = ppm.

This report applies to the sample(s) tested. Samples are retained a maximum of thirty days after testing. Soil Analysis prepared by: A&L EASTERN LABORATORIES, INC.

by: *Paul Chu*
Paul Chu, Ph.D.

Report Number:
R09083-0010
Account Number:
78964

A&L EASTERN LABORATORIES, INC.

7621 Whitepine Road • Richmond, Virginia 23237-2214
Phone (804) 743-9401 • Fax (804) 271-6446

Website: www.al-labs-eastern.com • E-mail: office@al-labs-eastern.com



RECEIVED

MAR 27 2009

TO: YORKTOWN MATERIALS LLC
POB 1741
YORKTOWN, VA 23692

Grower: YORKTOWN MATERIALS LLC Submitted By: DON BOYD

ATTN: DON BOYD

Date Received: 3/24/09 Date Reported: 03/26/2009

REPORT OF ANALYSIS

Page: 1

LAB NO	SAMPLE ID	ANALYSIS	RESULT	UNIT	METHOD
10366	1	Sand	75	%	Bouyoucos 1962
		Silt	14	%	Bouyoucos 1962
		Clay	11	%	Bouyoucos 1962
		Soil Textural Class	Sandy Loam		Bouyoucos 1962
10367	2	Sand	69	%	Bouyoucos 1962
		Silt	22	%	Bouyoucos 1962
		Clay	9	%	Bouyoucos 1962
		Soil Textural Class	Sandy Loam		Bouyoucos 1962

ALE-MISC

Our reports and letters are for the exclusive and confidential use of our clients, and may not be reproduced in whole or in part, nor may any reference be made to the work, the results, or the company in any advertising, news release, or other public announcements without obtaining our prior written authorization.

Paul Chu, Ph.D.

Date Record Created: 8/19/2009

WS_BMPNO:

Created By: Scott Thomas

PC244

WATERSHED PC
BMP ID NO 244
PLAN NO SP-01-06
TAX PARCEL
PIN NO 3330100003
CONSTRUCTION DATE
PROJECT NAME 5525 Olde Towne Road
FACILITY LOCATION 5525 Olde Towne Road
CITY-STATE Williamsburg, VA 23188
CURRENT OWNER EPEUS LLC
OWNER ADDRESS 426 Airport Rd
OWNER ADDRESS 2
CITY-STATE-ZIP CODE Williamsburg-VA-23188
OWNER PHONE 565-2699
MAINT AGREEMENT Yes
EMERG ACTION PLAN Yes

MAINTENANCE PLAN

SITE AREA acre 0.94
LAND USE Commercial
old BMP TYP Bioretention
JCC BMP CODE D1 Bioretention
POINT VALUE 10

SVC DRAIN AREA acres

SERVICE AREA DESCR

IMPERV AREA acres 0.00
RECV STREAM Chisel Run
EXT DET-WQ-CTRL No
WTR QUAL VOL acre-ft
CHAN PROT CTRL No
CHAN PROT VOL acre-ft
SW/FLOOD CONTROL No
GEOTECH REPORT No

CTRL STRUC DESC

CTRL STRUC SIZE inches 3
OTLT BARRL DESC
OTLT BARRL SIZE inch 15
EMERG SPILLWAY No
DESIGN HW ELEV
PERM POOL ELEV N/A
2-YR OUTFLOW cfs 0.00
10-YR OUTFLOW cfs 0.00
REC DRAWING Yes

CONSTR CERTIF

LAST INSP DATE Inspected by: Amy Parker

INTERNAL RATING

MISC/COMMENTS

New Guiseppis Restaurant, behind PRIME

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Additional Comments:

