PC241

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 10th day of May, 2005, between VIRGINIA UNITED METHODIST HOMES, INC., and all successors in interest, ("COVENANTOR(S),") owner(s) of the following property:

Street Address: 144 JESTERS LANE
Legal Description: 105.931 AC CC CASEY LIMITED COMPANY
Project Name: WINDSOR MEADE VILLA SITE PLAN
Document No. 030023373, Deed Book —, Page No. —;
Instrument No. —, and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

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

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

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

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

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

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

Instrument # 050011883
Recorded on May 31, 2005

Revised 01/05

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

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

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

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

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

COVENANTOR(S)

Wm. Jerry Finks, President

Print Name/Title Wm. Jerry Finks, President

ATTEST:

Martha Seward

COVENANTOR(S)

_____

Print Name/Title _____

ATTEST:

_____

COMMONWEALTH OF VIRGINIA

CITY/COUNTY OF Henrico

I hereby certify that on this 20th day of May, 2005, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared Wm. Joseph Fink and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 20th day of May, 2005.

Judy M. Walker
Notary Public

My Commission expires: Sept. 30, 2008

Approved as to form:

County Attorney

This Declaration of Covenants prepared by:

JAMES D. FRANKLIN
(Print Name)

ENGINEERING & CONSTRUCTION MGR.
(Title)

453 McLAWS CIRCLE, SUITE 2
(Address)

WILLIAMSBURG, VA 23185
(City) (State) (Zip)

(757) 565-9670
(Phone Number)

drainage1.pre

James City County Environmental Division Stormwater Management/BMP Record Drawing and Construction Certification Review Tracking Form

Project Name: Windsor Meade - Villa BMP #2
County Plan No.: SP-03-04
Stormwater Management Facility: Wet Detention Pond
BMP Phase #: ☐ I ☐ II ☐ III

- ☒ Information Package Received. Date/By: 12/17/2008
- ☒ Completeness Check:
  - ☒ Record Drawing Date/By: 12/15/2008 - Marc Bennett
  - ☒ Construction Certification Date/By: 12/17/2008 - Marc Bennett
  - ☐ RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001Only)
  - ☒ Insp/Maint Agreement # / Date: 050011883 May 31, 2005
  - ☒ BMP Maintenance Plan Location: Sheet 25 Item 20
  - ☐ Other:
- ☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review
  - ☒ Yes ☐ No Location: Sheet #4, Item 20
- ☒ Assign **County BMP ID Code #**: Code: PC241
- ☒ Preliminary Input/Log into Division's "As-Built Tracking Log"
- ☒ Add Location to GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.)
- ☒ Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
- ☒ Active Project File Review (correspondence, H&H, design computations, etc.).
- ☒ Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.).
- ☒ Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).
- ☒ Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).
- ☒ Final Inspection (FI) Performed Date: 6/7/2010 - 2/25/2009
- ☒ Record Drawing (RD) Review Date: 2/24/2009
- ☒ Construction Certification (CC) Review Date: 2/24/2009
- ☒ Actions:
  - ☐ No comments.
  - ☐ Comments. Letter Forwarded. Date:
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☒ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :
- ☐ Second Submission: NA
- ☒ Reinspection (if necessary): 6/7/2010
- ☒ Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release.
- ☒ Complete "Surety Request Form".
- ☒ Check/Clean active file of any remaining material and finish "As-Built" file.
- ☒ Add to County BMP Inventory/Inspection schedule (Phase I, II or III).
- ☒ Copy Final Inspection Report into County BMP Inspection Program file.
- ☒ Obtain Digital Photographs of BMP and save into County BMP Inventory.
- ☐ Request mylar/reproducible from As-Built plan preparer.
- ☒ Complete "As-built Tracking Log".
- ☒ Last check of BMP Access Database (County BMP Inventory).
- ☐ Add BMP to JCC Hydrology & Hydraulic database (optional).
- ☐ Add BMP to Municipal BMP list (if a County-owned facility)
- ☐ Add BMP to PRIDE BMP ratings database.

Final Sign-Off

Inspector: [signature] Date: 6/10/2010

Chief Engineer: [signature] Date: 04/06/12

*** See separate checklist, if needed.

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: Villa Construction Plan Villa Windsor Meade of Williamsburg
Structure/BMP Name: [redacted] Villa BMP#2
Project Location: 3975 Windsormeade Way Williamsburg , VA 23188
BMP Location: Off of Castleside Circle, South of 169 Southport Lot
County Plan No.: SP - 03 - 04

Project Type:
- ☒ Residential
- ☐ Business
- ☐ Commercial
- ☐ Office
- ☐ Institutional
- ☐ Industrial
- ☐ Public
- ☐ Roadway
- ☒ Other Retirement Community

Tax Map/Parcel No.: (38-3)(1-34A)
BMP ID Code (if known):
Zoning District: MU (Mixed Use)
Land Use: Single Family - Suburban
Site Area (sf or acres): 105.93 acres

Brief Description of Stormwater Management/BMP Facility: Both BMPs are Extended Detention Wet Pond JCC BMP Type A-3
Villa BMP #1 is located by the roadway Castleside Circle, Near the wooden bridge
Villa BMP #1 has a drainage area of 18.06 acres nearly all of the drainage area is single family homes.
Villa BMP #2 is by the roadway Corbridge Course, between two dwellings.
Villa BMP #2 has a drainage area of 10.36 acres nearly all of the drainage area are single family homes.

Nearest Visible Landmark to SWM/BMP Facility: Villa BMP#1: Wooden Bridge Villa BMP#2: Retaining Wall

Nearest Vertical Ground Control (if known):
☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other
Station Number or Name: #325
Datum or Reference Elevation: NAD-83
Control Description: Vertical NGVD 1929, VA State Plane Coordinates-South Zone (NAD83)(1986)
Control Location from Subject Facility: Control is located at Berkeley Elementary School.

#241

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: Villa #1 BMP: May-2005, Villa #2 BMP: Sept.-2005
Facility Monitored by County Representative during Construction: ☒ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: C.A. Barrs Contractors, Inc.
Name of Professional Firm Who Routinely Monitored Construction: ECS Mid-Atlantic, LLC.
Date of Completion for SWM/BMP Facility: Villa #1 BMP: Oct.-2008, Villa #2 BMP: Oct.-2008
Date of Record Drawing/Construction Certification Submittal: Sept-2008

(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: Virginia United Methodist Homes, Inc.
Mailing Address: 4704 Shotley Way
Williamsburg, VA 23188
Business Phone: (757) 565-6200 Fax:(757) 941-3611
Contact Person: Richard Bottone Title:Executive Director

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, VA 23188
Business Phone: (757) 253-0040
Fax: (757) 220-8994
Responsible Plan Preparer: V. Marc Bennett, PE
Title: Senior Project Manager
Plan Name: Villa Construction Plan Villa Windsor Meade of Williamsburg
Firm's Project No. 8818-05
Plan Date: 01/09/2004
Sheet No.'s Applicable to SWM/BMP Facility: SH 1 / SH 12 / SH 16 / SH 25 / ____

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

Name: C.A. Barrs Contractors, Inc.
Mailing Address: P.O. Box 1489
Yorktown, VA 23692-1489
Business Phone: (757) 898-7282
Fax: (757) 898-1282
Contact Person: Erik R. Turkovish
Site Foreman/Supervisor: M. Scott St. Clair
Specialty Subcontractors & Purpose (for BMP Construction Only):

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 Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Business Phone: (757) 253-0040
Fax: (757) 220-8994

Name: Van Marc Bennett
Title: Senior Project Manager
Signature:
Date: 12/16/08

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

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
Lic. No. 026528
12/16/08
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

Construction Certification

Firm Name: ECS Mid-Atlantic, LLC
Mailing Address: 108 Ingram Rd, Ste 1
Williamsburg, VA 23188
Business Phone: 229-6677
Fax: 229-9978

Name: Michael J. Galli
Title: Principal Engineer
Signature:
Date: 3/12/09

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.

COMMONWEALTH OF VIRGINIA
MICHAEL J. GALLI
Lic. No. 030684
3/12/09
PROFESSIONAL ENGINEER

(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.)*

* Inc 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.

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

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

* Both Villa BMP #1 and Villa BMP #2 have dam height issues. These issues are being resolved.

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.
XX	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.**
XX	13.	Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
XX	14.	Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
XX	15.	Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
XX	16.	Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
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.
N/A	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)

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

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

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

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

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

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

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

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

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

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

XX A10. Low flow orifice has a non-clogging mechanism.

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

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

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

Windsor Meade Villas

~~PC240~~ PC241

Order of Contents for Stormwater Management Facilities As-built Files

Each file is to contain:

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

BMP RECORD DRAWINGS

RECEIVED
DEC 17 2008
ENVIRONMENTAL DIVISION

LEGEND

EXISTING		PROPOSED
W	WATER	W
S	GRAVITY SEWER	S
S	GRAVITY SEWER (BY OTHERS)	S
	STORM SEWER	
EX. FM	FORCE MAIN	
	MANHOLE	
	CURB DROP INLET	
	YARD DROP INLET	
	VALVE	
	FIRE HYDRANT ASSEMBLY	

EXISTING		PROPOSED
	BLOW-OFF ASSEMBLY	
	CLEAN OUT	CO
	WATER METER	
	WATER BOX	WB
	CENTERLINE/BASELINE	
	RIGHT OF WAY	
	PROPERTY LINE	
	℄ DITCH/SWALE	
	EXISTING TREELINE	
65	GROUND ELEVATION	
80	EXISTING CONTOUR ELEV.	

NOTES:

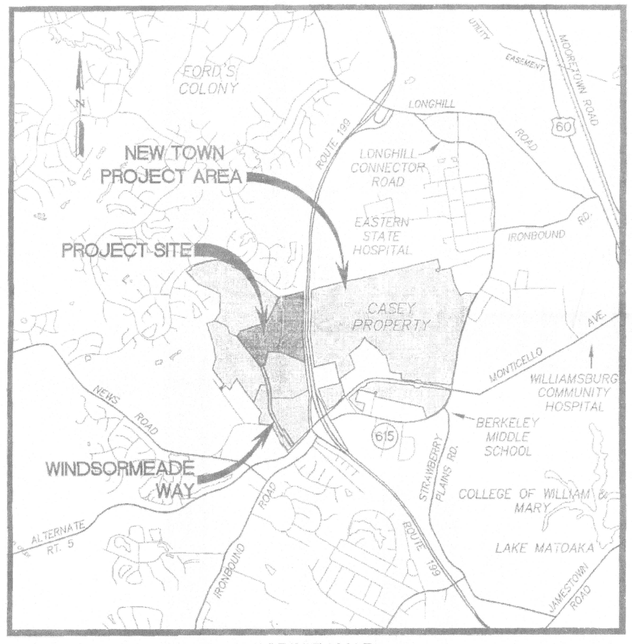
1. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY FOR EXISTING UTILITY LOCATIONS PRIOR TO COMMENCING CONSTRUCTION.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE DOMINION VIRGINIA POWER COMPANY, VERIZON TELEPHONE, APPROPRIATE CABLE COMPANY AND OTHERS THAT MAY BE REQUIRED.
3. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK TO INCLUDE, BUT NOT LIMITED TO, ANY DEMOLITION PERMITS, AND BURNING PERMITS.
5. RESEARCH HAS SHOWN NO EVIDENCE OF ENVIRONMENTAL OR HEALTH HAZARDS ON THIS SITE.
6. ALL UTILITIES WILL BE PLACED UNDERGROUND.
7. A PRECONSTRUCTION CONFERENCE SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE PROJECT ENGINEERS AND THE CONTRACTOR PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT.
8. ALL WATER AND SANITARY SEWER FACILITIES MUST HAVE A 5 FOOT MINIMUM HORIZONTAL SEPARATION DISTANCE BETWEEN IT AND ALL OTHER FIXED STRUCTURES, SUCH AS: DROP INLETS, FIRE HYDRANTS, LIGHT POLES, AND STORM SEWER PIPES, ETC.
9. ANY EXISTING UNUSED WELLS SHALL BE ABANDONED IN ACCORDANCE WITH STATE PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE. PERMITS CAN BE ACQUIRED FROM THE VIRGINIA DEPARTMENT OF HEALTH, WILLIAMSBURG OFFICE. TELEPHONE NUMBER: 757-253-4813
10. ANY EXISTING SEPTIC SYSTEMS THAT MAY BE LOCATED ON SITE MUST BE ABANDONED IN ACCORDANCE WITH STATE HEALTH DEPARTMENT REGULATIONS. THE CONTRACTOR IS REQUIRED TO OBTAIN ALL NECESSARY PERMITS CAN BE ACQUIRED FROM THE VIRGINIA DEPARTMENT OF HEALTH, WILLIAMSBURG OFFICE. TELEPHONE NUMBER: 757-253-4813
11. THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FEET.
12. ALL SECURITY LIGHTING IS TO BE LOCATED A MINIMUM OF 10' OFF THE EDGE OF PAVEMENT AND SHALL NOT BE POSITIONED IN DITCH LINES.
13. ALL PIPE SHALL BE HDPE (TYPE-S) SMOOTH WALLED PIPE OR CLASS III RCP UNLESS OTHERWISE NOTED.
14. ALL EXISTING STRUCTURES LOCATED ON THE SITE ARE TO BE DEMOLISHED AND WILL REQUIRE A DEMOLITION PERMIT. THIS PERMIT CAN BE ACQUIRED FROM THE JAMES CITY COUNTY CODE COMPLIANCE DEPARTMENT TELEPHONE NUMBER: 757-253-6626
15. NO TREES, SHRUBS, FENCES OR OBSTACLES SHALL BE PLACED WITHIN A J.C.S.A. EASEMENT WHICH WOULD RENDER THE EASEMENT INACCESSIBLE BY EQUIPMENT. SHRUBS SHALL BE A MINIMUM OF 5 FEET, AND TREES A MINIMUM OF 10 FEET, FROM THE CENTER OF WATER AND SEWER PIPELINES.
16. ALL ROADS SHALL BE PLACED WITHIN PRIVATE RIGHT-OF-WAYS AND SHALL NOT BE MAINTAINED BY JAMES CITY COUNTY OR VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT). THE PRIVATE RIGHT-OF-WAYS WILL REMAIN PRIVATELY OWNED, AND ALLOW FOR MAINTENANCE OF UTILITIES, ACCESS, AND INGRESS/EGRESS WITHIN THE PROPERTY.
17. J.C.S.A. SHALL BE GRANTED ACCESS EASEMENTS TO WATER AND SEWER LOCATED WITHIN PRIVATE RIGHT-OF-WAYS.
18. ALL IMPROVEMENTS, EXCEPT FOR THE WATERLINE CONNECTION IN FORD'S COLONY, IS WITHIN THE ORIGINAL BOUNDARY OF RECORD (P.B. 91, PG. 11-12).
19. ALL ROADWAY DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
20. SOLID WASTE PICKUP SHALL BE CONTRACTED THROUGH A PRIVATE HAULER PROVIDING PICKUP AT EACH INDIVIDUAL BUILDING OR RESIDENCE.
21. ONLY J.C.S.A. PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ONTHE EXISTING MAIN.
22. ALL CONCRETE WORK SHALL BE BROOM FINISHED UNLESS OTHERWISENOTED.
23. STORM STRUCTURES SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS. ALL MANHOLES AND RISER STRUCTURES SHALL INCLUDE INLET SHAPING (IS-1) AND MANIOLES DEEPER THAN 4 FEET SHALL HAVE STEPS (ST-1). PIPE BEDDING SHALL BE IN ACCORDANCE WITH VDOT PB-1 AND MANUFAITURER'S SPECIFICATIONS/GUIDILINES.

CERTIFIED RESPONSIBLE LAND DISTURBER:
V. MARC BENNETT, P.E.
AES CONSULTING ENGINEERS
5248 OLDE TOWNE ROAD, SUITE 1
WILLIAMSBURG, VIRGINIA, 23188
TELEPHONE: 757-253-0040

OWNER/DEVELOPER INFORMATION:
VIRGINIA UNITED METHODISTS HOME, INC.
453 McLAWS CIRCLE, SUITE 2
WILLIAMSBURG, VIRGINIA, 23185
TELEPHONE: (757) 565-6200
CONTACT: JIM FRANKLIN

WINDSORMEADE
Of Williamsburg

JAMES CITY COUNTY, VIRGINIA



VICINITY MAP
SCALE: 1"=2000'

JANUARY, 2004
PROJECT NO.: 8818-5

JCC CASE #SP-03-04

"THE STORM DRAINAGE & BMP AS-BUILT LOCATIONS AND GRADES SHOWN ON THESE DRAWINGS, ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF AND I CERTIFY THAT I, OR MY AGENT, HAVE MADE SUFFICIENT INSPECTION TO ENSURE THE ACCURACY OF THIS STATEMENT."

Thomas C. Sublett 8/18/08
THOMAS C. SUBLETT DATE

COMMONWEALTH OF VIRGINIA
8-18-2008
THOMAS C. SUBLETT
No. 1886
LAND SURVEYOR

THESE PLANS ARE SUBJECT TO THE SPECIAL CONDITIONS OF THE RPA EXCEPTION REQUEST DATED JULY 13, 2004 SIGNED BY DARRYL COOK OF JCC ENVIRONMENTAL AND W. JERYL FINK, PRESIDENT OF VIRGINIA UNITED METHODIST HOMES.

AES
CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

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

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	COVER SHEET
~~2A~~	~~WINDSORMEADE OVERALL LAYOUT~~
~~2~~	~~ENVIRONMENTAL INVENTORY PLAN AND SHEET INDEX~~
~~3~~	~~INITIAL EROSION CONTROL PLAN~~
~~4~~	~~OVERALL EROSION CONTROL PLAN~~
~~5A~~	~~MASTER ROAD AND UTILITY PLAN~~
~~5~~	~~ROAD & UTILITY PLAN~~
~~6~~	~~ROAD & UTILITY PLAN~~
~~7~~	~~ROAD & UTILITY PLAN~~
~~8~~	~~ROAD & UTILITY PLAN~~
~~9~~	~~ROAD & UTILITY PLAN~~
~~10~~	~~ROAD & UTILITY PLAN~~
~~11~~	~~DRAINAGE AREAS~~
12	GRADING & DRAINAGE PLAN
~~13~~	~~GRADING & DRAINAGE PLAN~~
~~14~~	~~GRADING & DRAINAGE PLAN~~
~~15~~	~~GRADING & DRAINAGE PLAN~~
16	GRADING & DRAINAGE PLAN
~~17~~	~~GRADING & DRAINAGE PLAN~~
~~18~~	~~ROAD & UTILITY PROFILE - SHOTLEY WAY & CASTLESIDE CIRCLE~~
~~19~~	~~ROAD & UTILITY PROFILE - DOVEDALE DRIVE & CORGRIDGE COURSE~~
~~20~~	~~ROAD & UTILITY PROFILE - CORGRIDGE COURSE~~
~~21~~	~~ROAD & UTILITY PROFILE - CORGRIDGE COURSE, SHERINGHAM GREEN, BEERHURST GREEN, & CLUBHOUSE PARKING~~
~~22~~	~~ROAD & UTILITY PROFILE - EXBURY LANE~~
~~23A~~	~~ROAD & UTILITY PROFILE - OFF SITE WATER (TO FORD'S COLONY), MH#1 TO MH#23~~
~~23~~	~~ROAD & UTILITY PROFILE - STOURHEAD SQUARE & WINDSORMEADE WAY~~
~~24~~	~~GENERAL NOTES & DETAILS~~
25	GENERAL NOTES & DETAILS
~~26~~	~~WATER & SEWER NOTES & DETAILS~~
~~L-1~~	~~OVERALL PLANTING PLAN~~
~~L-2~~	~~REQUIRED PLANTING PLAN (SWMP)~~
~~L-3~~	~~TYPICAL VILLA PLANTING PLAN~~
~~L-4~~	~~NOT PROVIDED~~
~~L-5~~	~~NOT PROVIDED~~
~~L-6~~	~~NOT PROVIDED~~
~~L-7~~	~~CLUBHOUSE PLANTING PLAN~~
~~L-8~~	~~NOTES & DETAIL SHEET~~

SITE DATA: (WINDSORMEADE OVERALL)

TAX MAP PARCEL No.	(38-3)(1-34A)
ZONING:	MU (MIXED USE) WITH PROFFERS (JCC CASE NO. Z-2-01/MP-2-01)
TOTAL PROJECT AREA:	4,614,364 S.F.± 105.931 AC.± (ENTRANCE ROAD, WINDSOR HALL, VILLAS)
WATERSHED:	POWHATAN CREEK (SUBWATERSHED 209, CATCHMENTS 209-101-1)

SITE DATA: (VILLAS)

DISTURBED AREA:	1,215,324 S.F.± 32.2 AC.±	
WETLAND DISTURBED AREA:	11,326 S.F.± 0.26 AC.± (PERMITTED DISTURBANCE)	
FLOOD HAZARD MAP:	FEMA PANEL NUMBER 510201 0035 B, DATED 2/6/91 NOTE: SITE IS LOCATED IN ZONE "X" (AREAS DETERMINED TO BE OUTSIDE THE 500 YEAR FLOOD PLAIN)	
MAXIMUM STRUCTURE HEIGHT:	60'-0"	
PROPOSED UNITS:	96 SINGLE FAMILY HOMES (VILLAS) 1 CLUBHOUSE (3,222 SF)	
RESIDENTIAL DENSITY:	1.7 SINGLE FAMILY HOMES PER ACRE	
TOTAL PARKING REQUIRED:	2 SPACES PER RESIDENTIAL UNIT, 96 UNITS 1 SPACE PER 200 SF, 3,222 SF CLUBHOUSE	= 192 SPACES = 16 SPACES
	TOTAL SPACES REQUIRED TOTAL HANDICAP SPACES (CLUBHOUSE ONLY) REQUIRED	= 208 SPACES = 1 SPACE
TOTAL PARKING PROVIDED:	384 SPACES @ HOMES (4 EACH, 2 GARAGE, 2 DRIVEWAY) 39 SPACES (ON STREET) 38 SPACES @ CLUBHOUSE (4 HANDICAP)	
RECREATION AREA:	CLUBHOUSE AND SURROUNDING LAWN AREA WILL SERVE AS A RECREATION AREA FOR RESIDENTS.	
COMMUNITY OPEN SPACE:	ALL AREAS OUTSIDE OF DESIGNATED VILLA UNITS WILL BE MAINTAINED AS COMMUNITY OPEN SPACE FOR THE BENEFIT OF THE ENTIRE DEVELOPMENT.	

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PC240

BMP RECORD DRAWINGS.: 8-18-2008

GRAPHIC SCALE
25' 0' 25' 50'
SCALE: 1" = 25'

NOTE:
ADDITIONAL EROSION CONTROL MEASURES WILL BE NECESSARY DURING CONSTRUCTION OF INDIVIDUAL BUILDINGS. SILT FENCE SHOULD BE PLACED ON THE DOWNHILL SIDE OF CONSTRUCTION AND ADDITIONAL CONTROLS SUCH AS ROCK CHECK DAMS, FILL DIVERSIONS AND/OR SLOPE DRAINS MAY BE REQUIRED.

60" PRECAST MANHOLE
WITH ANTIVORTEX DEVICE
RISER ELEV.= 55.60

LIMITS OF WETLANDS

EX. RIP-RAP
OUTLET PROTECTION

SEWER BRIDGE (SEE WINDSORMEADE WINDSOR HALL CONSTRUCTION PLANS)

30" RCP
INV=46.11

77 LF OF 30"
RCP @ 0.68%

EMERGENCY
SPILLWAY
ELEV.=56.6'

6" ACCESS HOLE

6± LF OF
4" PVC
INV=50.52'

NORMAL POOL
ELEV.= ~~51.0~~ 50.5'

EXTENDED DETENTION WET POND
JCC BMP TYPE A-3

VILLA BMP #1
~~2 YR ELEV= 54.11~~
~~2 YR ELEV= 54.36~~
~~10 YR ELEV= 56.32~~
~~100 YR ELEV= 57.29~~

SS #1-3
STA. 19+60, 12' LT
VDOT DI-2D
RIM= 61.91
INV= 52.91

SS #1-2
STA. 18+87, 12' RT
VDOT DI-2D
RIM= 62.39
INV= 55.91 (1-3)
INV= 53.03 (1-4)
INV OUT= 53.03

24 LF OF 12"
HDPE @ 12.42%

RIP-RAP FOREBAY
BARRIER (SEE
DETAIL SHEET 25)

RIP RAP

10'X10' OUTLET PROTECTION
TO BE EMBEDDED 18" OVER
FILTER FABRIC
D50=6"

SS #1-1
STA. 18+87, 12' LT
VDOT DI-2D
RIM= 62.39
INV= 50.80

60 LF OF 42"
HDPE @ 0.50%

SS#1-0
VDOT EW-2
INV= ~~46.00~~
46.03

SEDIMENT
FOREBAY

60 LF OF 42"
HDPE @ ~~13.27%~~
HDPE 10.00%

SS #1-1
STA. 18+05
VDOT DI-3D
(GRATE) RIM= ~~62.55~~ 63.51
INV= ~~52.55~~ 52.05

MODULAR RETAINING
WALL

SS #1-4
STA. 19+60, 12' RT
VDOT DI-2D
RIM= 61.91
INV= 55.91 (1-5)
INV= 53.43 (1-6)
INV OUT= 53.43

BLDG. #1
DURHAM
F.F.=63.50
2-6" STEPS

BLDG. #2
EDINBURGH
F.F.=64.00
1-6" STEPS

98 LF OF 36"
HDPE @ 0.80%

SS #1-6
STA. 20+51, 12' RT
VDOT DI-2D
RIM= 62.55
INV= 54.21

CASTLESIDE CIRCLE
PRIVATE 50' R/W

24 LF OF 12"
HDPE @ 8.33%

86 LF OF 36"
HDPE @ 0.73%

BLDG. #3
DURHAM
F.F.=65.00
3-6" STEPS

BLDG. #4
EDINBURGH
F.F.=65.5
2-6" STEPS

BLDG. #5
DURHAM
F.F.=65.00
2-6" STEPS

BLDG. #6
DURHAM
F.F.=67.00
3-6" STEPS

BLDG. #7
EDINBURGH
F.F.=69.00
3-6" STEPS

BLDG. #8
DURHAM
F.F.=71.00
6" STEP-UP

BLDG. #10
DURHAM
F.F.=69.00
3-6" STEPS

BLDG. #11
EDINBURGH
F.F.=70.50
6" STEP-UP

BLDG. #12
DURHAM
F.F.=65.00
3-6" STEPS

50' BUFFER

LIMITS OF CLEARING

MATCHLINE
SEE SHEET 13

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WILLIAMSBURG • RICHMOND

GRADING & DRAINAGE PLAN
WINDSORMEADE of Williamsburg
VILLA CONSTRUCTION PLAN
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VMB/JAG	MEG
Scale	Date
1"=25'	1/9/04

Project No.
8818-05
Drawing No.
12 AS-BUILT

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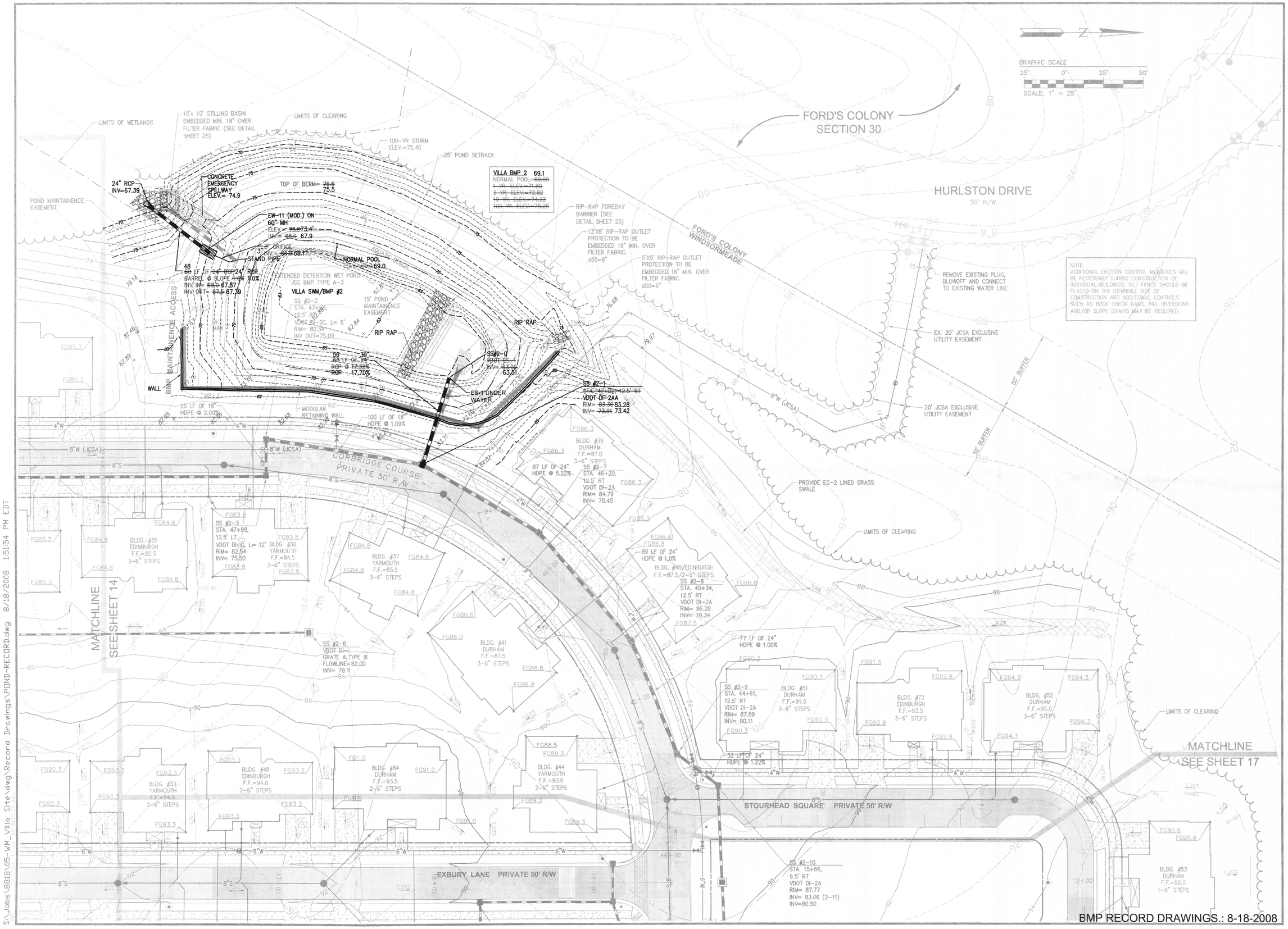

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1	4/12/04	REVISION PER JCC COMMENTS DATED 2/04	WB

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WILLIAMSBURG • RICHMOND

GRADING & DRAINAGE PLAN

WINDSORMEADE of Williamsburg

VILLA CONSTRUCTION PLAN

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
VMB/JAG	MEG
Scale	Date
1"=25'	1/9/04

Project No. 8818-05

Drawing No. 16 AS-BUILT

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GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.

2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL RESULTS ARE NEEDED PRIOR TO FINAL APPROVAL.

3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.

4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER. AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON-SITE. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN ANOTHER AREA ON THE SITE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES AS MAY BE REQUIRED TO CONTROL EROSION AND SEDIMENTATION AT EARTHWORK AND STOCKPILE LOCATIONS PER THE VESCH THIRD EDITION.

5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM, UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS, UNLESS OTHERWISE DIRECTED BY THE GEOTECHNICAL ENGINEER.

6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.

7. UPON COMPLETION, THE CONSTRUCTION OF THE DAM WILL BE CERTIFIED BY A GEOTECHNICAL ENGINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.

8. A RECORD DRAWING (AS-BUILT) SHALL BE SUBMITTED, REVIEWED, AND APPROVED PRIOR TO RELEASE OF THE POSTED BOND / SURETY.

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACILITY, SPILLWAY(S) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE EVERY 10 YEARS. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT THE BMP FACILITY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST. INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.

2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE. DURING QUARTERLY INSPECTIONS.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

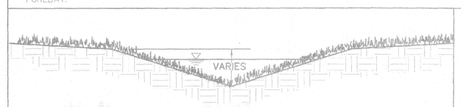
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/APPROVAL OF THE COUNTY.

CONVERSION OF SEDIMENT BASINS INTO BMP FACILITIES

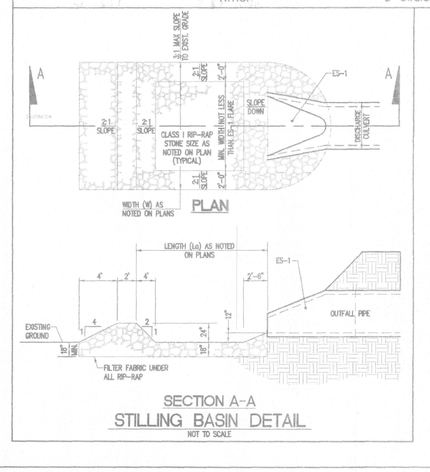
BMP FACILITIES WILL INITIALLY BE CONSTRUCTED AS SEDIMENT BASINS REQUIRING EXCAVATION TO PROVIDE ADEQUATE STORAGE. ONCE J.C.C. ENVIRONMENTAL DIVISION GIVES CONCURRENCE TO REMOVE THE SEDIMENT BASIN FACILITIES, ANY EXCESS EARTH OR SEDIMENT SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR. REMOVE TEMPORARY BARRIERS AND INSTALL RIP-RAP FOREBAY.



NOTE:
1. MINIMUM LONGITUDINAL SWALE SLOPES TO BE 1%
2. THE SWALE BANKS SHALL BE STABILIZED WITH GRASS (UNLESS OTHERWISE NOTED ON PLAN
3. SWALE SIDE SLOPES TO BE 3:1 MAX.

GRASS SWALE DETAIL

N.T.S. D-swale.dwg

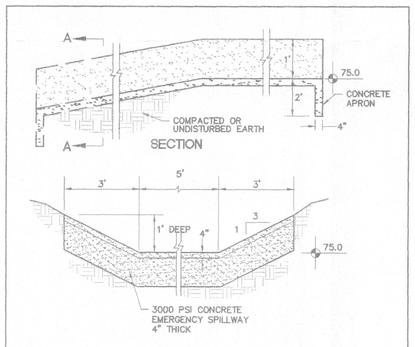


PLAN

SECTION A-A

STILLING BASIN DETAIL

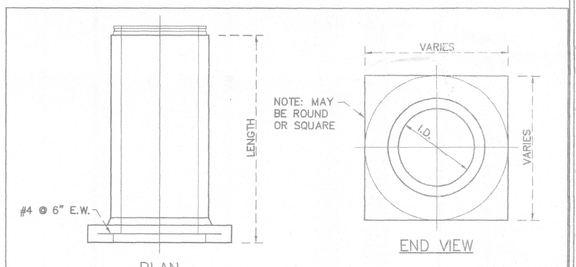
NOT TO SCALE



CROSS-SECTION AT CONTROL SECTION

CONCRETE SPILLWAY SEDIMENT BASIN #2 & B&P #2

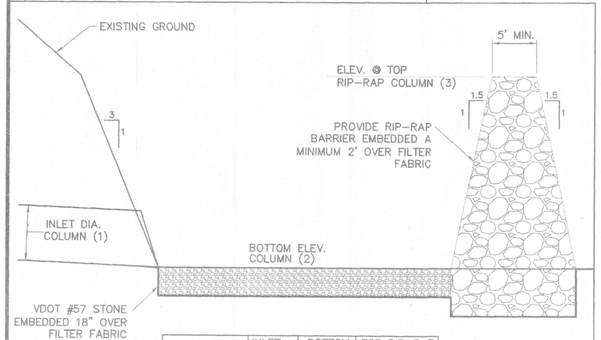
N.T.S.



PLAN END VIEW

PRE-CAST CONCRETE ANTI-SEEP COLLAR

N.T.S.

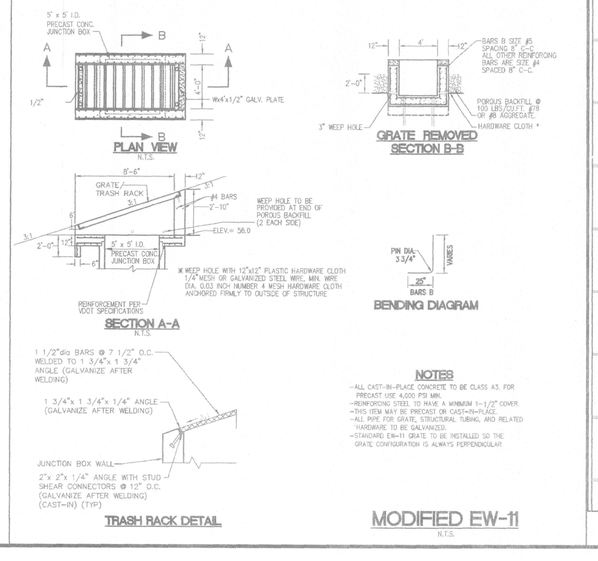


BMP	INLET DIA. (1)	BOTTOM ELEV. (2)	TOP RIP-RAP BARRIER (3)
VILLA BMP# 1	42"	46.0	50.0
VILLA BMP# 2	24"	68.0	68.0

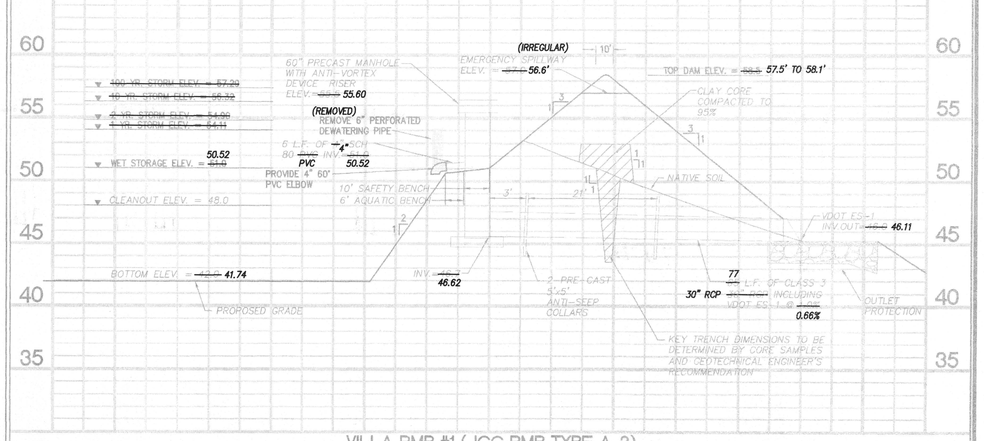
SEDIMENT FOREBAYS

N.T.S.

EW-11m



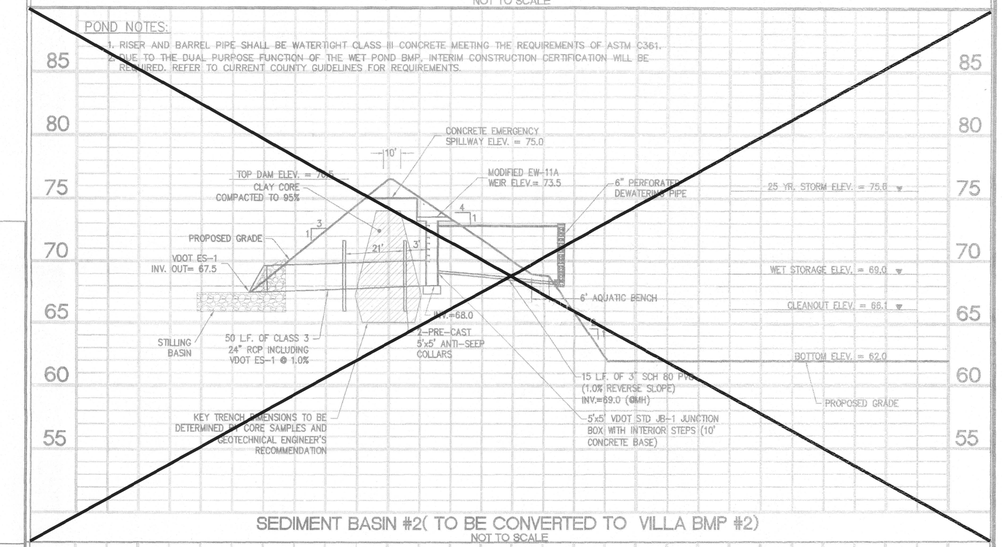
POND NOTES:
1. RISER AND BARREL PIPE SHALL BE WATERTIGHT CLASS III CONCRETE MEETING THE REQUIREMENTS OF ASTM C361.
2. DUE TO THE DUAL PURPOSE FUNCTION OF THE WET POND BMP, INTERIM CONSTRUCTION CERTIFICATION WILL BE REQUIRED. REFER TO CURRENT COUNTY GUIDELINES FOR REQUIREMENTS.



VILLA BMP #1 (JCC BMP TYPE A-3)

NOT TO SCALE

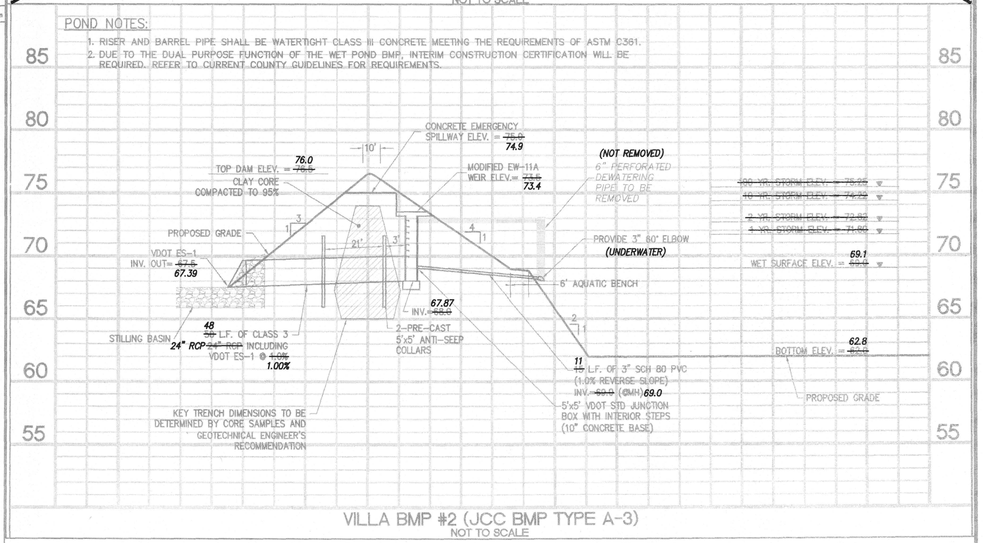
POND NOTES:
1. RISER AND BARREL PIPE SHALL BE WATERTIGHT CLASS III CONCRETE MEETING THE REQUIREMENTS OF ASTM C361.
2. DUE TO THE DUAL PURPOSE FUNCTION OF THE WET POND BMP, INTERIM CONSTRUCTION CERTIFICATION WILL BE REQUIRED. REFER TO CURRENT COUNTY GUIDELINES FOR REQUIREMENTS.



SEDIMENT BASIN #2(TO BE CONVERTED TO VILLA BMP #2)

NOT TO SCALE

POND NOTES:
1. RISER AND BARREL PIPE SHALL BE WATERTIGHT CLASS III CONCRETE MEETING THE REQUIREMENTS OF ASTM C361.
2. DUE TO THE DUAL PURPOSE FUNCTION OF THE WET POND BMP, INTERIM CONSTRUCTION CERTIFICATION WILL BE REQUIRED. REFER TO CURRENT COUNTY GUIDELINES FOR REQUIREMENTS.



VILLA BMP #2 (JCC BMP TYPE A-3)

NOT TO SCALE

BMP RECORD DRAWINGS.: 8-18-2008

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GENERAL NOTES & DETAILS

WINDSOR MEADE of Williamsburg

VILLA CONSTRUCTION PLAN

JAMES CITY COUNTY VIRGINIA

BERKELEY DISTRICT

Designed	Drawn
VMB/JAG	MEG
Scale N/A	Date 1/9/04
Project No. 8818-05	
Drawing No. 25 AS-BUILT	

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Windsor Meade - Villas
SP-03-04

APR 2004
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PLANNING DEPARTMENT

WINDSORMEADE
Of Williamsburg

Calculations
For
James City County Environmental Division

SP-03-04
2nd SUBMISSION

Prepared by

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Williamsburg, VA 23188
(757) 253-0040 Fax: (757) 220-8994
http://www.aesva.com

CONSULTING ENGINEERS

Villa
BMP#1

Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Mar 30 2004, 8:41 AM

Pond No. 9 - VILLA BMP 1

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	51.00	16,935	0	0
1.00	52.00	22,330	19,633	19,633
3.00	54.00	26,565	48,895	68,528
5.00	56.00	31,050	57,615	126,143
7.00	58.00	36,440	67,490	193,633

Culvert / Orifice Structures

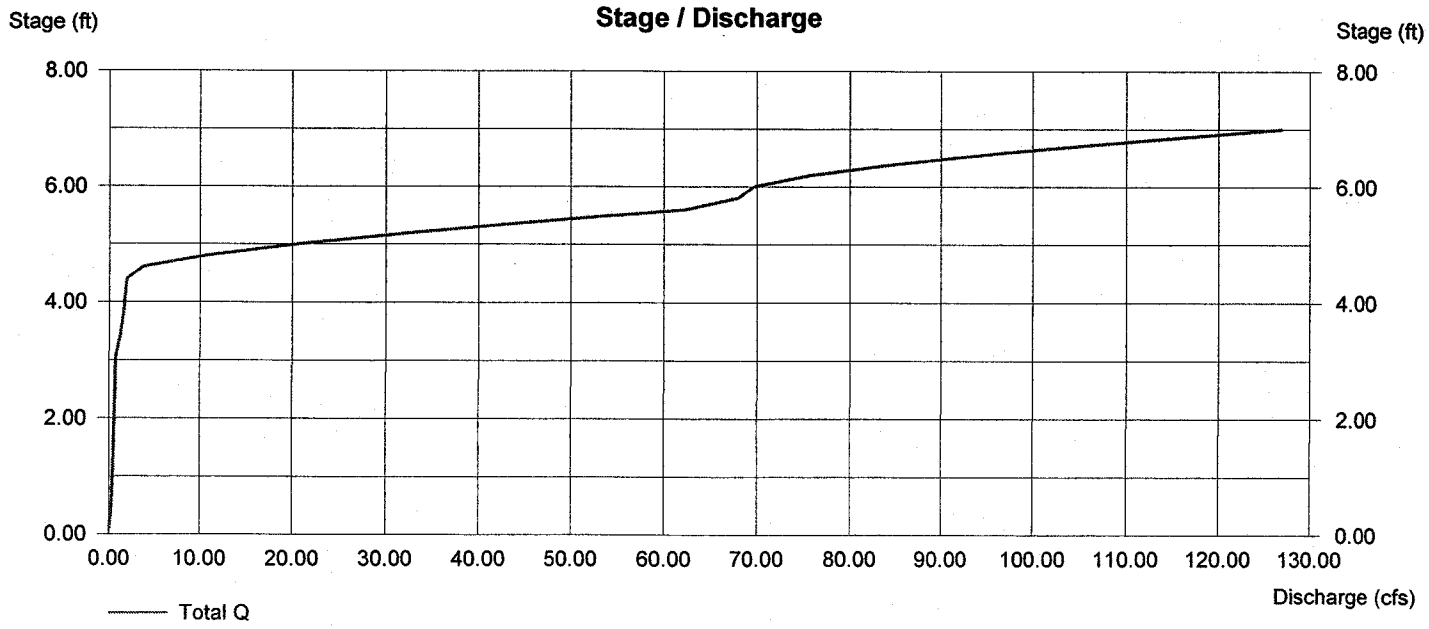
	[A]	[B]	[C]	[D]
Rise (in)	= 30.00	4.00	6.00	0.00
Span (in)	= 30.00	4.00	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 46.60	51.00	54.00	0.00
Length (ft)	= 65.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.71	20.00	0.00	0.00
Crest El. (ft)	= 55.50	57.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	0.00	0.00
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft - Headwater Control

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



WindsorMeade Overall
CALCULATION FOR SCS HYDROGRAPH GENERATION
FOR VILLAS BMP 1
Project No. 8818-5
12/12/2003

II. POST-DEVELOPMENT CONDITIONS TO BMP

A. Post-Development Drainage Area to Point of Concern = 18.06 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C, 14-B, 15-D	C	Impervious(roads/homes)	7.58	98	743
2)	11-C, 14-B, 15-D	C	Open Space/Landscaped	4.08	74	302
3)	17	D	Impervious(roads/homes)	1.30	98	127
4)	17	D	Open Space/Landscaped	0.73	80	58
5)	15-D Emporia Complex	B	Impervious(roads/homes)	1.37	98	134
6)	15-D Emporia Complex	B	Open Space/Landscaped	3.00	61	183
	Total Adjusted CN =			18.06		1,548
	Composite CN =					86

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential
Manning's roughness coefficient., n (table 5-7)	0.2
Length of overland flow, L	100 Feet
2-year 24-hour rainfall, P2	3.6 inches
Average slope of overland flow , s	0.025 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.18 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	paved
Length of shallow concentrated flow, L	0 Feet
Average slope of shallow concentrated flow, s	0.2 feet per foot
Average velocity, v	3.0 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours

3) Channel or Pipe Flow

Length of channel flow, L	1300 Feet
Average velocity of channel flow, v	5 feet per second
Travel time, Tt = L/(3600*v)	0.07 hours
Total Time of Concentration =	0.25 hours
or	15 minutes

III. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
42.0		680	0			
44.0	2.0	1115	1795	66	1795	66
46.0	2.0	1760	2875	106	4670	173
48.0	2.0	2520	4280	159	8950	331
50.0	2	3410	5930	220	14880	551
52.0	2	8230	11640	431	26520	982
54.0	2	10500	18730	694	45250	1676
56.0	2	52714	63214	2341	108464	4017

IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Percent Impervious of the BMP Watershed, Post-Development	60%		
Drainage Area of the BMP Watershed	18.06	acres	
Impervious Acres of BMP Watershed	10.84	acres	

Calculation for Water Quality Volume, WQ_V

WQ_v = (2.0 inches per impervious acre) *(impervious acres of BMP watershed)

WQv = (2.0 inches)*(1 ft / 12 inches) * (43560 sq. Ft per acre) * (impervious acres of BMP watershed)

WQ_v = (2.0 inches)*(1 ft / 12 inches) * (43560 sq. Ft per acre) *	10.84	=	78669 cu. Ft
1/2 WQ_v =	39,335 cu. Ft		Required Volume for Permanent Pool
	90,330 cu. Ft		Design Volume for Permanent Pool
1/2 WQ_v =	39,335 cu. Ft		Volume to be Released in 24-Hours
Elevation of 1/2 WQv =	52.8		
Elevation of release inlet for 1/2 water quality volume =	51.0		
Average head, in feet, on release inlet =	0.9		

Average release rate calculation

$$\frac{39{,}334.7 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.5 \text{ cfs}$$

Calculation of size of release inlet for 1/2 Water Quality Volume

Diameter of Release Inlet = 2 * (Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)

where, Q equals Average Release Rate, in cfs

h equals Average Head, in feet

Diameter of Release Inlet = 0.40 feet, or 5 inches

AES Projet No.: 8818-4
Project Title: WINDSORMEADE Villas BMP1; 1-Year Channel Protection Volu

CONSULTING ENGINEERS

Channel Protection

Channel Protection Volume

Post Development Watershed Data

Area = 15.98 Acres 0.0250sq.mi.
Runoff Curve No. = 88
Time of Concentration = 0.280 hr.
Return Period = 1 Yr.

Runoff Depth = 2.8 in.

Initial Abstraction (From TR55 Equation 2-2)

Ia = (200/CN)-2

Ia = 0.273

Unit Peak Discharge (From TR55 Equation for Exhibit 4)

log(Qu) = C0+C1 log(Tc)+C2(log(Tc))²

Qu = 696.96 csm/in

Ratio of Peak Outflow Discharge to Peak Inflow Discarge

(From Maryland Stormwater Design Manual Figure D.11.2)

Qo/Qi = 0.025

Ratio of Volume of Storage to Volume of Runoff (From TR55 Figure 6.1)

Vs/Vr = C0+C1(Qo/Qi)+C2(Qo/Qi)²+C3(Qo/Qi)³

Vs/Vr = 0.647

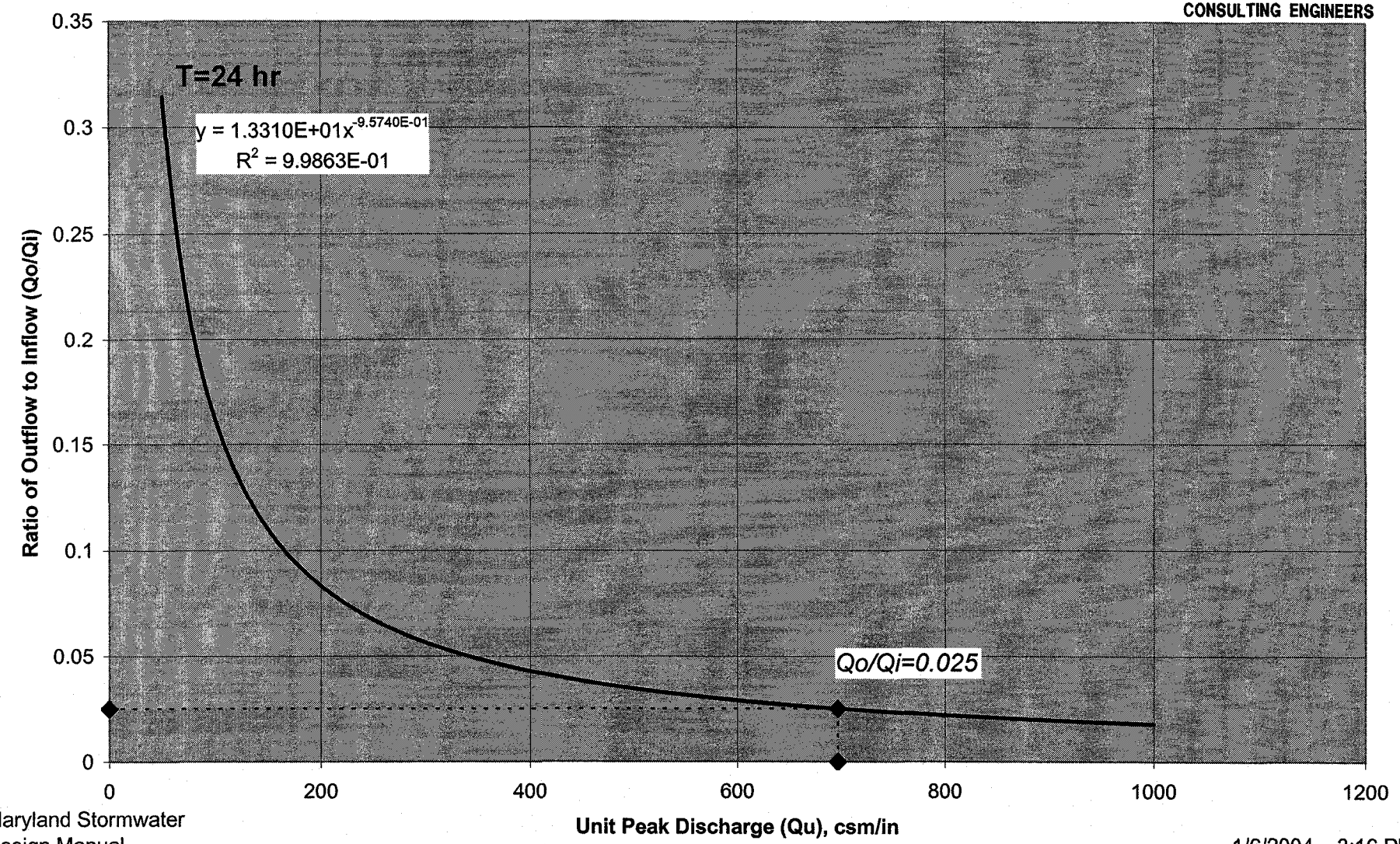
Vs = 1.414 Ac-Ft
Vs = 61603 cu.ft.

Table F-2				
Coefficients for the equations used to generate figure 6-1				
Rainfall Dist.	C0	C1	C2	C3
I, IA	0.66	-1.76	1.96	-0.73
II, III	0.682	-1.43	1.64	-0.804

Average Release Rate

Qi = 28.57 cfs
Qo/Qi = 0.03
Qo = 0.72 cfs

Detention Time Versus Discharge Ratios



Maryland Stormwater
Design Manual
Appendix D.11
Figure D.11.3

1/6/2004 3:16 PM
Villa BMP1_1yr_24hr.xls
Chart1 1

Hydrograph Plot

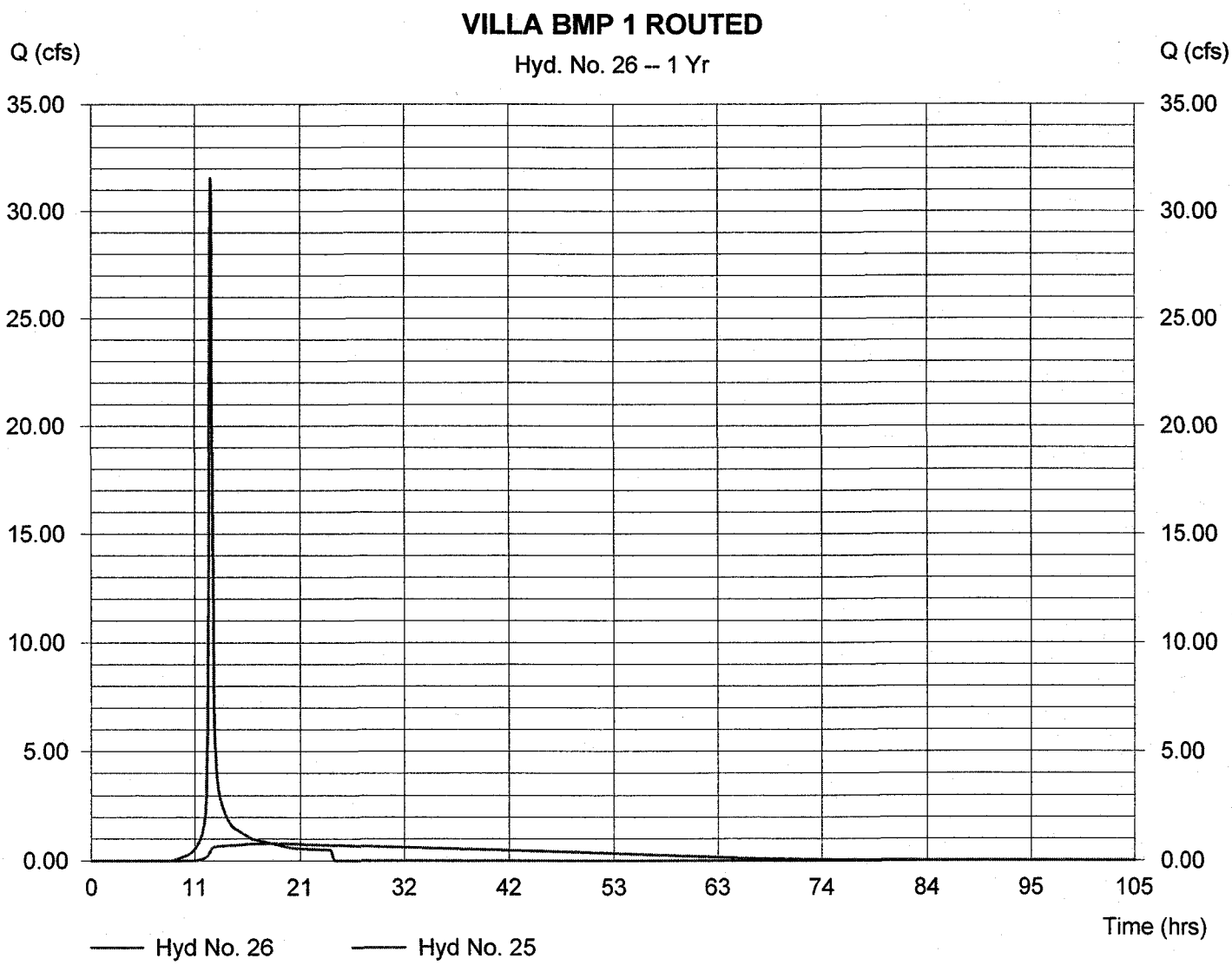
Hydraflow Hydrographs by Intelisolve | Tuesday, Mar 30 2004, 8:41 AM

Hyd. No. 26

VILLA BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.78 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 25	Max. Elevation	= 54.11 ft
Reservoir name	= VILLA BMP 1	Max. Storage	= 71,707 cuft

Storage Indication method used. | Hydrograph Volume = 100,787 cuft



Hydrograph Plot

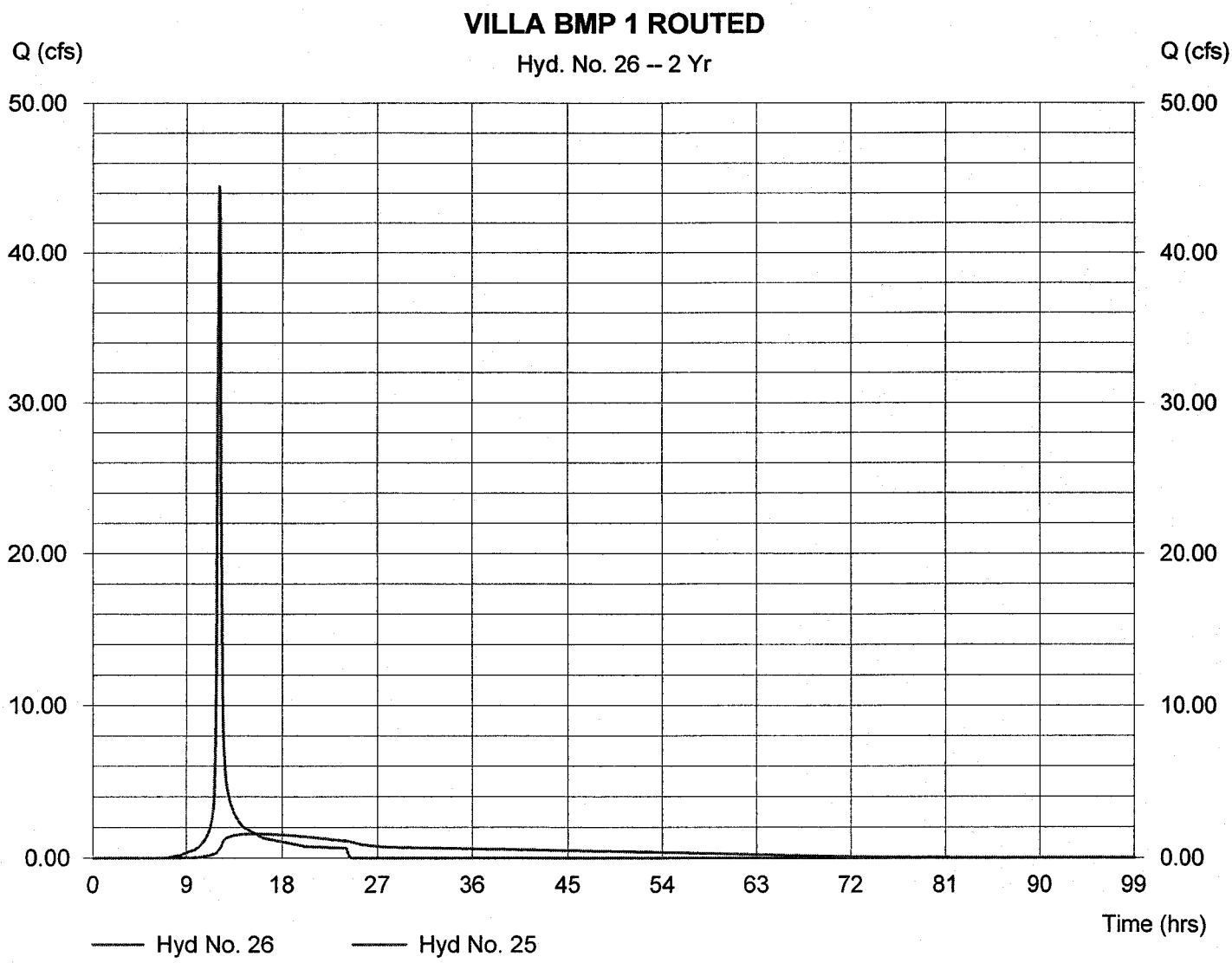
Hydraflow Hydrographs by Intelisolve | Tuesday, Mar 30 2004, 8:41 AM

Hyd. No. 26

VILLA BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 1.57 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 25	Max. Elevation	= 54.90 ft
Reservoir name	= VILLA BMP 1	Max. Storage	= 94,485 cuft

Storage Indication method used. | Hydrograph Volume = 141,725 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Mar 30 2004, 8:41 AM

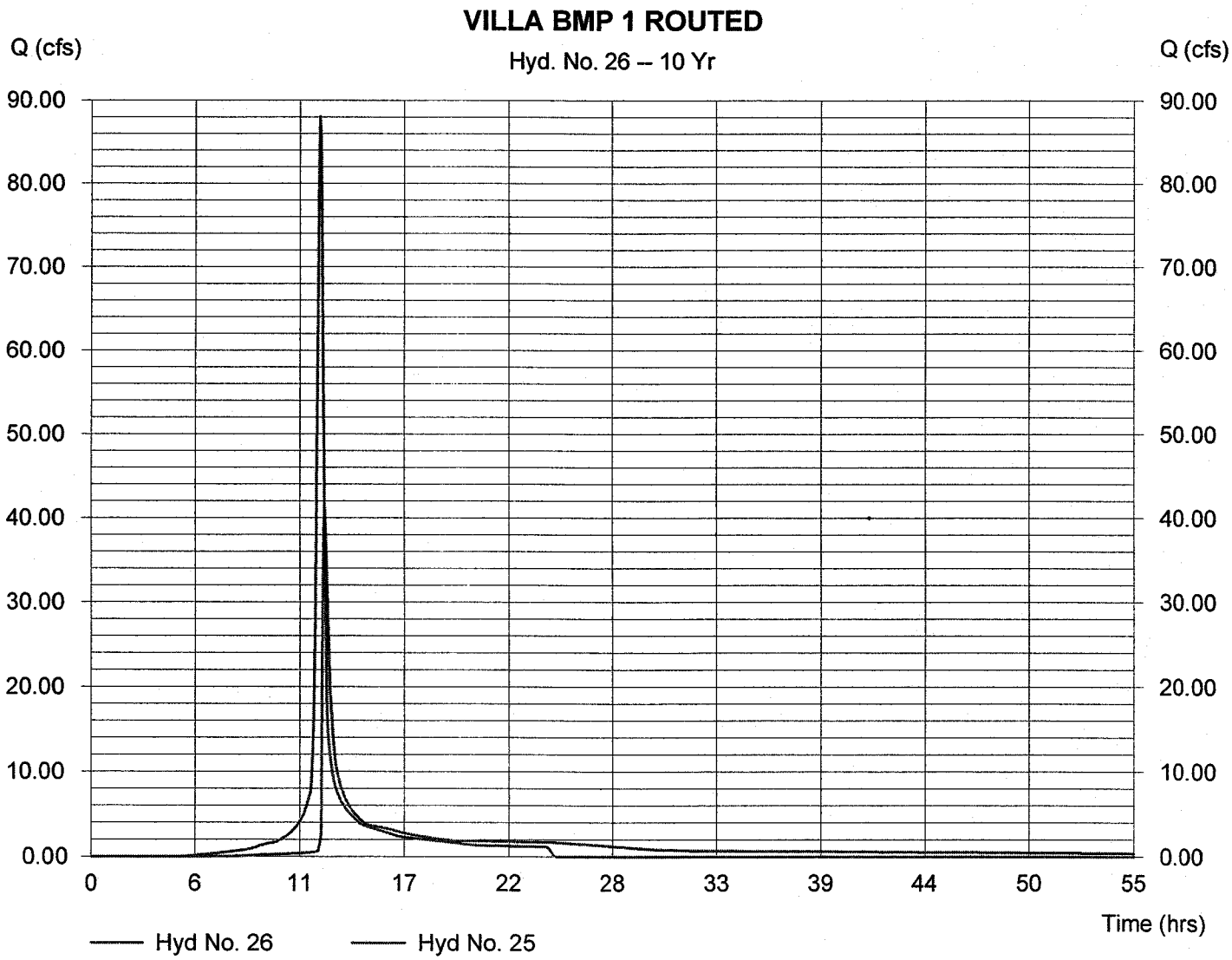
Hyd. No. 26

VILLA BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 41.28 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 25	Max. Elevation	= 56.32 ft
Reservoir name	= VILLA BMP 1	Max. Storage	= 136,917 cuft

Storage Indication method used.

Hydrograph Volume = 285,112 cuft



Hydrograph Plot

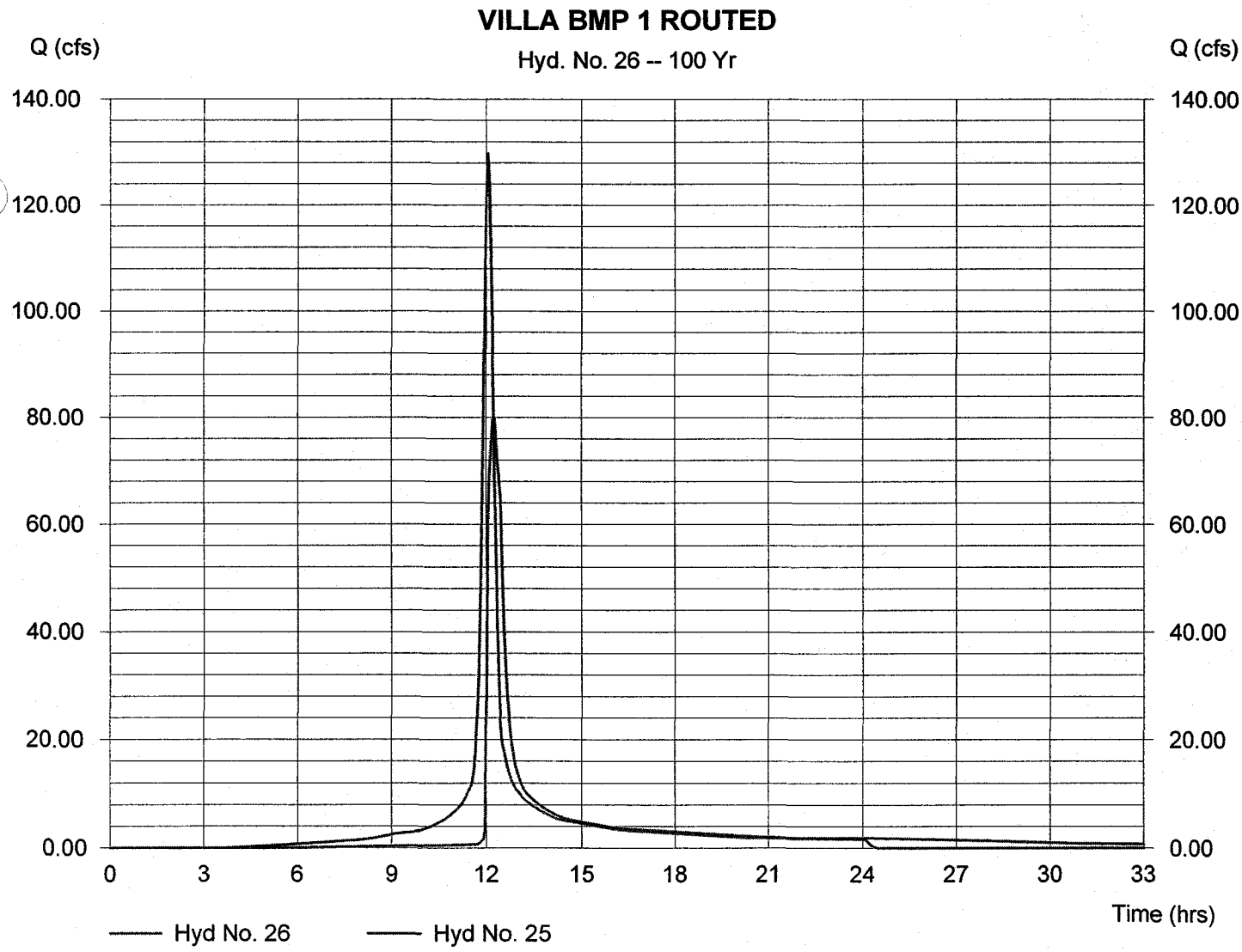
Hydraflow Hydrographs by Intelisolve | Tuesday, Mar 30 2004, 8:41 AM

Hyd. No. 26

VILLA BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 80.12 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 25	Max. Elevation	= 57.29 ft
Reservoir name	= VILLA BMP 1	Max. Storage	= 169,781 cuft

Storage Indication method used. | Hydrograph Volume = 427,871 cuft



AES JOB # 8818-4

AS SUBMITTED w/ Windsor Meade Way

1992

3.14

APR 2001 RECEIVED PLANNING DEPARTMENT

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project WINDSORMEADE WAY

Basin # SEDIMENT BASIN 3 Location BORROW SITE

VILLA SEDIMENT BASIN #1 = WINDSORMEADE WAY ROAD SB # 3

Total area draining to basin: 15.98* acres.

*Ultimate Condition

Basin Volume Design

Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

   67 cu. yds. x 16 acres = 1072 cu. yds.

2. Available basin volume = 3345 cu. yds. at elevation 51. (From storage - elevation curve)

3. Excavate 3345 cu. yds. to obtain required volume*. (ALL EXCAVATION)

   * Elevation corresponding to required volume = invert of the dewatering orifice.

4. Available volume before cleanout required.

   33 cu. yds. x 16 acres = 528 cu. yds.

5. Elevation corresponding to cleanout level = ~ 44.5 **
   **(@ half available storage volume = 48.0)
   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 3 ft. (Min. = 1.0 ft.)

Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).

   67 cu. yds. x 16 acres = 1072 cu. yds.

8. Total available basin volume at crest of riser* = 7484 cu. yds. at elevation 55.5. (From Storage - Elevation Curve)

* Minimum = 134 cu. yds./acre of total drainage area.

9. Diameter of dewatering orifice = 4 in.

10. Diameter of flexible tubing = 6 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 55.5

Top of Dam = 58.5

Design High Water = 56.4 (25-YR STORM)

Upstream Toe of Dam = 42

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}}$ $\frac{L}{We}$ = $\frac{240}{90} = 2.7$

If > 2, baffles are not required X

If < 2, baffles are required _____

Runoff

13. Q_2 = 43.59 cfs (From Chapter 5)

14. Q_{25} = 93.14 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = 43.59 cfs. (riser and barrel)

~~Without emergency spillway, required spillway capacity $Q_p = Q_{25}$ = _____ cfs. (riser and barrel)~~

16. With emergency spillway:

Assumed available head (h) = 49 ft. (Using Q_2)

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation

~~Without emergency spillway:~~

~~Assumed available head (h) = _____ ft. (Using Q_{25})~~

~~h = Design High Water Elevation - Crest of Riser Elevation~~

17. Riser diameter (D_r) = 60 in. Actual head (h) = ____ ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 65 ft.

Head (H) on barrel through embankment = _____ ft.

(From Plate 3.14-7).

19. Barrel diameter = 30 in.

(From Plate 3.14-B [concrete pipe] or Plate 3.14-A [corrugated pipe]).

20. Trash rack and anti-vortex device

Diameter = 72 inches.

Height = 24 inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 49.55 cfs.

22. Bottom width (b) = 20 ft.; the slope of the exit channel (s) = _____ ft./foot; and the minimum length of the exit channel (x) = _____ ft.
(From Table 3.14-C).

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 13.5 ft.

Slope of upstream face of embankment (Z) = 3 :1.

Slope of principal spillway barrel (S_b) = 1 %

Length of barrel in saturated zone (L_s) = 95 ft.

24. Number of collars required = 3 dimensions = 5.5'x5.5'

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 58.5

Design High Water = 56.4

Emergency Spillway Crest = 57

Principal Spillway Crest = 55.5

Dewatering Orifice Invert = 51

Cleanout Elevation = 48

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 42

AES Projet No.: 8818-4
Project Title: SEDIMENT BASIN 3; WINDSORMEADE WAY 1-Year Channel Pı

CONSULTING ENGINEERS

Channel Protection

Channel Protection Volume

Post Development Watershed Data

Area = 15.98 Acres 0.0250sq.mi.
Runoff Curve No. = 88
Time of Concentration = 0.280 hr.
Return Period = 1 Yr.

Runoff Depth = 2.8 in.

Initial Abstraction (From TR55 Equation 2-2)

Ia = (200/CN)-2

Ia = 0.273

Unit Peak Discharge (From TR55 Equation for Exhibit 4)

log(Qu) = C0+C1 log(Tc)+C2(log(Tc))²

Qu = 696.96 csm/in

Ratio of Peak Outflow Discharge to Peak Inflow Discarge

(From Maryland Stormwater Design Manual Figure D.11.2)

Qo/Qi = 0.025

Ratio of Volume of Storage to Volume of Runoff (From TR55 Figure 6.1)

Vs/Vr = C0+C1(Qo/Qi)+C2(Qo/Qi)²+C3(Qo/Qi)³

Vs/Vr = 0.647

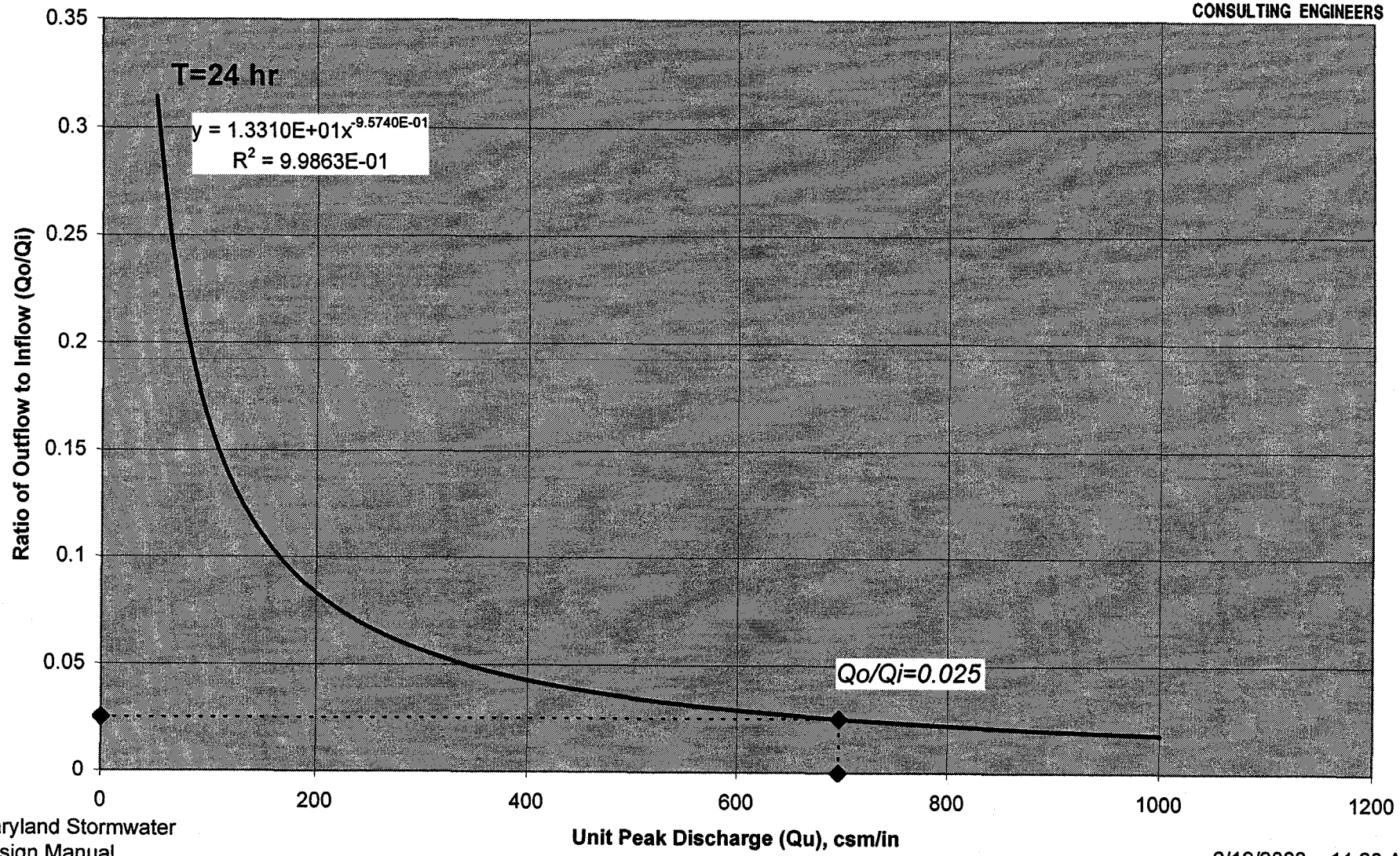
Vs = 1.414 Ac-Ft
Vs = 61603 cu.ft.

Table F-2				
Coefficients for the equations used to generate figure 6-1				
Rainfall Dist.	C0	C1	C2	C3
I, IA	0.66	-1.76	1.96	-0.73
II, III	0.682	-1.43	1.64	-0.804

Average Release Rate

Qi = 28.57 cfs
Qo/Qi = 0.03
Qo = 0.72 cfs

Detention Time Versus Discharge Ratios



Maryland Stormwater
Design Manual
Appendix D.11
Figure D.11.3

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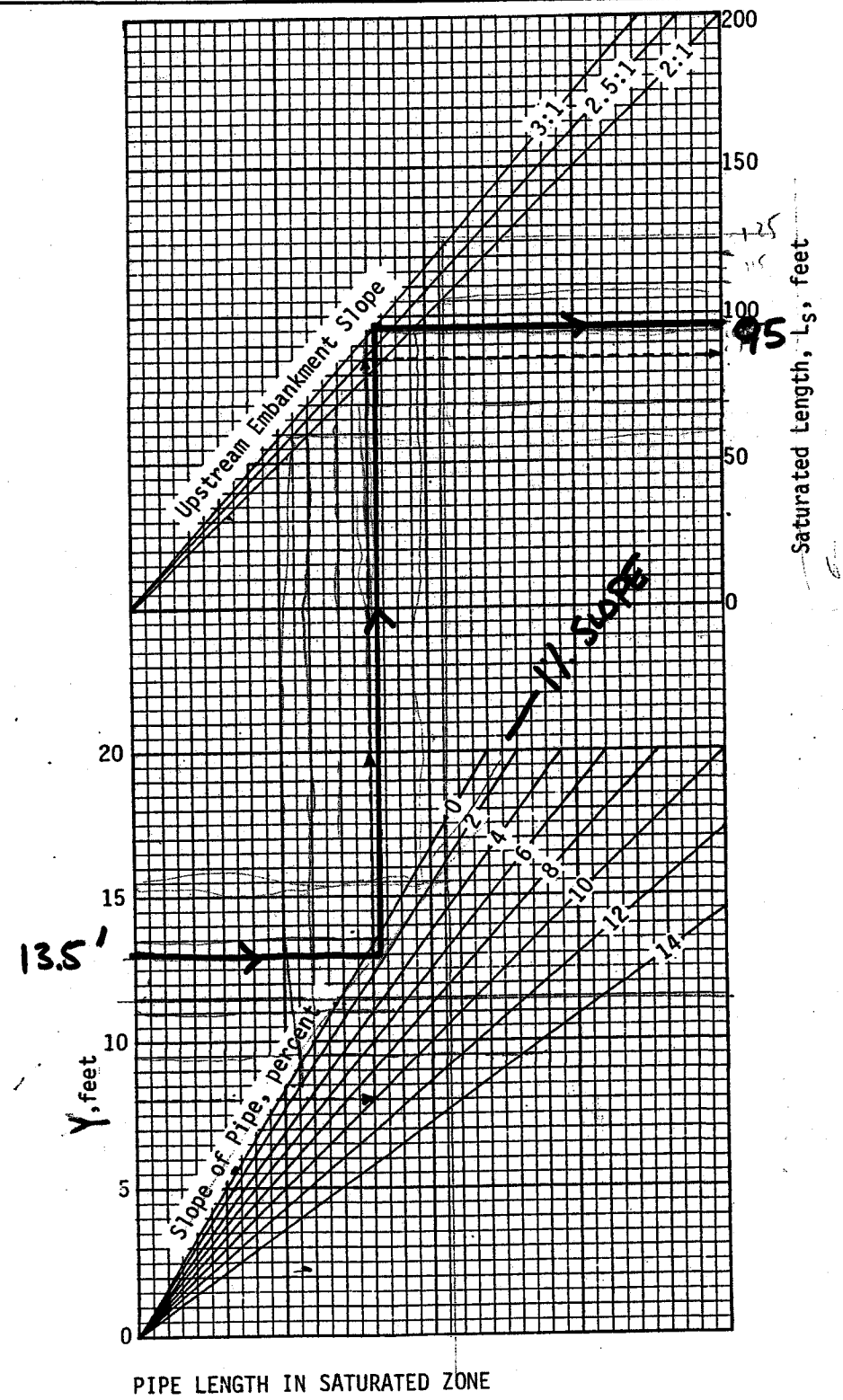
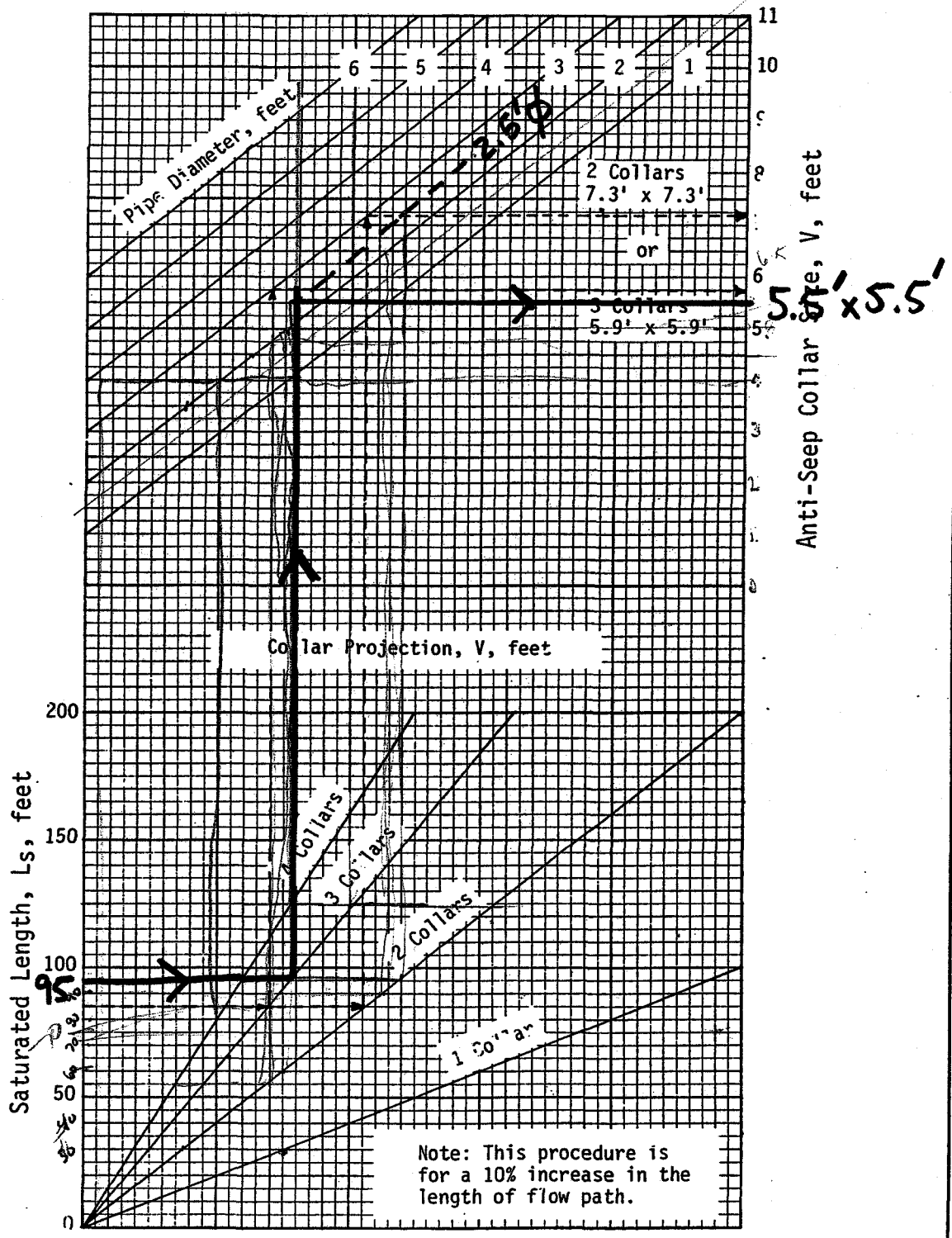
1yr_24hr_Worksheet.xls
Chart1 1

BASIN 3



Source: USDA-SCS

Plate 3.14-11

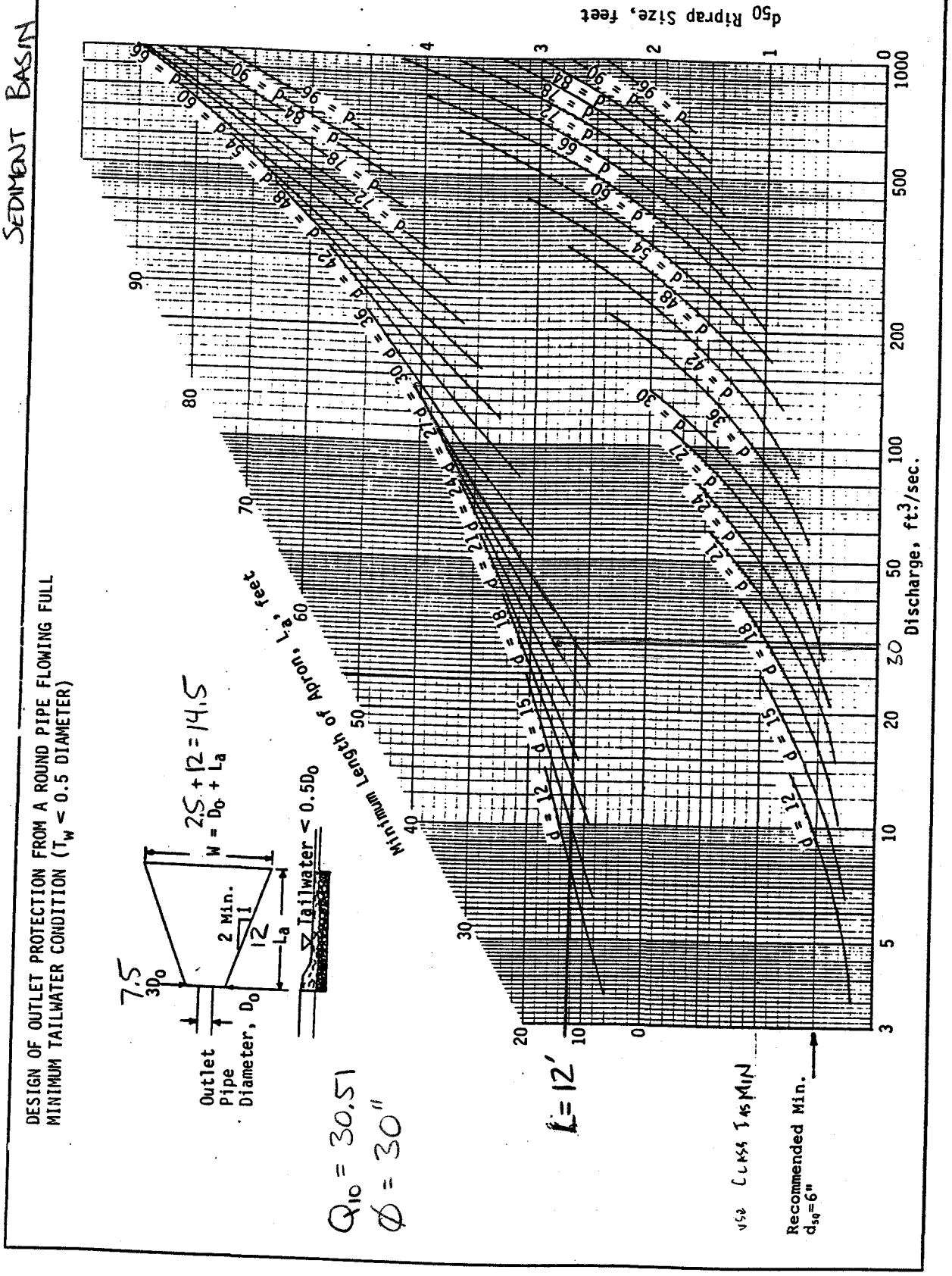


NUMBER OF ANTI-SEEP COLLARS REQUIRED

Source: USDA-SCS

Plate 3.14-12

SEDIMENT BASIN 3



Source: USDA-SCS

Plate 3.18-3

CALCULATIONS FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR SEDIMENT BASIN 3 (VILLAS BMP 1)
WINDSOR MEADE
AES Project No.: 8818-04
April 21, 2003

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 2.80 Acres

B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	15-D Emporia Complex	C	Wooded, Fair	1.66	73	121
2)	14-B Emporia Fine Sandy Loam	C	Wooded, Fair	0.31	73	23
3)	17 Johnston Complex	D	Wooded, Fair	0.80	79	63
	Totals =			2.8		207
	Composite CN =					74

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Wooded
Manning's roughness coefficient., n (table 5-7)	0.4
Length of overland flow, L	300 Feet
2-year 24-hour rainfall, P2	3.6 inches
Average slope of overland flow , s	0.053 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.55 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	Unpaved
Length of shallow concentrated flow, L	100 Feet
Average slope of shallow concentrated flow, s	0.1 feet per foot
Average velocity, v	5.0 feet per second
Travel time, Tt = L/(3600*v)	0.01 hours

3) Channel or Pipe Flow

Length of channel flow, L	0 Feet
Average velocity of channel flow, v	0.00 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours
Total Time of Concentration =	0.56 hours
or	33 minutes

II. POST-DEVELOPMENT CONDITIONS TO BMP

A. Post-Development Drainage Area to Point of Concern = 15.98 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Impervious(roads/homes)	1.79	98	175
2)	11-C Craven-Uchee	C	Open Space/Landscaped	2.33	74	172
3)	14-B and C Emporia Fine Sandy Loam	C	Impervious(roads/homes)	1.57	98	154
4)	14-B and C Emporia Fine Sandy Loam	C	Open Space/Landscaped	1.23	74	91
5)	15-D Emporia Complex	C	Impervious(roads/homes)	3.39	98	332
6)	15-D Emporia Complex	C	Open Space/Landscaped	1.92	74	142
7)	17 Johnston Complex	D	Impervious(roads/pond)	1.32	98	129
8)	17 Johnston Complex	D	Open Spc (Grass/Landscaped	0.55	80	44
9)	18-B Kempsville Fine Sandy Loam	B	Impervious(roads/homes)	1.23	98	121
10)	18-B Kempsville Fine Sandy Loam	B	Open Space/Wooded	0.65	61	40
	Total Adjusted CN =			15.98		1,401
	Composite CN =					88

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential	
Manning's roughness coefficient., n (table 5-7)	0.2	
Length of overland flow, L	100	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.02	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.19	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	paved	
Length of shallow concentrated flow, L	200	Feet
Average slope of shallow concentrated flow, s	0.2	feet per foot
Average velocity, v	3.0	feet per second
Travel time, Tt = L/(3600*v)	0.02	hours

3) Channel or Pipe Flow

Length of channel flow, L	1300	Feet
Average velocity of channel flow, v	5	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours
Total Time of Concentration =	0.28	hours
or	17	minutes

III. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
42.0		680	0			
44.0	2.0	1115	1795	66	1795	66
46.0	2.0	1760	2875	106	4670	173
48.0	2.0	2520	4280	159	8950	331
50.0	2	3410	5930	220	14880	551
52.0	2	8230	11640	431	26520	982
54.0	2	10500	18730	694	45250	1676
56.0	2	52714	63214	2341	108464	4017

IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Due to preliminary considerations, it is desired to provide this site extended detention wet pond to achieve a 10 point BMP rating for the facility. Under the James City County guide lines for storm water management BMPs, the extended detention wet pond may have one half of the water quality volume stored in the permanent pool and one half of the water quality volume released in a 24-hour period.

Percent Impervious of the BMP Watershed, Post-Development	58.2%	
Drainage Area of the BMP Watershed	15.98	acres
Impervious Acres of BMP Watershed	9.30	acres

Calculation for Water Quality Volume, WQ_v

WQ_v = (2.0 inches per impervious acre) *(impervious acres of BMP watershed)

WQv = (2.0 inches)*(1 ft / 12 inches) * (43560 sq. Ft per acre) * (impervious acres of BMP watershed)

WQ_v = (2.0 inches)*(1 ft / 12 inches) * (43560 sq. Ft per acre) *	9.30	=	67518 cu. Ft
1/2 WQ_v =	33759 cu. Ft		Required Volume for Permanent Pool
	0 cu. Ft		Design Volume for Permanent Pool (2" per Impervious Acre)
1/2 WQ_v =	33759 cu. Ft		Volume to be Released in 24-Hours

Elevation of 1/2 WQv =	0.0
Elevation of release inlet for 1/2 water quality volume =	0.0
Average head, in feet, on release inlet =	0.0

Average release rate calculation

$$\frac{33{,}759.0 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.4 \text{ cfs}$$

Calculation of size of release inlet for 1/2 Water Quality Volume

Diameter of Release Inlet = 2 * (Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)

where, Q equals Average Release Rate, in cfs

h equals Average Head, in feet

Diameter of Release Inlet = #DIV/0! feet, or #DIV/0! inches (4" use in Computer Routing)

Note: No routing of the WQV is required. 100% of the required Water Quality Volume is avilable in storage.

Reservoir Report

SEDIMENT BASIN #3

Hydraflow Hydrographs by Intelisolve

Reservoir No. 3 - Villas BMP 1 (4/23/03)

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	42.00	5,250	0	0
2.00	44.00	6,585	11,835	11,835
4.00	46.00	9,530	16,115	27,950
6.00	48.00	11,680	21,210	49,160
8.00	50.00	14,015	25,695	74,855
9.00	51.00	16,935	15,475	90,330
10.00	52.00	22,330	19,633	109,963
12.00	54.00	26,565	48,895	158,858
14.00	56.00	31,050	57,615	216,473
16.00	58.00	36,440	67,490	283,963

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 30.0	4.0	6.0	0.0
Span in	= 30.0	4.0	6.0	0.0
No. Barrels	= 1	1	1	0
Invert El. ft	= 46.60	51.00	54.00	0.00
Length ft	= 65.0	0.0	0.0	0.0
Slope %	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 15.71	20.00	0.00	0.00
Crest El. ft	= 55.50	57.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	0.00
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	42.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
2.00	11,835	44.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
4.00	27,950	46.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
6.00	49,160	48.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
8.00	74,855	50.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
9.00	90,330	51.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
10.00	109,963	52.00	0.38	0.38	0.00	---	0.00	0.00	---	---	---	0.38
12.00	158,858	54.00	0.72	0.71	0.00	---	0.00	0.00	---	---	---	0.71
14.00	216,473	56.00	20.88	0.92	1.25	---	18.50	0.00	---	---	---	20.67
16.00	283,963	58.00	74.85	0.14	0.33	---	74.37	52.00	---	---	---	126.84

Hydrograph Plot

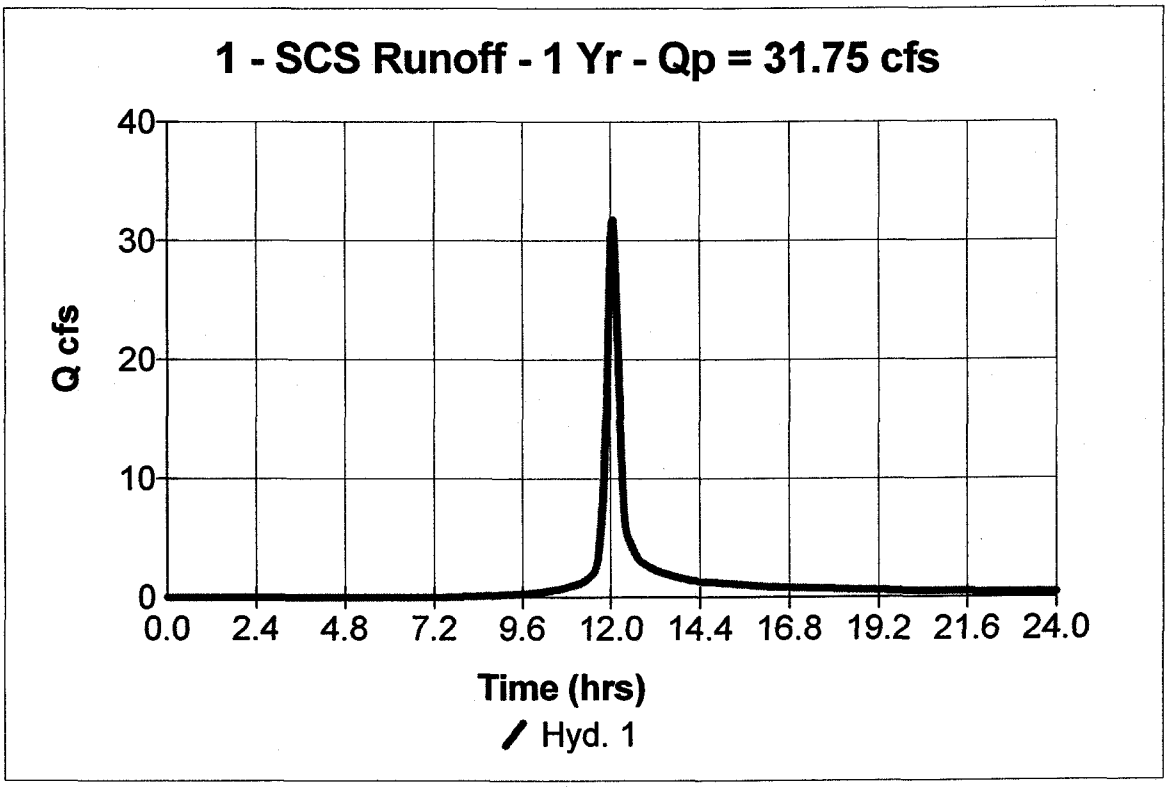
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

VILLAS 1 -POST

Hydrograph type	= SCS Runoff	Peak discharge	= 31.75 cfs
Storm frequency	= 1 yrs	Time interval	= 1 min
Drainage area	= 15.98 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 93,794 cuft



Hydrograph Plot

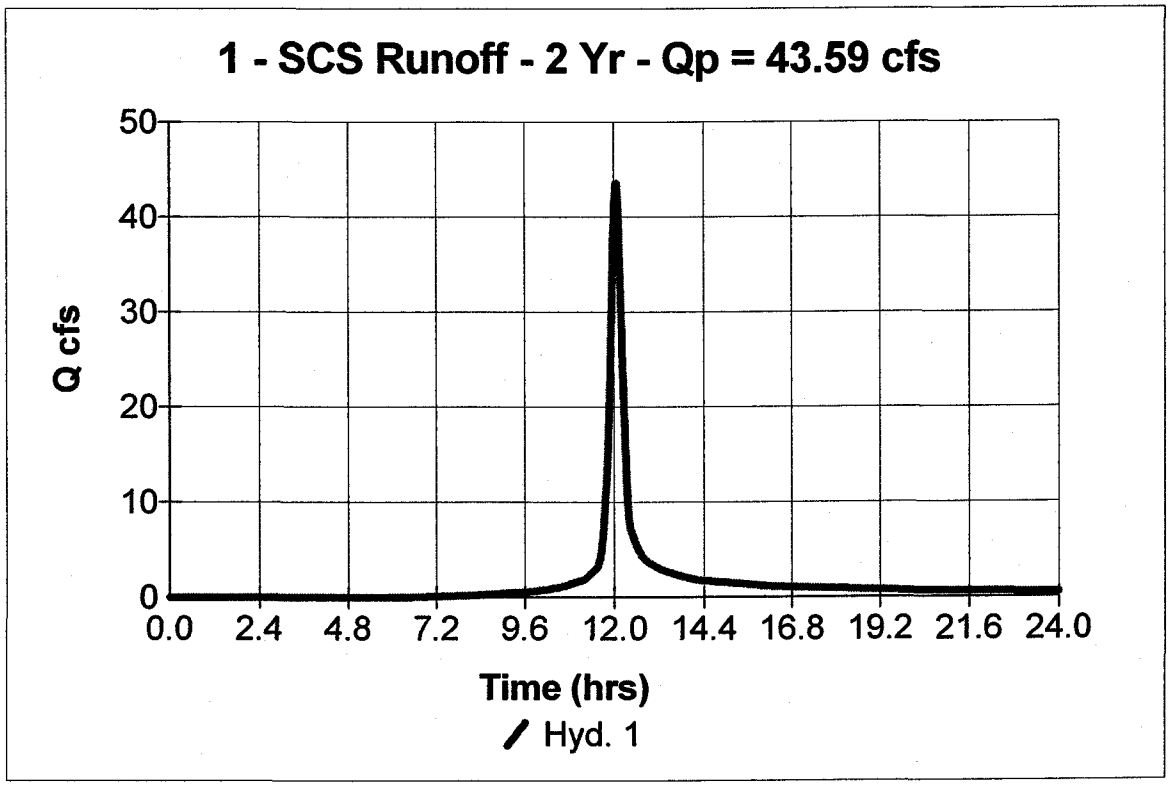
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

VILLAS 1 -POST

Hydrograph type	= SCS Runoff	Peak discharge	= 43.59 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 15.98 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 129,655 cuft



Hydrograph Plot

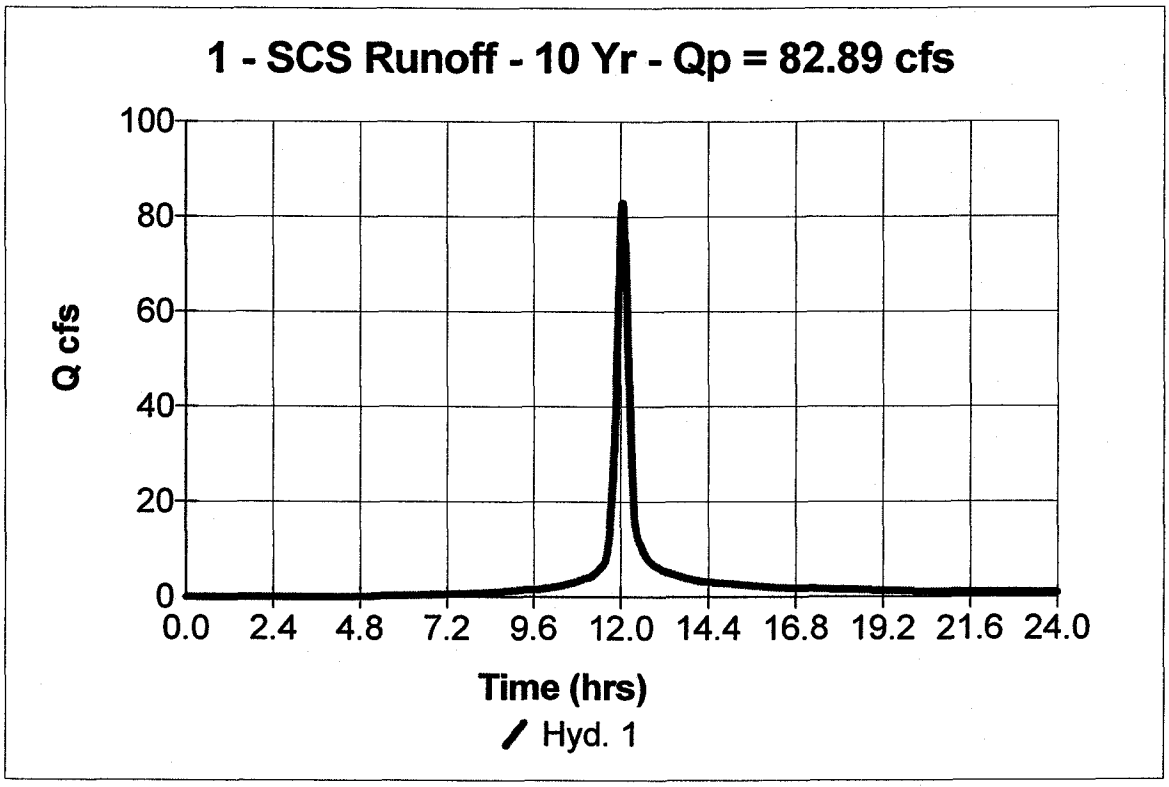
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

VILLAS 1 -POST

Hydrograph type	= SCS Runoff	Peak discharge	= 82.89 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 15.98 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 253,467 cuft



Hydrograph Plot

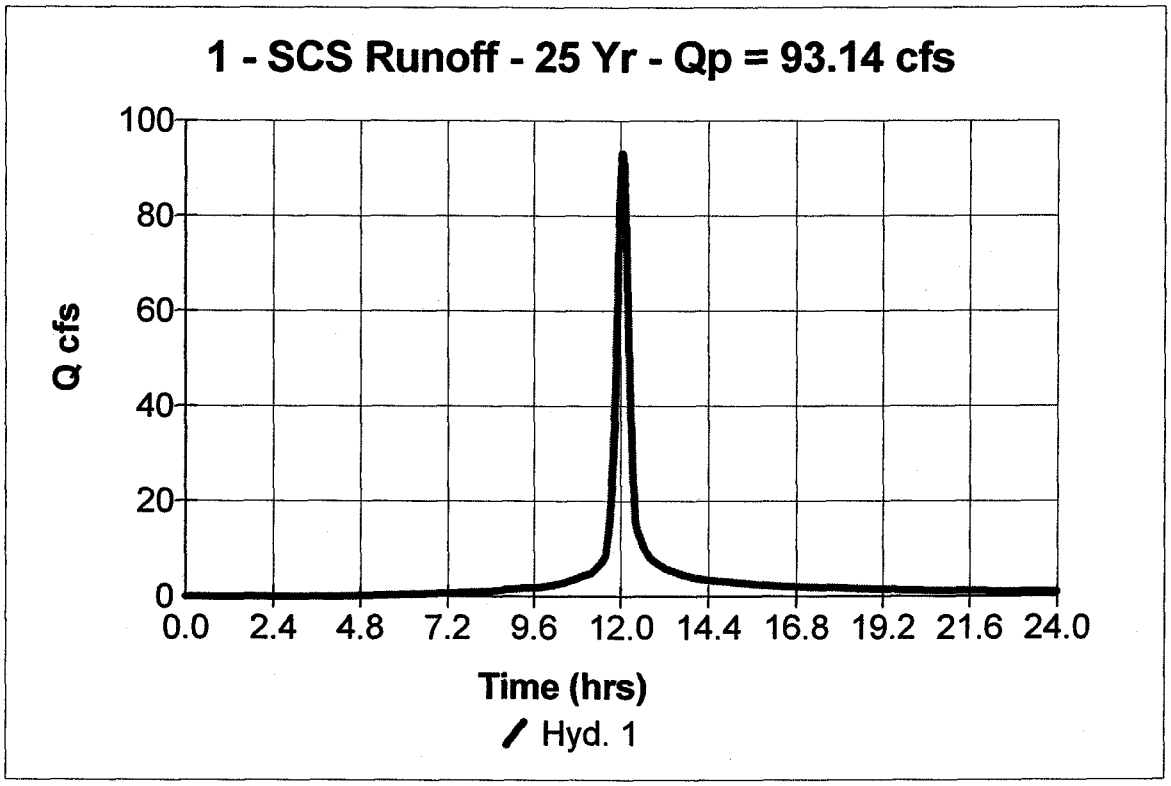
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

VILLAS 1 -POST

Hydrograph type	= SCS Runoff	Peak discharge	= 93.14 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Drainage area	= 15.98 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 286,549 cuft



Hydrograph Plot

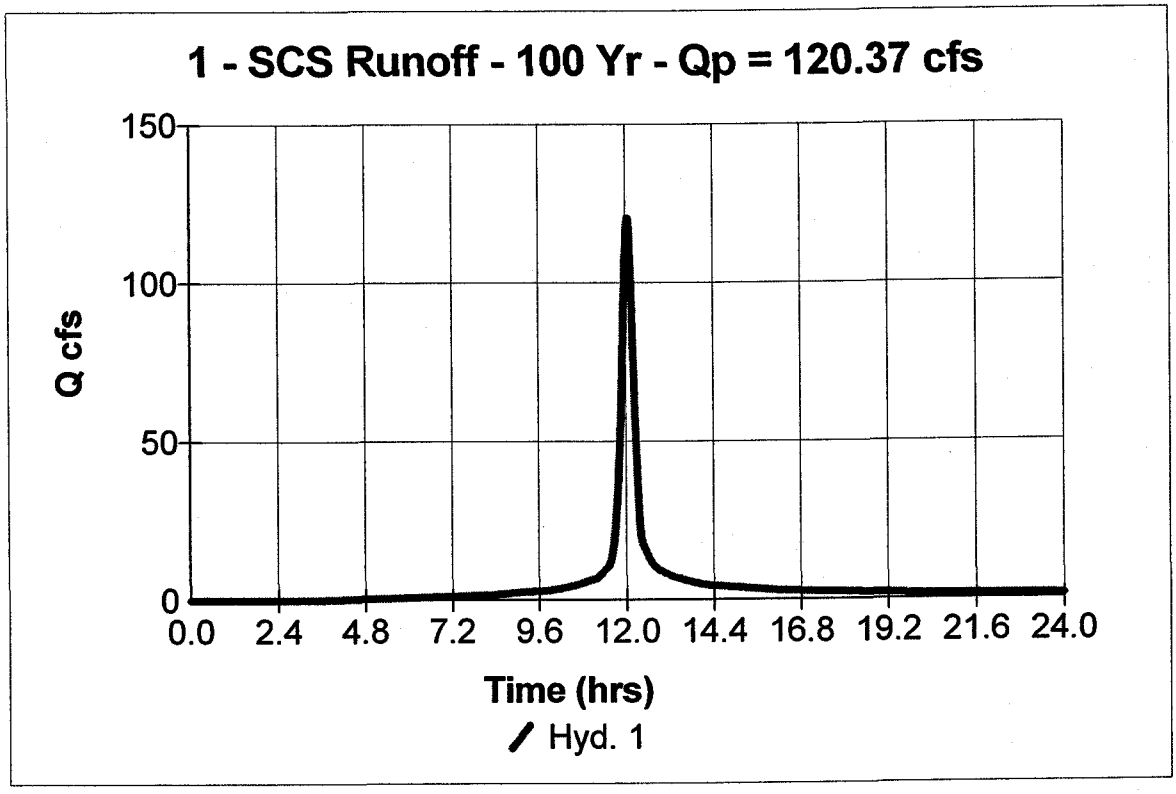
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

VILLAS 1 -POST

Hydrograph type	= SCS Runoff	Peak discharge	= 120.37 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 15.98 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 375,571 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

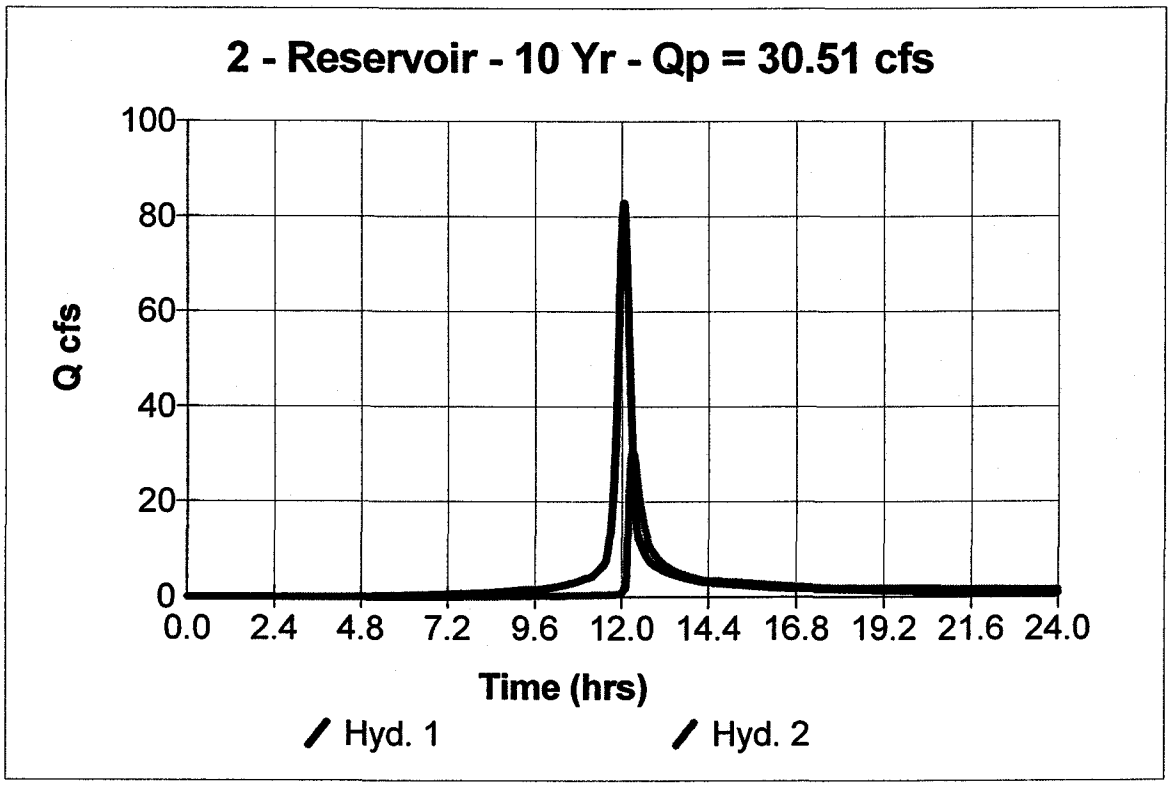
Hyd. No. 2

SED. BASIN 3 Routed

Hydrograph type	= Reservoir	Peak discharge	= 30.51 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Villas BMP 1 (4
Max. Elevation	= 56.16 ft	Max. Storage	= 221,900 cuft

Storage Indication method used.

Hydrograph Volume = 157,124 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

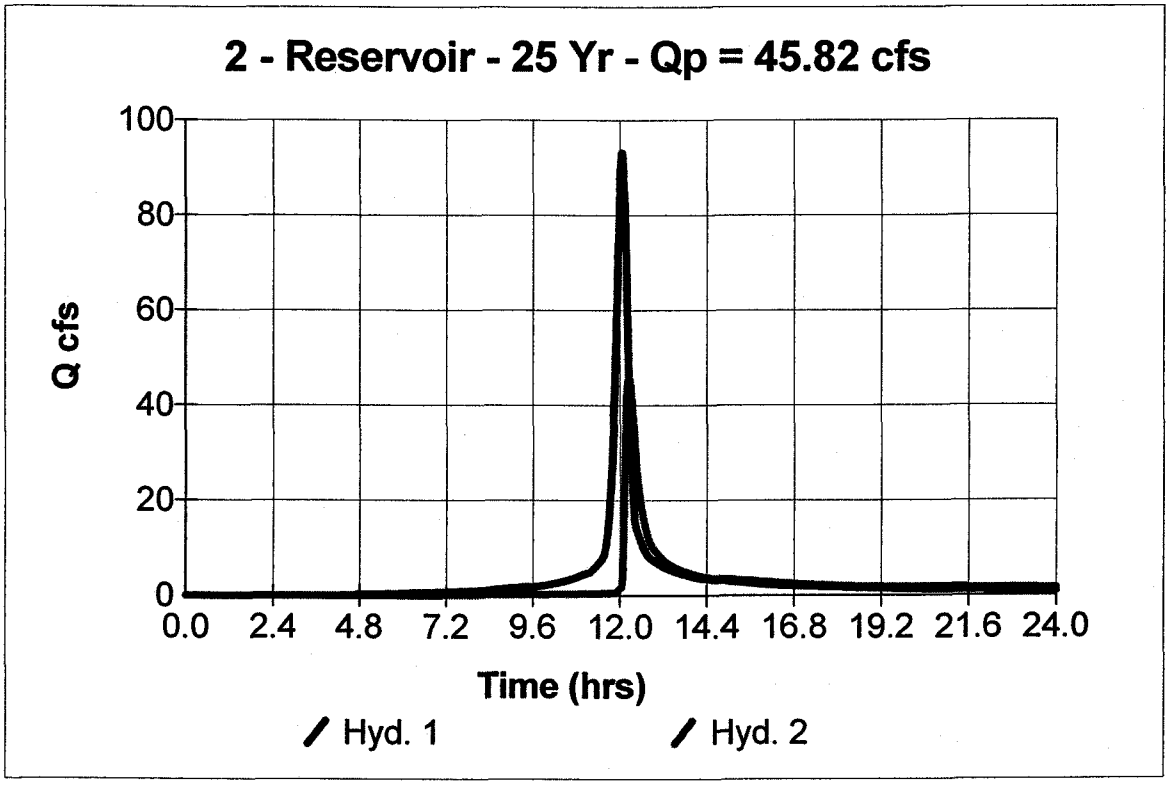
Hyd. No. 2

SED. BASIN 3 Routed

Hydrograph type	= Reservoir	Peak discharge	= 45.82 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Villas BMP 1 (4
Max. Elevation	= 56.38 ft	Max. Storage	= 229,425 cuft

Storage Indication method used.

Hydrograph Volume = 187,700 cuft



WindsorMeade Villa Plan

SWM / BMP #1 BOUYANCE CALCULATIONS
April 5, 2004

Note: THESE CALCULATION PROVIDED TO INSURE THE PRINCIPAL SPILLWAY / RISER DOES NOT HAS THE TENDENCY TO FLOAT.

ELEVATIOIN OF RISER CREST =	55.5
ELEVATION OF INVERT OF RISER = (AFTER GROUTING)	46.7
INSIDE DIAMETER OF RISER =	6 feet
OUTSIDE DIAMETER OF RISER =	7 feet

5'? 60" ϕ

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air : Weight of water per cu. Ft. * 3.14 * (Diameter of riser / 2)^2 * (El. Of Riser Creast - El. Of riser invert)

Weight of water displaced by air : 15,518 lbs.

WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete per cu. Ft. * 3.14 * (Outside diameter of riser / 2)^2 * (El. Of Riser Creast - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 3.14 * (Inside diameter of riser / 2)^2 * (El. Of Riser Creast - El. Of riser invert))

Weight of Concrete Riser =	13,471 lbs.	
Weight of Anti-Vortex =	11,000 lbs.	(Based on Hanson Pipe Precast Anti-Vortex Device)
Weight of Extend Base Only =	- lbs.	
Total Weight of Riser =	24,471 lbs.	

Total Weight of Riser > Weight of Water Displaced, I.e. Will not float !

Villa
BMP #2

Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 4:34 PM

Pond No. 10 - VILLA BMP 2

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	62.00	4,500	0	0
2.00	64.00	6,965	11,465	11,465
4.00	66.00	8,520	15,485	26,950
6.00	68.00	10,185	18,705	45,655
7.00	69.00	11,060	10,623	56,278
8.00	70.00	15,877	13,469	69,746
10.00	72.00	19,098	34,975	104,721
12.00	74.00	21,130	40,228	144,949
14.00	76.00	23,260	44,390	189,339

Culvert / Orifice Structures

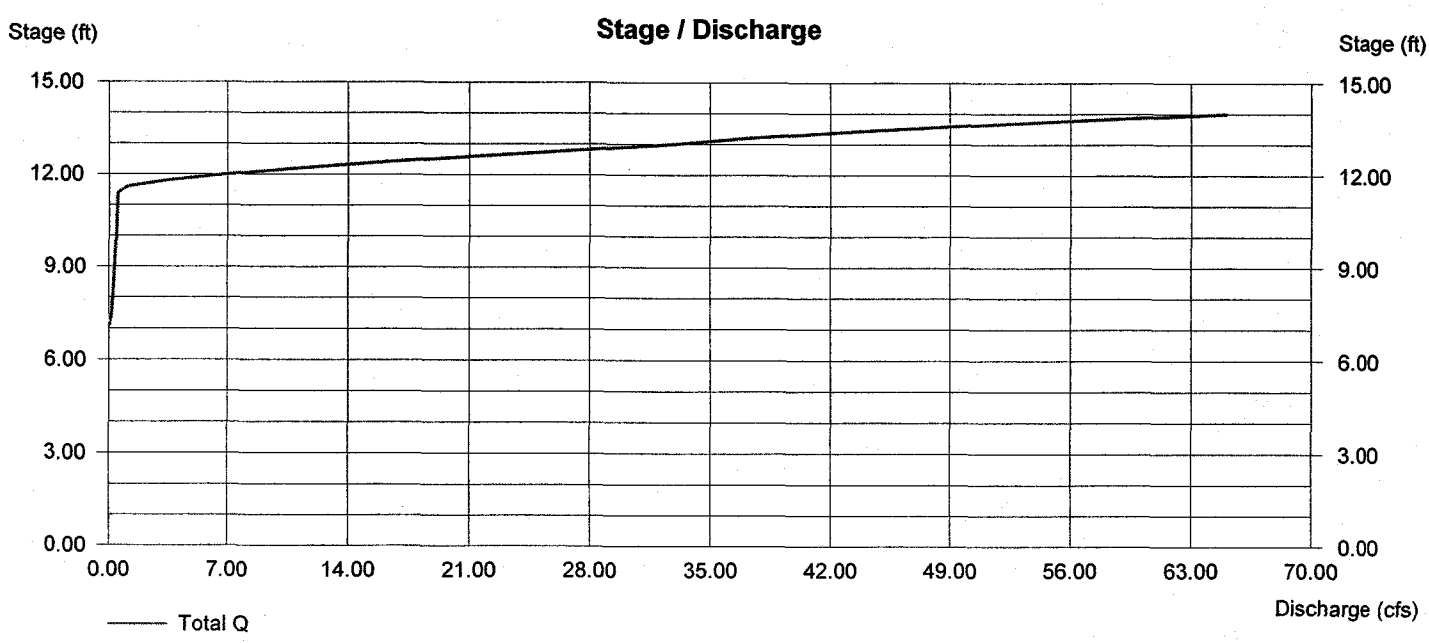
	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	3.00	0.00	0.00
Span (in)	= 24.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 68.00	69.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 7.00	10.00	0.00	0.00
Crest El. (ft)	= 73.50	75.00	0.00	0.00
Weir Coeff.	= 2.60	2.60	0.00	0.00
Weir Type	= Broad	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft - Headwater Control

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



WindsorMeade Overall
CALCULATION FOR SCS HYDROGRAPH GENERATION
FOR VILLAS BMP 2
Project No. 8818-5
12/12/2003

II. POST-DEVELOPMENT CONDITIONS TO BMP

A. Post-Development Drainage Area to Point of Concern = 10.36 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C, 14-B, 15-D, 18-B, 29A	C	Impervious(roads/homes)	3.98	98	390
2)	11-C, 14-B, 15-D, 18-B, 29A	C	Open Space/Landscaped	3.67	74	272
3)	17 Johnston Complex	D	Impervious(roads/homes)	0.61	98	60
4)	17 Johnston Complex	D	Open Space/Landscaped	0.26	80	21
5)	18-B Kempsville Fine Sandy Loam	B	Impervious(roads/homes)	1.20	98	118
6)	18-B Kempsville Fine Sandy Loam	B	Open Space/Landscaped	0.64	61	39
	Total Adjusted CN =			10.36		899
	Composite CN =					87

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential
Manning's roughness coefficient., n (table 5-7)	0.2
Length of overland flow, L	150 Feet
2-year 24-hour rainfall, P2	3.6 inches
Average slope of overland flow , s	0.02 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.27 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	
Length of shallow concentrated flow, L	0 Feet
Average slope of shallow concentrated flow, s	0.2 feet per foot
Average velocity, v	3.0 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours

3) Channel or Pipe Flow

Length of channel flow, L	550 Feet
Average velocity of channel flow, v	4.5 feet per second
Travel time, Tt = L/(3600*v)	0.03 hours
Total Time of Concentration =	0.30 hours
or	18 minutes

III. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
70.0		15877	0			
72.0	2.0	19098	34975	1295	34975	1295
74.0	2.0	21130	40228	1490	75203	2785
76.0	2.0	23260	44390	1644	119593	4429

IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Percent Impervious of the BMP Watershed, Post-Development	55.9%		
Drainage Area of the BMP Watershed	10.36	acres	
Impervious Acres of BMP Watershed	5.79	acres	

Calculation for Water Quality Volume, WQ_V

WQ_v = (2.0 inches per impervious acre) *(impervious acres of BMP watershed)

WQv = (2.0 inches)*(1 ft / 12 inches) * (43560 sq. Ft per acre) * (impervious acres of BMP watershed)

WQ_v = (2.0 inches)*(1 ft / 12 inches) * (43560 sq. Ft per acre) *	5.79	=	42035 cu. Ft
1/2 WQ_v =	21018 cu. Ft		Required Volume for Permanent Pool
	cu. Ft		Design Volume for Permanent Pool
1/2 WQ_v =	21018 cu. Ft		Volume to be Released in 24-Hours
Elevation of 1/2 WQv =	70.4		
Elevation of release inlet for 1/2 water quality volume =	69.0		
Average head, in feet, on release inlet =	1.5		

Average release rate calculation

$$\frac{21{,}018.0 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.2 \text{ cfs}$$

Calculation of size of release inlet for 1/2 Water Quality Volume

Diameter of Release Inlet = 2 * (Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)

where, Q equals Average Release Rate, in cfs

h equals Average Head, in feet

Diameter of Release Inlet = 0.30 feet, or 4 inches

AES Projet No.: 8818-5
Project Title: Villa BMP 2

CONSULTING ENGINEERS

Channel Protection

Channel Protection Volume

Post Development Watershed Data

Area = 10.36 Acres 0.0162sq.mi.
Runoff Curve No. = 87
Time of Concentration = 0.300 hr.
Return Period = 1 Yr.

Runoff Depth = 2.8 in.

Initial Abstraction (From TR55 Equation 2-2)

Ia = (200/CN)-2

Ia = 0.299

Unit Peak Discharge (From TR55 Equation for Exhibit 4)

$\log(Qu) = C0+C1 \log(Tc)+C2(\log(Tc))^2$

Qu = 676.18 csm/in

Ratio of Peak Outflow Discharge to Peak Inflow Discarge

(From Maryland Stormwater Design Manual Figure D.11.2)

Qo/Qi = 0.026

Ratio of Volume of Storage to Volume of Runoff (From TR55 Figure 6.1)

$Vs/Vr = C0+C1(Qo/Qi)+C2(Qo/Qi)^2+C3(Qo/Qi)^3$

Vs/Vr = 0.646

Vs = 0.873 Ac-Ft
Vs = 38034 cu.ft.

Table F-2

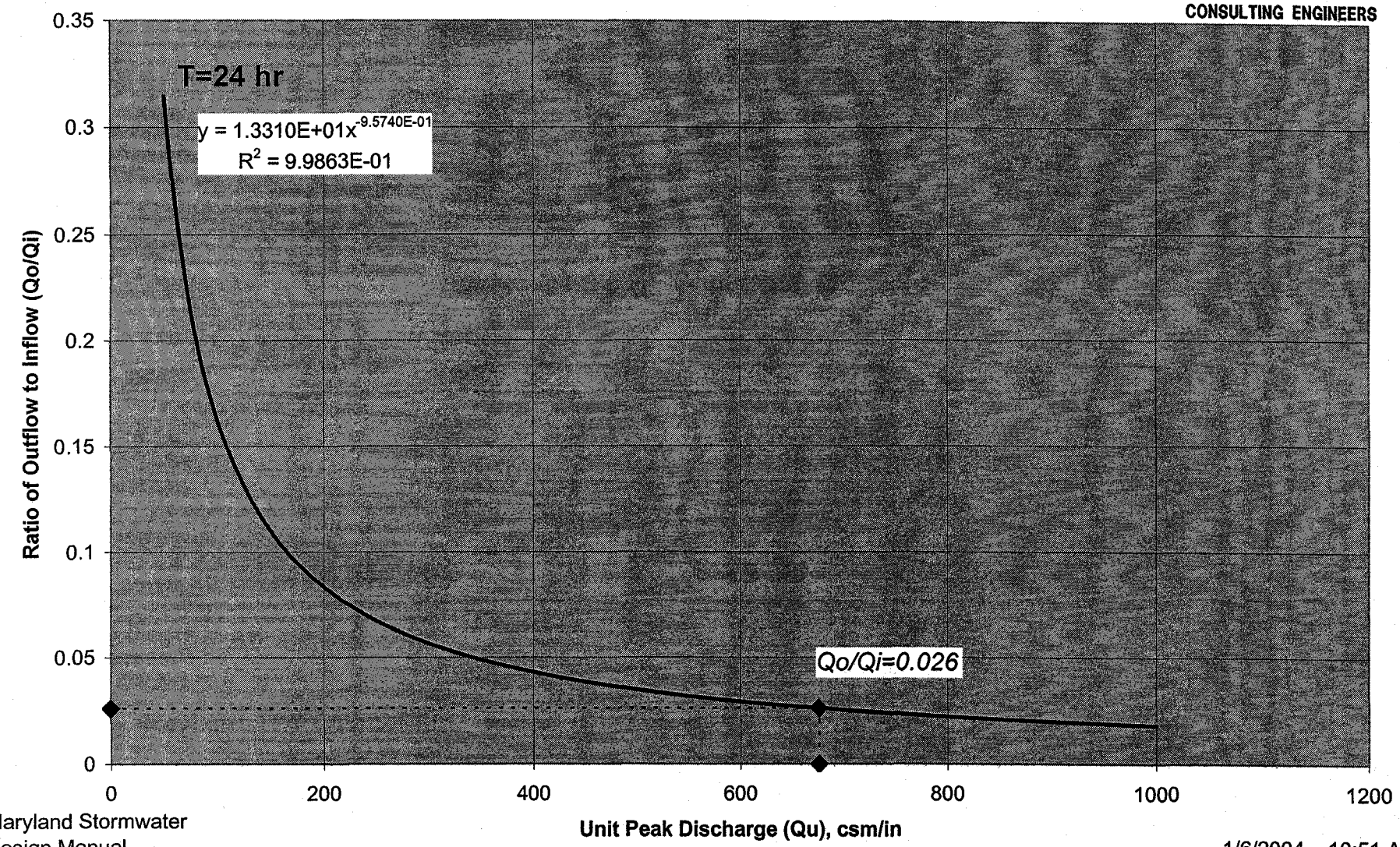
Coefficients for the equations used to generate figure 6-1

Rainfall Dist.	C0	C1	C2	C3
I, IA	0.66	-1.76	1.96	-0.73
II, III	0.682	-1.43	1.64	-0.804

Average Release Rate

Qi = 17.14 cfs
Qo/Qi = 0.03
Qo = 0.45 cfs

Detention Time Versus Discharge Ratios



Maryland Stormwater
Design Manual
Appendix D.11
Figure D.11.3

1/6/2004 10:51 AM
Villa_BMP2_1yr_24hr.xls
Chart1 1

Hydrograph Plot

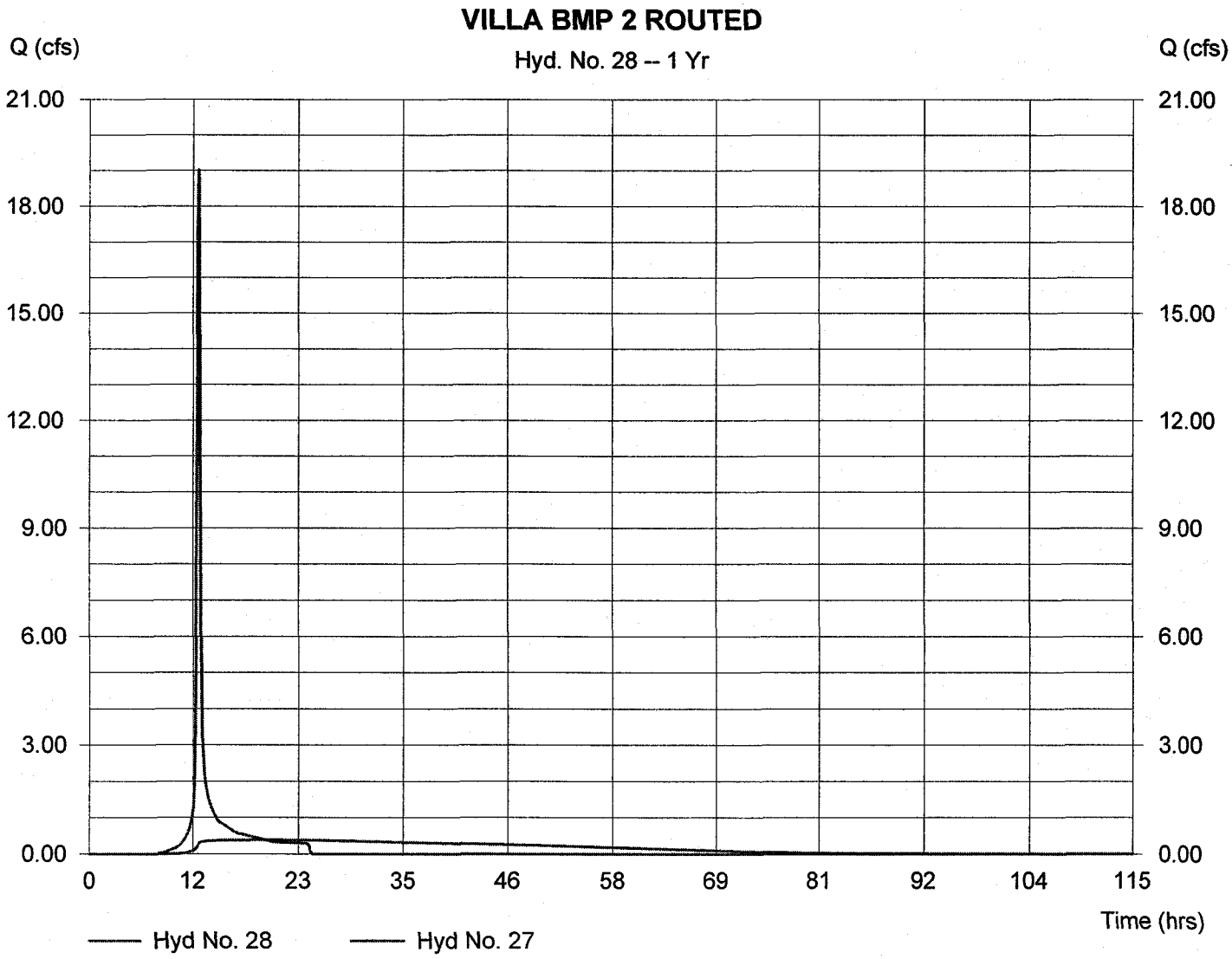
Hydraflow Hydrographs by Intelisolve | Monday, Mar 29 2004, 4:34 PM

Hyd. No. 28

VILLA BMP 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.39 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 27	Max. Elevation	= 71.80 ft
Reservoir name	= VILLA BMP 2	Max. Storage	= 101,148 cuft

Storage Indication method used. Wet pond routing start elevation = 69.00 ft. | Hydrograph Volume = 60,656 cuft



Hydrograph Plot

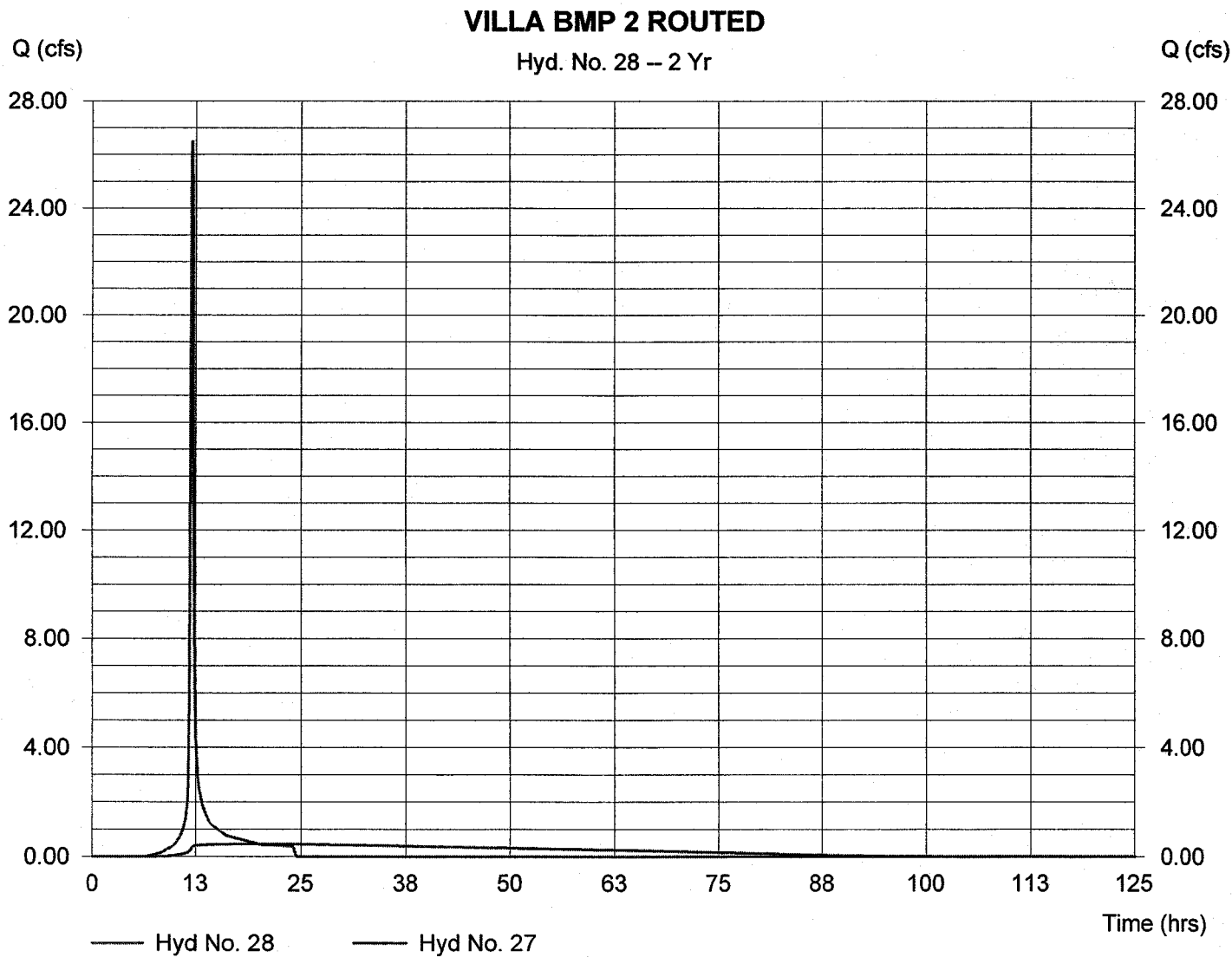
Hydraflow Hydrographs by Intelisolve | Monday, Mar 29 2004, 4:34 PM

Hyd. No. 28

VILLA BMP 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.45 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 27	Max. Elevation	= 72.82 ft
Reservoir name	= VILLA BMP 2	Max. Storage	= 121,231 cuft

Storage Indication method used. Wet pond routing start elevation = 69.00 ft. | Hydrograph Volume = 84,534 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 4:34 PM

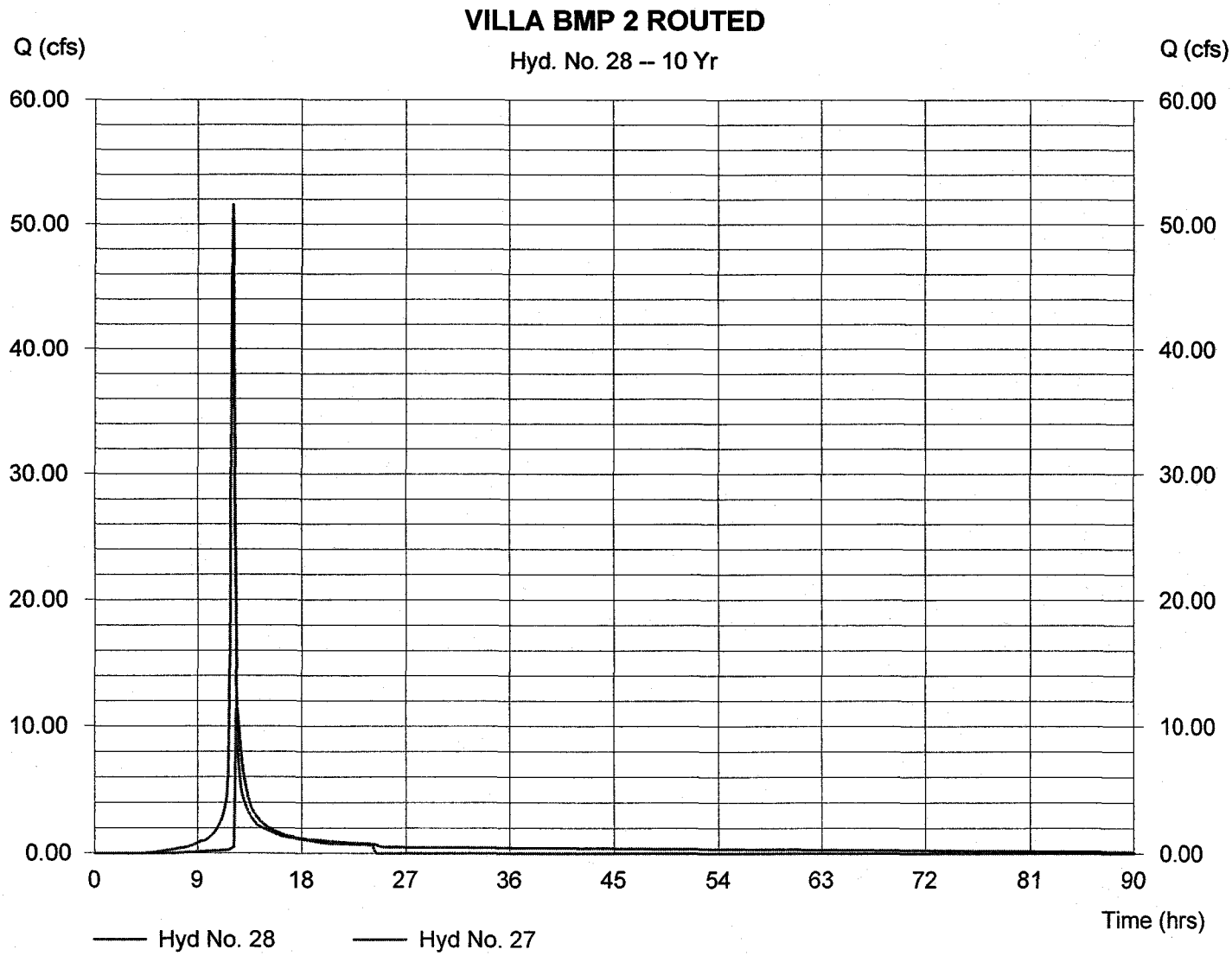
Hyd. No. 28

VILLA BMP 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 11.53 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 27	Max. Elevation	= 74.22 ft
Reservoir name	= VILLA BMP 2	Max. Storage	= 149,727 cuft

Storage Indication method used. Wet pond routing start elevation = 69.00 ft.

Hydrograph Volume = 167,612 cuft



Hydrograph Plot

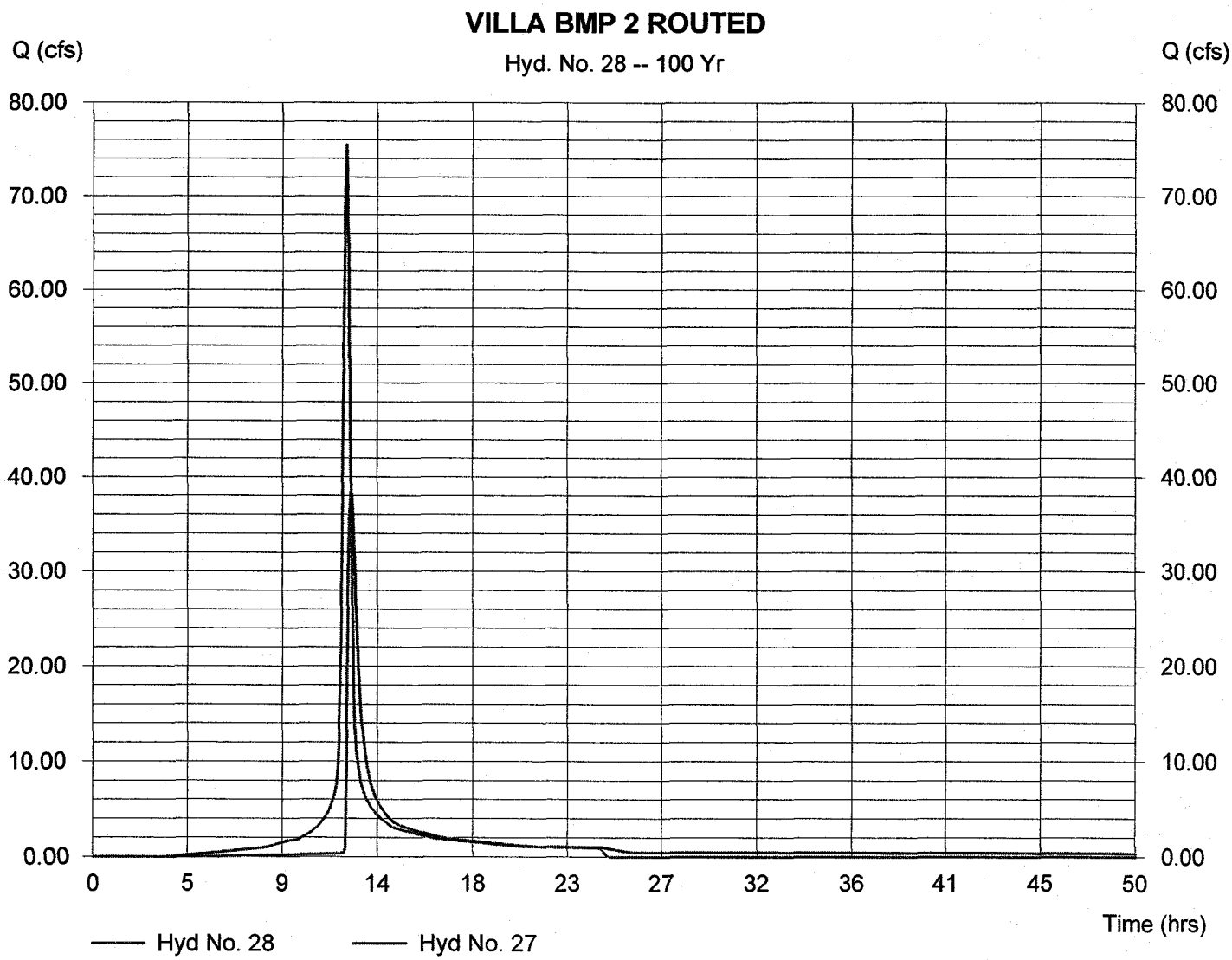
Hydraflow Hydrographs by Intelisolve | Monday, Mar 29 2004, 4:34 PM

Hyd. No. 28

VILLA BMP 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 38.43 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 27	Max. Elevation	= 75.25 ft
Reservoir name	= VILLA BMP 2	Max. Storage	= 172,585 cuft

Storage Indication method used. Wet pond routing start elevation = 69.00 ft. | Hydrograph Volume = 249,965 cuft



Hydrograph Plot

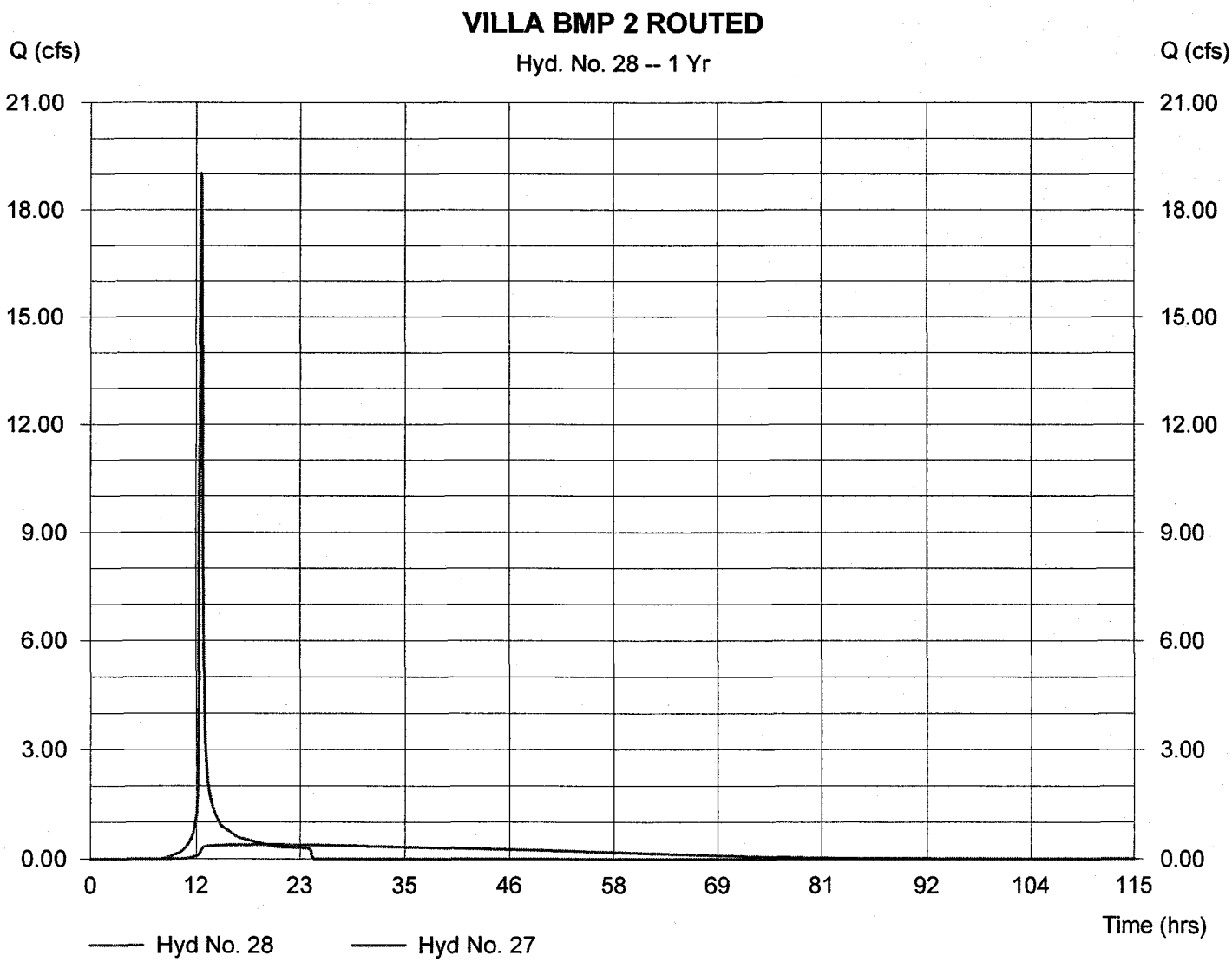
Hydraflow Hydrographs by Intelisolve | Monday, Mar 29 2004, 4:34 PM

Hyd. No. 28

VILLA BMP 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.39 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 27	Max. Elevation	= 71.80 ft
Reservoir name	= VILLA BMP 2	Max. Storage	= 101,148 cuft

Storage Indication method used. Wet pond routing start elevation = 69.00 ft. | Hydrograph Volume = 60,656 cuft



No. 5505 Engineer's Computation Pad
ALVIN

Dewatering Orifice Sizing Calculation

$$A = \frac{Q}{(64.32h)^{1/2}(0.6)} \qquad d = 2\left(\frac{A}{3.14}\right)^{1/2}$$

A = flow area
Q = flowrate for 6hr drawdown

$$Q = \frac{\text{total storage (dry)}}{21{,}600s}$$

d = pipe diameter
h = average head

$$Q = \frac{111{,}753}{21{,}600}$$

$$Q = 5.17 \ ft^3/s$$

$$A = \frac{5.17}{(64.32 \times 3)^{\frac{1}{2}}(0.6)} \qquad A = .62$$

$$d = 0.88 \ ft \Rightarrow 10''$$

10 inch orifice, 4" used based on 1yr 24 hour stream channel protection.

WindsorMeade Villa Plan

SWM / BMP #2 BOUYANCE CALCULATIONS
April 5, 2004

Note: THESE CALCULATION PROVIDED TO INSURE THE PRINCIPAL SPILLWAY / RISER DOES NOT HAS THE TENDENCY TO FLOAT.

ELEVATIOIN OF RISER CREST =	73.5	✓
ELEVATION OF INVERT OF RISER = (AFTER GROUTING)	68.0	✓
INSIDE DIAMETER OF RISER =	5 feet	✓
OUTSIDE DIAMETER OF RISER =	6 feet	

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air: Weight of water per cu. Ft. * 3.14 * (Diameter of riser / 2)^2 * (El. Of Riser Creast - El. Of riser invert)

Weight of water displaced by air 6,735 lbs. ✓

WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete per cu. Ft. * 3.14 * (Outside diameter of riser / 2)^2 * (El. Of Riser Creast - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 3.14 * (Inside diameter of riser / 2)^2 * (El. Of Riser Creast - El. Of riser invert))

Weight of Concrete Riser =	7,124 lbs.	
Weight of EW-11 =	4,255 lbs.	(Based on 28cuft of concrete)
Weight of Extend Base Only =	- lbs.	
Total Weight of Riser =	11,379 lbs.	✓

Total Weight of Riser > Weight of Water Displaced, I.e. Will not float ! ✓

Villa
X-ING

Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 2:58 PM

Pond No. 6 - WM VILLA CROSSING

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	46.00	2,631	0	0
2.00	48.00	10,353	12,984	12,984
4.00	50.00	24,303	34,656	47,640
6.00	52.00	43,172	67,475	115,115

Culvert / Orifice Structures

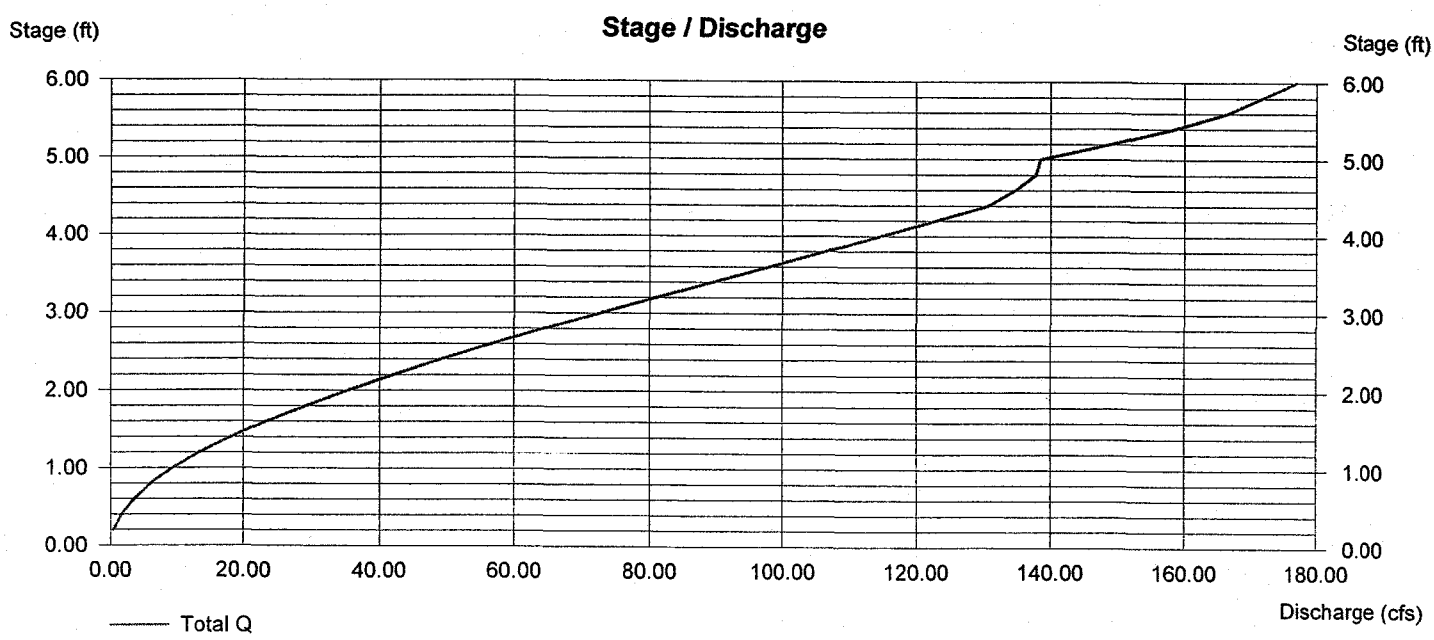
	[A]	[B]	[C]	[D]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 46.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 2.60	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 46.01 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 2:58 PM

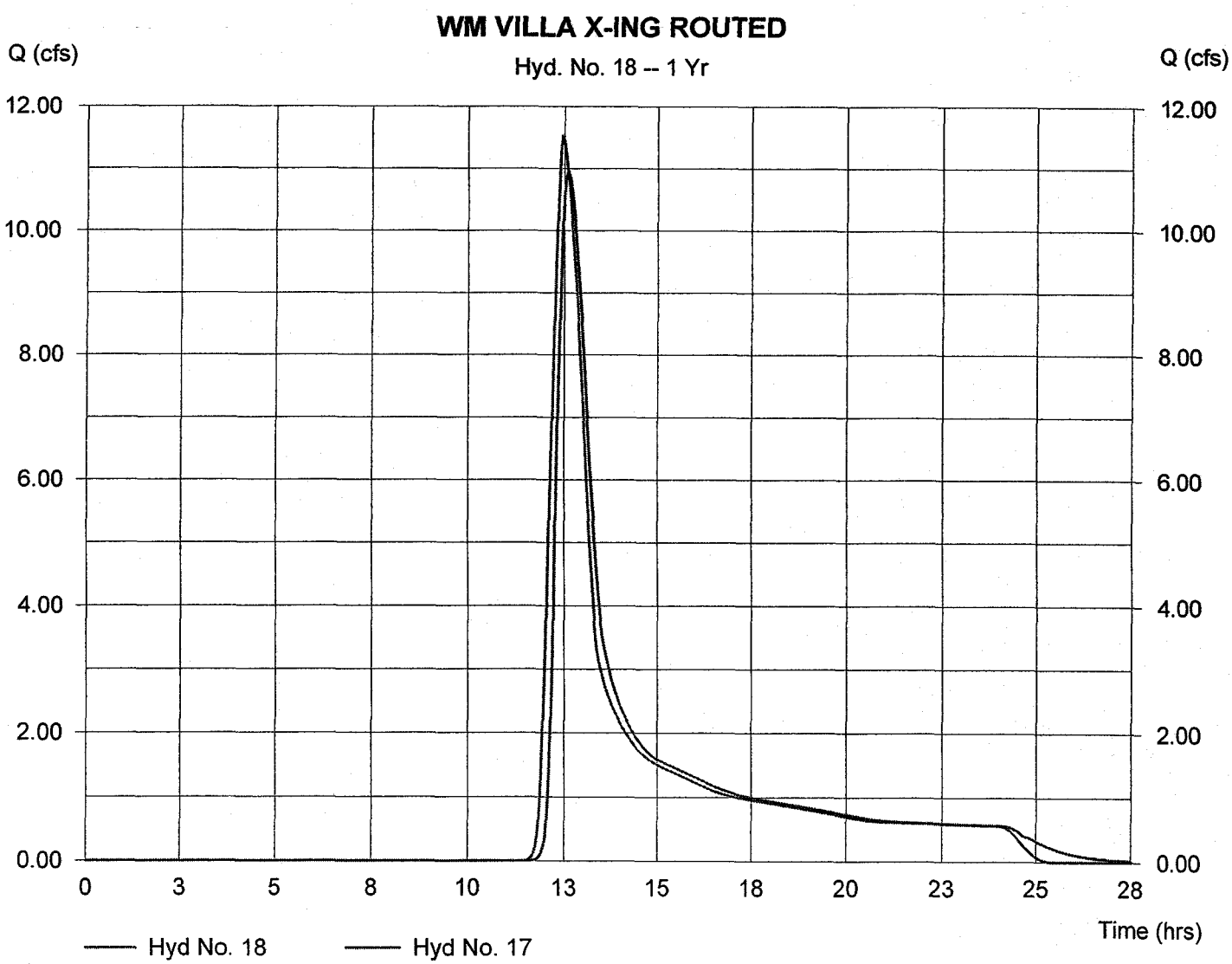
Hyd. No. 18

WM VILLA X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 10.96 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 17	Max. Elevation	= 47.07 ft
Reservoir name	= WM VILLA CROSSING	Max. Storage	= 6,954 cuft

Storage Indication method used.

Hydrograph Volume = 80,330 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 2:58 PM

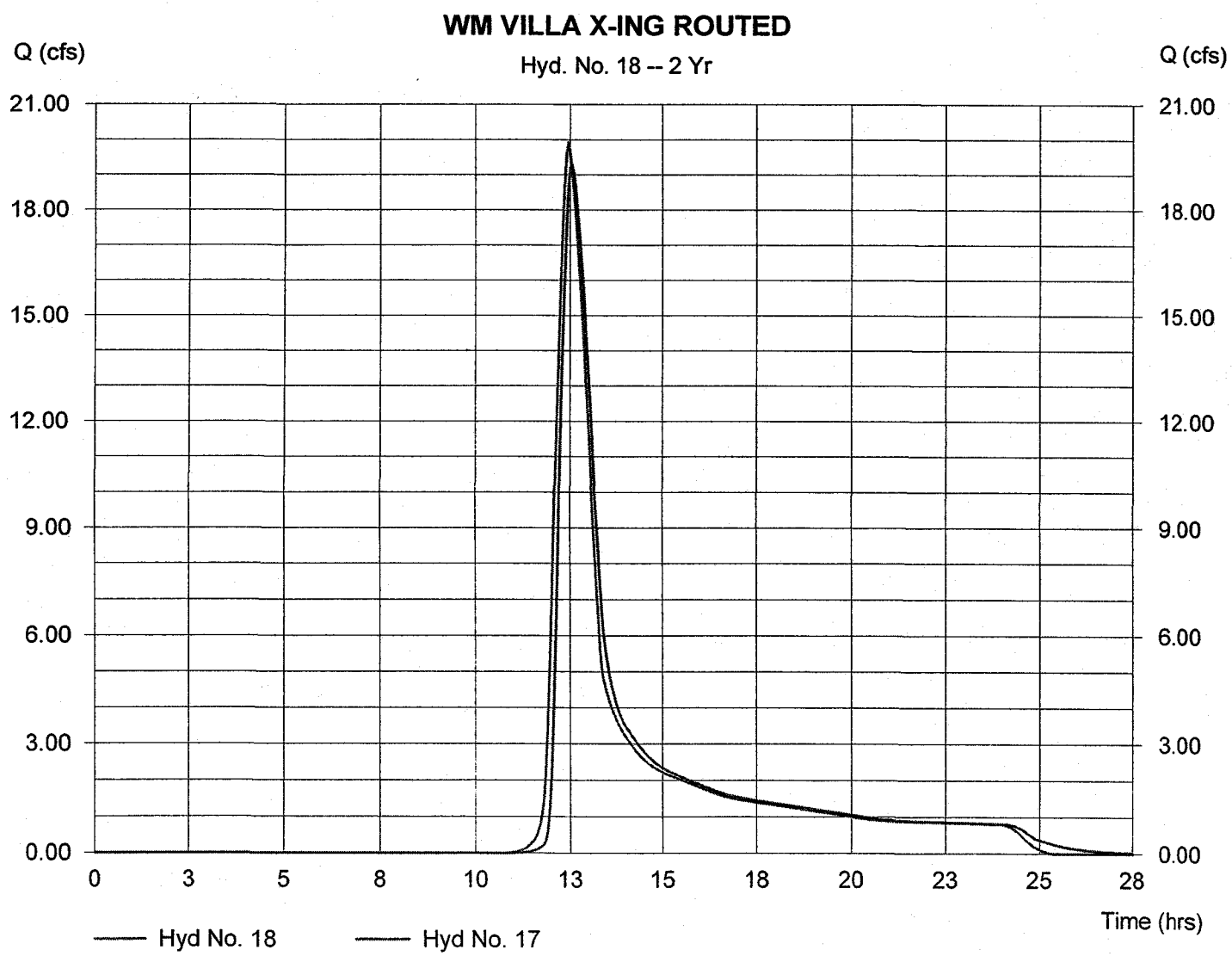
Hyd. No. 18

WM VILLA X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 19.29 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 17	Max. Elevation	= 47.44 ft
Reservoir name	= WM VILLA CROSSING	Max. Storage	= 9,377 cuft

Storage Indication method used.

Hydrograph Volume = 128,565 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 2:58 PM

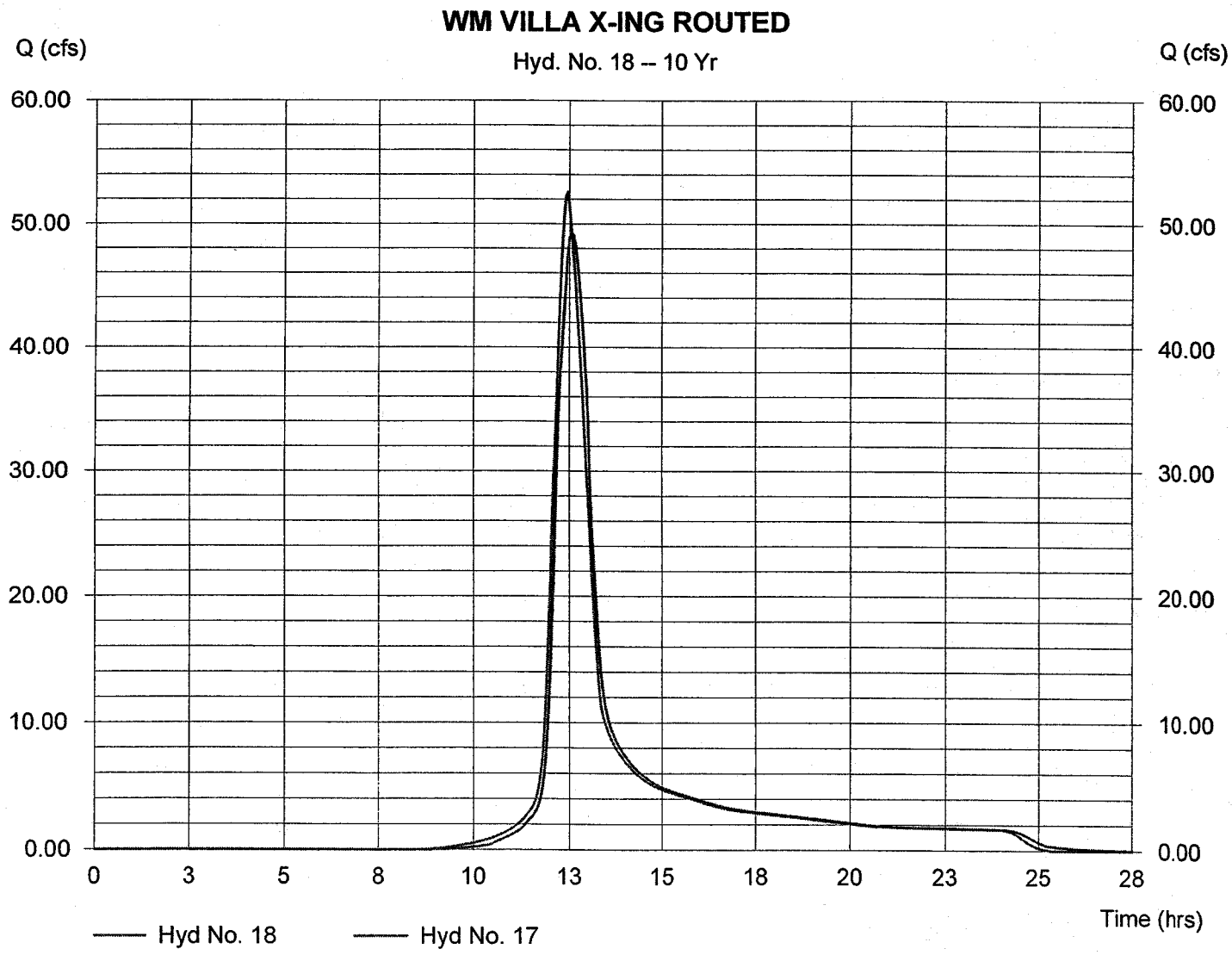
Hyd. No. 18

WM VILLA X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 49.37 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 17	Max. Elevation	= 48.40 ft
Reservoir name	= WM VILLA CROSSING	Max. Storage	= 19,996 cuft

Storage Indication method used.

Hydrograph Volume = 318,626 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Mar 29 2004, 2:58 PM

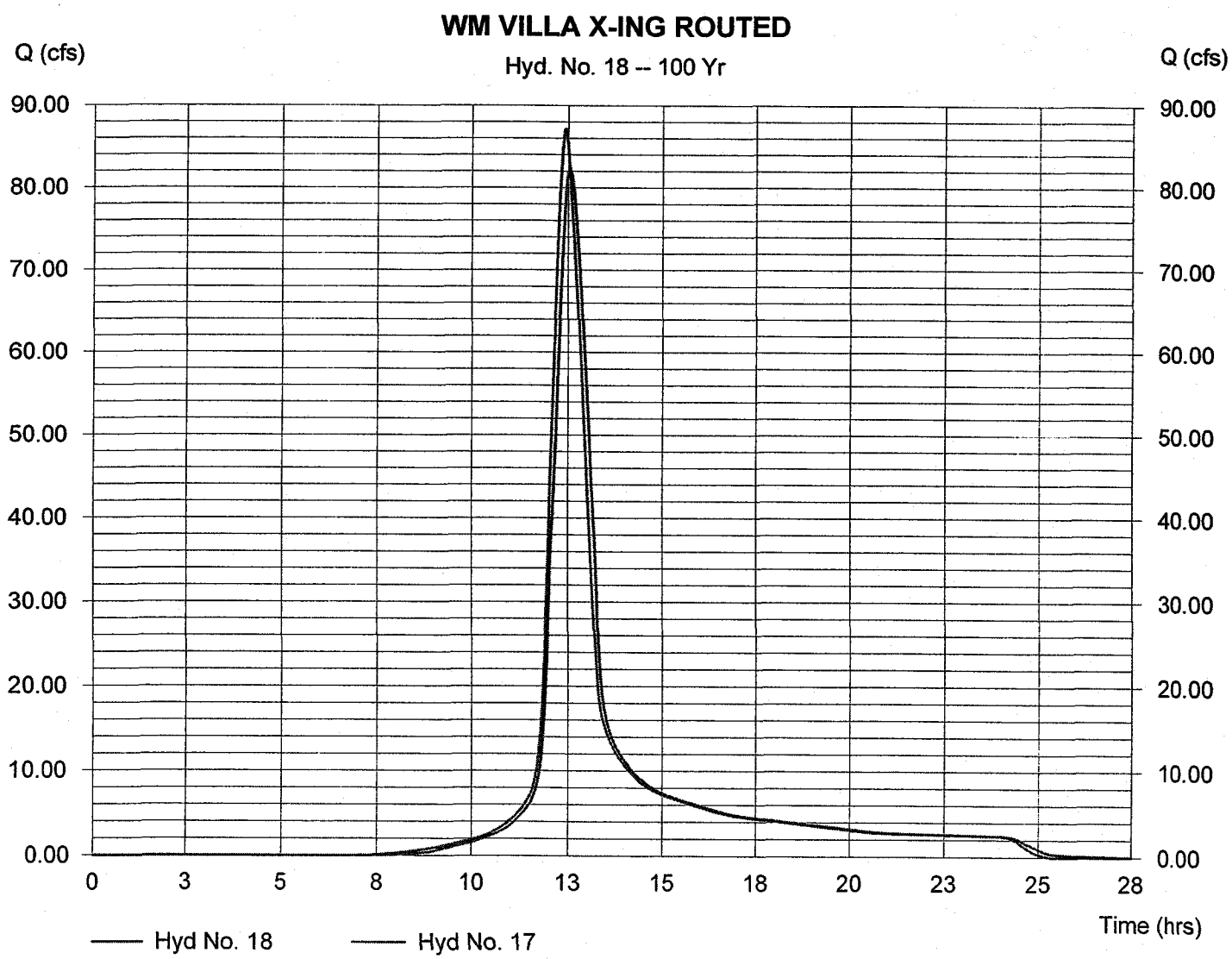
Hyd. No. 18

WM VILLA X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 82.45 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 17	Max. Elevation	= 49.24 ft
Reservoir name	= WM VILLA CROSSING	Max. Storage	= 34,427 cuft

Storage Indication method used.

Hydrograph Volume = 524,232 cuft



WINDSORMEADE
Of Williamsburg

Calculations
For
James City County Environmental Division

SP-3-04
3RD SUB

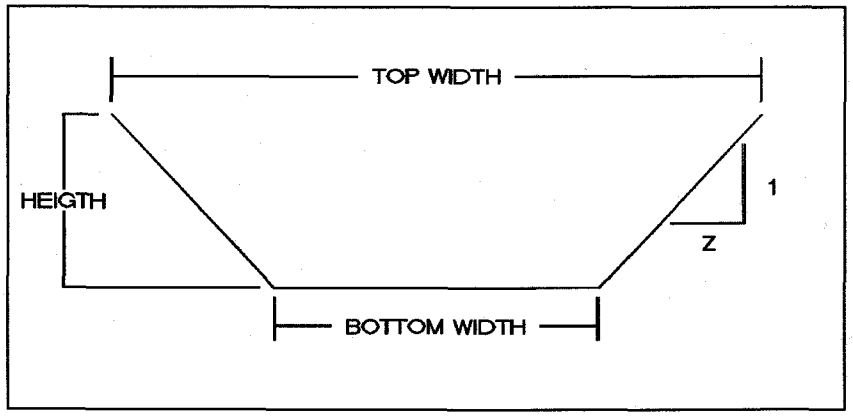
Prepared by

AES Consulting Engineers
5248 Olde Towne Road. Suite 1
Williamsburg, VA 23188
(757) 253-0040 Fax: (757) 220-8994
http://www.aesva.com

AES CONSULTING ENGINEERS

Adequate Channel Analysis of Proposed Swale
Windsor Meade Villas - Swale #1 - West of Rt.199 R/W
1/20/2003
Project No. 8818-05

CHANNEL GEOMETRY



TOP WIDTH =	10.4 FT
BOTTOM WIDTH =	0 FT
HEIGHT =	1.3 FT
Z =	4.0 FT
SLOPE (S)	0.014 FT/FT
MANNING'S N	0.050

CALCULATION OF CHANNEL CAPACITY AND VELOCITY

MANNING'S EQUATION

V = (1.49 / N) * R 2/3 * S 1/2

WHERE:

V = AVERAGE VELOCITY
N = MANNING'S ROUGHNESS COEF.
R = HYDRAULIC RADIUS = A / WP
S = SLOPE OF CHANNEL
A = AREA OF CROSS SECTION
WP = WETTED PERIMETER

MAX. PERMISSIBLE VELOCITY = **4 FT /SEC** EC-2 LINED CHANNEL

2-YEAR STORM EVENT

TIME OF CONCENTRATION =	5	MIN.
RAINFALL INTENSITY =	5.6	IN/HR
RUNOFF COEF. =	0.5	
POST-DEV. DRAINAGE AREA =	1.6	AC.

PEAK FLOW RATE =	**4.48**	**CFS**	
PEAK VELOCITY =	**1.84**	**FT/SEC**	(SEE BELOW)
DEPTH=	**0.78**	**FT**	(SEE BELOW)

VELOCITY FOR POST DEVELOPMENT 2-YEAR STORM IS
*** LESS THAN MAXIMUM PERMISSIBLE VELOCITY OF 4.0 CFS**
THEREFORE, CHANNEL IS ADEQUATE. FLOW DEPTH IS
LESS THAN 1.3'. CHANNEL DEPTH IS ADEQUATE.

Incremental Depth (FT)	Area (SQ FT)	WP (FT)	Hydraulic Radius (FT)	Velocity (FT/SEC)	Flow (CFS)
0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!
0.10	0.04	0.82	0.05	0.47	0.02
0.20	0.16	1.65	0.10	0.74	0.12
0.30	0.36	2.47	0.15	0.98	0.35
0.36	0.51	2.95	0.17	1.10	0.56
0.40	0.64	3.30	0.19	1.18	0.76
0.50	1.00	4.12	0.24	1.37	1.37
0.60	1.44	4.95	0.29	1.55	2.23
0.70	1.96	5.77	0.34	1.72	3.36
0.78	2.43	6.43	0.38	1.84	4.48
0.80	2.56	6.60	0.39	1.88	4.80

10-YEAR STORM EVENT

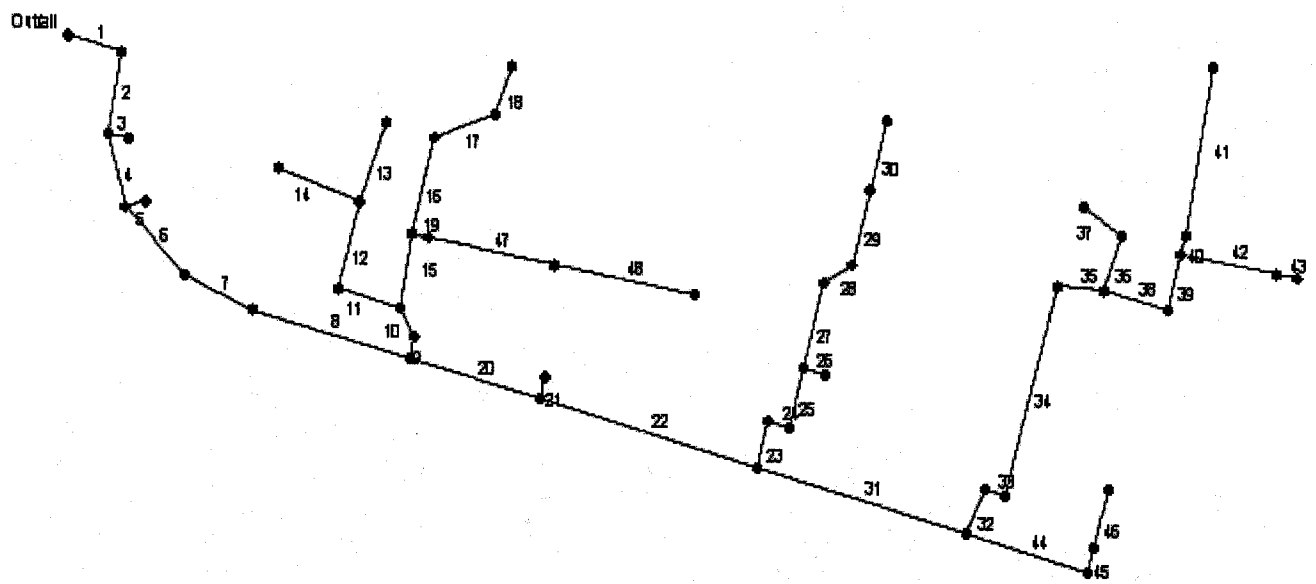
TIME OF CONCENTRATION =	5	MIN.
RAINFALL INTENSITY =	6.9	IN/HR
RUNOFF COEF. =	0.5	
POST-DEV. DRAINAGE AREA =	1.6	AC.

PEAK FLOW RATE =	**5.52**	**CFS**	
PEAK VELOCITY =	**1.94**	**FT/SEC**	(SEE BELOW)
DEPTH=	**0.84**	**FT**	(SEE BELOW)

Incremental Depth (FT)	Area (SQ FT)	WP (FT)	Hydraulic Radius (FT)	Velocity (FT/SEC)	Flow (CFS)
0.00	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!
0.10	0.04	0.82	0.05	0.47	0.02
0.20	0.16	1.65	0.10	0.74	0.12
0.30	0.36	2.47	0.15	0.98	0.35
0.39	0.60	3.18	0.19	1.15	0.69
0.40	0.64	3.30	0.19	1.18	0.76
0.50	1.00	4.12	0.24	1.37	1.37
0.60	1.44	4.95	0.29	1.55	2.23
0.70	1.96	5.77	0.34	1.72	3.36
0.80	2.56	6.60	0.39	1.88	4.80
0.84	2.84	6.95	0.41	1.94	5.52
0.90	3.24	7.42	0.44	2.03	6.57

Hydraflow Plan View

STORM SYSTEM 1



Project file: 8818-05-STM-1.vab.stm	No. Lines: 48	05-13-2004

Hydraflow Storm Sewers 2003

Storm Sewer Tabulation

STORM SYSTEM 1

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	64.0	0.69	16.70	0.65	0.45	9.62	5.0	12.1	5.6	53.71	323.1	5.58	42	10.31	52.60	46.00	56.21	56.03	63.99	48.00	1-1 to Outfall
2	1	86.0	0.05	16.01	0.70	0.04	9.17	5.0	11.8	5.6	51.69	71.14	5.37	42	0.50	53.03	52.60	56.92	56.70	62.39	63.99	1-2 to 1-1
3	2	24.0	0.46	0.46	0.60	0.28	0.28	5.0	5.0	7.1	1.97	12.55	3.27	12	12.42	58.89	55.91	59.48	57.37	62.39	62.39	1-3 to 1-2
4	2	80.0	0.23	15.50	0.65	0.15	8.86	5.0	11.5	5.7	50.38	71.14	5.24	42	0.50	53.43	53.03	57.57	57.37	61.91	62.39	1-4 to 1-2
5	4	24.0	0.45	0.45	0.60	0.27	0.27	5.0	5.0	7.1	1.92	10.28	3.23	12	8.33	57.91	55.91	58.50	58.00	61.91	61.91	1-5 to 1-4
6	4	98.0	0.14	14.82	0.65	0.09	8.44	5.0	11.3	5.7	48.40	59.50	6.85	36	0.80	54.21	53.43	58.52	58.00	62.55	61.91	1-6 to 1-4
7	6	86.0	0.05	14.68	0.90	0.05	8.35	5.0	11.0	5.8	48.24	57.08	6.82	36	0.73	54.84	54.21	59.30	58.84	63.45	62.55	1-7 to 1-6
8	7	190.0	0.22	14.63	0.65	0.14	8.30	5.0	10.5	5.9	48.76	53.66	6.90	36	0.65	56.07	54.84	60.42	59.40	64.57	63.45	1-8 to 1-7
9	8	24.0	0.22	4.59	0.65	0.14	2.47	5.0	9.7	6.0	14.92	41.86	3.04	30	1.04	58.57	58.32	61.19	61.16	64.57	64.57	1-9 to 1-8
10	9	35.0	0.20	4.37	0.70	0.14	2.33	5.0	9.5	6.1	14.15	33.25	2.88	30	0.66	58.80	58.57	61.30	61.30	65.37	64.57	1-10 to 1-9
11	10	74.0	0.13	0.91	0.70	0.09	0.50	5.0	8.3	6.3	3.14	18.59	1.00	24	0.68	59.30	58.80	61.41	61.40	65.37	65.37	1-11 to 1-10
12	11	94.0	0.12	0.78	0.70	0.08	0.41	5.0	7.3	6.5	2.65	7.66	1.50	18	0.53	59.80	59.30	61.49	61.43	67.04	65.37	1-12 to 1-11
13	12	89.0	0.10	0.10	0.70	0.07	0.07	5.0	5.0	7.1	0.50	8.94	1.58	12	6.30	65.41	59.80	65.71	61.52	68.91	67.04	1-13 to 1-12
14	12	101.0	0.56	0.56	0.45	0.25	0.25	5.0	5.0	7.1	1.80	4.54	1.46	15	0.50	60.30	59.80	61.55	61.52	63.16	67.04	1-14 to 1-12
15	10	78.0	0.14	3.26	0.70	0.10	1.69	5.0	8.8	6.2	10.51	22.62	3.35	24	1.00	59.58	58.80	61.56	61.40	66.75	65.37	1-15 to 1-10
16	15	105.0	0.10	1.68	0.70	0.07	1.02	5.0	5.3	7.0	7.16	8.31	5.83	15	1.66	61.32	59.58	63.02	61.73	68.91	66.75	1-16 to 1-15
17	16	76.0	0.76	1.58	0.60	0.46	0.95	5.0	5.2	7.1	6.70	10.79	8.57	12	9.18	68.55	61.57	69.52	63.47	73.08	68.91	1-17 to 1-16
18	17	53.0	0.82	0.82	0.60	0.49	0.49	5.0	5.0	7.1	3.51	3.56	4.46	12	1.00	69.08	68.55	70.90	70.38	73.08	73.08	1-18 to 1-17
19	15	21.0	0.56	1.44	0.40	0.22	0.58	5.0	8.7	6.2	3.59	17.94	3.77	15	7.71	61.70	60.08	62.46	61.73	64.50	66.75	1-19 to 1-15
20	8	159.0	0.14	9.82	0.65	0.09	5.69	5.0	10.1	6.0	33.85	64.07	7.31	30	2.44	59.95	56.07	62.04	61.16	67.50	64.57	1-20 to 1-8
21	20	24.0	0.39	0.39	0.65	0.25	0.25	5.0	5.0	7.1	1.81	4.36	3.91	12	1.50	64.00	63.64	64.57	64.21	67.50	67.50	1-20A to 1-20

Project File: 8818-05-STM-1.vab.stm | Number of lines: 48 | Run Date: 05-13-2004

NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.

Storm Sewer Tabulation

STORM SYSTEM 1

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	20	265.0	0.36	9.29	0.65	0.23	5.34	5.0	9.4	6.1	32.55	64.03	7.37	30	2.44	66.41	59.95	68.32	62.97	72.41	67.50	1-21 to 1-20
23	22	50.0	0.18	2.88	0.70	0.13	1.65	5.0	6.2	6.8	11.21	16.40	6.34	18	2.44	67.63	66.41	69.91	69.34	72.38	72.41	1-22 to 1-21
24	23	25.0	0.38	2.70	0.65	0.25	1.52	5.0	6.1	6.8	10.38	10.50	5.87	18	1.00	67.88	67.63	70.78	70.53	72.38	72.38	1-23 to 1-22
25	24	65.0	0.04	2.32	0.70	0.03	1.27	5.0	5.9	6.9	8.77	14.50	4.96	18	1.91	69.12	67.88	71.77	71.31	73.89	72.38	1-24 to 1-23
26	25	26.0	0.58	0.58	0.45	0.26	0.26	5.0	5.0	7.1	1.86	8.20	2.37	12	5.31	70.50	69.12	72.22	72.15	72.50	73.89	1-25 to 1-24
27	25	94.0	0.09	1.70	0.85	0.08	0.98	5.0	5.7	6.9	6.82	8.50	8.69	12	5.70	74.48	69.12	75.47	72.15	78.23	73.89	1-26 to 1-24
28	27	38.0	0.42	1.61	0.65	0.27	0.91	5.0	5.6	7.0	6.32	11.33	5.56	15	3.08	75.65	74.48	76.66	76.35	79.40	78.23	1-27 to 1-26
29	28	80.0	0.53	1.19	0.45	0.24	0.63	5.0	5.3	7.0	4.46	8.59	5.87	12	5.81	80.30	75.65	81.19	77.07	82.50	79.40	1-28 to 1-27
30	29	75.0	0.66	0.66	0.60	0.40	0.40	5.0	5.0	7.1	2.82	3.08	3.92	12	0.75	80.86	80.30	81.66	81.27	84.61	82.50	1-29 to 1-28
31	22	255.0	0.08	6.05	0.70	0.06	3.46	5.0	8.4	6.3	21.81	52.70	5.62	30	1.65	71.12	66.91	72.68	69.34	77.13	72.41	1-30 to 1-21
32	31	51.0	0.18	3.93	0.70	0.13	2.30	5.0	8.2	6.3	14.56	36.52	5.54	24	2.61	72.45	71.12	73.80	73.39	77.20	77.13	1-31 to 1-30
33	32	25.0	0.39	3.75	0.60	0.23	2.17	5.0	8.1	6.4	13.81	22.62	4.52	24	1.00	72.70	72.45	74.50	74.45	77.20	77.20	1-32 to 1-31
34	33	228.0	0.02	3.36	0.85	0.02	1.94	5.0	7.1	6.6	12.74	38.86	5.07	24	2.95	79.43	72.70	80.69	74.83	84.23	77.20	1-33 to 1-32
35	34	54.0	0.12	3.34	0.70	0.08	1.92	5.0	6.9	6.6	12.73	19.95	4.69	24	0.78	79.85	79.43	81.31	81.27	84.66	84.23	1-34 to 1-33
36	35	60.0	0.11	0.54	0.70	0.08	0.36	5.0	5.4	7.0	2.51	3.98	3.19	12	1.25	80.60	79.85	81.96	81.67	84.66	84.66	1-35 to 1-34
37	36	54.0	0.43	0.43	0.65	0.28	0.28	5.0	5.0	7.1	1.99	7.49	3.30	12	4.43	82.99	80.60	83.59	82.10	86.87	84.66	1-36 to 1-35
38	35	77.0	0.11	2.68	0.70	0.08	1.48	5.0	6.5	6.7	9.96	16.50	3.64	24	0.53	80.26	79.85	81.75	81.67	85.58	84.66	1-37 to 1-34
39	38	60.0	0.10	2.57	0.70	0.07	1.40	5.0	6.3	6.8	9.51	10.59	5.38	18	1.02	80.89	80.28	82.49	82.00	85.58	85.58	1-38 to 1-37
40	39	21.0	0.62	1.22	0.45	0.28	0.55	5.0	6.2	6.8	3.74	17.82	3.86	15	7.62	82.75	81.15	83.52	82.94	85.50	85.58	1-39 to 1-38
41	40	178.0	0.60	0.60	0.45	0.27	0.27	5.0	5.0	7.1	1.92	5.34	3.39	12	2.25	86.75	82.75	87.34	83.57	89.50	85.50	1-40 to 1-39
42	39	112.0	0.57	1.25	0.60	0.34	0.78	5.0	5.1	7.1	5.56	8.97	5.60	15	1.93	84.17	82.01	85.11	82.95	88.42	85.58	1-41 to 1-38

Project File: 8818-05-STM-1.vab.stm

Number of lines: 48

Run Date: 05-13-2004

NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.

Storm Sewer Tabulation

STORM SYSTEM 1

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
43	42	25.0	0.68	0.68	0.65	0.44	0.44	5.0	5.0	7.1	3.15	3.56	4.07	12	1.00	84.42	84.17	85.35	85.19	88.42	88.42	1-42 to 1-41
44	31	148.0	0.86	2.04	0.60	0.52	1.11	5.0	5.5	7.0	7.77	8.85	6.33	15	1.88	73.90	71.12	75.54	73.39	79.85	77.13	1-43 to 1-30
45	44	25.0	0.42	1.18	0.60	0.25	0.59	5.0	5.3	7.0	4.18	6.46	3.40	15	1.00	74.15	73.90	76.26	76.16	79.85	79.85	1-44 to 1-43
46	45	64.0	0.76	0.76	0.45	0.34	0.34	5.0	5.0	7.1	2.44	3.15	3.10	12	0.78	74.65	74.15	76.59	76.29	77.41	79.85	1-45 to 1-44
47	19	150.0	0.61	0.88	0.40	0.24	0.35	5.0	7.9	6.4	2.26	4.92	3.80	12	1.91	64.56	61.70	65.20	62.51	67.36	64.50	1-46 to 1-19
48	47	168.0	0.27	0.27	0.40	0.11	0.11	5.0	5.0	7.1	0.77	4.92	2.12	12	1.90	67.76	64.56	68.13	65.24	70.56	67.36	1-47 to 1-46

Project File: 8818-05-STM-1.vab.stm

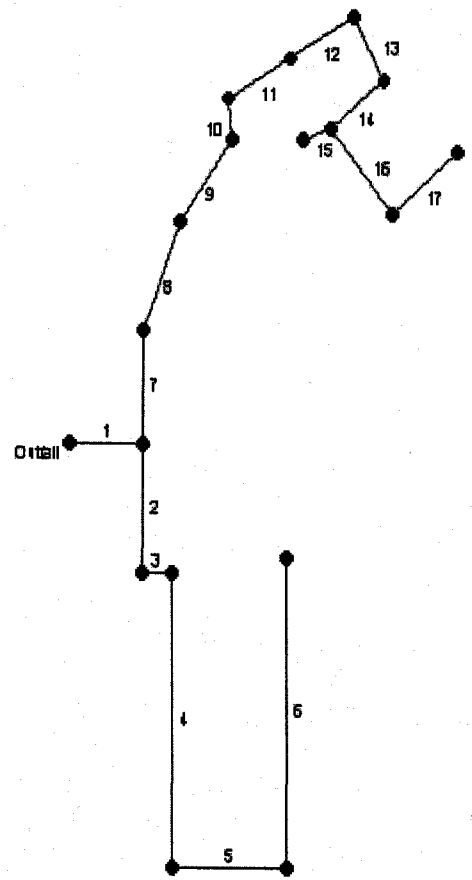
Number of lines: 48

Run Date: 05-13-2004

NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.

Hydraflow Plan View

STORM SEWER SYSTEM 2



Project file: 8818-05-STM-2.vab.stm	No. Lines: 17	05-13-2004

Hydraflow Storm Sewers 2003

Storm Sewer Tabulation

STORM SYSTEM 2

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	63.0	0.09	6.74	0.65	0.06	3.74	5.0	9.0	6.2	23.10	87.41	7.35	24	14.94	72.41	63.00	74.77	74.11	81.86	67.00	2-1 to Outfall
2	1	100.0	0.34	2.70	0.65	0.22	1.41	5.0	8.5	6.3	8.81	10.96	5.43	18	1.09	75.00	73.91	76.19	75.61	82.54	81.86	2-2 to 2-1
3	2	25.0	0.76	2.36	0.60	0.46	1.19	5.0	8.4	6.3	7.45	14.85	4.41	18	2.00	75.50	75.00	76.79	76.72	82.54	82.54	2-3 to 2-2
4	3	225.0	0.02	1.60	0.90	0.02	0.73	5.0	7.0	6.6	4.81	9.29	3.73	18	0.78	77.26	75.50	78.10	77.12	85.63	82.54	2-4 to 2-3
5	4	100.0	0.64	1.58	0.45	0.29	0.71	5.0	6.6	6.7	4.77	5.55	4.52	15	0.74	78.00	77.26	78.89	78.45	82.00	85.63	2-5 to 2-4
6	5	237.0	0.94	0.94	0.45	0.42	0.42	5.0	5.0	7.1	3.01	4.58	3.14	15	0.50	79.19	78.00	79.96	79.29	82.00	82.00	2-6 to 2-5
7	1	87.0	0.16	3.95	0.60	0.10	2.27	5.0	8.6	6.2	14.20	51.67	5.69	24	5.22	78.45	73.91	79.78	75.61	84.79	81.86	2-7 to 2-1
8	7	89.0	0.05	3.79	0.65	0.03	2.18	5.0	8.3	6.3	13.76	22.62	5.67	24	1.00	79.34	78.45	80.65	80.07	86.28	84.79	2-8 to 2-7
9	8	77.0	0.02	3.74	0.85	0.02	2.15	5.0	8.0	6.4	13.69	22.62	5.69	24	1.00	80.11	79.34	81.42	80.93	87.59	86.28	2-9 to 2-8
10	9	32.0	0.63	3.72	0.60	0.38	2.13	5.0	7.9	6.4	13.64	24.97	5.45	24	1.22	80.50	80.11	81.81	81.88	87.77	87.59	2-10 to 2-9
11	10	62.0	0.35	3.09	0.39	0.14	1.75	5.0	7.6	6.5	11.33	18.84	5.80	24	0.69	83.49	83.06	84.68	84.25	88.72	87.77	2-11 to 2-10
12	11	62.0	1.21	2.74	0.60	0.73	1.61	5.0	7.3	6.5	10.56	19.05	5.33	24	0.71	83.93	83.49	85.08	84.76	89.52	88.72	2-12 to 2-11
13	12	54.0	0.39	1.53	0.65	0.25	0.89	5.0	7.0	6.6	5.86	7.70	3.32	18	0.54	84.22	83.93	85.72	85.58	90.21	89.52	2-13 to 2-12
14	13	60.0	0.12	1.14	0.70	0.08	0.63	5.0	6.6	6.7	4.25	7.43	2.41	18	0.50	84.52	84.22	85.98	85.89	88.52	90.21	2-14 to 2-13
15	14	25.0	0.30	0.30	0.60	0.18	0.18	5.0	5.0	7.1	1.28	6.46	1.05	15	1.00	84.77	84.52	86.08	86.07	88.52	88.52	2-15 to 2-14
16	14	84.0	0.23	0.72	0.65	0.15	0.37	5.0	6.0	6.9	2.54	8.43	3.05	15	1.70	85.95	84.52	86.59	86.07	89.95	88.52	2-16 to 2-14
17	16	73.0	0.49	0.49	0.45	0.22	0.22	5.0	5.0	7.1	1.57	9.41	2.55	15	2.12	87.50	85.95	88.00	86.84	90.25	89.95	2-17 to 2-16

Project File: 8818-05-STM-2.vab.stm

Number of lines: 17

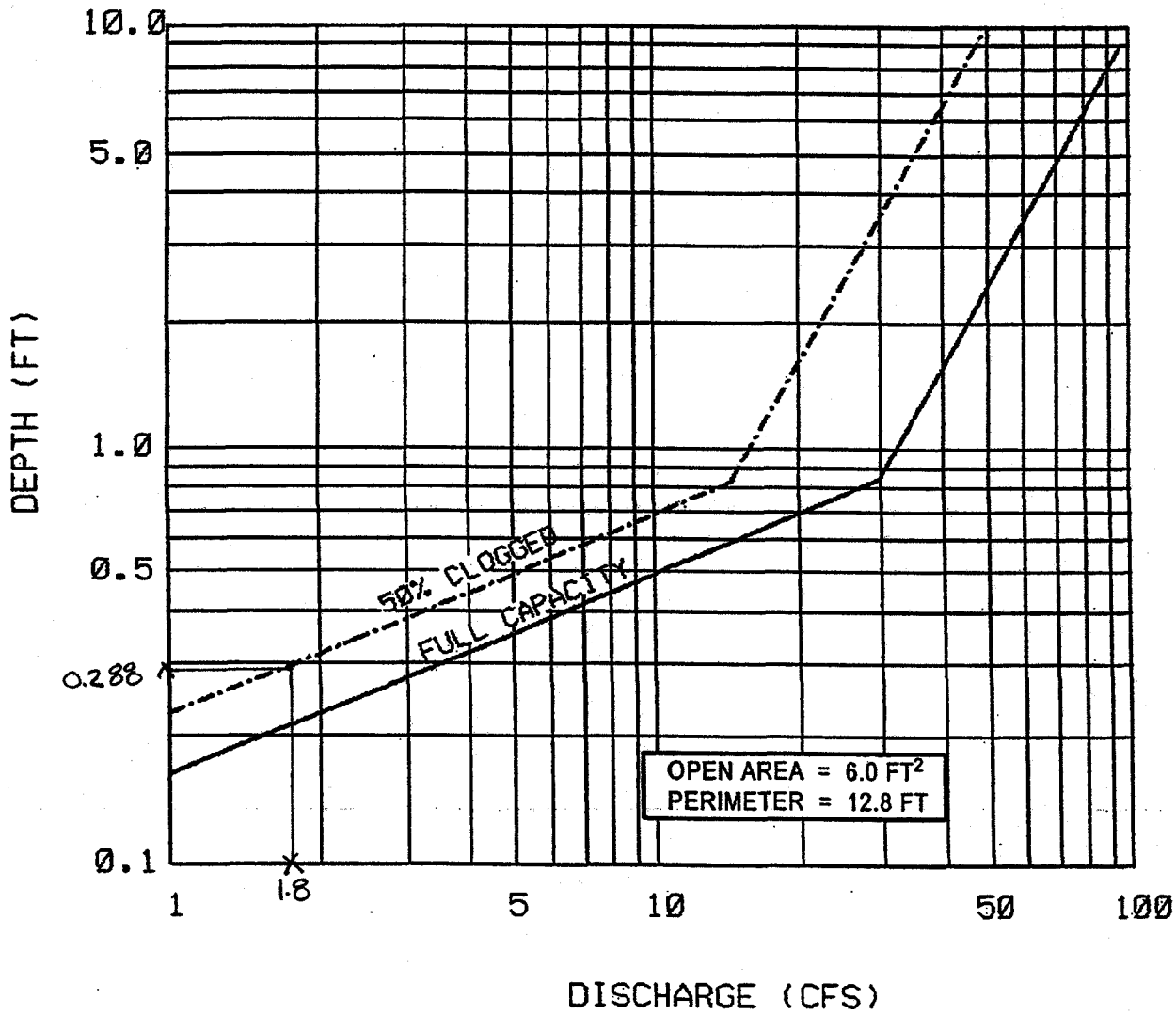
Run Date: 05-13-2004

NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.

WINDSOR MEADE VILLA

DI-7 SS 1-14

Appendix 9C-14 Performance Curve DI-7 in a Sump



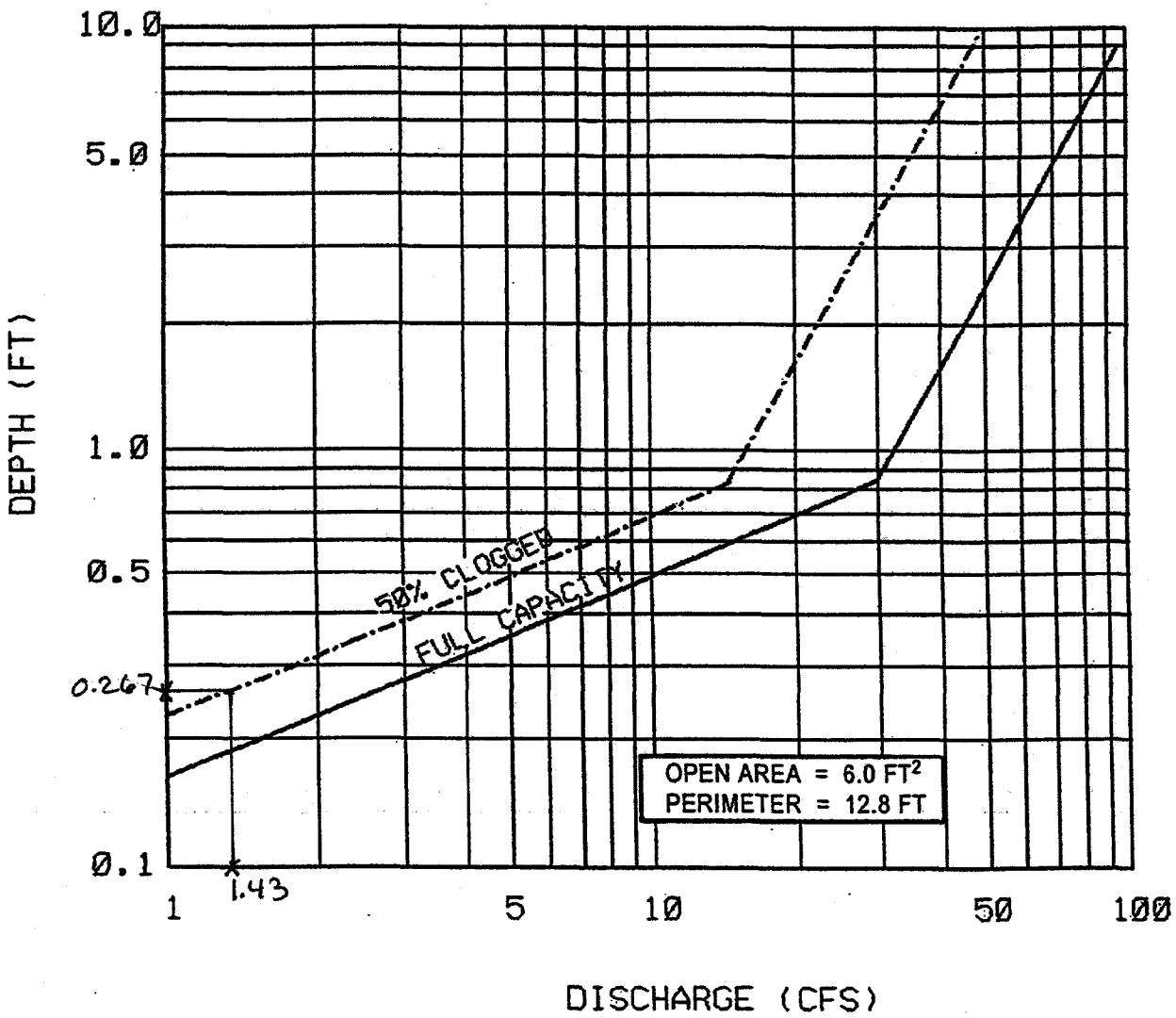
Q = 1.80 cfs

DEPTH = 0.288 ft = 3.46 in

Source: VDOT

WINDSORMEADE VILLA
DI-7 SS-1-19

Appendix 9C-14 Performance Curve DI-7 in a Sump



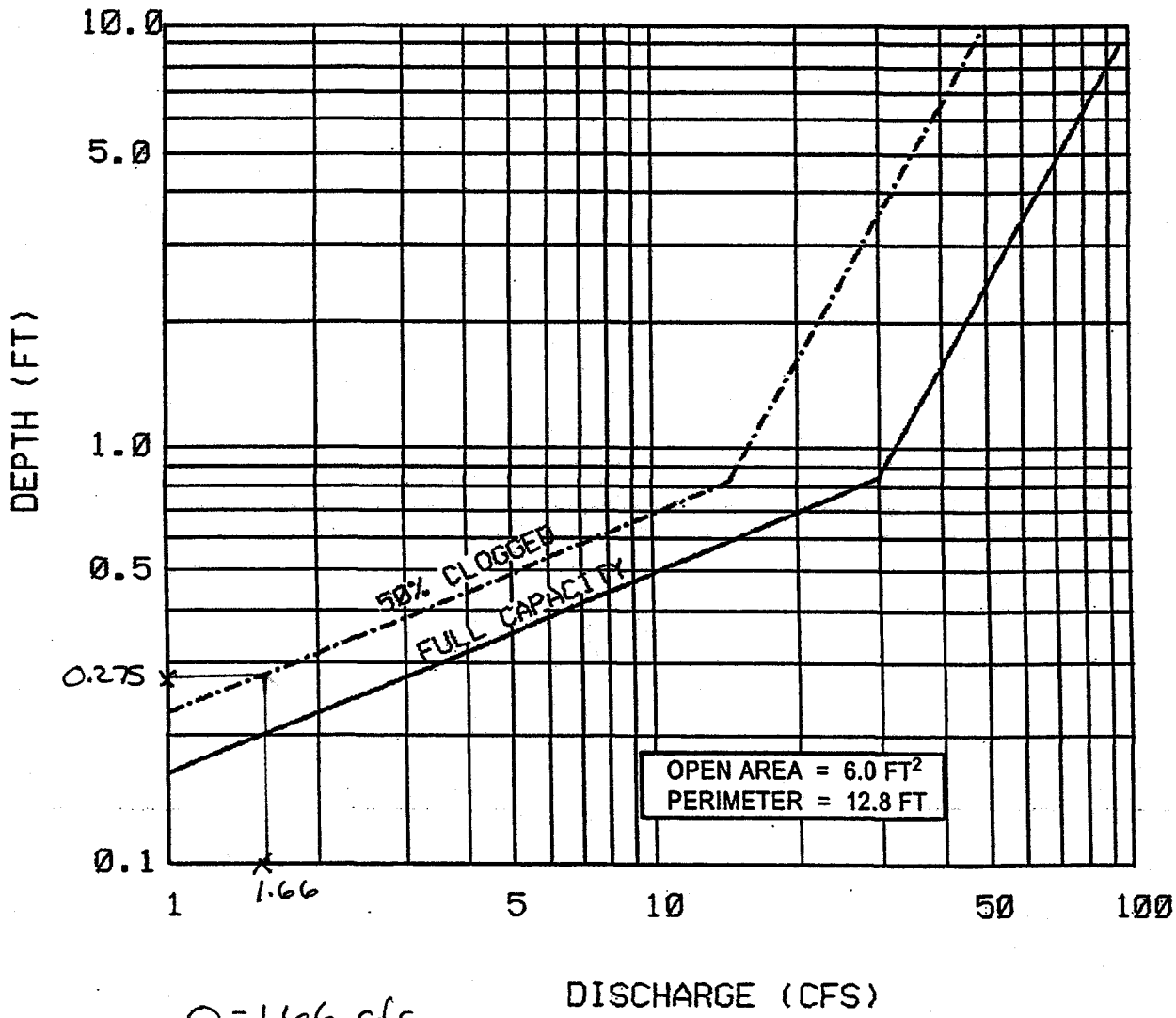
Q = 1.43 cfs

DEPTH = 0.267 ft = 3.20 in

Source: VDOT

WINDSOR MEADE WIL
DI-7 SS1-46

Appendix 9C-14 Performance Curve DI-7 in a Sump



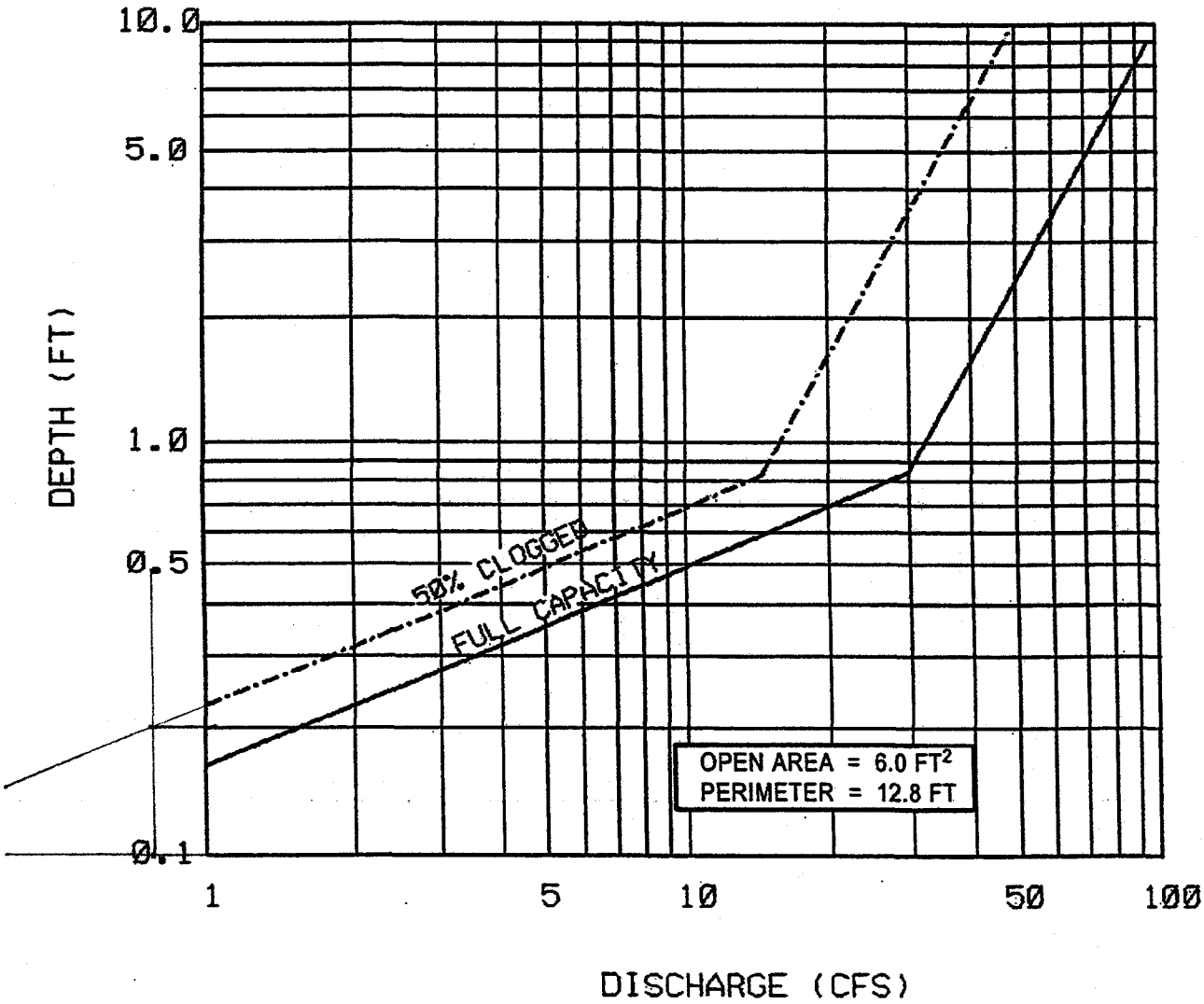
Q = 1.66 cfs

DEPTH = 0.275 ft = 3.3 in

Source: VDOT

WINDSORMEADE VILL
DI-7 SS 1-47

Appendix 9C-14 Performance Curve DI-7 in a Sump



Q = 0.77 cfs

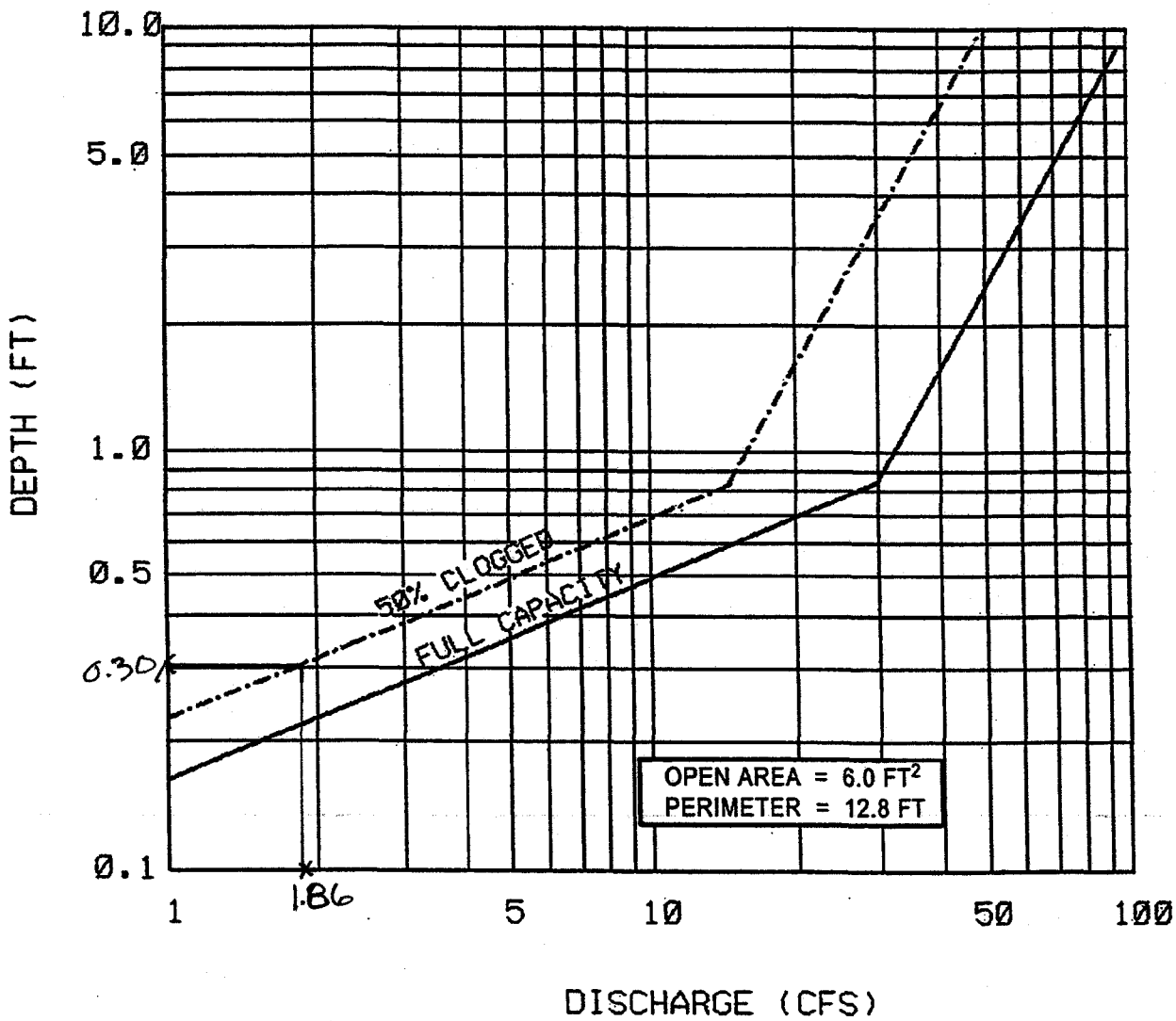
DEPTH = 0.20 FT = 2.4 in

Source: VDOT

X

WINDSOR MEADOWVILLE
DI-7 SS 1-25

Appendix 9C-14 Performance Curve DI-7 in a Sump



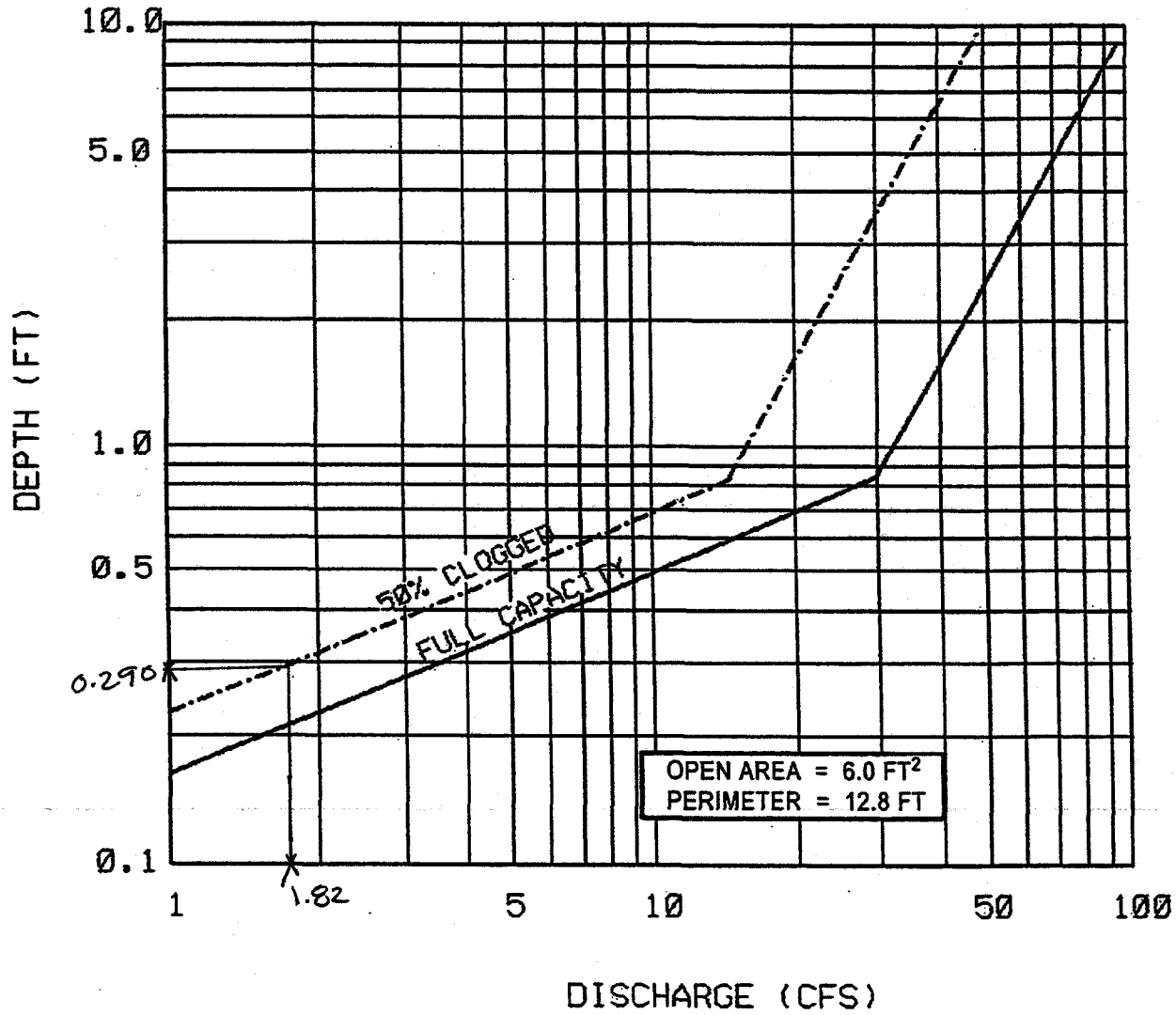
Q = 1.86 cfs

DEPTH = 0.30 ft = 3.6 in

Source: VDOT

WINDSORMEADE VIA
DI-7 SS 1-39

Appendix 9C-14 Performance Curve DI-7 in a Sump



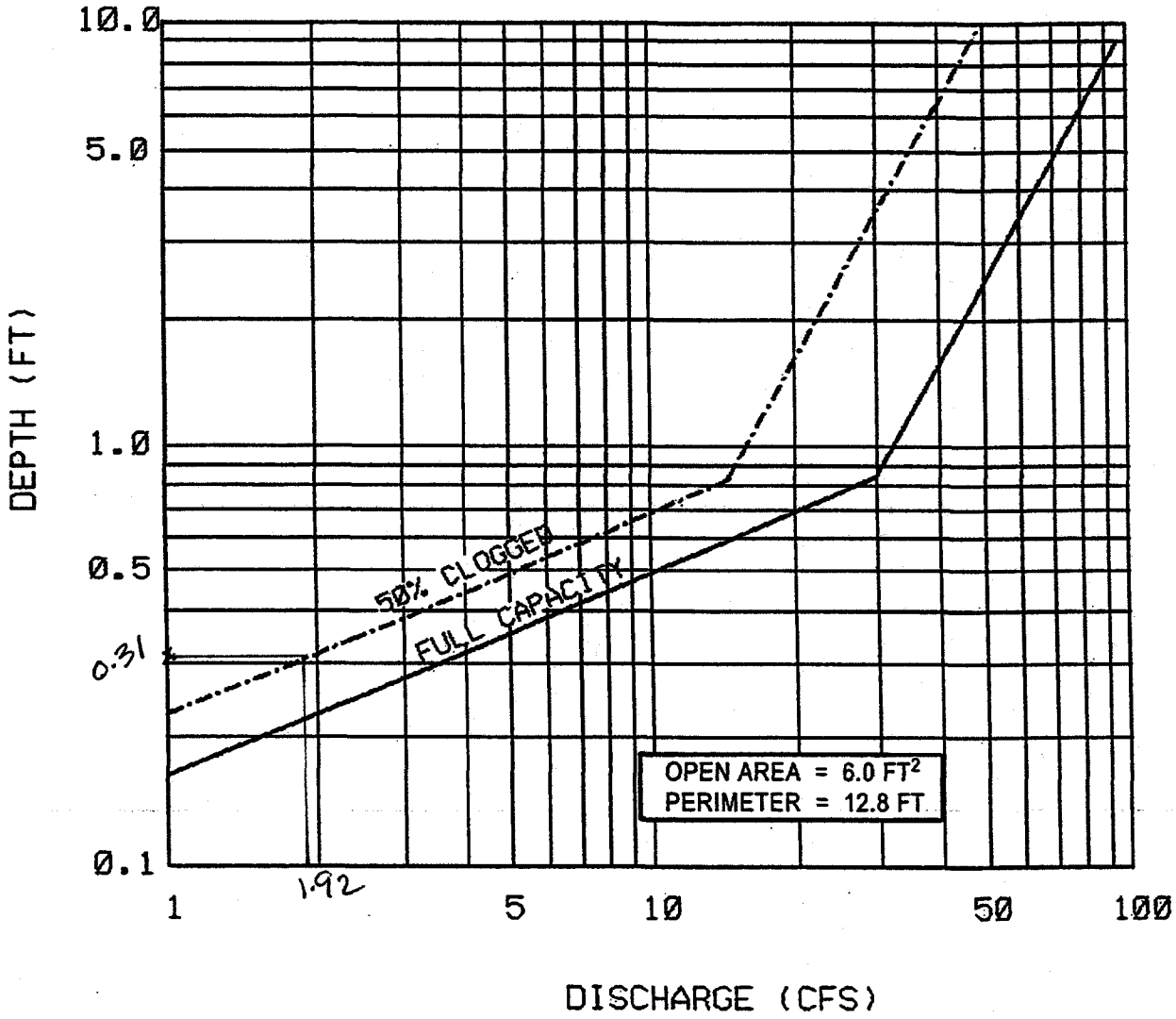
Q = 1.82 cfs

DEPTH = 0.290 ft = 3.48 in

Source: VDOT

WINDSORMEADE VILL
DI-7 SS 1-40

Appendix 9C-14 Performance Curve DI-7 in a Sump



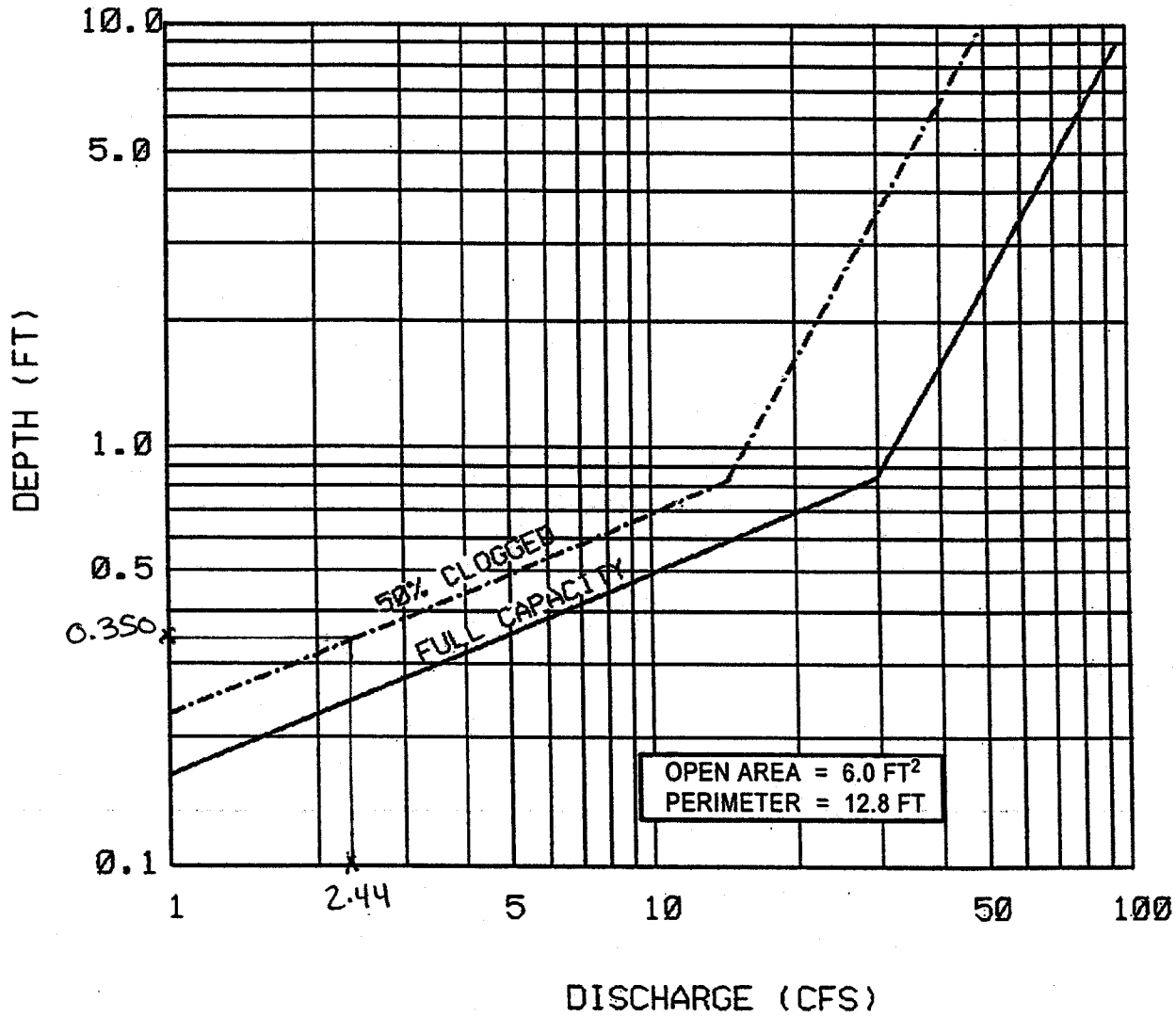
Q = 1.92 cfs

DEPTH = 0.31 ft = 3.72 in

Source: VDOT

WINDSORMEADE VILLA
DI-7 SS 1-46

Appendix 9C-14 Performance Curve DI-7 in a Sump

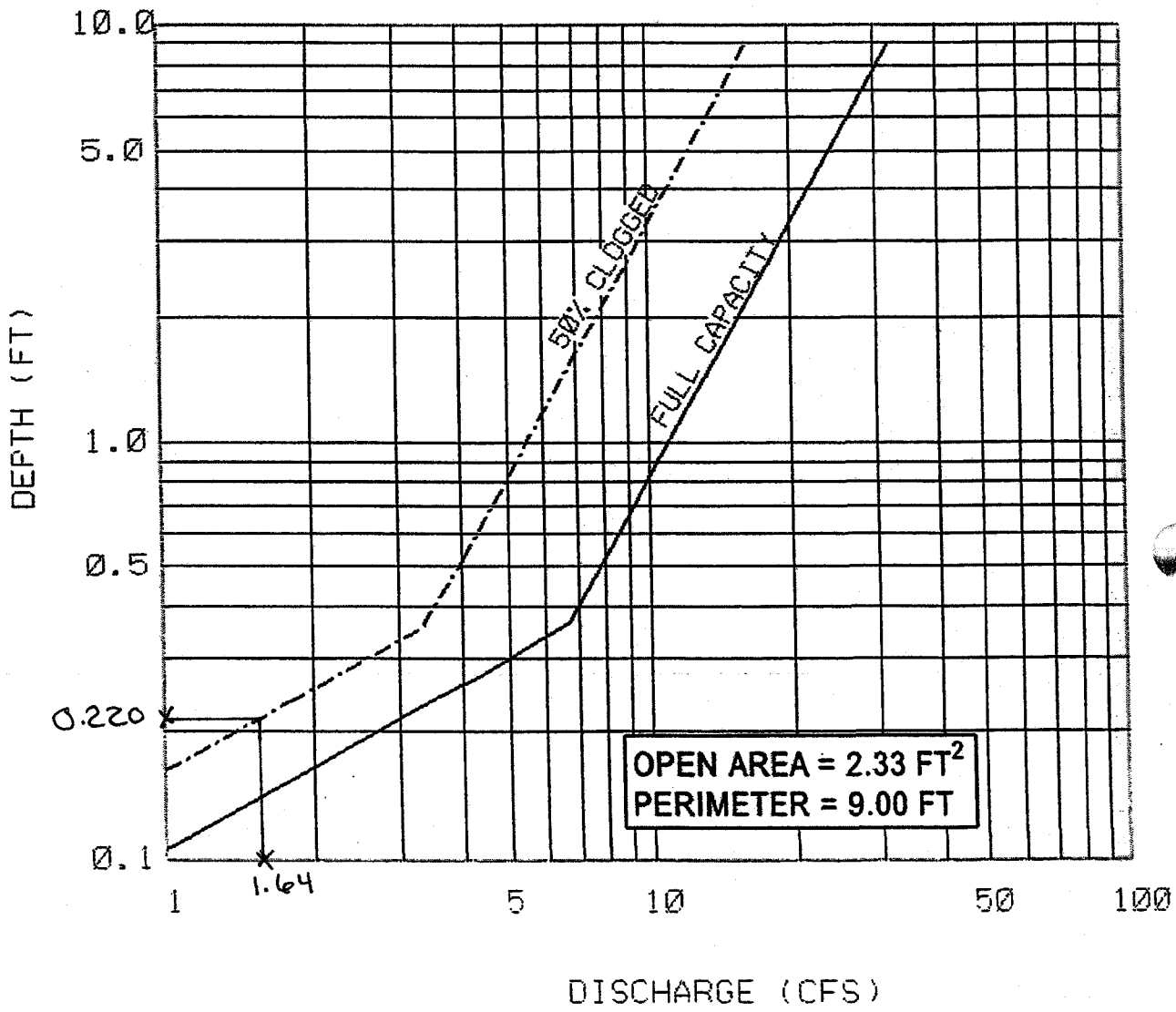


Q = 2.44 cfs
DEPTH = 0.350 ft = 4.2 in

Source: VDOT

WINDSOR MEADOW VILLA
DI-1 SS 1-28

Appendix 9C-13 Performance Curve DI-1 in a Sump



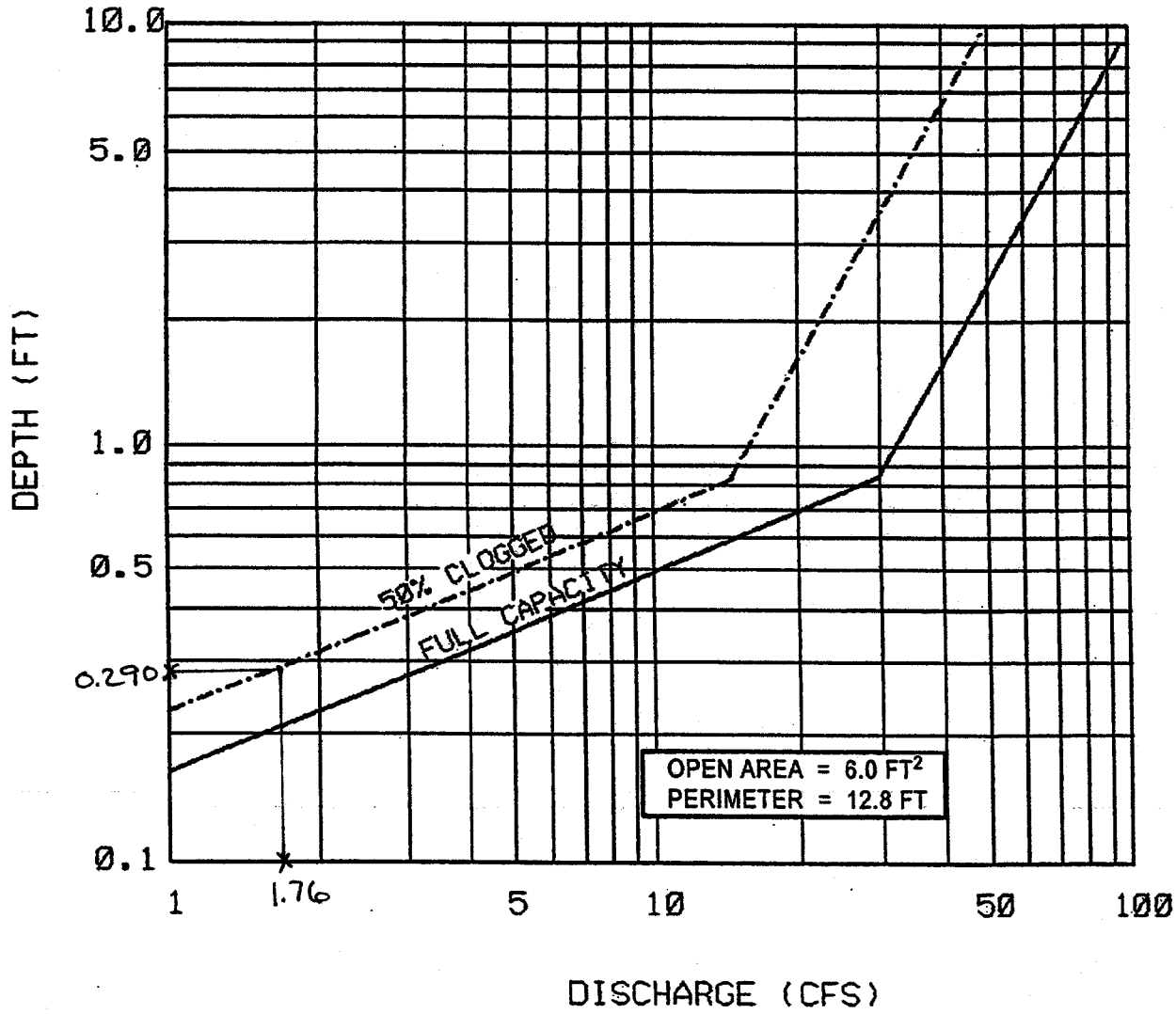
Q = 1.64 cfs

DEPTH ≈ 0.220 ft. = 2.64 in

Source: VDOT

WINDSOR MEADE VI
DI-7 SS 2-5

Appendix 9C-14 Performance Curve DI-7 in a Sump



Q = 1.76 cfs

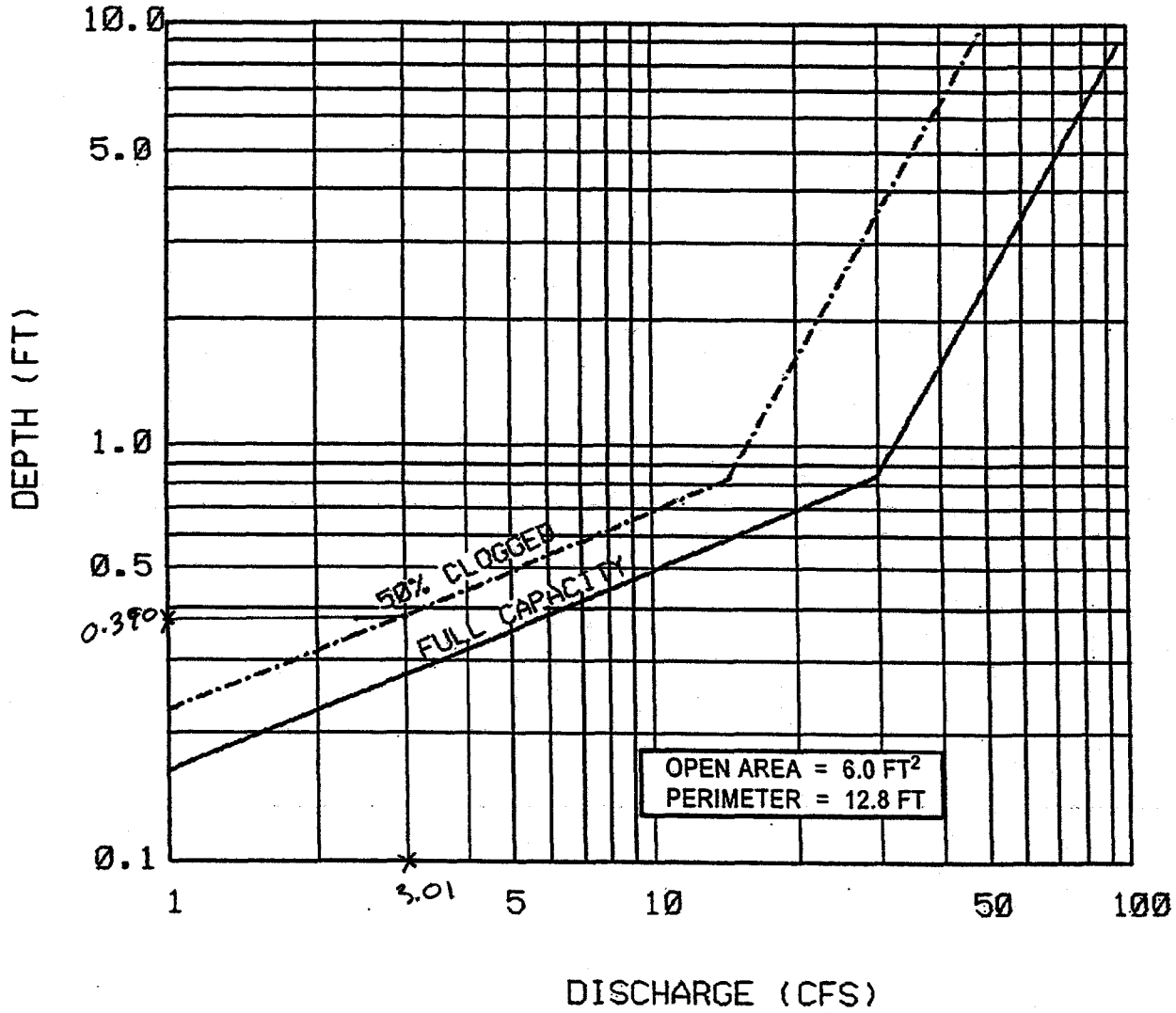
DEPTH = 0.290 ft = 3.48 in

Source: VDOT

WINDSCRYMEADE VIL

DI-7 SS2-6

Appendix 9C-14 Performance Curve DI-7 in a Sump



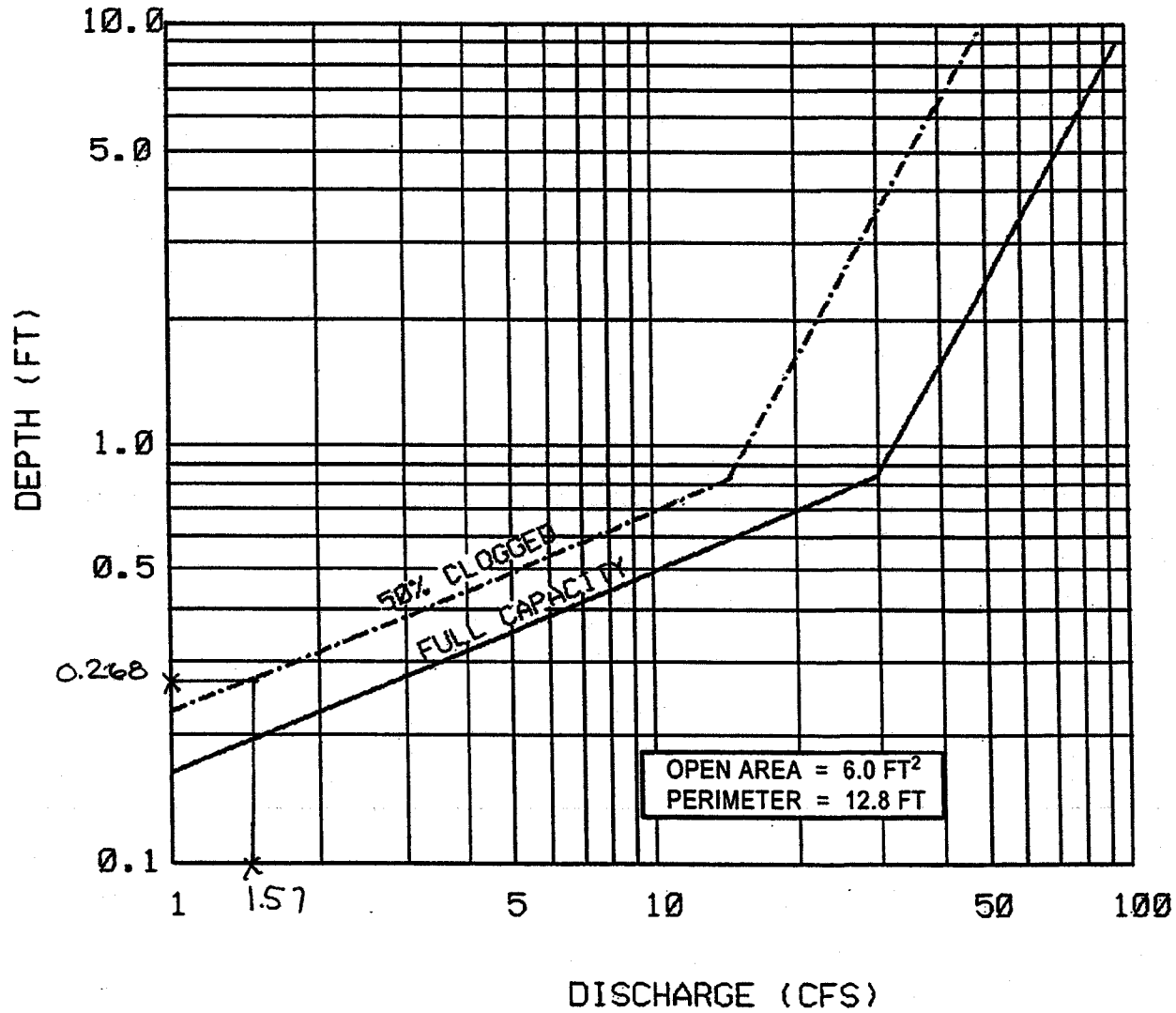
Q = 3.01 cfs

DEPTH = 0.390 ft = 4.68 in

Source: VDOT

WINDSOR MEADOWVILLE
DI-7 SS 2-17

Appendix 9C-14 Performance Curve DI-7 in a Sump



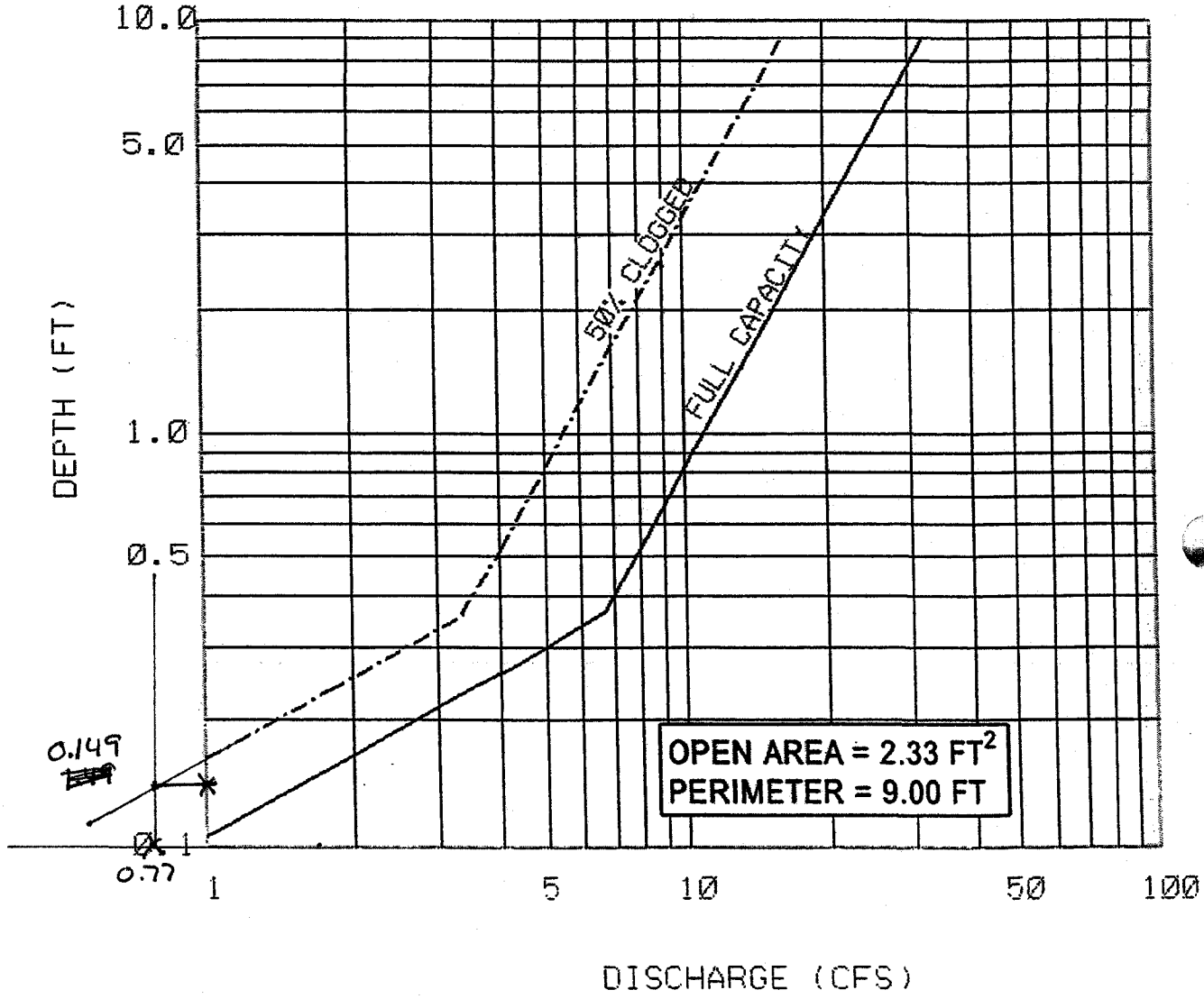
Q = 1.57 cfs

DEPTH = 0.268 ft = 3.22 in

Source: VDOT

WINDSORMEADE VILLA
DI-1 SS 2-11

Appendix 9C-13 Performance Curve DI-1 in a Sump



Q = 0.77 cfs

DEPTH = 0.149 ft = 1.79 in

Source: VDOT

X

James City County Environmental Division
Stormwater Management / BMP Inspection Report
Detention and Retention Pond Facilities

County BMP ID Code (if known): PC-241

Name of Facility: Windsor Meade Villas BMP No.: 2 of 2 Date: 2/25/2009

Location:

Name of Owner: Virginia United Methodist Home, Inc.

Name of Inspector: Greg Johnson

Type of Facility: A-3 Extended Retention

Weather Conditions: 82° Sunny Type: ☒ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection

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

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

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

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:				
Grass Height			X	Site needs further stabilization
Vegetation Condition			X	Site needs reestablishment of veg.
Tree Growth		X		Trees need to be removed from dam
Erosion		X		Several areas need to be addressed
Trash & Debris	X			
Seepage	X			
Fencing or Benches	X			
Interior Landscaping/Planted Areas: ☐ None ☐ Constructed Wetland/Shallow Marsh ☐ Naturally Established Vegetation				
Vegetated Conditions				
Trash & Debris				
Floating Material	X			
Erosion				
Sediment	X			
Dead Plant	X			
Aesthetics		X		Landscaping plan not followed
Other				
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: ☒ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☐ None, Dry (Detention Basin)				
Shoreline Erosion	X			
Algae	X			
Trash & Debris	X			
Sediment	X			
Aesthetics	X			
Other			X	Rip-rap four bay missing
Inflows (Describe Types/Locations):				
Condition of Structure	NA			
Erosion			X	Fabric and stone needed at bottom of slope
Trash and Debris	X			
Sediment	X			
Outlet Protection			X	
Other				
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):				
Condition of Structure	NA			
Corrosion	NA			
Trash and Debris	NA			
Sediment	NA			
Vegetation	NA			
Other	NA			
Principal Outlet Structure - Barrel, Conduit, etc. :				
Condition of Structure				
Settlement				
Trash & Debris				
Erosion/Sediment				
Outlet Protection				
Other				
Emergency Spillway (Overflow):				
Vegetation		X		needs more vegetation
Lining		X		needs to be sloped per plan
Erosion	X			
Trash & Debris	X			
Other				
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	X			
Animal Burrows	X			
Graffiti	X			
Other	X			
Surrounding Perimeter Conditions:				
Land Uses	X			
Vegetation		X		More stabilization needed
Trash & Debris	X			
Aesthetics		X		Landscaping plan not followed
Access /Maintenance Roads or Paths	X			
Other		X		SF needs to be removed

Remarks:

Overall Environmental Division Internal Rating: _____

Signature: _____ **Date:** _____

Title: _____

SWMProg\BMP\CoInspProg\InspForms\DetRet.wpd

Environmental Division
101-E Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P-757-253-6683
C-757-259-4032
gregj@james-city.va.us

February 25, 2009

Windsor Meade Villa BMP 2
ATTN: Rich Bottone
453 McLaws Circle Suite 3
Williamsburg, Virginia 23185

JCC BMP : PC-241
County Plan No. SP-03-04

Dear Mr. Franklin:

The Environmental Divisions has received a record drawing (as-built) for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a wet pond retention BMP located on the.

Based on our review of the project and a concurrent field inspection as performed on February 25 2009, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project.

Record Drawing:

1. The record drawing set dated **8/08/2008** is **satisfactory**.

2. Along with the record drawing set, submit completed record drawing and construction certification forms, Sections 1 through 5, and applicable record drawing checklists from the James City County, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions (packet). The Environmental Division began use of the forms and checklists in this packet effective February 1st 2001.

3. A professional seal and signature is required on the record drawing and construction certification.

Construction - Related Items (Outfall and Dam):

1. Remove Silt Fence and stakes from the outside slopes of the dam.

2. Remove sediment from inside 24 inch RCP at outfall of BMP.

3. Outfall needs to be construction per plan. On site inspection revealed this has not occurred.

4. A more definitive channel needs to be made to ensure a positive flow of storm water from the BMP. Ninety degree bends are not recommended for emergency spillways and outfalls

5. Trash rack on DI-7 needs to be modified or replaced. The opening at the bottom of the structure is to large not. This will allow debris to enter structure thus defeating the purpose of the rack.

6. At the top of the slope of the emergency spillway the embankment is higher than the lip of the concrete. This needs to be brought to grade.

7. The black corrugated draw down pipe needs a cap installed/placed on the top of pipe.

8. There is no indication that the four bay that is on the approved plan was installed.

9. More rip rap and filter fabric needs to be placed at the bottom of the swale on upper end of pond.

10. Stabilization needs to be applied to slopes of the dam.

11. Remove trees and woody vegetation on the down slope embankment.
Usually trees, shrubs and woody vegetation are not permitted to grow on any part of pond embankments.

Once this work is satisfactorily completed, contact our office appropriately for a re-inspection. We can then proceed with final release of the surety and/or closing out the project. One reproducible and one blue/black line set of the record drawings will be required once the above items are adequately addressed.

Please contact me at 757-253-6683 if you have any further comments or questions.

Sincerely,

Gregory B. Johnson
Inspector

James City County, Virginia
Environmental Division

APR 2001
RECEIVED

Erosion and Sediment Control and Stormwater Management Design Plan Checklists

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GENERAL INFORMATION

Project Name: WindsorMeade Villa
Owner / Applicant: VA United Methodist Homes
Plan Preparer: JASON GRIMES Email:
Project Location: WindsorMeade Way off Monticello Ave.
Tax Map / Parcel: (38-3)(1-34A)
County Plan No. (if known): SP-3-04
County BMP Type: Ex. Dentention Wet Pond (A-3)

Other information submitted in addition to this checklist (Check all that apply):

- ☐ Design or Construction Drawings (Plans, Profiles, Details, etc.).
- ☐ Erosion & Sediment Control Plan (Plans, Details, etc.).
- ☐ Erosion & Sediment Control Plan Design Report.
- ☐ Stormwater Management Design Plan (Plans, Profiles, Details, etc.).
- ☐ Stormwater Management Design Report.
- ☐ Other, List: _____

Issue Date
March 1, 2001

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

EROSION AND SEDIMENT CONTROL PLAN CHECKLIST

I. *GENERAL:*

Yes	No	N/A	
X	☐	☐	*FAMILIARITY* with current versions of Chapter 8, Erosion and Sedimentation Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia and the Virginia Erosion and Sediment Control Handbook (VESCH).
X	☐	☐	*LAND DISTURBING PERMIT AND SILTATION AGREEMENT* with surety are required for the project.
X	☐	☐	*VARIANCE* if necessary, requested in writing, for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site. ? CBPO

II. *SITE PLAN:*

Yes	No	N/A	
X	☐	☐	*VICINITY MAP* locating the site in relation to the surrounding area. Include any major landmarks which might assist in physically locating the site.
X	☐	☐	*INDICATE NORTH* direction in relation to the site.
X	☐	☐	*LIMITS OF CLEARING AND GRADING* for the site including that required for implementation of erosion and sediment controls, stockpile areas and utilities.
X	☐	☐	*DISTURBED AREA ESTIMATES* in acres or square feet for the project.
X	☐	☐	*EXISTING TOPOGRAPHY* or contours for the site at no more than 5 foot contour interval.
X	☐	☐	*FINAL TOPOGRAPHY*, contours or proposed site grading in accordance with the design plan which indicates changes to existing topography and drainage patterns at no more than 2 foot contour interval (or 1 foot contours where required).
X	☐	☐	*EXISTING AND PROPOSED SPOT ELEVATIONS* to supplement existing and proposed contours, topography or site grading information. Spot elevations may replace final contours in some instances, especially if terrain is in a low lying area or relatively flat.
X	☐	☐	*EXISTING VEGETATION* including existing tree lines, grassed or unique vegetation areas.

Yes	No	N/A	
X	☐	☐	*EXISTING SITE FEATURES* including roads, buildings, homes, utilities, streams, fences, structures and other important surface features of the site.
X	☐	☐	*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia.
X	☐	☐	*ENVIRONMENTAL INVENTORY* in accordance with Section 23-10(2) of the Chesapeake Bay Preservation Ordinance of James City County. Inventory generally includes: tidal shores and wetlands, non-tidal wetlands, resource protection area, hydric soils and slopes steeper than 25 percent. For wetlands, provide a copy of issued permits or satisfactory evidence that appropriate permits are being pursued for the entire project.
X	☐		*100-YEAR FLOODPLAIN LIMITS* or any special flood hazard areas or flood zones based on appropriate Federal Management Agency Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) of James City County, Virginia.
X	☐	☐	*DRAINAGE AREAS* for offsite and onsite areas, existing or proposed as applicable. Include drainage divides and directional labels for all subareas at points of interest and size (in acres), weighted runoff coefficient or curve number and times of concentration for each subarea.
X	☐	☐	*CRITICAL EROSION AREAS* which require special consideration or unique erosion and sediment control measures. Refer to the VESCH, Chapter 6 for criteria.
X	☐	☐	*DEVELOPMENT PLAN* for the site showing all improvements such as buildings, structures, parking areas, access roadways, above and below ground utilities, stormwater management and drainage facilities, trails or sidewalks, proposed vegetation and landscaping, amenities, etc.
X	☐	☐	*LOCATION OF PRACTICES* proposed for erosion and sediment control, tree protection and temporary stormwater management due to land disturbance activities at the site. Use standard abbreviations, labels and symbols consistent for plan views based on minimum standards and specifications in Chapter 3 of the VESCH.
X	☐	☐	*TEMPORARY STOCKPILE AREAS* or staging and equipment storage areas as required for onsite or offsite construction activities or indicate that none are anticipated for this project.
☐	☐	X	*OFFSITE LAND DISTURBING AREAS* including borrow sites, waste areas, utility extensions, etc. and required erosion and sediment controls. If none are anticipated for the project, then indicate on the plans by general or erosion and sediment control notes.
X	☐	☐	*DETAILS* or alternately, appropriate reference to current minimum standards and specifications of the VESCH for each measure proposed for the project. Non-modified, standard duplicated details (silt fence, diversion dikes, etc.) may be referenced to the current version of the VESCH. Specific dimensional or modified standards (basins, traps, outlet protections, check dams, etc.) require presentation on detail sheets. Schedules or tables may be used for multiple site measures such as sediment traps, basins, channels, slope drains, etc. Any modification to standard details should be clearly defined, explained and illustrated.

Yes No N/A

☒ ☐ ☐ *MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.

☐ ☐ ☒ *TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.

☒ ☐ ☐ *CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.

☐ ☐ ☒ *PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.

☒ ☐ ☐ *STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.

☒ ☐ ☐ *PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

III. *NARRATIVE:*

Yes No N/A

☒ ☐ ☐ *PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.

☒ ☐ ☐ *EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.

☒ ☐ ☐ *ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.

☒ ☐ ☐ *OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.

☒ ☐ ☐ *SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoffpotential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.

☒ ☐ ☐ *CRITICAL AREAS* on the site which many have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

☒ ☐ ☐ *PROPOSED EROSION & SEDIMENT CONTROL MEASURES* inclusive to the specific erosion and sediment control plan as proposed for the land disturbing activity. Measures should be consistent with those proposed on the site drawings. Address general use, installation, limitations, sequencing and maintenance requirements for each control measure.

☒ ☐ ☐ *STABILIZATION MEASURES* required for the site, either temporary or permanent, and during and following construction including temporary and permanent seeding and mulching, paving, stone, soil stabilization blankets and matting, sodding, landscaping or special stabilization techniques to be utilized at the site.

☒ ☐ ☐ *STORMWATER MANAGEMENT CONSIDERATIONS* for the site, either of temporary or permanent nature, and strategies, sequences and measures required for control. May reference the stormwater management plan for the site, if prepared, for permanent stormwater management facilities and control of drainage once the site is stabilized.

IV. ***CALCULATIONS:***

Yes No N/A

☒ ☐ ☐ *CALCULATIONS AND COMPUTATIONS* associated with hydrology, hydraulics and design of proposed temporary and permanent erosion and sediment control measures including: sediment traps and basins, diversions, stormwater conveyance channels, culverts, slope drains, outlet protections, etc. Computations are not required on the construction plan and may be attached in a supplemental erosion and sediment control plan design report, if presented in a clear and organized format.

☒ ☐ ☐ *TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET* submitted for each basin along with schematic or sketch cross-section showing applicable design and construction data, storage volumes (wet-dry), dimensions and elevations. Peak design runoff to be based on the 2- or 25-year design storm event based on maximum disturbed site conditions (existing, interim or proposed conditions) in accordance with Minimum Standard 3.14 of the VESCH.

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST

I. *GENERAL:*

Yes	No	N/A	
X	☐	☐	*FAMILIARITY* with current versions of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual; Chapter 8, Erosion and Sediment Control and Chapter 23, Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; the Virginia Erosion and Sediment Control Handbook (VESCH); and the Virginia Stormwater Management Handbook (VSMH).
X	☐	☐	*WAIVER OR EXCEPTION* if necessary, requested in writing, for the plan approving authority to waive or except the requirements of Chapter 23, Chesapeake Bay Preservation ordinance in accordance with procedure established in Sections 23-14 through 23-17 of the ordinance. Applies to this review case only. CBPO? RPA
X	☐	☐	*VARIANCE REQUEST* if necessary, requested in writing for the plan approving authority to waive or modify any of the minimum standards and specifications of the VESCH deemed inappropriate based on site conditions specific to this review case only. Variances which are approved shall be properly documented in the plan and become part of the approved erosion and sediment control plan for the site.
X	☐	☐	*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved stormwater management plans, drawings, technical reports and specifications.
X	☐	☐	*WORKSHEET FOR BMP POINT SYSTEM* to ensure the stormwater management plan for the project attains at least 10 BMP points (New Development) or traditional pollutant load reduction computations per the Chesapeake Bay Local Assistance Manual (Redevelopment Only).
X	☐	☐	*PROPOSED CONSERVATION EASEMENT AREAS* for any natural open space points claimed in the BMP worksheet.
X	☐	☐	*INSPECTION/MAINTENANCE AGREEMENT* is required to be prepared and executed with the County for the project.
X	☐	☐	*FEMA FIRM PANEL* reference with designated special flood hazard areas or zone designations associated with the site, as applicable.
X	☐	☐	*DRAINAGE AREA MAP* at a maximum scale of 1"=200' scale showing drainage area boundaries for pre- and postdevelopment conditions and associated time of concentration flow paths. Labels to include drainage area size, runoff coefficient or curve number and time of concentration for each subarea shown on the map.

Yes	No	N/A	
☒	☐	☐	*SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.
☒	☐	☐	*STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.
☒	☐	☐	*TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.
☒	☐	☐	*MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.
☒	☐	☐	*STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and muti-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.
☒	☐	☐	*PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)
	☐	☐	☐ North arrow and plan legend.
	☐	☐	☐ Property lines.
	☐	☐	☐ Adjacent property information.
	☐	☐	☐ Existing site features and existing impervious cover areas.
	☐	☐	☐ Impervious cover tabulations.
	☐	☐	☐ Existing drainage facilities (natural or manmade).
	☐	☐	☐ Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.).
	☐	☐	☐ Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.
	☐	☐	☐ Existing and proposed easement locations.

Yes	No	N/A	
☐	☐	☐	Proposed site improvements and proposed impervious cover areas.
☐	☐	☐	Proposed stormwater conveyance, drainage and management facilities with appropriate labeled construction data and information.
☐	☐	☐	Proposed landscaping and seeding plans (disturbed areas, pond interior, etc.).
☐	☐	☐	Proposed slope stabilization areas (riprap, blankets, mattings, walls, etc.).
☐	☐	☐	Delineation of permanent pools and the 1-, 2-, 10- and 100-year Design Water Surface Elevations.
☐	☐	☐	Delineation of ponding, headwater, surcharge or backwater areas which may affect adjacent existing or proposed buildings, structures or upstream adjacent properties.
☐	☐	☐	Test boring locations with reference surface elevations (if known).
☐	☐	☐	Risers, barrels, underdrains, overflows and outlet protections.
☐	☐	☐	Emergency spillway level section and outlet channel.
☐	☐	☐	Existing and proposed site utilities and protection measures.
☐	☐	☐	Erosion and sediment control measures (for site or BMP).
☐	☐	☐	Maintenance or access corridors to permanent stormwater management, BMP or drainage facilities.

II. *STORMWATER CONVEYANCE SYSTEMS:*

Yes	No	N/A	
X	☐	☐	*PLAN VIEWS*
	☐	☐	Storm drain lengths, sizes, types, classes and slopes for all segments. Label directly on plan or use structure/pipe schedule.
	☐	☐	Access structure (inlets, manholes, junctions, etc.) rim elevations, inverts, type and required grate or top unit and lengths labeled.
	☐	☐	All structure numbers labeled.
	☐	☐	Adequate horizontal clearance from other site utilities or structures.
X	☐	☐	*PROFILES* generally are not required but are encouraged to expedite review. If not provided, ensure all pipe segments have adequate minimum cover, do not exceed maximum depths of cover for the type/class of pipe specified and do not conflict with other site utilities or excavation areas.
X	☐	☐	*DETAILS*
	☐	☐	Typical storm drain bedding details or reference note.
	☐	☐	Standard details or reference note for all proposed access structure types (inlets, manholes, junctions, etc.).
	☐	☐	Inlet shaping detail or applicable reference note.
	☐	☐	Step detail or applicable reference note (if depth 4 ft. or more).
	☐	☐	Typical open channel details with designation, location, shape, type, bottom width, top width, lining, slope, length, side slope, and installation depth required for construction. Channel design data as necessary may also be included.
	☐	☐	Outlet protections at all pipe outfalls.

Yes No N/A

☒ ☐ ☐ *STORMWATER CONVEYANCE SYSTEM COMPUTATIONS*

- ☐ ☐ ☐ Storm Sewer Design computations based on 10-year design event.
- ☐ ☐ ☐ Hydraulic Grade Line computations based on 10-year design event.
- ☐ ☐ ☐ Inlet computations based on current VDOT procedure for spread, ponding depth and grate size required.
- ☐ ☐ ☐ Culvert Headwater computations. Design based on 10-year design storm event and check only for 100-year storm event.
- ☐ ☐ ☐ Open Channel computations based on 2-year design event for velocity and 10-year design event for capacity.
- ☐ ☐ ☐ Standard outlet protection or special energy dissipators.
- ☐ ☐ ☐ Pipe thickness design computations, as required, for selected pipe type (live load, minimum cover, maximum height of cover, etc.).
- ☐ ☐ ☐ Adequate channel computations for receiving channels (based on field measured channel section data).

III. ***STORMWATER MANAGEMENT / BMP FACILITIES***:

Yes No N/A

☒ ☐ ☐ *HYDROLOGY* - An SCS based methodology is required for the design of stormwater management/BMP facilities with watersheds exceeding 20 acres. Under 20 acres, other generally accepted methodologies such as the modified rational, critical storm are allowable. Refer to Chapter 5 of the VESCH or Chapter 5 of the VSMH.

- ☐ ☐ ☐ Runoff Curve Number or Coefficient determinations: predeveloped and ultimate development land use scenarios.
- ☐ ☐ ☐ Time of concentration: predeveloped and ultimate development indicating overland, shallow concentrated, and channel flow components (200 ft. maximum length for overland flow).
- ☐ ☐ ☐ Hydrograph generation (tabular or graphical): pre- and postdevelopment conditions for the 1-, 2-, 10-, and 100-year design storm events.

☒ ☐ ☐ *FACILITY CONFIGURATION and MINIMUM SEPARATIONS*

- ☐ ☐ ☐ Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).
- ☐ ☐ ☐ Basic considerations for safety and unauthorized entry.
- ☐ ☐ ☐ Proper length to width ratio (Typically 2H:1V).
- ☐ ☐ ☐ Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis.
- ☐ ☐ ☐ Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.
- ☐ ☐ ☐ No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.

Yes No N/A

☐ ☐ ☐ Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.

Yes No N/A

☒ ☐ ☐ *HYDRAULIC COMPUTATIONS*

☐ ☐ ☐ Elevation- or Stage- Storage curve and/or tabular data.

☐ ☐ ☐ Weir / Orifice Control - Extended Detention.

☐ ☐ ☐ Weir / Orifice Control - riser 1-year control for channel protection.

☐ ☐ ☐ Weir / Orifice Control - riser 2-year control for quantity (if required).

☐ ☐ ☐ Weir / Orifice Control - riser 10-year control for quantity (if required).

☐ ☐ ☐ Inlet / Outlet (barrel) control - (All Storms).

☐ ☐ ☐ Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.

☐ ☐ ☐ Emergency spillway capacity and depth of flow.

☐ ☐ ☐ Elevation - Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.

☐ ☐ ☐ Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria.

☒ ☐ ☐ *POND or RESERVOIR ROUTING*

☐ ☐ ☐ Storage-Indication Routing of postdeveloped inflow hydrographs for the 1-, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation.

☐ ☐ ☐ Downstream hydrographs at established study points, if conditions warrant (ie. facility discharge combined with uncontrolled bypass).

☒ ☐ ☐ *MISCELLANEOUS COMPUTATIONS*

☐ ☐ ☐ Water quality volume for permanent pool based on selected BMP treatment volume (WQv).

☐ ☐ ☐ Water quality volume for extended detention based on selected BMP treatment volume (WQv) with drawdown computations.

☐ ☐ ☐ Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.

☐ ☐ ☐ Pond drain computations (within 24 hours).

☐ ☐ ☐ Anti-seep collar design (concrete preferred) or match material type.

☐ ☐ ☐ Filter diaphragm design (or alternative method of controlling seepage).

Yes No N/A

☐ ☐ ☐ Riser / base structure flotation analyses. FS = 1.25 minimum.

☐ ☐ ☐ Downstream danger reach study and/or emergency action plan (if conditions warrant).

☐ ☐ ☐ Upstream backwater analyses onto offsite adjacent property (if conditions warrant).

☐ ☐ ☐ 100 year floodplain impacts (if conditions warrant).

Yes No N/A

☒ ☐ ☐ *GEOTECHNICAL REQUIREMENTS*

☐ ☐ ☐ Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.

☐ ☐ ☐ Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).

☐ ☐ ☐ Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).

☐ ☐ ☐ Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.

☐ ☐ ☐ Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.

☐ ☐ ☐ Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*

☒ ☐ ☐ *PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS*

☒ ☐ ☐ *EXISTING GROUND AND PROPOSED GRADE*

☐ ☐ ☐ Embankment or excavation side slopes labeled (3H:1V maximum).

☐ ☐ ☐ Minimum top width labeled (per VESCH or VSMH requirements).

☐ ☐ ☐ Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

Yes No N/A

☒ ☐ ☐ *CORE TRENCH*

- ☐ ☐ ☐ Material (per plan or Geotechnical Report).
- ☐ ☐ ☐ Bottom width (4' minimum or greater as dictated by Geotechnical Report recommendations).
- ☐ ☐ ☐ Side slopes (1:1 maximum steepness)
- ☐ ☐ ☐ Depth (4' minimum or greater as dictated by Geotechnical Report).

☒ ☐ ☐ *PRINCIPAL CONTROL STRUCTURE. RISER OR SIMILAR STRUCTURE (DETAILS REQUIRED FOR ALL ITEMS)*

- ☐ ☐ ☐ Durable, watertight, resistant material (concrete preferred).
- ☐ ☐ ☐ Riser diameter is at least 1.25 times larger than barrel diameter.
- ☐ ☐ ☐ All pertinent dimensions and elevations shown.
- ☐ ☐ ☐ Control orifice or weir dimensions and elevations shown.
- ☐ ☐ ☐ Trash rack - removable - for each release.
- ☐ ☐ ☐ Anti-vortex device, baffle or plate.
- ☐ ☐ ☐ Riser base structure with dimensions and embedment specifications (concrete preferred).
- ☐ ☐ ☐ Interior access (steps, ladders, etc.) for maintenance for structures over 4 feet in height. Excessively high risers may need some form of exterior access on top portion.
- ☐ ☐ ☐ Low flow orifice with trash rack device.

☒ ☐ ☐ *PRINCIPAL CONTROL STRUCTURE OUTLET BARREL*

- ☐ ☐ ☐ Material (ASTM C-361 reinforced concrete pipe) with watertight joints. Prior approval required for all other pipe material (other RCP types, CMP, CPP, PVC, etc.).
- ☐ ☐ ☐ Support and bedding requirements for barrel - concrete cradles, etc. or as recommended by the Geotechnical Report.
- ☐ ☐ ☐ Pipe inverts, length, size, class and slope shown.
- ☐ ☐ ☐ Flared end section or endwall provided on barrel outlet.

☒ ☐ ☐ *SEEPAGE CONTROL*

- ☐ ☐ ☐ Phreatic line shown (4:1 slope measured from the intersection of the embankment and the principal spillway design high water).

- ☐ ☐ ☐ *ANTI-SEEP COLLARS*
  - ☐ ☐ ☐ Anti-seep collar, concrete preferred.
  - ☐ ☐ ☐ Size - 15 percent increase in length of saturation using outside pipe diameter.
  - ☐ ☐ ☐ Spacing and location on barrel (located at least 2 feet from a pipe joint).

☐ ☐ ☐ *FILTER DIAPHRAGMS*

☐ ☐ ☐ Design based on latest NRCS design methods and certified by a professional engineer.

Yes No N/A

☒ ☐ ☐ *ELEVATION AND DIMENSIONAL DESIGN DATA*

- ☐ ☐ ☐ Top of facility - construction height and settled height (10 percent settlement).
- ☐ ☐ ☐ Crest of principal control structure spillway at least one (1) foot below crest of emergency spillway, if provided.
- ☐ ☐ ☐ Minimum freeboard of one (1) foot above the 100-year design high water elevation for facilities <u>with</u> an emergency spillway.
- ☐ ☐ ☐ Minimum freeboard of two (2) feet above the 100-year design high water elevation for facilities <u>without</u> an emergency spillway or in accordance with the SCS National Engineering Handbook (prior approval required).
- ☐ ☐ ☐ Basin Sediment Clean-Out elevation (permanent mode). Typically 10 to 25 percent of water quality volume.

☒ ☐ ☐ *CROSS SECTION THROUGH FACILITY*

- ☐ ☐ ☐ Existing Ground.
- ☐ ☐ ☐ Proposed grade.
- ☐ ☐ ☐ Top of facility - constructed and settled.
- ☐ ☐ ☐ Location of emergency spillway with side slopes labeled (emergency spillway in cut).
- ☐ ☐ ☐ Bottom of core trench (4' minimum).
- ☐ ☐ ☐ Location of each soil boring.
- ☐ ☐ ☐ Barrel location.
- ☐ ☐ ☐ Existing and proposed utility location/protection.

☒ ☐ ☐ *EMERGENCY SPILLWAY PROFILE*

- ☐ ☐ ☐ Existing ground.
- ☐ ☐ ☐ Inlet, level (control) and outlet sections per SCS.
- ☐ ☐ ☐ Spillway and crest elevations.

☒ ☐ ☐ *PRETREATMENT DEVICES* of adequate depth and properly designed using required pretreatment volumes for the selected County BMP facility type. Including, but not limited to: sediment forebays, sediment basins, sumps, grass channels, gravel diaphragms, plunge pools, chamber separators, manufactured systems or other acceptable methods.

Yes No N/A

☒ ☐ ☐ *CONSTRUCTION SPECIFICATIONS and NOTES*

- ☐ ☐ ☐ Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan).
- ☐ ☐ ☐ Provisions to control base stream or storm flow conditions encountered during construction.
- ☐ ☐ ☐ Site and subgrade preparation requirements.
- ☐ ☐ ☐ Embankment, fill and backfill material soil and placement (lift) thickness requirements.
- ☐ ☐ ☐ Compaction and soil moisture content requirements.
- ☐ ☐ ☐ Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes.
- ☐ ☐ ☐ Clay or synthetic (PVC or HDPE) pond liners.
- ☐ ☐ ☐ Storm drain, underdrain and pipe conduit requirements.
- ☐ ☐ ☐ Minimum depth of pipe cover for temporary (construction) and final cover conditions.
- ☐ ☐ ☐ Permanent shutoff valve and pond drain.
- ☐ ☐ ☐ Concrete requirements for structural components.
- ☐ ☐ ☐ Riprap and slope protection.
- ☐ ☐ ☐ Access or maintenance road surface, base, subbase.
- ☐ ☐ ☐ Temporary and permanent stabilization measures.
- ☐ ☐ ☐ Temporary or permanent safety fencing.
- ☐ ☐ ☐ BMP Landscaping (deep, shallow, fringe, perimeter,etc.)
- ☐ ☐ ☐ Dust and traffic control (if warranted).
- ☐ ☐ ☐ Construction monitoring and certification by professional.
- ☐ ☐ ☐ Other: _____
- ☐ ☐ ☐ Other: _____.

☒ ☐ ☐ *MAINTENANCE PROVISIONS*

- ☐ ☐ ☐ Entity responsible for maintenance identified..
- ☐ ☐ ☐ Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays
- ☐ ☐ ☐ Maintenance access from public right-of-way or publicly traveled road.
- ☐ ☐ ☐ Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas.
- ☐ ☐ ☐ Minimum 6 foot wide public safety shelf (landing) or alternative fencing.

IV. *OUTLET PROTECTIONS:*

Yes	No	N/A	
X	☐	☐	Sized for maximum design release (generally 10-year storm).
X	☐	☐	Flared end section or endwall.
X	☐	☐	Dimensions.
X	☐	☐	Rock or riprap size, quantity and placement thickness.
X	☐	☐	Slope at 0 percent (Level Grade).
X	☐	☐	Geotextiles (nonwoven).
☐	☐	X	Special energy dissipators are required for design discharge velocities that exceed eighteen (18) feet per second; or if use of standard outlet protection would result in velocities exceeding permissible channel velocities; or if space restricts or limits their use.

V. *ADDITIONAL COMMENTS OR INFORMATION SPECIFIC TO THE PLAN:*

Plan Preparer: [signature]

Date: 3/31/04

SWMProg/BMP/Checklist/ChkList

GEOTECHNICAL

CONSULTING ENGINEERS

5248 Olde Towne Road • Suite 1 • Williamsburg, Virginia 23188
(757) 253-0040 • Fax (757) 220-8994 • E-mail aes@aesva.com

April 2, 2004

James City County Planning
Development Management
101-E Mounts Bay Road
Williamsburg, VA 23187-8784

RE: WindsorMeade – Villas Construction Plan
Former JCC Case No. SP-003-04
AES Project No. 8818-05

Dear Ms. Weisiger:

This letter is a response to the requested changes or revisions to the WindsorMeade Villa site plan. Changes or revisions were made to these documents to address the items provided in your letter of February 11, 2004.

Planning:

Item 1: Zoning Designation
The zoning designation has been modified as requested.

Item 2: DRB Review
The DRB has approved this project.

Item 3: General Layout Sheet
An overall WindsorMeade Project sheet has been added to the plan and should serve the purpose of showing the total project area.

Item 4: Tax Map Number
The tax map number has been revised as requested.

Item 5: Private Roads
General note 16 has been added to the cover sheet indicating that the roads are to remain private.

Item 6: Residential Density
The project area and the residential density for the villa site have been provided.

Item 7: Number Units

The units have been labeled on all plan sheets as requested.

Item 8: "Villa"

The term villa has been defined on the cover sheet as a single family unit as requested.

Item 9: DRC Review

The DRC has reviewed and approved the site plan.

Item 10: Small Whorled Pogonia Conservation Plan

The small whorled pogonia conservation plan is in the process of being developed. This will be passed along as soon as it is available.

Item 11: Water Source (Cash Contribution)

The owner/developer understands that a cash contribution for each unit will be required prior to final approval.

Item 12: Age Restriction Documents

The owner/developer is in the process of drafting the age restriction documentation and understands that these documents are required prior to final approval.

Item 13: Landscape Buffer

The right-of-way line for Route 199 is displayed and a label has been added to clearly identify the landscape buffer.

Item 14: Ginkgo Tree

The male form of the tree was specified on the previously submitted plans and is located in the "comment" section of the plant schedule.

Item 15: Recreation Area

The clubhouse, clock tower, and the Windsor Hall building will provide amenities for the Villa residents. After reviewing the proffers we could not find any reference for a recreation area requirement as such we have withheld indicating anything about recreation areas on the plans.

Item 16: Specimen Trees

There is no possibility of saving any particular trees or plants on site within the limits of construction due to the earth moving requirements.

JCSA:

General

Item 1: Coordinate with Other Sections

Comments from other sections have been taken into consideration while addressing issues with this site plan.

Item 2: Fire Flow Requirements

It is understood that 1000gpm fire flows will be required throughout the Villas (2500gpm at the clubhouse) and 2500gpm at the Hall. The hydrant that is located on the block with the clubhouse has sufficient flows and pressures to meet the fire department requirements. (See water model submitted with the Villa Entrance Plan, JCC SP-04-04)

Item 3: JCSA General Notes

The JCSA general notes have been added to the plans as requested.

Item 4: Fire Department

According to Planning, the Fire Department has reviewed and approved the hydrant layout.

Cover Sheet

Item 1: Unused Wells, General Note 9

General Note No. 9 has been revised as requested.

Item 2: Existing Valves, General Note

A note has been added to the general notes stating that only JCSA personnel shall operate existing valves.

Item 3: Owner/Developer

Jim Franklin has been added as a contact for the owner.

Sheet No. 5

Item 1: Private Sewer

The sewer has been revised and JCSA designation added to all JCSA utilities. Easements have been revised as necessary to only encompass JCSA utilities.

Item 2: Pedestrian Bridge Alignment

The bridge alignment has been modified as part of the Windsor Hall site plan.

Item 3: 10' Separation

The sanitary lateral and water service connection for bldg 7 & 10 have been shifted to provide 10' separation.

Item 4: Existing JCSA Easement

The JCSA easement for the sewer has been labeled as existing as requested.

Item 5: Sanitary Manhole 23

San MH#23 has been revised to correctly match the label in all the plan sets.

Sheet No. 6

Item 1: Station label

The station label for the 45-degree bend along WindsorMeade Way has been revised as requested.

Sheet No. 7

Item 1: 10' Separation

The sanitary lateral and water service connection for bldg 29 & 76 have been shifted to provide 10' separation.

Item 2: Water Valve

A gate valve has been added as requested at station 10+27.

Item 3: Community Pool

No pool is planned for the clubhouse. The pool facility for the residence is inside Windsor Hall.

Item 4: 45-degree Bends

Two 45-degree bends have been added to replace the 90-degree bend at station 52+07.

Item 5: Clubhouse Water Meter

No water meter is sized for the clubhouse as the site is master metered. Once fixture information has been provided to us, calculations will be shown to ensure that the 1" water line is correctly sized for the clubhouse.

Sheet No. 8

Item 1: 10' Separation

The sanitary lateral and water service connection for bldg 87 & 45 have been shifted to provide 10' separation.

Sheet No. 9

Item 1: 10' Separation

10' separation has been provided between the water service connection for bldg 36 and MH#14.

Item 2: JCSA Offsite Water Main, Sta. 10+50

The water line has been revised to eliminate the requirement of the air release valve.

Item 3: JCSA Offsite Water Main, Sta. 11+00 to 11+70

The offsite water line has been shifted to provide an unencumbered easement free of the retaining wall.

Item 4: Sta. 45+15

The air release has been relocated to station 44+40.

Sheet No. 10

Item 1: 10' Separation

The sanitary lateral and water service connection for bldg 96 & 57 have been shifted to provide 10' separation.

Sheet No. 18

Item 1: Conflict between water and sanitary laterals

The water main has been lowered to prevent possible conflicts between the water and the sanitary laterals.

Item 2: Sta. 18+60 to 19+25

The vertical separation has been indicated between the sanitary and water line.

Item 3: Sta. 22+87

The vertical separation has been indicated between the JCSA and private water line.

Item 4: Sta. 22+87

The 36" storm pipe has been removed from the profile.

Sheet No. 19

Item 1: Sta. 29+99 to 30+04

The fittings have been adjusted to match the layout in plan view.

Item 2: Sand Cushion (Sta. 36+10)

The sand cushion was removed as there was no conflict with the water line as previously depicted.

Item 3: Conflict between water and sanitary laterals

The water main has been lowered to prevent possible conflicts between the water and the sanitary laterals.

Sheet No. 20

Item 1: Conflict between water and sanitary laterals

The water main has been lowered to prevent possible conflicts between the water and the sanitary laterals.

Item 2: Sta. 47+54

The separation between the JCSA waterline and the private water has been adjusted to provide an 18" separation.

Sheet No. 21

Item 1: Outer Loop Road Profile (Cambridge Course)

a. **Sta. 52+07**-- The separation between the JCSA waterline and the private water has been labeled as requested.
b. **Sta. 54+90**— The separation between the private water and sanitary crossing have been labeled as requested.

Item 2: South Clubhouse Profile (Weston on the Green- South)

a. **Sta. 10+38**-- The storm size has been corrected.
b. **Conflict between water and sanitary laterals**--the water main has been lowered to prevent possible conflicts between the water and the sanitary laterals.

Sheet No. 22

Item 1: Conflict between water and sanitary lateral

The water main has been lowered to prevent possible conflicts between the water and the sanitary lateral serving bldg 84.

Item 2: Sta. 19+48

The sanitary sewer crossing has been shown in profile as requested.

Sheet No. 23A

Item 1: Sta. 10+00

The label has been corrected to indicate an 8" x 6" Tee.

Item 2: Sta. 10+50

The 4" private waterline has been indicated as requested.

Item 3: 24" storm sewer

The location of the 24" storm has been revised.

Item 4: Sta. 15+15

The elevation of the existing water main in Ford's Colony has been adjusted to match the elevation as depicted in the Ford's Colony section 30 plans.

Sheet No. 23

Item 1: One Way Loop Profile

a. **Sta. 10+38**—The storm sewer pipe size has been adjusted.
b. **Sta. 15+65**—The storm sewer size and elevation have been adjusted.

Item 2: WindsorMeade Way Profile

a. **Sta. 43+45**—The label has been changed to a blow off valve.
b. **Sta. 44+00 to 44+38**—The fittings have been adjusted to match those in plan view.

c. **Sand Cushion**—The sand cushion has been revised and a detail added.
d. **Ductile Iron Pipe (Sta.43+45 to 44+90)**-- Ductile iron pipe has been indicated on the JCSA line within the fill section.

Sheet No. 26

Item 1: Concrete Master Meter Vault Detail:
The master meter vault has been revised to provide a Neptune Protectus III meter and a bypass. Also a drain line has been added to drain the vault.

Item 2: HRPDC/ JCSA Detail List
The duplicate detail list has been removed from sheet 5 as requested.

Landscape Sheet

Item 1: Laterals and Water Services
The sanitary laterals and water services have been added to the plans as requested.

Sanitary Sewer Data Sheet

Item 1: Section 5
Sanitary sewer demand calculations will be provided once the architect has finalized the clubhouse plans. A demand of 300gpd has been assumed for all homes and the clubhouse at this time.

Item 2: Section 6&7
The sanitary sewer data sheet has been updated to only include the line and manhole being dedicated to JCSA.

Water Data Sheet

Item 1: Section 5B
The demand for the clubhouse has yet to be calculated and has been assumed to be 300gpd and all single family homes are calculated at 300gpd.

Item 2: Section 5C
The fire flow requirement has been indicated to be 2500 gpm for the clubhouse.

Item 3: Section 6
The water data sheet has been updated to only all the lines being dedicated to JCSA.

Item 4: Section 7
Water demand calculations will be provided once the architect has finalized the clubhouse plans. A demand of 300gpd has been assumed for all homes and the clubhouse at this time.

Item 5: Section 8

Only hydrants on JCSA lines have been included on the water data sheet.

Water Distribution Analysis

Item 1: Irrigation

The site is not to have irrigation systems supplied from the JCSA system.

Item 2: Ford's Colony Fire Flow Test

The fire flow test has been provided as requested.

Item 3: Summary Page

A summary page has been provided as requested.

Item 4: Windsor Hall Demands

The flow demand for the hall is still in flux and calculations will provided once they are finalized. The 500gpm shown in the current model is a rounded value, up from a 425-475gpm estimate from the architect, so we feel comfortable that the number will only be revised lower.

Item 5: Future Apartments

The apartment demands have been added as requested, however it should be understood that these demands are not fixed.

Item 6: Pipe Report

a. **Pipe Lengths (P-3 thru P-6; P-71 and P-83)**—Pipe lengths have been updated as requested.
b. **Pipe Size (P-72)** — The pipe size has been updated.
c. **Pipe Materials** – The pipe materials listed in the model are inconsequential and have been removed from the model to prevent future confusion.
d. **Pipe Status "Closed" (FC-1)** — For modeling purposes a check valve is provided on the pipe to prevent errors in the model. When the pressures on the WindsorMeade side are higher than those within Ford's Colony the pipe status becomes closed.
e. **Fire Flow (Windsor Hall)** — Calculations have been prepared for the fire department to justify the reduced fire flow requirement. A copy has been provided to JCSA with this submittal. Once the fire department has approved this calculation we will forward the fire departments approval.
f. **Fire Flow (Clubhouse)** — The clubhouse will have three hydrants within 300' (one of which will be off the JCSA line with 2500gpm @ 20psi). It is our determination that these hydrants are adequate to supply the required fire flow.

Water Conservation

No comments at this time

Environmental Department:

Item 1: Land Disturbing Permit and Siltation Agreement

A representative of owner will provide the required permits and agreements prior to construction.

Items 2: Water and Sewer Inspection Fees

A representative of owner will provide the required inspection fees.

Items 3: Wetlands

The wetlands permits have been provided for the overall project.

Item 4: Inspection and Maintenance Agreement

A representative of owner will provide the required inspection and maintenance agreement.

Item 5: Record Drawing and Construction Certification

Notes referencing the requirement of construction certification and interim certification are in the General Notes For Construction of Stormwater Basins and James City County Environmental Division Erosion and Sediment Control Notes on sheet 25.

Item 6: Interim Certification

Notes referencing the requirement of construction certification and interim certification are in the General Notes For Construction of Stormwater Basins and James City County Environmental Division Erosion and Sediment Control Notes on sheet 25.

Item 7: VPDES

It is understood that a VPDES permit is required for this project once plan approval has been obtained.

Item 8: Site Tabulation

A project area breakdown has been provided and an estimated impervious cover calculation has been provided on sheet 2A.

Item 9: Watershed

The watershed designation has been provided on the plan cover sheet.

Item 10: Retaining Walls

The supplier of the retaining walls will be providing engineering design for the structures. They have been provided information on the potential for saturation.

Item 11: Environmental Inventory

The environmental inventory has a clearly defined clearing limits and the retaining walls have been shown as requested.

Item 12: Steep Slopes

A wavier will be provided for the disturbance of the "steep" slopes that may be created with the WindsorMeade Way roadway as requested.

Erosion and Sediment Control Plan:

Item 13: Design Checklist

Erosion and Sediment Control and Stormwater Management Checklists have been provided as requested.

Item 14: Limits of Work

A distinct limit of work line has been provided around Villa BMP #1 as requested.

Item 15: E&SC Plan

Large amounts of grading will be required to bring the site to finished grades. It is the intention of the interior site sediment traps to stay in place as the roadways are brought to grade and then to have the road storm system convey the runoff to the sediment basins. At that time the sediment traps may be removed and the interior grades can be established. This is explained in steps 2-4 of the sequence of construction.

Item 16: Sequence of Construction

The sequence of construction has been revised as requested to include the removal of sediment trap #1 and the installation of the waterline into Ford's Colony.

Item 17: Perimeter E&S Controls

EC-3 matting has been indicated in locations of steep slopes adjacent to the wetlands. In addition silt fence is indicated to be installed at the top of the retaining walls once their construction has been completed.

Item 18: Temporary Sediment Basin (Villa BMP #1)

A copy of the sediment basin design sheets submitted with the WindsorMeade Way plan have been provided as requested.

Item 19: Temporary Sediment Basin (Villa BMP #2)

A calculation has been provided for sizing of the sediment basin orifice. This sizing was ignored for a more conservative 1-year 24 hour drawdown, which determined the orifice needed to be 3".

Item 20: BMPs

All BMPs on the plans have been labeled with JCC Environmental notation as requested.

Item 21: Open Space Credit

A conservation easement plat is being prepared for the WindsorMeade project.

Item 22: Pond Benches

A wavier letter requesting a variance on the bench widths for the BMPs has been provided.

Item 23: Pond Buffers

As discussed on the phone between Chris Basic of AES and Scott Thomas of JCC Environmental, the area of the buffer impacted by the wall was calculated as if the wall we not present, and that calculation determined the total quantity of required plant material for the buffer. It was therefore resolved that no further action be required.

Item 24: Villa BMP #2

An EW-11 detail has been provided indicating how the riser and the EW-11 attach as requested.

Item 25: BMP Designs

BMP storage volumes were provided to the bottom of the BMPs and not to the water surface. These volumes were ignored by the program in the routing (as indicated on the BMP "Reservoir Reports" – Stage Storage Discharge Table). However for the sake of clarity the volumes below water surface elevation have been removed to prevent further confusion.

Item 26: Stage Storage

The wet pool elevation was incorrectly labeled on sheet 16 and should be elevation 69.0.

Item 27: Pond Tailwater

A tailwater condition was analyzed while reviewing the pond routing. Due to a software issue, the tailwater was reset to zero as the tailwater did not influence the pond routing hydraulics.

Item 28: Emergency Spillway

An emergency spillway detail has been added as requested.

Item 29: Riser Structure (EW-11A Detail)

An EW-11 detail has been provided indicating how the riser and the EW-11 attach as requested.

Item 30: Concrete Riser and Barrel

A note has been added to the BMP sections indicating the use of watertight concrete pipe and dimensions have been provided for the riser bases as requested.

Item 31: Floatation Calculations

Buoyancy calculations have been provided with this submittal as requested.

Item 32: Low Flow Orifice Protection

Turn down elbows and reverse slope pipes have been provided to prevent clogging of low flow orifices.

Item 33: Low Flow Orifice (BMP 2)

The low flow orifice length has been updated to more correctly indicate the required pipe length as requested.

Item 34: Pond Drain/Valve

Due to the location of BMPs on this site it is not feasible to provide pond drains. These structures will require dewatering by pumping for any maintenance.

Item 35: Stilling Basins

The stilling basin detail has been provided. Also the outlet protection has been labeled on the erosion and sediment control sheets as requested.

Item 36: Adequate Outflow

The outfalls of the BMPs are located immediately adjacent to the wetlands and empty into stilling basins (the natural channels are within the wetland areas).

Item 37: HGL Computations

The tailwater condition on storm system #2 has been modified to match that of the 10-yr storm elevation and the calculations have been resubmitted.

Item 38: Stormwater Conveyance Channels

All swales requiring EC-2 lining have been labeled as such and reference the grass swale detail.

Item 39: Storm Profiles

The storm sewer depths have been verified for proper depth.

Item 40: Storm Design

The pipe length from #1-46 & 1-47 has been corrected to 168 feet (from 50 feet) in the calculations. Also the inlet numbering discrepancy has been corrected as requested.

Item 41: Inlet Calculations

The inlet performance curves have been revised and resubmitted.

Item 42: Inlet Depths

The inlet type for SS#1-1&2 have been modified due to there depth as requested.

Item 43: Drop Inlet Type

The inlet type for inlet (SS#1-7) has been revised as requested.

Item 44: Inlet Grates

Inlet grate types have been indicated on all DI-7 inlets as requested.

Item 45: Inlet Steps

A note has been added to the cover sheet indicating the requirement for steps within structures over 4 foot deep.

Item 46: Inlet Shaping (IS-1)

A note has been added to the cover sheet indicating the requirement for inlet shaping.

Item 47: End Treatment

A headwall has been indicated at the outfall of storm system 1 and a flared end section was added to the outfall of storm system 2.

Item 48: Pond Landscaping

Landscaping has been modified as not to interfere with the principal spillway as requested.

Item 49: Miscellaneous

Guardrail has been discussed for the requested location but after reviewing we would prefer to wait until the time of construction to determine the necessity for guardrail. It is our opinion that the curb, shoulder and associated planting will provide a substantial buffer between the road and the pond at the road design speed.

Item 50: Geotechnical

The geotechnical report as submitted with the WindsorMeade road construction plan includes information on all the proposed BMPs within the project. The report indicates that the soils in all locations have low to moderate permeability and that no liners are required for water retention. It also notes that soils should be evaluated during construction for the need of localized liners.

I would like to thank you and the other agencies involved for their assistance in the review of this project. Should any further questions arise, please feel free to contact us.

Sincerely,

AES Consulting Engineers

Jason Grimes
Project Engineer

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ENVIRONMENTAL DIVISION REVIEW COMMENTS
WINDSORMEADE VILLAS
COUNTY PLAN NO. SP - 03 - 04
February 13, 2004

General:

1. A Land-Disturbing Permit and Siltation Agreement, with surety, are required for this project.

2. Water and sewer inspection fees, as applicable, must be paid in full prior to issuance of a Land-Disturbing Permit.

3. Wetlands. Provide evidence that any necessary wetlands permits have been obtained, have not expired or are not necessary for this project. Refer to Chapter 23 Chesapeake Bay Preservation ordinance, Section 23-9(b)(9) and 23-10(7)(d). The permit that the Environmental Division has on file shows fewer impacts to wetlands than the current plan of development for this site. *(Note: This includes securing necessary wetland permits through the U.S. Army Corps of Engineers Norfolk District and under the Virginia Department of Environmental Quality non-tidal wetlands programs, which became effective October 1st 2001.)*

4. A Standard Inspection/Maintenance agreement is required to be executed with the County due to the proposed stormwater conveyance systems and Stormwater Management/BMP facilities associated with this project.

5. Record Drawing and Construction Certification. The stormwater management/BMP facilities as proposed for this project will require submission, review and approval of record drawings (as-builts) and construction certifications prior to release of the posted bond/surety. Provide notes on the plan accordingly to ensure this activity is adequately coordinated and performed before, during and following construction in accordance with current County guidelines.

6. Interim Certification. Due to the characteristics and dual purpose function of Villa BMP #1, interim construction certification will be required. Refer to current County guidelines for requirements. *(Note: The embankment for this basin may have been initially constructed under approved County site plan SP-93-03.)*

7. VPDES. It appears land disturbance for the project may exceed one (1) acre. Therefore, it is the owner's responsibility to register for a General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities, in accordance with current requirements of the Virginia Department of Environmental Quality and 9 VAC 25-180-10 et seq. Contact the Tidewater Regional Office of the DEQ at (757) 518-2000 or the Central Office at (804) 698-4000 for further information.

8. Site Tabulation. Provide a total site area for this portion of the project (as defined by metes and bounds as shown on Sheets 2, 3, and 4) and an impervious cover estimate. If over 60 percent, it should be demonstrated that it is in compliance with the Chesapeake Bay ordinance or consistent with the overall approved master plan intent.

9. **Watershed.** Provide a note on the cover sheet of the plans indicating which County watershed, sub-watershed and/or catchment for which the project is situated in. *(Note: It appears the project is situated in Sub-Watershed 209, Catchments 209-101-1 of the Powhatan Creek Watershed.)*

10. **Modular** retaining walls are proposed for the project along the southern perimeter and adjacent to proposed Villa BMP #2. The retaining wall adjacent to BMP # 2 will be subjected to saturation during lower frequency storms. Indicate what measures will be provided to ensure the integrity of foundation of the proposed retaining wall in the location adjacent to BMP # 2. All of the proposed modular retaining walls shall be reviewed for compliance and building permit purposes with Codes Compliance.

Chesapeake Bay Preservation:

11. **Environmental Inventory.** An environmental inventory was provided on Sheet 2. The inventory needs to show the limit of work (clearing and grading) in the southwest portion of the site adjacent to Villa BMP # 1. Also, show the extent of the proposed modular retaining walls and show an outline for Villa BMP #2.

12. **Steep Slopes.** A waiver for steep slope impacts, in writing, is necessary regardless of whether the subject slope is natural or man-made. A disturbed, man-made slope of 25 percent or more will erode in the same manner as a denuded natural slope.

Erosion & Sediment Control Plan:

13. **Design Checklist.** Please provide a completed standard James City County Erosion and Sediment Control and Stormwater Management Design Plan Checklist, specific to this project. The intent of the checklist is to ensure the plan preparer has provided all items necessary for a complete and expeditious review.

14. **Limits of Work.** Show and label a distinct limit of work (clearing and grading) around the <u>entire</u> site periphery. Be sure to include work associated with installation of erosion and sediment controls and onsite or offsite utility connections. Ensure disturbed area estimates match land-disturbance inclusive within the limits of work. On Sheet 4, the final limits of clearing should include the waterline tie to Ford's Colony and the final limits of clearing should not extend into area identified as non-RPA wetlands along the southern boundary of the project site and the "Endangered Specie Preserve" in the northeast corner of the site.

15. **E&SC Plan.** The Phase I erosion and sediment control plan as presented on Sheet 3, which will handle initial clearing and grading operations, has three temporary sediment traps (# 2, # 3 and # 4) which are interior to the site. It initially appears that the locations of these traps will conflict with future site grading and site improvements. For example, temporary sediment trap # 3 which has a bottom at El. 80 is situated in an area that is proposed to be filled to Elev. 91.5 (11 ft. of fill). Address whether an erosion and sediment control plan as such will provide for adequate protection during all phases of the land-disturbing activity.

16. **Sequence** of Construction. The following comments pertain to the sequence of construction as presented on Sheet 3.

    16a. The sequence of construction fails to include when Sediment Trap #1 will be removed.

    16b. Reference offsite utility work related to the Ford's Colony waterline tie and the associated erosion and sediment control measures within the sequence of construction.

17. **Perimeter** E&S Controls. The site's existing slopes along the southern boundary of the project site average around 4 to 10 percent and slope lengths behind the silt fences are generally less than 100 ft. The runoff potential due to this amount of upslope "exposed" drainage area (which is greater than 3 acres) combined with the site's existing slopes and slope lengths behind the silt fences will pose maintenance concerns for silt fence. This scenario also increases the risk for "disturbed" site runoff to enter into the adjacent non-RPA wetlands. It is recommended that if silt fence is going to be used at this location as presented, that the area along the southern boundary of the Villa Project Site be graded in stages and immediately stabilized with erosion control slope matting as grading operations proceed following placement of the proposed sediment traps and basins. EC-3 turf-reinforcement matting is preferred as these slopes may be subject to concentrated runoff until the onsite storm drainage system is installed and functional. *(Note: Also adjust the sequence of construction accordingly to reflect staged grading and use of erosion control matting.)*

18. **Temporary** Sediment Basin (Villa BMP # 1). Submit Sediment Basin Design Data Sheets and associated computations to ensure this sediment basin design is in compliance with Minimum Standard & Specification 3.14 of the VESCH.

19. **Temporary** Sediment Basin (Villa BMP # 2). Include calculations for sizing of the dewatering orifice invert and size based on a 6-hour drawdown. Refer to Minimum Standard & Specification 3.14 of the VESCH. The included calculations for the temporary sediment basin indicate a diameter of 4" for the dewatering orifice. The detail entitled Sediment Basin # 2 (to be converted to Villa BMP #2) on Sheet 25 of the plans indicates a diameter of 3". Include calculations and correct the calculation sheets or the detail as necessary.

Stormwater Management / Drainage:

20. **BMPs**. Label all permanent BMPs as proposed for this site consistent with the BMP worksheet and nomenclature in the County BMP manual. For example, if wet extended detention ponds are to be used consistent with the overall master plan 10 point worksheet, label on the plans as wet extended detention pond, County type A-3 BMP, 10 point BMP.

21. **Open** Space Credit. Provide a conservation easement plat for all Natural Open Space areas as claimed in the master plan BMP worksheet and exhibit Sheet 1 "BMP Point Display" as provided in the design report.

22. **Pond** Benches. Provide a written request, in writing, to vary from minimum bench width standards for the aquatic and safety benches as provided within Villa BMP # 1 and Villa BMP # 2. Safety bench requirements may be waived if interior pond sideslopes are 4H: 1V or flatter.

23. Pond Buffers. Assigned BMP point values assume all features consistent with the County BMP manual are provided such as pretreatment forebays, aquatic shelves, stream channel protection volume, pond buffers, etc. As full 10 point credit value is being taken for Villa BMP # 2 in the calculation worksheet, all applicable design features must be present. It does not appear that a pond buffer, meeting the County BMP manual requirements will be present along the north and east sides of the basin due to the location of the retaining wall. Clarify how the loss of the pond buffer/setback will be mitigated. The same is also true for Villa BMP # 1, as the Outer Loop Road will be situated in the pond buffer along the east side of the facility.

24. Villa BMP # 2. Provide a detail within the plans for principal spillway and the proposed grate top unit (described as a modified DI-11 sitting on a 60" diameter manhole) for Villa BMP # 2. Provide appropriate riser, grate and bar details as applicable

25. BMP Designs. For stage-storage purposes, the invert of the lowest control orifice is zero storage. For extended detention (dry) basins, this corresponds to the bottom of the facility. For retention (wet) basins, this corresponds to elevation of the permanent (normal) pool. It appears from the stage-storage-discharge tables provided for Villa BMP #1 and #2 that zero storage corresponds to the bottom of the basins when it should correspond to the elevation of the permanent pool. Correct or provide additional evidence that this is not the case. *(Note: This may result in the basins being severely undersized for stream channel protection control purposes.)*

26. Stage-Storage. Please confirm that the permanent pool elevation for Villa Pond #2 is actually at El. 70.0' (as shown of plan Sheet 16) and not at El. 69.0'. Note that the invert of the 3" orifice is identified on the detail Sheet 25 at El. 69.0'. Review and revise the plans as necessary to show consistent information.

27. Pond Tailwater. Tailwater conditions directly downstream of the SWM/BMP facilities was not considered in any of the hydraulic routing for the both Villa Pond # 1 and # 2. Due to the presence of downstream wetlands, evaluate the potential for tailwater conditions at the outlet of the barrel and subsequent effects a tailwater condition may have to the outlet discharges and design water surface elevations for each of the BMP. Incorporate tailwater conditions in the hydraulic models in the design report as appropriate and/or justify the use of no tailwater conditions.

28. Emergency Spillway. Provide a detail or typical section for the 10 ft concrete emergency spillway shown on the plans for Villa BMP #2.

29. Riser Structure. The riser structure for Villa BMP # 2 is described as a 60" manhole. Provide details of how the modified EW-11A principal spillway crest is attached to the 60" manhole and provide details of the base that will anchor the riser structure firmly to the base and prevent floating.

30. Concrete Riser and Barrel. Specify watertight reinforced concrete pipe meeting the requirements of ASTM C361 or ASTM C76 for the reinforced concrete pipe riser and outlet barrel for Villa BMP # 1 and # 2. Provide dimensions and specifications for size of the anchor bases for both BMP risers. Include provisions or labels for access and steps within the risers for maintenance purposes. *(Note: Description of concrete outlet barrel, 50 ft of 24" concrete pipe, on plan Sheet 16 for Villa BMP # 2 is not consistent with details, 50 ft of 30" concrete pipe, on plan Sheet 25.*

Calculations in the design report for Villa BMP # 2 indicate a length of 100 ft. for the concrete outlet barrel. Provide consistency throughout and make corrections as necessary.)

31. **Flotation Computations.** Provide flotation (buoyancy) computations for the riser and base structures for both BMPs. A minimum factor of safety of 1.25 is recommended.

32. **Low Flow Orifice Protection.** Provide a non-clogging trash rack for the low flow orifices for both BMPs. HDPE trash racks per Technical Bulletin 7 of the VaDCR can be considered for review on a case-by-case basis.

33. **Low Flow Orifice.** Correct the specified length for the 3" Schedule 80 PVC pipe shown on the details for Sediment Basin 2 and Villa Pond # 2 on Sheet 25. The pipe extends under the 3:1 fill slope of the basin dam and also under a 6' safety bench and an additional 6' aquatic bench. The length specified of 10' is obviously incorrect.

34. **Pond Drain/Valve.** Include provisions for both BMPs to provide a pond drain and valve system that is capable of completely or partially draining the entire facility within 24 hours for future maintenance purposes. This is consistent with County BMP manual requirements. Include specifications for valve size, type and materials and supporting hardware.

35. **Stilling Basin.** Provide details for the stilling basin as proposed at the outfall of Villa BMP # 2. Also, on the initial and overall erosion and sediment control plan Sheets 3 and 4, label all outlet protections and stilling basins at storm drainage system and BMP outfalls consistent with VESCH Chapter 3 keys and symbols.

36. **Adequate Outflow.** Outflows from SWM/BMP facilities must be discharged to an adequate and well-defined channel. Facilities discharging onto flat areas with no defined channel usually require an onsite channel to be provided which can adequately convey design flows (discharges). Refer to VSMH page 5 - 61. *(Note: According to topography shown on the plans, both BMP outfalls are directed directly onto uniform slopes upland of wetlands, not natural defined receiving channels).*

37. **HGL Computations.** The tail water elevation utilized in the storm sewer tabulation computations for the system draining into Villa BMP # 2 (ie. System 2) should be corrected from El. 67.25 to correspond to the 10-yr depth of the routed pond calculations of El. 74.41, or at a minimum the 2-year water surface elevation of the pond. Ensure depths of flow at the inlets or inlet surcharging due to hydraulic grade or inlet/orifice control will not create an undesirable condition for intended uses at the site.

38. **Stormwater Conveyance Channels.** Reference the "Typical Swale Detail" shown on Sheet 25 to grading and drainage plan sheets as necessary. Identify or label EC-2 lined grassed swales (adjacent to landscaped berm) on grading and drainage plan Sheets 15 and 17. Clarify if all swales shown on the grading and drainage plans are to receive EC-2 lining.

39. **Storm Drain Profiles.** If storm drain (sewer) profiles are not to be provided within the project plan set, please check to ensure that minimum cover is maintained for all storm segments and all storm segment pipe wall types (if HDPE) or wall thicknesses (if RCP) are adequate and designed for maximum heights of cover.

40. **Storm Design.** The pipe segment length in the design report between storm drainage structure SS # 1-46 and SS # 1-47 is 50 feet; however, the length shown on the construction plans is 168 feet. Ensure the pipe segment (and corresponding downstream pipe segments) are of correct size for a larger pipe run which would have greater friction losses. Also, there are two storm drain structure labels for SS # 1-40 on Sheet 15.

41. **Inlet Calculations:** Some of the performance curves for DI-1 and DI-7 (from the VDOT Drainage Manual) as used to compute inlet depths are mislabeled and reference drop inlet drainage structures. Review for accuracy and revise to identify the correct drainage structure.

42. **Inlet Depths.** Inlets SS # 1-1, # 1-2 exceed 9' in depth and do not meet minimum depth requirements per VDOT standards for DI-2E and DI-2D drop inlets. Specify DI-2EE and DI-2DD to comply with VDOT Standards. Inlet SS # 2-1 exceeds 9' in depth and should be specified as DI-2AA to comply with VDOT Standards.

43. **Drop Inlet Type.** Inlet SS # 1-7 is specified as a DI-2B. In order to comply with VDOT Standards specify as a DI-2D since it has a 36" outlet pipe.

44. **Inlet Grates.** Specify inlet grate type to be used with VDOT Standard DI-7. Recommend Grate A, type III for use in pedestrian areas not subject to traffic loading unless there are concerns for pedestrian safety-access then use Grate type B.

45. **Inlet Depths.** Where inlets are greater than 4 ft., use notes or details to include steps in accordance with VDOT Standard ST-1.

46. **IS-1 Shaping.** Inlet shaping will help to minimize and prevent debris buildups due to changes in pipe alignment. Use notes or details to specify inlet shaping at all storm drain structures where changes in pipe alignments occur at structures in accordance with VDOT Standard IS-1.

47. **End Treatment.** In accordance with Items 4.17 and 5.10 of the *JCC Stormwater Drainage Conveyance Systems (Non-BMP related) General Design and Construction Guidelines*, provide standard headwalls for the ends of the storm drain systems at the following locations: the 42" pipe entering Villa BMP # 1 and the 24" pipe entering Villa BMP #2.

48. **Pond Landscaping.** On landscaping Sheet L-2, remove trees shown within 25 ft of the principal spillway structure for Villa BMP #2. Refer to Minimum Standard 3.05 of the VSMH for additional detailed guidance.

49. **Miscellaneous.** Due to the close proximity of Villa BMP # 1 to Outer Loop Road, it is highly recommended that a guiderail be installed along Outer Loop Road, between approximate road stations 17+30 and 18+70 right.

50. **Geotechnical.** Provide information (preliminary soil evaluations, logs, test results, reports, etc.) as necessary to substantiate that existing soils beneath Villa BMP's # 1 and # 2 are adequate to sustain a permanent pool as intended for water quality purposes.