Stormwater Division

MEMORANDUM

DATE: March 12, 2010

TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services

FROM: Jo Anna Ripley, Stormwater

PO: 270712

RE: Files Approved for Scanning

General File ID or BMP ID: PC237

PIN: 3831800005

Subdivision, Tract, Business or Owner Name (if known): Windsormeade Marketplace

Property Description: Shopping Center

Site Address: 3950 Windsormeade Way

(For internal use only) **Box** 24 **Drawer:** N/A

Agreements: (in file as of scan date) Y **Book or Doc#:** 050011882 **Page:**

030023373

Comments

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 10th day of MAY, 20 05, 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 WINDSOR HALL 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 # 050011882
Recorded on May 31, 2005

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. Joseph Finks, President

Print Name/Title Wm. Joseph 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 Hall
County Plan No.: SP-134-05
Stormwater Management Facility: Wet Pond
BMP Phase #: ☐ I ☐ II ☐ III
☐ Information Package Received. Date/By: 5/23/2008
☐ Completeness Check:
- ☒ Record Drawing Date/By: 5/19/08 Gene Hatcher
- ☒ Construction Certification Date/By: 5/16/08 Gene Hatcher
- ☒ RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001Only)
- ☒ Insp/Maint Agreement # / Date: #0500117322 5/31/2005
- ☐ BMP Maintenance Plan Location:
- ☐ Other:

☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review
☒ Yes ☐ No Location: Item 20 Sheet 24
☒ Assign **County BMP ID Code #**: Code: PC-287
☒ 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: 8/19/2009
☒ Record Drawing (RD) Review Date: 8/14/2009
☒ Construction Certification (CC) Review Date: 8/14/2009
☐ Actions:
- ☐ No comments.
- ☒ Comments. Letter Forwarded. Date: Email
- ☐ Record Drawing (RD)
- ☐ Construction Certification (CC)
- ☒ Construction-Related (CR)
- ☐ Site Issues (SI)
- ☐ Other :

☑ Second Submission: NA
☑ Reinspection (if necessary): NA
☑ 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 JC~~C 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: _____ Date: _____

Chief Engineer: _____ Date: 10-13-09

*** See separate checklist, if needed.

TRANSMITTAL

RECEIVED
AUG 25 2008
ENVIRONMENTAL DIVISION

DATE: August 22, 2008

TO: Records Management
Fire
Environmental
JCSA (3 copies)

FROM: Brian Elmore, Development Management Assistant

WINDSOR MEADE

SUBJECT: **Case No: SP-0048-2008 Windsor Hall SP Amend**

TAXMAP: **3830100034A**

ATTACHED: For your records.

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

May 21, 2007

RECEIVED
MAY 2 3 2008
ENVIRONMENTAL DIVISION

Mr. Scott Thomas
Environmental Engineer
James City County
101-E Mounts Bay Road
Williamsburg, VA 23188

RE: Windsor Hall BMP Certification

Dear Mr. Thomas:

Please find enclosed the following materials regarding the above-referenced BMP: one copy of the Windsor Hall BMP record drawings, and one copy of the completed Stormwater Management/BMP Facilities Record Drawing and Construction Certification Standard Forms and Instructions.

The design for the above-referenced BMP was completed by AES Consulting Engineers. As a result, the only design drawings available to us for the BMP Certification package were half-size hard copies of the design drawings, and a digital copy of the design BMP grading contours. Digital copies for the remainder of the design drawings were not available.

The attached record drawings were completed using both half-size hard copies of the design drawings, and the digital drawing of the design BMP grading contours. The intent was to submit record drawings that meet the format for James City County BMP Record Drawings as closely as possible. However, upon your review of the attached drawings, I would be happy to accommodate any changes in the record drawings that you might require.

Upon approval of the record drawings, one set of reproducible drawings will also be submitted to the County. Should you have any questions or comments in regards to this submittal package, please feel free to contact me at (804) 200-6435.

Respectfully submitted,
Timmons Group

Janet L. Rogel

Janet L. Rogel, E.I.T.
Project Engineer
JLR:jr
Encl:

1001 Boulders Parkway, Suite 300 | Richmond, Virginia 23225

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities Record Drawing and Construction Certification

Standard Forms & Instructions

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Issue Date
February 1, 2001

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: Amended Site Plan for Windsor Hall
Structure/BMP Name: Hall BMP #1
Project Location: Windsor Hall Site - James City County, VA
BMP Location:
County Plan No.: #SP - 134 - 05

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

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

Brief Description of Stormwater Management/BMP Facility: BMP to serve the Windsor Hall facility

Nearest Visible Landmark to SWM/BMP Facility: _____

Nearest Vertical Ground Control (if known):
☐ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other
Station Number or Name: _____
Datum or Reference Elevation: _____
Control Description: _____
Control Location from Subject Facility: _____

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: _____
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☒ Unknown
Name of Site Work Contractor Who Constructed Facility: JH Martin & Sons
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: _____
Date of Record Drawing/Construction Certification Submittal: May 19, 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 Home
Mailing Address: 453 McLaws Circle, Suite 2
Williamsburg VA
Business Phone: (757) 293-2800 Fax: _____
Contact Person: Mr. Jim Franklin Title: _____

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

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Business Phone: (757) 220-0040
Fax: (757) 220-8994
Responsible Plan Preparer: V. Marc Bennett, P.E.
Title: _____
Plan Name: Amended Site Plan for Windsor Hall
Firm's Project No. _____
Plan Date: 3/6/06
Sheet No.'s Applicable to SWM/BMP Facility: 1 / 20 / 25 / ___ / ___

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

Name: JH Martin & Sons
Mailing Address: 6550 Iron Bridge Road
Richmond, VA 23234
Business Phone: (804) 275-1670
Fax: (804) 271-4129
Contact Person: Lorne Liston, Jr.
Site Foreman/Supervisor: _____
Specialty Subcontractors & Purpose (for BMP Construction Only): _____

Section 4 - Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: Timmons Group
Mailing Address: 1001 Boulders Parkway
Richmond, VA 23225
Business Phone: (804) 200-6574
Fax: (804) 794-1899

Name: Gene Hatcher
Title: Principal

Signature:
Date: 5/19/08

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
GENE W. HATCHER
Lic. No. 013067
5/19/08
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: Timmons Group
Mailing Address: 1001 Boulders Parkway
Richmond, VA 23225
Business Phone: (804) 200-6574
Fax: (804) 794-1899

Name: Gene Hatcher
Title: Principal

Signature:
Date: 5/19/08

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
GENE W. HATCHER
Lic. No. 013067
5/19/08
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

XX 4. Top widths, berm widths and embankment side slopes.

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

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

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

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

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

XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

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

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

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

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

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

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

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

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.)*

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

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

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

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

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

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

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

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

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

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

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

N/A 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.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A B1. Same requirements as Group A Wet Ponds.

N/A B2. Minimum 2:1 length to width flow path provided across the facility.

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

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

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

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

N/A B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

V. Group C - Infiltration Practices *(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)*

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

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

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

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

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

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

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

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

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

N/A C10. Stormwater outfalls provided for overflow associated with larger design storms.

N/A C11. No visual signs of erosion or channel degradation immediately downstream of facility.

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

N/A C13. Observation well provided.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

N/A D2. Sediment pretreatment devices provided.

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

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

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

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

N/A D7. Filtering system is off-line from storm drainage conveyance system.

N/A D8. Overflow outlet has adequate erosion protection.

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

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

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

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

N/A D13. No visual signs of erosion or channel degradation immediately downstream of facility.

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

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

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

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

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

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

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

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

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

N/A F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

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

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

N/A F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

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

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

N/A F15. No visual signs of erosion or channel degradation immediately downstream of facility.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A **G1.** All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.

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

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

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

N/A **G5.** Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.

N/A **G6.** Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

XII. Other Systems

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

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

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

XIII. References

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

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

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

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities Record Drawing and Construction Certification

Standard Forms & Instructions

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Issue Date
February 1, 2001

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: Amended Site Plan for Windsor Hall
Structure/BMP Name: Hall BMP #1
Project Location: Windsor Hall Site - James City County, VA
BMP Location:
County Plan No.: #SP - 134 - 05

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

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

Brief Description of Stormwater Management/BMP Facility: BMP to serve the Windsor Hall facility

Nearest Visible Landmark to SWM/BMP Facility: _____

Nearest Vertical Ground Control (if known):
☐ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other
Station Number or Name: _____
Datum or Reference Elevation: _____
Control Description: _____
Control Location from Subject Facility: _____

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: _____
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☒ Unknown
Name of Site Work Contractor Who Constructed Facility: JH Martin & Sons
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: _____
Date of Record Drawing/Construction Certification Submittal: May 19, 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 Home
Mailing Address: 453 McLaws Circle, Suite 2
Williamsburg, VA
Business Phone: (757) 293-2800 Fax: _____
Contact Person: Mr. Joe Franklin Title: _____

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

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Business Phone: (757) 220-6040
Fax: (757) 220-8994
Responsible Plan Preparer: V. Marc Bennett, P.E.
Title: _____
Plan Name: Amended Site Plan for Windsor Hall
Firm's Project No. _____
Plan Date: 3/6/06
Sheet No.'s Applicable to SWM/BMP Facility: 1 / 20 / 25 / 1

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

Name: JH Martin & Sons
Mailing Address: 6550 Iron Bridge Road
Richmond, VA 23234
Business Phone: (804) 275-1670
Fax: (804) 271-4129
Contact Person: Lane Liston, Jr.
Site Foreman/Supervisor: _____
Specialty Subcontractors & Purpose (for BMP Construction Only): _____

Section 4 - Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: Timmons Group
Mailing Address: 1001 Boulders Parkway
Richmond, VA 23225
Business Phone: (804) 200-6574
Fax: (804) 794-1899

Name: Gene Hatcher
Title: Principal

Signature:
Date: 5/19/08

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
GENE W. HATCHER
Lic. No. 013067
5/19/08
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: Timmons Group
Mailing Address: 1001 Boulders Parkway
Richmond, VA 23225
Business Phone: (804) 200-6574
Fax: (804) 794-1899

Name: Gene Hatcher
Title: Principal

Signature:
Date: 5/19/08

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
GENE W. HATCHER
Lic. No. 013067
5/19/08
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

XX 4. Top widths, berm widths and embankment side slopes.

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

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

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

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

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

XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

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

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

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

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

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

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

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

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.)*

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

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

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

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

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

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

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

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

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

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

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

N/A 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.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A B1. Same requirements as Group A Wet Ponds.

N/A B2. Minimum 2:1 length to width flow path provided across the facility.

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

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

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

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

N/A B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

V. Group C - Infiltration Practices *(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)*

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

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

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

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

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

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

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

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

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

N/A C10. Stormwater outfalls provided for overflow associated with larger design storms.

N/A C11. No visual signs of erosion or channel degradation immediately downstream of facility.

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

N/A C13. Observation well provided.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

N/A D2. Sediment pretreatment devices provided.

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

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

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

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

N/A D7. Filtering system is off-line from storm drainage conveyance system.

N/A D8. Overflow outlet has adequate erosion protection.

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

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

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

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

N/A D13. No visual signs of erosion or channel degradation immediately downstream of facility.

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

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

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

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

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

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

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

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

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

N/A F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

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

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

N/A F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

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

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

N/A F15. No visual signs of erosion or channel degradation immediately downstream of facility.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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: Windsormeade Way
Structure/BMP Name: SWM / BMP #2
Project Location: between Monticello Marketplace and Windsormeade Marketplace
BMP Location: 2700 feet north of Monticello Avenue, on right side of Windsormeade Way
County Plan No.: SP - 093 - 03

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

Tax Map/Parcel No.: (38-4) (01-00-0001)
BMP ID Code (if known):
Zoning District: MU (Mixed Use)
Land Use: Roadway
Site Area (sf or acres): 19.85 acres, moreor less

Brief Description of Stormwater Management/BMP Facility: dry pond constructed through excavation

Nearest Visible Landmark to SWM/BMP Facility: Windsor Hall (At Windsormeade) (located to the northeast of BMP #2)

Nearest Vertical Ground Control (if known):
☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other
Station Number or Name: 322
Datum or Reference Elevation: 65.61
Control Description: JCC Geodetic Control Monumnet
Control Location from Subject Facility: 4,500 feet, more or less, southwest from site

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: October 2003
Facility Monitored by County Representative during Construction: ☒ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: C. A. Barrs
Name of Professional Firm Who Routinely Monitored Construction: AES Consutling Engineers / ESC Mid-Atlantic, LLC
Date of Completion for SWM/BMP Facility: May 2005
Date of Record Drawing/Construction Certification Submittal: December 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: C. C. Casey, Ltd. Co.
Mailing Address: 721 Richmond Road
Williamsburg, Virginia 23185
Business Phone: 757-258-5042 Fax:
Contact Person: Robert Casey Title:

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

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: V. Marc Bennett, P.E.
Title: Senior Project Manager
Plan Name: Windsormeade Way
Firm's Project No. 8818-04
Plan Date: May, 2002
Sheet No.'s Applicable to SWM/BMP Facility: 10 / BMP#2 / 17 / / /

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

Name: C.A. Barrs
Mailing Address: P.O. Box 1489
Yorktown, Virginia 23692
Business Phone: 757-898-7282
Fax: 757-898-1282
Contact Person: Erik Turkovich
Site Foreman/Supervisor: 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 Consutling Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Business Phone: 757-253-0040
Fax: 757-220-8994

Name: Van Marc Bennett
Title: Senior Project Manager
Signature:
Date: December 22, 2008

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. 026628
12/22/08
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

Construction Certification

Firm Name: ECS, Mid-Atlantic, LLC
Mailing Address: 108 Ingram Road, Unit 1
Williamsburg, Virginia 23188
Business Phone: 757-229-6677
Fax: 757-229-9978

Name: Michael J. Galli
Title: Principal Engineer
Signature:
Date: 1/8/09

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
1/8/09
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.)*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.
Inc	12.	Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
N/A	13.	Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
XX	14.	Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
XX	15.	Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
XX	16.	Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
N/A	17.	BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
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.)*

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

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

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

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

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

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

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

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

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

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

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

N/A 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.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A B1. Same requirements as Group A Wet Ponds.

N/A B2. Minimum 2:1 length to width flow path provided across the facility.

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

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

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

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

N/A B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

V. Group C – Infiltration Practices *(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)*

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

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

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

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

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

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

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

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

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

N/A C10. Stormwater outfalls provided for overflow associated with larger design storms.

N/A C11. No visual signs of erosion or channel degradation immediately downstream of facility.

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

N/A C13. Observation well provided.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

N/A D2. Sediment pretreatment devices provided.

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

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

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

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

N/A D7. Filtering system is off-line from storm drainage conveyance system.

N/A D8. Overflow outlet has adequate erosion protection.

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

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

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

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

N/A D13. No visual signs of erosion or channel degradation immediately downstream of facility.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

N/A E8. Gravel diaphrahm provided in areas where lateral sheet flow from impervious surgaces are directly connected to the open channel system.

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

XX	F1.	All requirements of Section II, Minimum Standards, apply to Group F facilities.
XX	F2.	Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.
N/A	F3.	Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)
N/A	F4.	Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.
XX	F5.	A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging
XX	F6.	Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.
N/A	F7.	Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.
XX	F8.	Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.
N/A	F9.	Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.
N/A	F10.	Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.
N/A	F11.	Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.
XX	F12.	Stilling basin or standard outlet protection provided at principal spillway outlet.
XX	F13.	Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide, slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.
N/A	F14.	No visual signs of undercutting of timber walls or clogging of the low orifice were present.
XX	F15.	No visual signs of erosion or channel degradation immediately downstream of facility.
XX	F16.	No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

N/A SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

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

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

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

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

XII. Other Systems

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

Meeting on site
0930
9/3/09

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

Project Name: Windsormeade Way BMP 2
County Plan No.: SP-093-03
Stormwater Management Facility: _____
BMP Phase #: ☐ I ☐ II ☐ III

- ☒ Information Package Received. Date/By: 1/23/2009
- ☐ Completeness Check:
  - ☒ Record Drawing Date/By: 12/22/2008 Marc Bennett
  - ☒ Construction Certification Date/By: 1/8/2009 Michael Gall
  - ☒ RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001Only)
  - ☐ Insp/Maint Agreement # / Date: _____
  - ☒ BMP Maintenance Plan Location: _____
  - ☐ Other: _____
- ☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review
  - ☒ Yes ☐ No Location: Sheet 14, Item 20
- ☒ Assign **County BMP ID Code #**: Code: PC-237
- ☒ 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: 9/23/09
- ☒ Record Drawing (RD) Review Date: 4/3/09
- ☒ Construction Certification (CC) Review Date: 4/3/09
- ☐ Actions:
  - ☐ No comments.
  - ☒ Comments. Letter Forwarded. Date: 4/3/09
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☒ Construction-Related (CR)
  - ☒ Site Issues (SI)
  - ☐ Other : _____
- ☐ Second Submission: _____
- ☐ Reinspection (if necessary): _____
- ☒ 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

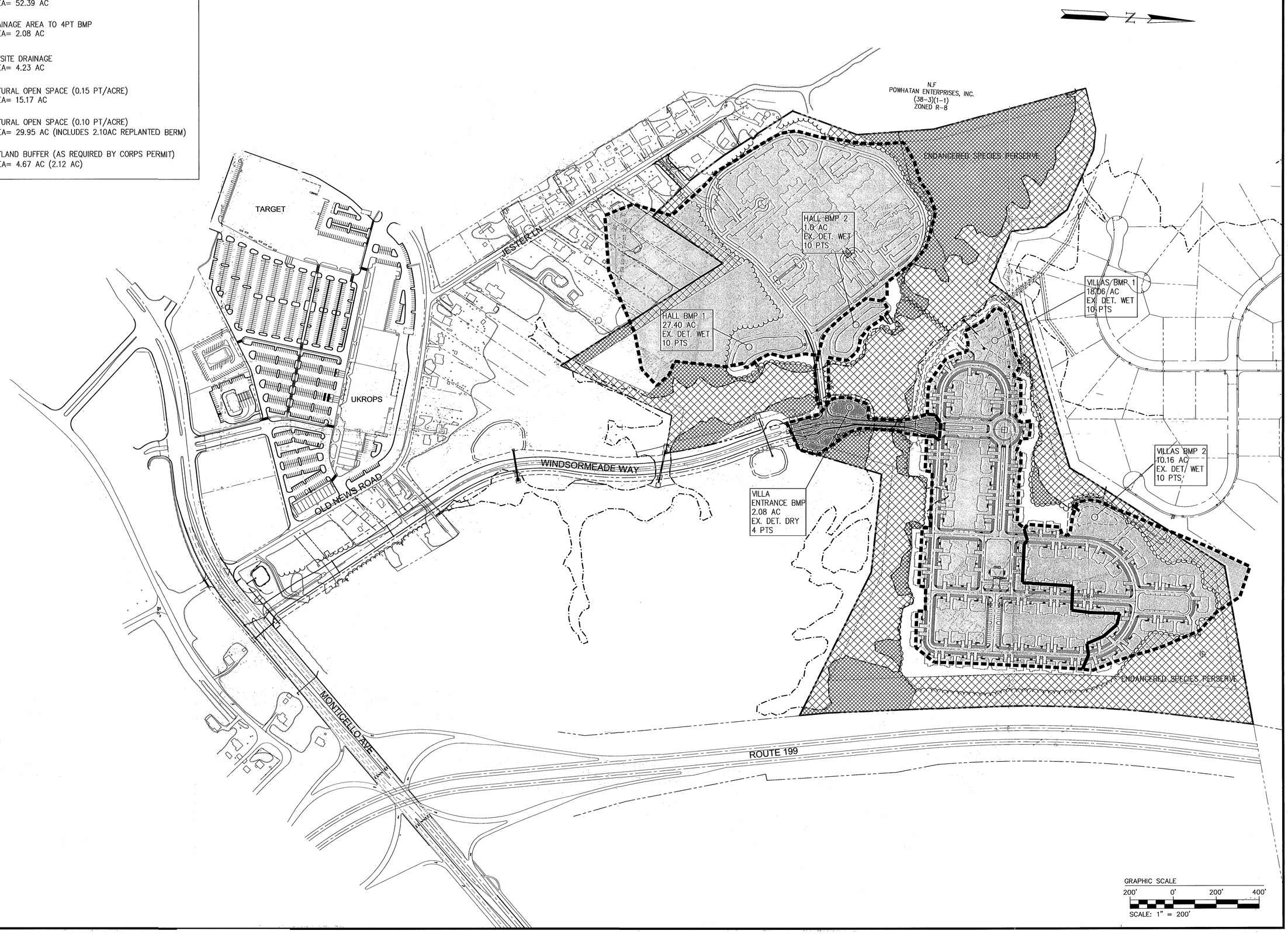
Inspector: _____ Date: 9/25/09

Chief Engineer: _____ Date: _____

*** See separate checklist, if needed.

TOTAL SITE AREA= 105.93 ACRES

- DRAINAGE AREA TO 10PT BMP (ON-SITE) AREA= 52.39 AC
- DRAINAGE AREA TO 4PT BMP AREA= 2.08 AC
- OFFSITE DRAINAGE AREA= 4.23 AC
- NATURAL OPEN SPACE (0.15 PT/ACRE) AREA= 15.17 AC
- NATURAL OPEN SPACE (0.10 PT/ACRE) AREA= 29.95 AC (INCLUDES 2.10AC REPLANTED BERM)
- WETLAND BUFFER (AS REQUIRED BY CORPS PERMIT) AREA= 4.67 AC (2.12 AC)



No.	DATE	REVISION / COMMENT / NOTE	BY
2	5/12/04	REVISED PER JCC COMMENTS DATED 4/04	VMB
1	3/29/04	REVISED PER JCC COMMENTS DATED 2/10/04	VMB

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
No. 26828
5-12-04
PROFESSIONAL ENGINEER

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

BMP POINT DISPLAY

WINDSOR MEADE of Williamsburg

VILLA ENTRANCE & SEWER CONSTRUCTION PLAN

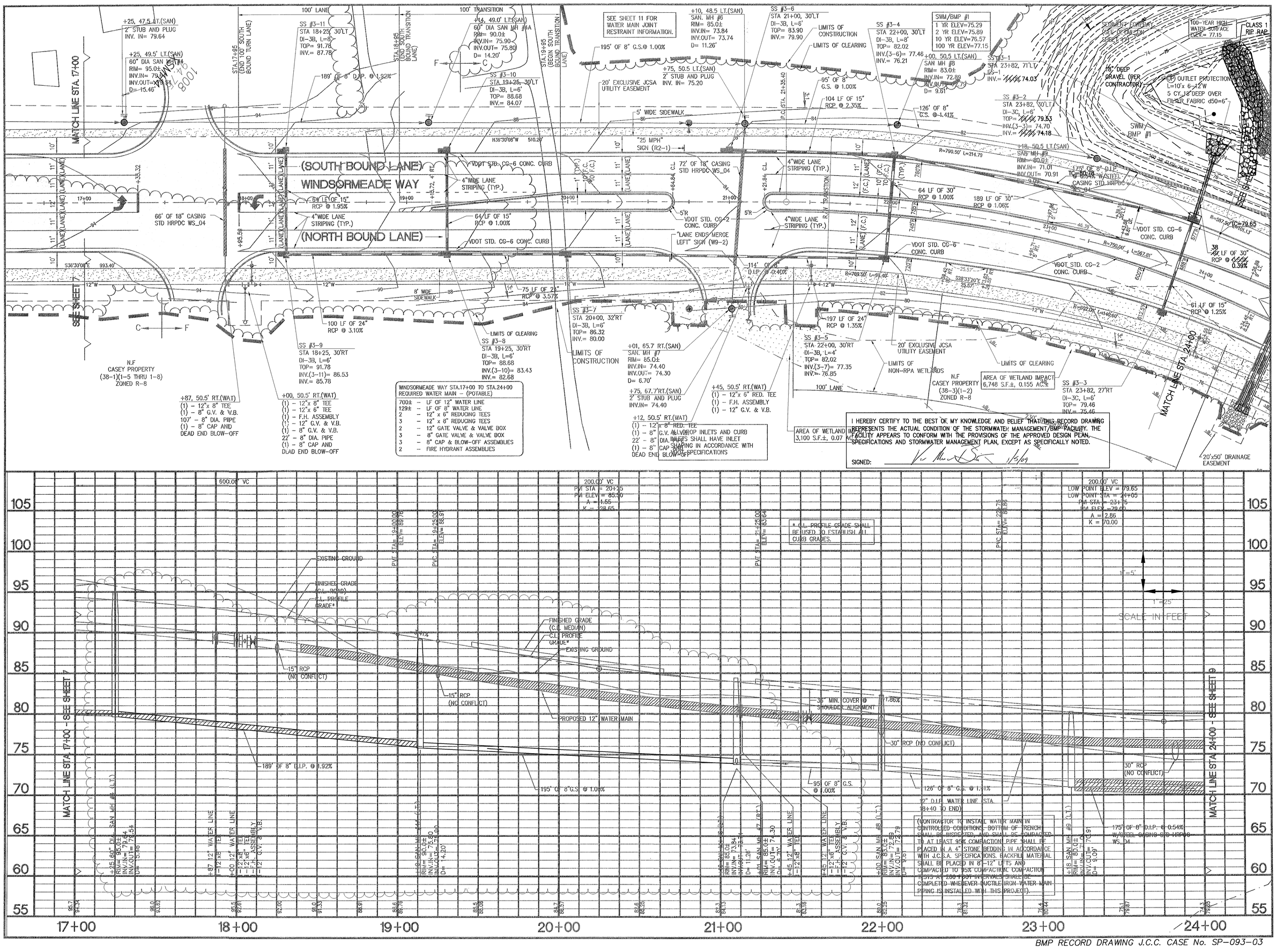
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
JAG	CVC
Scale	Date
1"=200'	1/9/04

Project No. 8818-05

Drawing No. 1 OF 1

JAG WINDSORMEADE.09+ERADD BMP POINTS.DWG



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.

SIGNED: 1/5/09

No.	DATE	REVISION / COMMENT / NOTE	BY
5	DEC. 2008	BMP RECORD DRAWING UTILITY REVISIONS	VMB
4	11/5/03	REMOVED LEFT TURN LANE AT STA. 14+00	VMB
3	10/3/03	REVISED PER JCC COMMENT LETTER DATED 10/1/03	VMB
2	8/28/03	REVISED PER JCC COMMENT LETTER	VMB
1	8/20/03	REVISED PER JCC COMMENT LETTER & ORB REVIEW	VMB
7	12/16/03		VMB

COMMONWEALTH OF VIRGINIA — VAN MANCHESTER III — LICENSED PROFESSIONAL ENGINEER — 11/5/03

JAN 22 2009 — ENVIRONMENTAL DIVISION

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

WINDSORMEADE WAY
ROADWAY / UTILITIES PLAN AND PROFILE
STA. 17+00 TO STA. 24+00

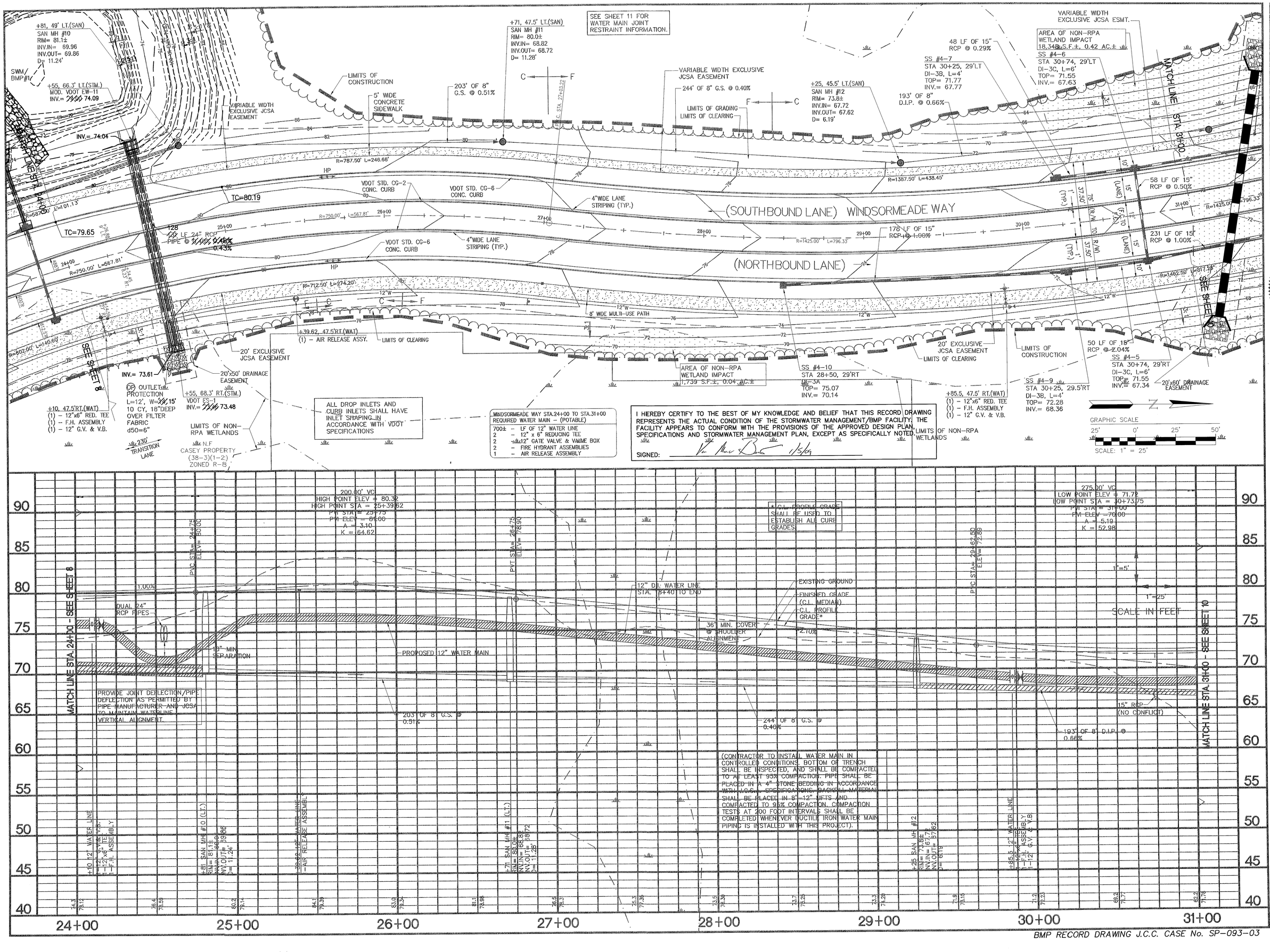
JAMES CITY COUNTY — VIRGINIA — BERKELEY DISTRICT

Designed HWP/RDS	Drawn AES
Scale 1"=25'	Date 5/2/02
Project No. 8818-04 (AS-BUILT)	
Drawing No. 8	

BMP RECORD DRAWING J.C.C. CASE No. SP-093-03

DECEMBER 2008

No.	DATE	REVISION / COMMENT / NOTE	BY
5	DEC. 2008	BMP RECORD DRAWING	VMB
4	11/5/03	REMOVED LEFT TURN LANE AT STA. 14+00	VMB
3	10/3/03	REVISED PER JCC COMMENT LETTER DATED 10/1/03	VMB
2	8/28/03	REVISED PER JCC COMMENT LETTER	VMB
1	6/20/03	REVISED PER JCC COMMENT LETTER & DRB REVIEW	VMB



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Fax (757) 220-8994
CONSULTING ENGINEERS

WINDSORMEADE WAY
ROADWAY / UTILITIES PLAN AND PROFILE
STA. 24+00 TO STA. 31+00

VIRGINIA
JAMES CITY COUNTY
BERKELEY DISTRICT

Designed	Drawn
HWP/RDS	RDS
Scale	Date
1"=25'	5/2/02

Project No.
8818-04 (AS-BUILT)

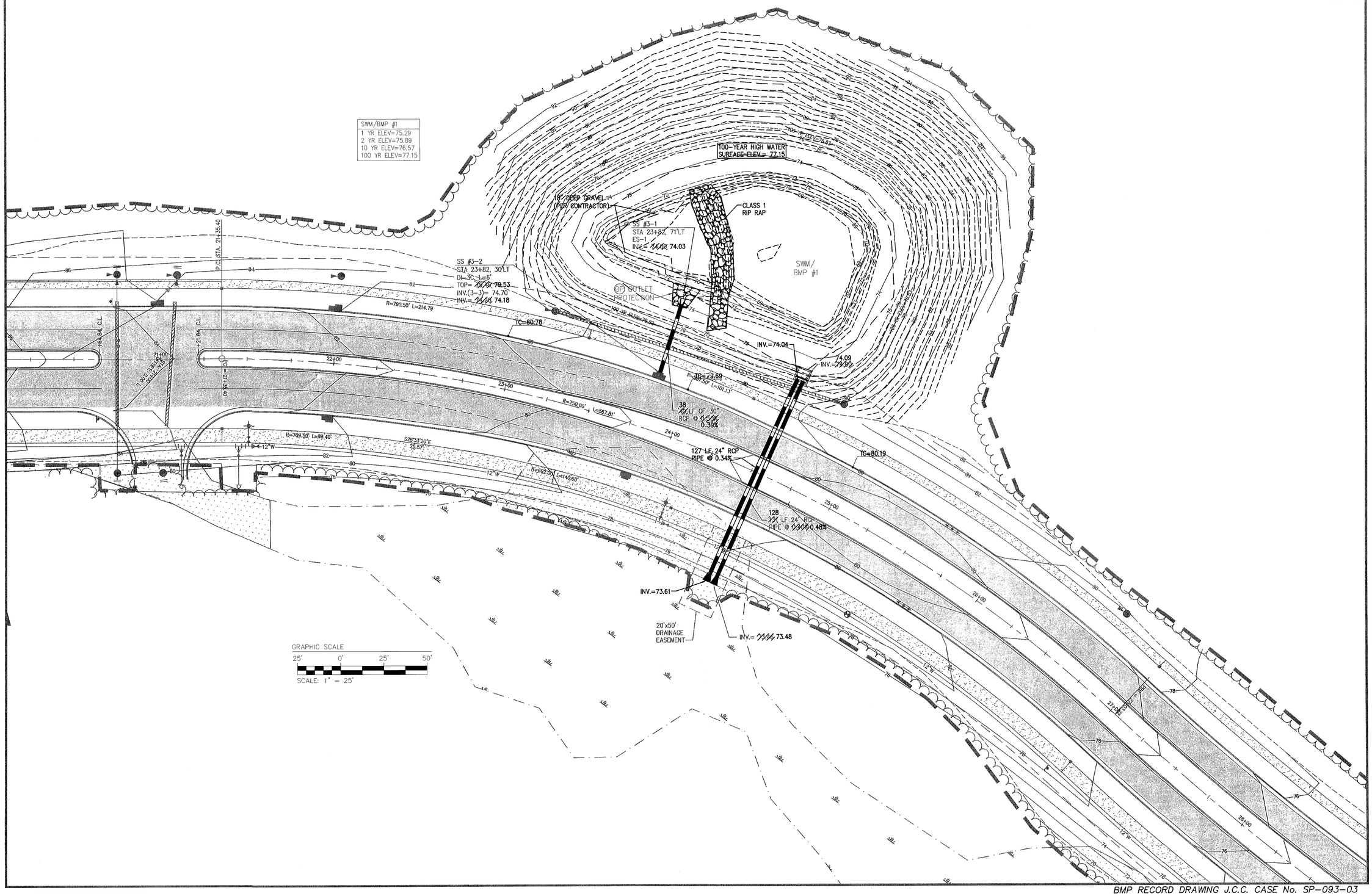
Drawing No.
9

DECEMBER 2008

BMP RECORD DRAWING J.C.C. CASE No. SP-093-03

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.

SIGNED: _____ 11/3/09



No.	DATE	REVISION / COMMENT / NOTE	BY

COMMONWEALTH OF VIRGINIA
VAHARIC LEONETTI
No. 2326
11/5/03
PROFESSIONAL ENGINEER

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Fax (757) 220-8994
AES CONSULTING ENGINEERS

WINDSORMEADE WAY
RECORD DRAWING
SWM/ BMP #1

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
HWP/RDS	AES
Scale	Date
1"=25'	5/2/02

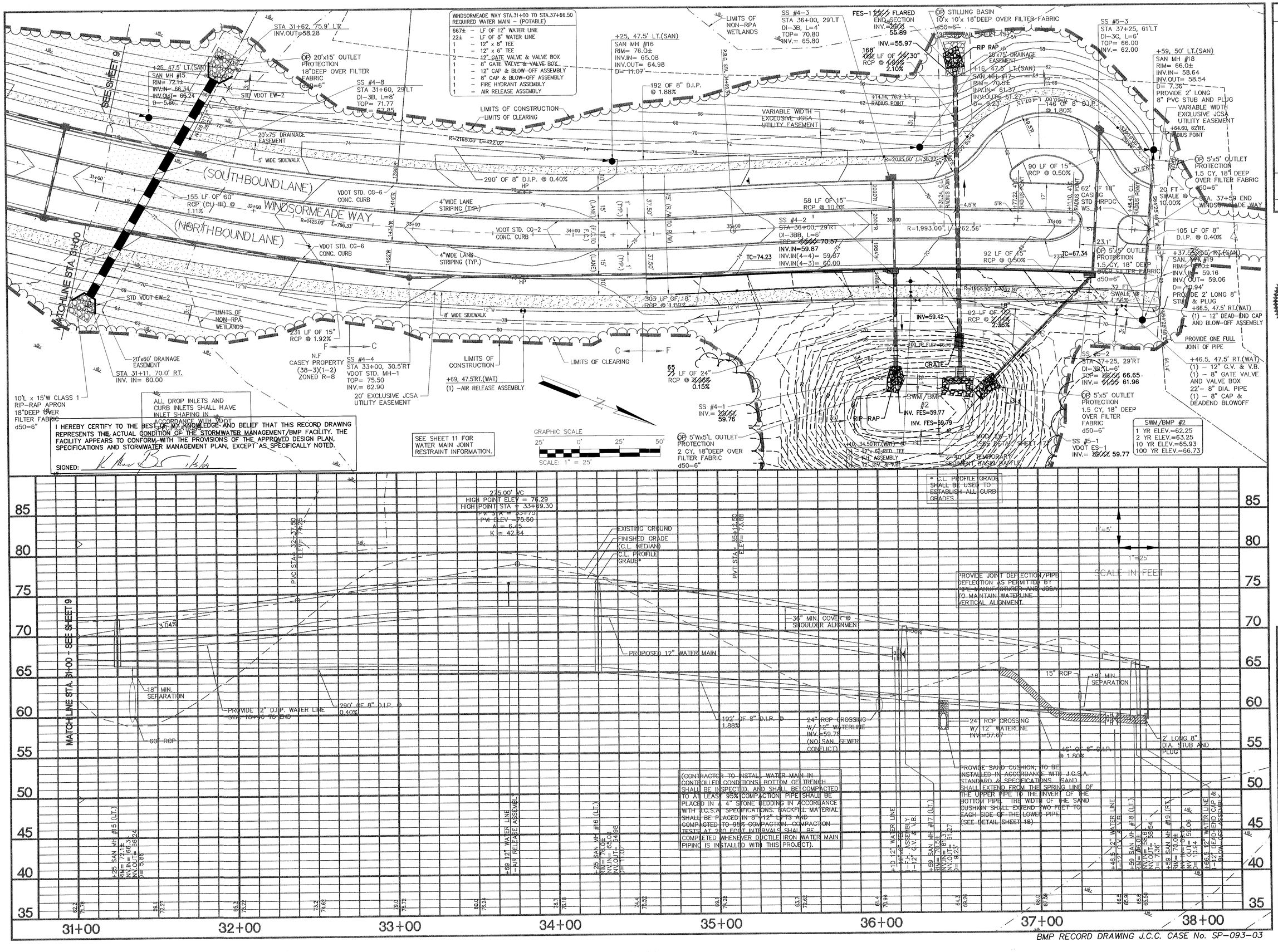
Project No.
8818-04 (AS-BUILT)

Drawing No.
BMP#1

BMP RECORD DRAWING J.C.C. CASE No. SP-093-03

DECEMBER 2008

No.	DATE	REVISION / COMMENT / NOTE	BY
5	DEC. 2008	BMP RECORD DRAWING	VMB
4	11/5/03	REMOVED LEFT TURN LANE AT STA. 14+00	VMB
3	10/3/03	REVISED PER JCC COMMENT LETTER DATED 10/1/03	VMB
2	8/28/03	REVISED PER JCC COMMENT LETTER	VMB
1	6/26/03	REVISED PER JCC COMMENT LETTER & DRB REVIEW	VMB



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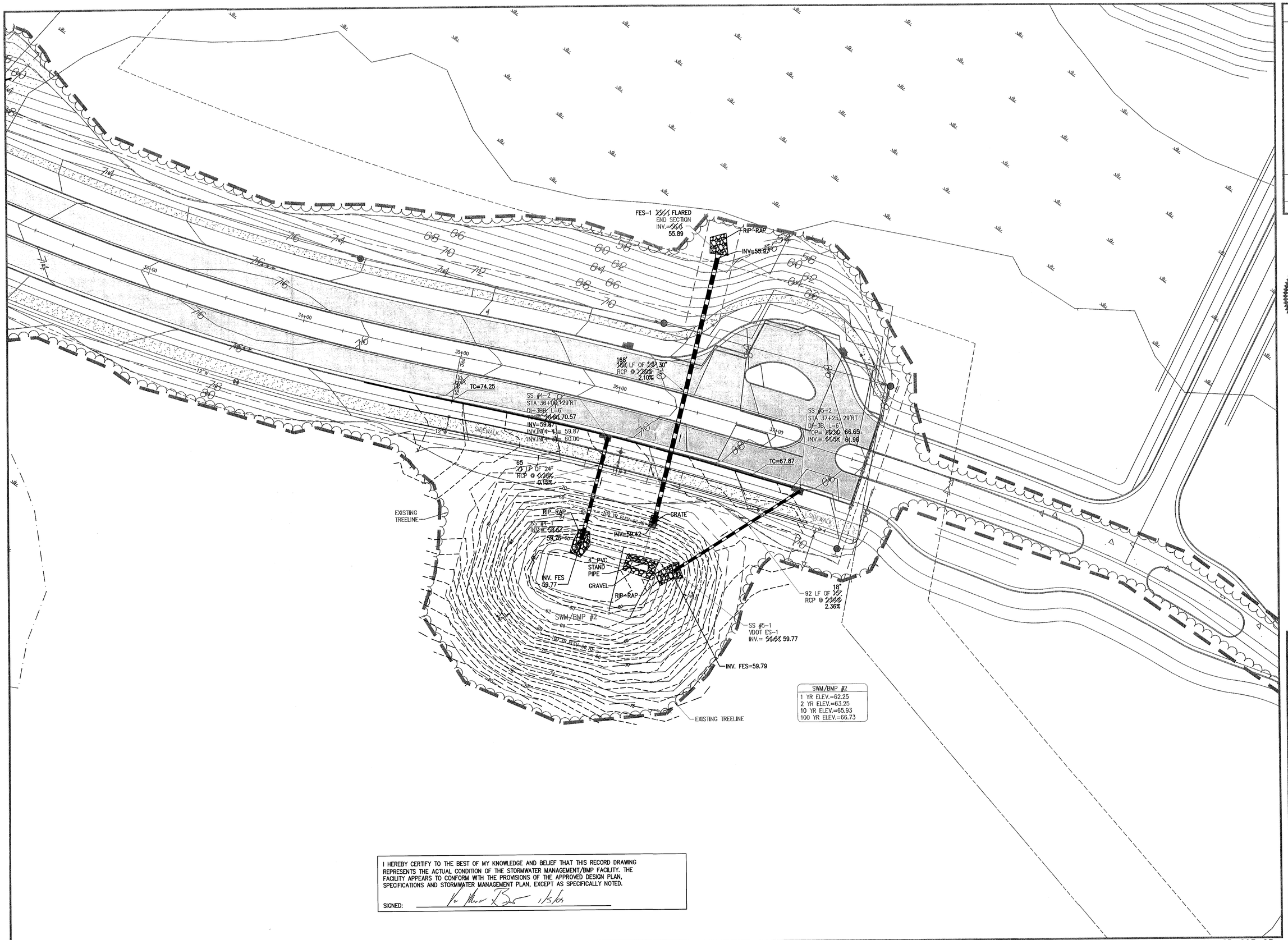
WINDSORMEADE WAY
ROADWAY / UTILITIES PLAN AND PROFILE
STA. 31+00 TO STA. 37+62.10

JAMES CITY COUNTY, VIRGINIA
BERKELEY DISTRICT

Designed	Drawn
HWP/RDS	AES
Scale	Date
1"=25'	5/2/02

Project No. 8818-04 (AS-BUILT)
Drawing No. 10

DECEMBER 2008



SWM/BMP #2
1 YR ELEV.=62.25
2 YR ELEV.=63.25
10 YR ELEV.=65.93
100 YR ELEV.=66.73

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.

SIGNED: _____ 11/5/08

No.	DATE	REVISION / COMMENT / NOTE	BY

COMMONWEALTH OF VIRGINIA
VAUGHAN MARC BENNETT
No. 2655
LICENSED PROFESSIONAL ENGINEER
11/5/08

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AES CONSULTING ENGINEERS

WINDSORMEADE WAY
RECORD DRAWING
SWM/ BMP #2

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
HWP/RDS	AES
Scale	Date
1"=25'	5/2/02
Project No.	
8818-04 (AS-BUILT)	
Drawing No.	
BMP#2	

BMP RECORD DRAWING J.C.C. CASE No. SP-093-03

DECEMBER 2008

POND FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACTILITY, 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 TWO DETENTION PONDS.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE DETENTION POND 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 DETENTION POND 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 DETENTION POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME, FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL 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, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

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.

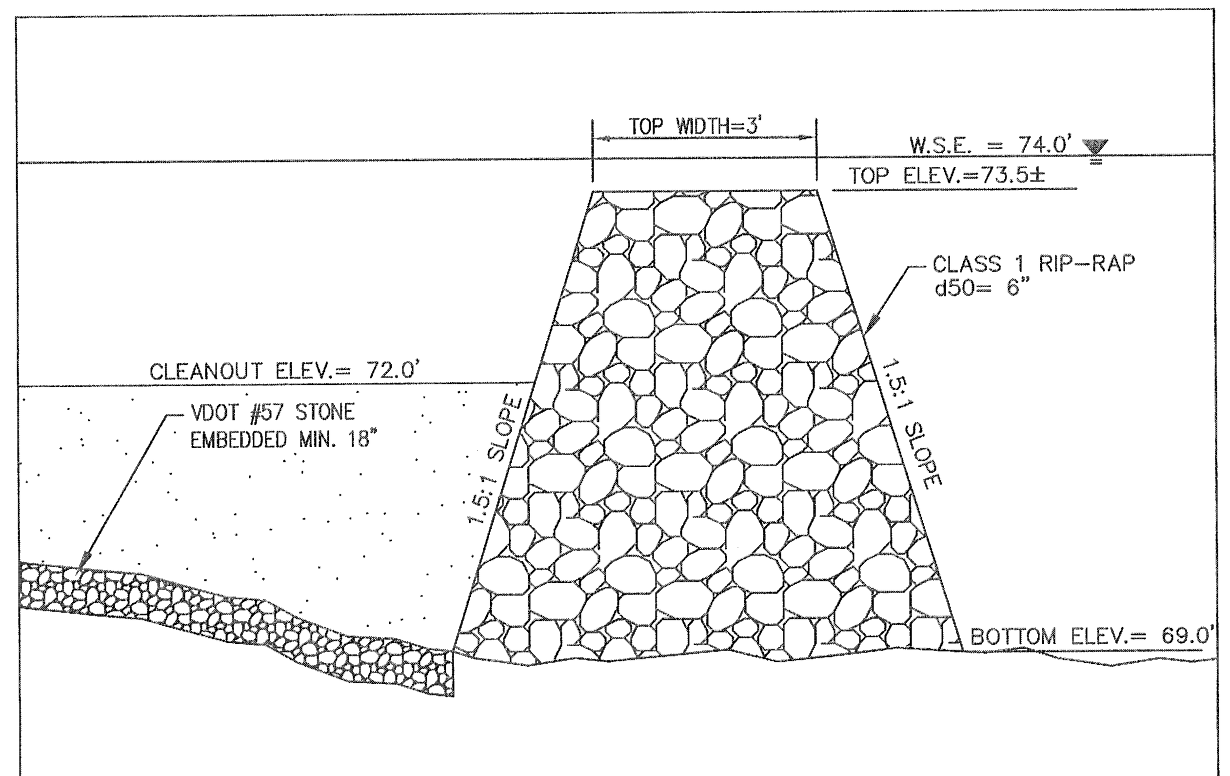
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

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 FROM BASIN 1 AND INSTALL RIP-RAP FOREBAY. SEDIMENT BASIN 2 SHALL BE REGRADED AND SEEDED. THE BAFFLES ORGINIALLY INSTALLED WITH SEDIMENT BASIN 2 SHALL REMAIN UNTIL SUCH TIME AS THE FACILITY IS REMOVED OR MODIFIED.



FOREBAY BARRIER BMP #1

N.T.S.

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, MATERIALS, 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.

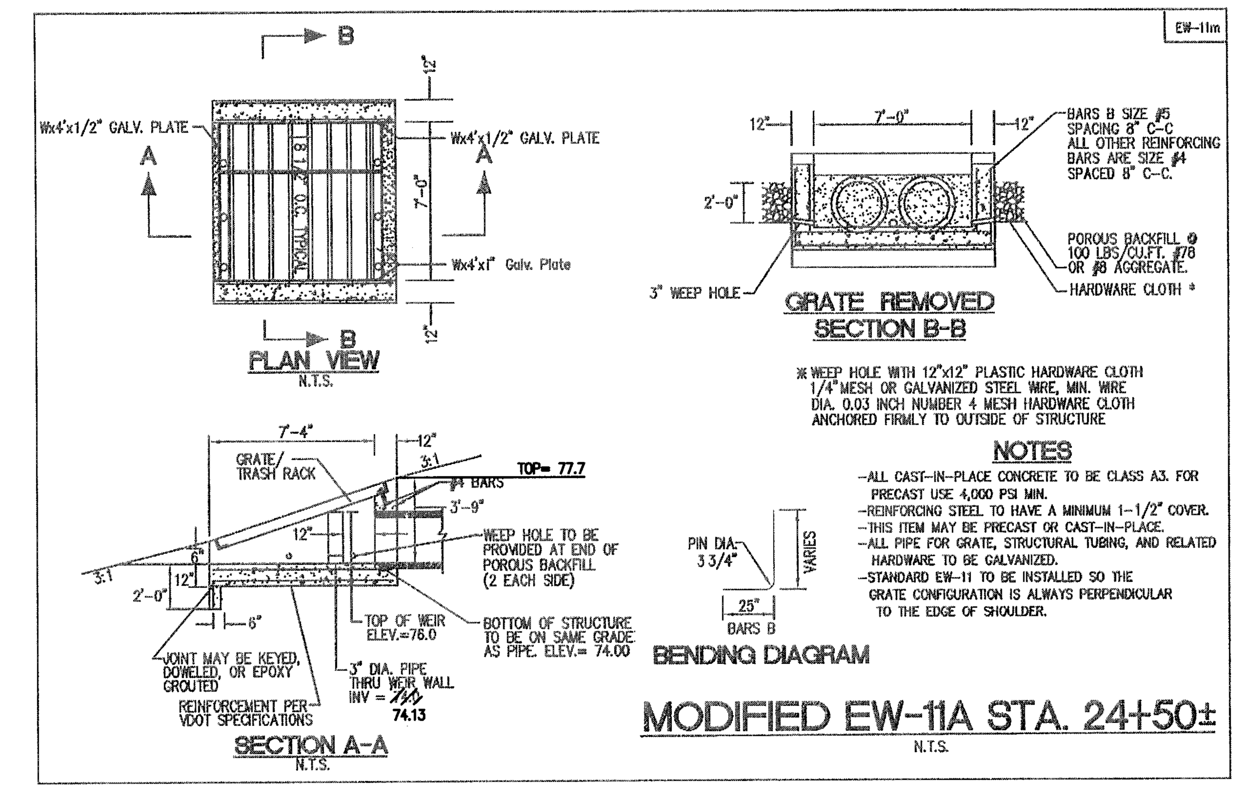
4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE PROPERTY. 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 AN AREA ON THE PROPERTY AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS 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. 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.

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.

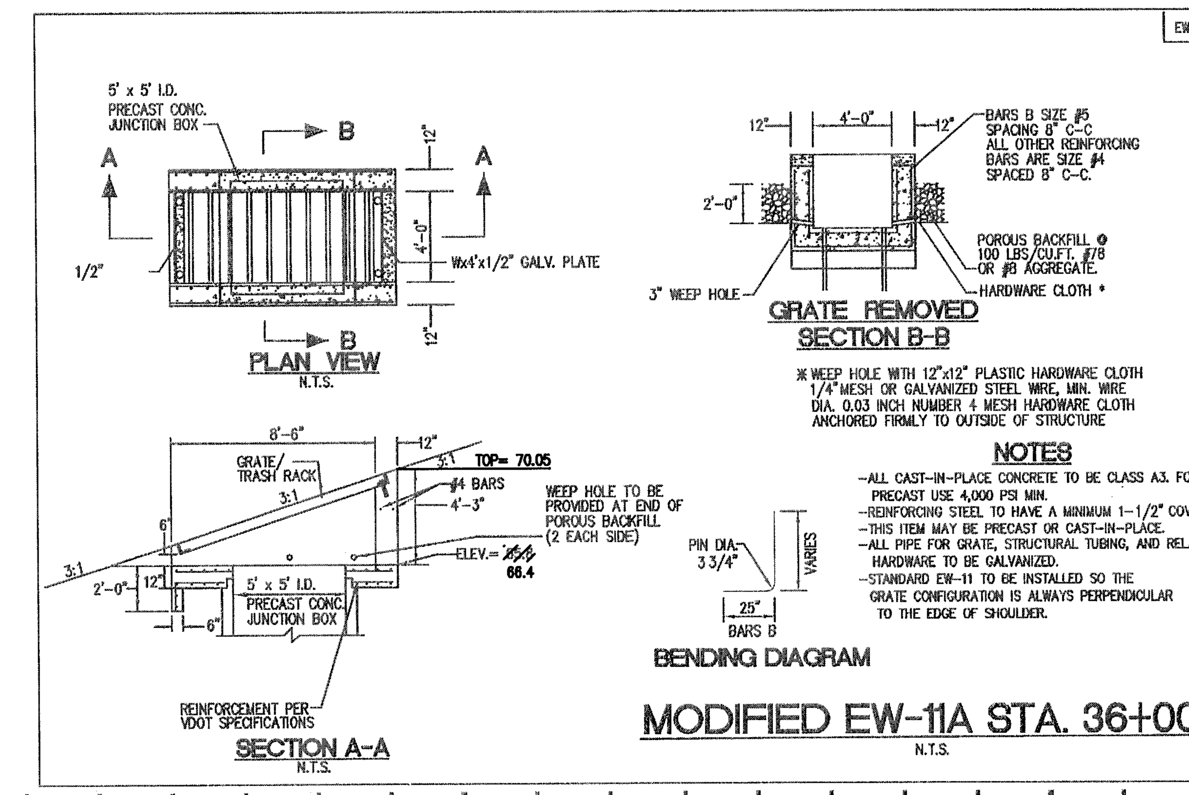
7. THE STORMWATER MANAGEMENT / BMP FACILITIES SHOWN ON THESE PLANS REQUIRE THE SUBMISSION, REVIEW AND APPROVAL OF RECORD DRWAING(S) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND / SURETY. THE GEOTECHNICAL ENGINEER IS TO ENSURE THAT HIS / HER INSPECTION OF THE SWM / BMP CONSTRUCTION ACTIVITY IS PERFORMED DURING AND FOLLOWING CONSTRUCTION OF THE SWM / BMP IN ACCORDANCE WITH THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER MANAGEMENT / BMP FACILITIES DESIGN GUIDELINES HANDBOOK, DATED AUGUST 30, 2000.

8. THE CONTRACTOR SHALL PROVIDE INTERIM CERTIFICATION OF TEMPORARY SEDIMENT BASINS AT THE DETENTION PONDS 1 AND 2 AND SEDIMENT BASIN No. 3 IN ACCORDANCE WITH SECTION 5 OF THE JAMES CITY COUNTY BMP, EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT DESIGN GUIDES.



MODIFIED EW-11A STA. 24+50±

N.T.S.



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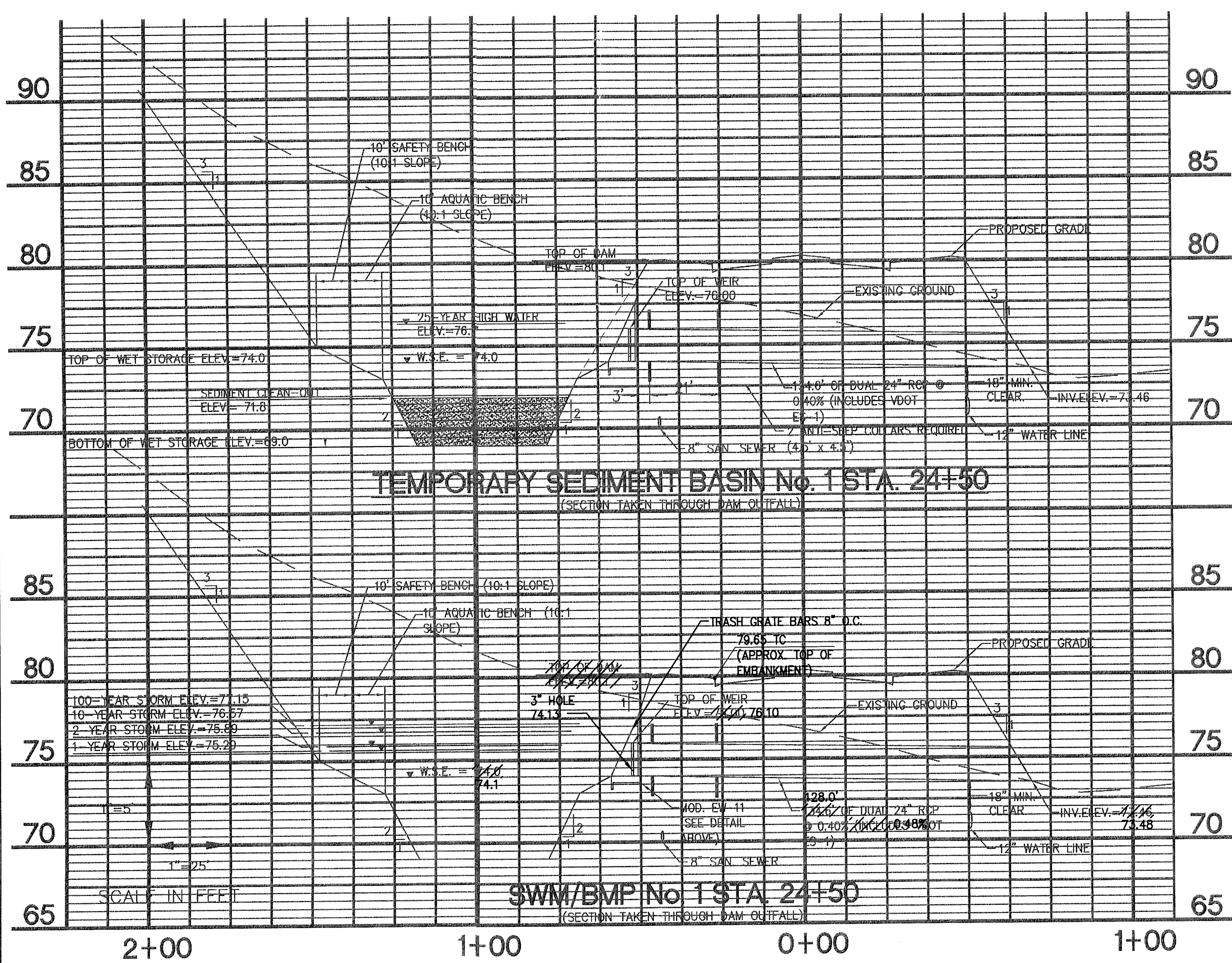
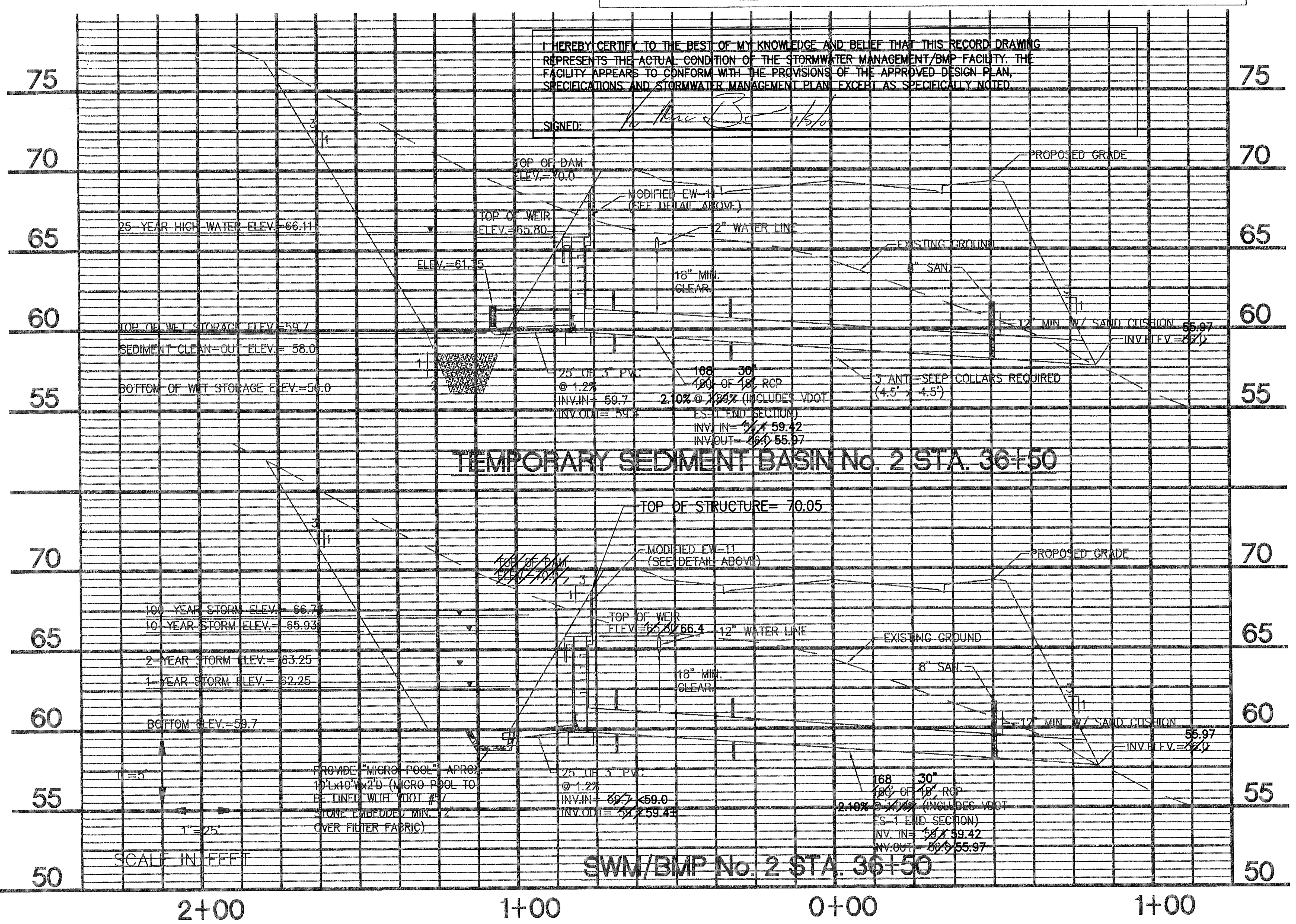




No.	DATE	REVISION / COMMENT / NOTE	BY
5	DEC. 2008	BMP RECORD DRAWING	VMB
4	11/5/03	REMOVED LEFT TURN LANE AT STA. 14+00	VMB
3	10/3/03	REVISED PER JCC COMMENT LETTER DATED 10/1/03	VMB
2	8/28/03	REVISED PER JCC COMMENT LETTER	VMB
1	6/20/03	REVISED PER JCC COMMENT LETTER & DRB REVIEW	VMB

COMMONWEALTH OF VIRGINIA — VAN MARC BENNETT — No. 025828 — 11/5/03 — PROFESSIONAL ENGINEER

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

WINDSORMEADE WAY

STORMWATER MANAGEMENT DETAILS

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
HWP/RDS	AES
Scale	Date
1"=50'	5/2/02
Project No.	
8818-04 (AS-BUILT)	
Drawing No.	
17	

1. Swale behind tennis courts
   Needs to be improved for positive flow
   Stilling Basin needs to be installed at base of swale
   Areas on sides of swale and at bottom needs to stabilized

2. Swale areas needs to be stabilized
3. Area of Irrigation system needs stabilized
4. Emergency spillway - replace rip rap below lip
5. Dust fall not constructed per plans

TRANSMITTAL

APR 1
ENVIRONMENTAL

DATE: **April 9, 2008**

TO: JCSA
Environmental
Fire
County Engineer

FROM: Kate Sipes, Senior Planner
WINDSORmeade -

SUBJECT: **SP-0048-2008, Windsor Hall Site Plan Amendment**

ITEMS ATTACHED:

- Site plan + stormwater calcs.

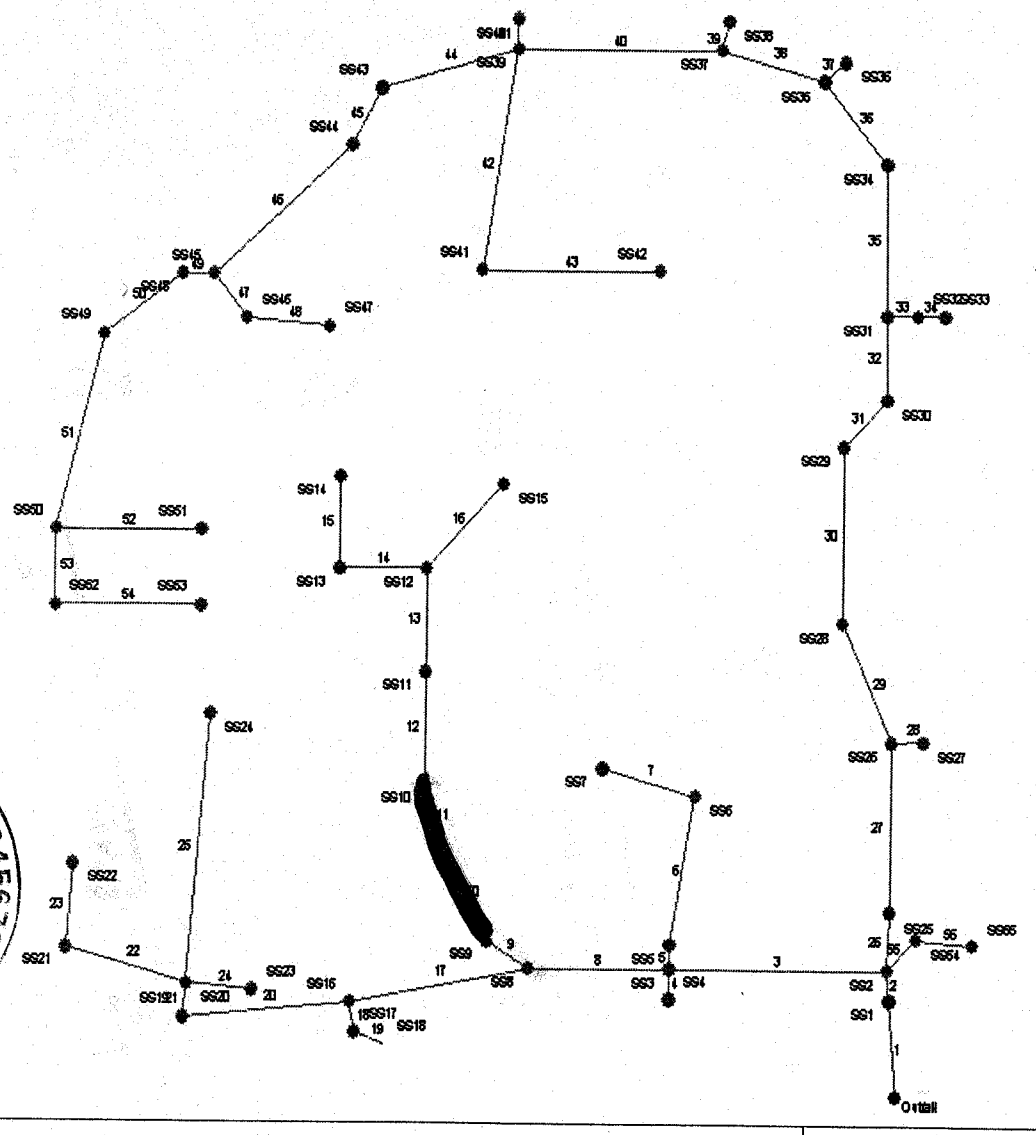
ACTION: Please review and return comments by **April 23, 2008. Please note:** this is an amendment to SP-0134-2005.

Please upload any comments issued for this application to CaseTrak.

Amendment is approved by the Environmental Division. Work under the amendment is covered under existing Land-Disturbing Permit #05-82 as issued under approved County Plan No. SP-04-04.

Scott Thorne
5/16/08

Hydraflow Plan View



RECEIVED
APR 2008
Planning

Windsor Hall (revised)	No. Lines: 56	04-02-2008

Hydraflow Storm Sewers 2005

Storm Sewer Tabulation

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	77.0	0.07	13.28	0.90	0.06	9.34	5.0	17.1	4.9	45.44	201.1	6.43	36	9.09	55.00	48.00	62.26	61.90	66.03	0.00	SS-1-Outfall
2	1	24.0	0.22	13.21	0.65	0.14	9.28	5.0	17.0	4.9	45.21	253.6	6.40	36	14.46	58.47	55.00	62.47	62.36	66.23	66.03	SS2-SS1
3	2	191.0	0.34	6.08	0.75	0.26	4.03	5.0	13.1	5.4	21.87	58.23	7.41	24	6.63	71.13	58.47	72.79	63.11	76.63	66.23	SS3-SS2
4	3	24.0	0.10	0.10	0.90	0.09	0.09	5.0	5.0	7.1	0.64	17.44	0.62	15	7.29	72.88	71.13	73.74	73.74	76.63	76.63	SS4-SS3
5	3	19.0	0.33	0.76	0.90	0.30	0.62	5.0	6.9	6.6	4.11	20.26	4.11	15	9.84	73.00	71.13	73.81	73.57	77.00	76.63	SS5-SS3
6	5	120.0	0.05	0.43	0.75	0.04	0.32	5.0	5.8	6.9	2.22	9.92	2.88	15	2.36	75.83	73.00	76.43	74.13	80.00	77.00	SS6-SS5
7	6	84.0	0.38	0.38	0.75	0.29	0.29	5.0	5.0	7.1	2.03	4.57	3.10	15	0.50	76.25	75.83	76.82	76.61	80.00	80.00	SS7-SS6
8	3	124.0	0.00	4.88	0.00	0.00	3.06	0.0	12.7	5.5	16.80	20.21	5.53	24	0.80	72.12	71.13	73.89	73.30	83.46	76.63	SS8-SS3
9	8	43.0	0.04	1.26	0.75	0.03	0.94	5.0	12.5	5.5	5.21	11.88	2.95	18	1.28	72.67	72.12	74.65	74.54	82.70	83.46	SS9A-SS8
10	9	86.0	0.28	1.22	0.75	0.21	0.92	0.0	12.1	5.6	5.11	9.34	2.89	18	0.79	73.35	72.67	74.94	74.73	81.00	82.70	SS9B-SS9A
11	10	51.0	0.09	0.94	0.75	0.07	0.71	5.0	11.8	5.6	3.98	7.35	2.25	18	0.49	73.60	73.35	75.10	75.03	81.00	81.00	SS10-SS9B
12	11	89.0	0.03	0.85	0.75	0.02	0.64	5.0	11.4	5.7	3.65	4.59	2.97	15	0.51	74.05	73.60	75.41	75.12	81.00	81.00	SS11-SS10
13	12	82.0	0.18	0.82	0.75	0.14	0.62	5.0	11.0	5.8	3.56	4.51	2.91	15	0.49	74.45	74.05	75.67	75.43	79.50	81.00	SS12-SS11
14	13	76.0	0.08	0.15	0.75	0.06	0.11	5.0	9.0	6.2	0.69	4.57	0.58	15	0.50	74.83	74.45	75.94	75.93	92.00	79.50	SS13-SS12
15	14	73.0	0.07	0.07	0.75	0.05	0.05	5.0	5.0	7.1	0.37	7.56	2.21	15	1.37	89.00	88.00	89.24	88.24	92.00	92.00	SS14-SS13
16	13	95.0	0.49	0.49	0.75	0.37	0.37	5.0	5.0	7.1	2.62	6.63	3.11	15	1.05	75.45	74.45	76.10	75.86	79.50	79.50	SS15-SS12
17	8	159.0	0.22	3.62	0.75	0.17	2.12	5.0	8.4	6.3	13.34	49.55	5.23	24	4.80	79.75	72.12	81.04	74.40	86.48	83.46	SS16-SS8
18	17	24.0	0.14	1.98	0.90	0.13	0.86	5.0	5.2	7.1	6.11	7.43	3.46	18	0.50	79.87	79.75	81.54	81.46	86.48	86.48	SS17-SS16
19	18	27.0	1.84	1.84	0.40	0.74	0.74	5.0	5.0	7.1	5.24	7.29	2.97	18	0.48	80.00	79.87	81.82	81.75	80.00	86.48	SS18-SS17
20	17	147.0	0.31	1.42	0.70	0.22	1.09	5.0	7.8	6.4	7.02	17.64	4.75	18	2.82	83.90	79.75	84.91	81.40	91.58	86.48	SS19-SS16
21	20	27.0	0.07	1.11	0.85	0.06	0.87	5.0	7.7	6.5	5.65	22.50	4.23	18	4.59	85.14	83.90	86.05	85.23	88.35	91.58	SS20-SS19

Windsor Hall (revised) | Number of lines: 56 | Run Date: 04-02-2008

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

Storm Sewer Tabulation

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	21	109.0	0.24	0.62	0.85	0.20	0.49	5.0	5.7	6.9	3.40	11.11	3.17	18	1.12	86.36	85.14	87.06	86.39	89.50	88.35	SS21-SS20
23	22	66.0	0.38	0.38	0.75	0.29	0.29	5.0	5.0	7.1	2.03	8.49	2.90	15	1.73	87.50	86.36	88.07	87.29	90.00	89.50	SS22-SS21
24	21	58.0	0.11	0.11	0.85	0.09	0.09	5.0	5.0	7.1	0.67	6.46	0.74	15	1.00	85.72	85.14	86.42	86.42	88.00	88.35	SS23-SS20
25	21	215.0	0.31	0.31	0.75	0.23	0.23	5.0	5.0	7.1	1.66	6.98	2.41	15	1.17	87.65	85.14	88.17	86.42	91.40	88.35	SS24-SS20
26	2	46.0	0.22	6.61	0.85	0.19	4.85	5.0	16.8	4.9	23.76	120.8	3.36	36	3.28	59.98	58.47	63.63	63.57	67.70	66.23	SS25-SS2
27	26	135.0	0.21	6.39	0.85	0.18	4.66	5.0	16.1	5.0	23.25	121.8	4.83	36	3.33	64.48	59.98	66.02	63.66	73.60	67.70	SS26-SS25
28	27	28.0	0.31	0.31	0.85	0.26	0.26	5.0	5.0	7.1	1.88	17.77	2.58	15	7.57	66.60	64.48	67.15	66.61	70.52	73.60	SS27-SS26
29	27	104.0	0.30	5.87	0.85	0.26	4.22	5.0	15.7	5.0	21.27	29.00	5.93	30	0.50	65.00	64.48	66.58	66.36	78.85	73.60	SS28-SS26
30	29	139.0	0.28	5.57	0.85	0.24	3.96	5.0	15.2	5.1	20.29	28.90	4.81	30	0.50	65.69	65.00	67.51	67.29	78.85	78.85	SS29-SS28
31	30	53.0	0.17	5.29	0.85	0.14	3.72	5.0	14.9	5.2	19.18	28.72	4.29	30	0.49	65.95	65.69	68.00	67.94	75.81	78.85	SS30-SS29
32	31	68.0	0.03	5.12	0.85	0.03	3.58	5.0	14.7	5.2	18.59	29.00	4.16	30	0.50	66.29	65.95	68.31	68.23	75.91	75.81	SS31-SS30
33	32	27.0	0.15	0.18	0.80	0.12	0.15	5.0	7.6	6.5	0.95	26.27	1.84	15	16.56	70.76	66.29	71.15	68.90	74.80	75.91	SS32-SS31
34	33	24.0	0.03	0.03	0.90	0.03	0.03	5.0	5.0	7.1	0.19	4.57	0.50	15	0.50	70.88	70.76	71.27	71.27	74.80	74.80	SS33-SS32
35	32	119.0	0.19	4.91	0.85	0.16	3.41	5.0	14.1	5.3	17.95	28.88	4.18	30	0.50	66.88	66.29	68.74	68.61	75.55	75.91	SS34-SS31
36	35	85.0	0.35	4.72	0.65	0.23	3.25	5.0	13.7	5.3	17.29	28.83	4.34	30	0.49	67.30	66.88	69.04	68.97	72.80	75.55	SS35-SS34
37	36	24.0	0.17	0.17	0.78	0.13	0.13	5.0	5.0	7.1	0.94	17.44	1.09	15	7.29	69.05	67.30	69.72	69.73	72.80	72.80	SS36-SS35
38	36	93.0	0.54	4.20	0.50	0.27	2.89	5.0	13.5	5.4	15.50	31.11	5.78	24	1.89	69.06	67.30	70.45	69.39	73.56	72.80	SS37-SS35
39	38	24.0	0.28	0.28	0.65	0.18	0.18	5.0	5.0	7.1	1.30	11.42	1.06	15	3.13	69.81	69.06	71.13	71.12	73.56	73.56	SS38-SS37
40	38	180.0	0.15	3.38	0.70	0.11	2.43	5.0	12.8	5.5	13.33	29.10	5.34	24	1.66	72.04	69.06	73.33	70.86	76.89	73.56	SS39-SS37
41	40	24.0	0.51	0.51	0.75	0.38	0.38	5.0	5.0	7.1	2.73	13.82	3.17	15	4.58	73.14	72.04	73.80	73.85	76.89	76.89	SS40-SS39
42	40	177.0	0.30	0.52	0.50	0.15	0.26	5.0	9.1	6.2	1.60	8.31	2.37	15	1.66	74.97	72.04	75.48	73.90	79.50	76.89	SS41-SS39

Windsor Hall (revised) | Number of lines: 56 | Run Date: 04-02-2008

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

Storm Sewer Tabulation

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)	
43	42	156.0	0.22	0.22	0.50	0.11	0.11	5.0	5.0	7.1	0.78	4.57	1.94	15	0.50	75.75	74.97	76.10	75.65	79.50	79.50	SS42-SS41
44	40	124.0	0.13	2.20	0.85	0.11	1.69	5.0	12.2	5.6	9.41	15.99	3.82	24	0.50	72.66	72.04	73.94	73.79	79.36	76.89	SS43-SS39
45	44	52.0	0.33	2.07	0.85	0.28	1.58	5.0	11.9	5.6	8.87	15.99	3.76	24	0.50	72.92	72.66	74.23	74.19	79.71	79.36	SS44-SS43
46	45	158.0	0.06	1.74	0.70	0.04	1.30	5.0	11.3	5.7	7.41	7.43	4.44	18	0.50	73.71	72.92	75.00	74.33	81.80	79.71	SS45-SS44
47	46	45.0	0.18	0.24	0.90	0.16	0.22	5.0	8.9	6.2	1.34	4.52	1.09	15	0.49	73.93	73.71	75.65	75.64	78.00	81.80	SS46-SS45
48	47	73.0	0.06	0.06	0.90	0.05	0.05	5.0	5.0	7.1	0.38	4.28	0.31	15	0.44	74.25	73.93	75.69	75.69	78.00	78.00	SS47-SS46
49	46	28.0	0.25	1.44	0.70	0.18	1.04	5.0	11.2	5.7	5.95	24.38	5.32	15	14.25	77.70	73.71	78.68	75.33	82.20	81.80	SS48-SS45
50	49	83.0	0.63	1.19	0.65	0.41	0.86	5.0	10.9	5.8	5.00	12.38	4.70	15	3.67	80.75	77.70	81.64	78.94	86.50	82.20	SS49-SS48
51	50	161.0	0.09	0.56	0.90	0.08	0.45	5.0	9.9	6.0	2.71	11.17	3.17	15	2.99	85.57	80.75	86.23	82.01	91.75	86.50	SS50-SS49
52	51	127.0	0.10	0.10	0.75	0.08	0.08	5.0	5.0	7.1	0.53	5.53	1.50	15	0.73	86.50	85.57	86.79	86.49	90.25	91.75	SS51-SS50
53	51	60.0	0.19	0.37	0.85	0.16	0.30	5.0	7.7	6.4	1.91	4.57	2.53	15	0.50	85.87	85.57	86.51	86.46	90.95	91.75	SS52-SS50
54	53	127.0	0.18	0.18	0.75	0.14	0.14	5.0	5.0	7.1	0.96	4.55	1.78	15	0.50	86.50	85.87	86.93	86.78	90.25	90.95	SS53-SS52
55	2	35.0	0.19	0.30	0.85	0.16	0.26	5.0	6.4	6.7	1.76	15.05	1.43	15	5.43	60.37	58.47	63.74	63.71	64.87	66.23	SS54-SS2
56	55	50.0	0.11	0.11	0.90	0.10	0.10	5.0	5.0	7.1	0.71	8.47	0.57	15	1.72	61.23	60.37	63.80	63.79	64.98	64.87	SS55-SS54

Windsor Hall (revised) | Number of lines: 56 | Run Date: 04-02-2008

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

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

PROJECT: WindsorMeade Hall Loop Road
PROJECT NO.: 8818-06
SUBJECT: Spread Calc's
SHEET NO.: 2
DATE: 12/31/2003
BY: V. Bains

STORM WATER INLET COMPUTATIONS FOR WINDSORMEADE HALL

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	i in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 Effec L	P	L/Lt (ft)	d	E(#16) (ft)	h	Q Int CFS d/h	Q Carryover Spread	Remark
HIGH POINT			10+76 R																														
				0.05	0.7	0.036	0.036	4	0.146	0	0.146	0.001	0.02	3.7	Flow Approaching From Down Station 10+76 R																	
SUMP	DI-2A	2.2	11+74 R								0.51	0.001	0.02		2		0.08								5.8		0.09		0.42	0.214	4.5	SS 3-3
				0.13	0.7	0.091	0.091	4	0.364	0	0.364	0.001	0.02	6.1	Flow Approaching From Up Station 13+30 R																	
GRADE	DI-2E	6	14+63 R	0.09	0.7	0.063	0.063	4	0.252	0.476	0.728	0.042	0.02	2.4	2	0.833	0.08	4	0.995	0.015	2	3.44	0.143	0.163	7.484		0.802		0.946	0.689	0.04	SS 1-3
GRADE	DI-2E	6	16+11 R	0.62	0.7	0.434	0.434	4	1.736	0	1.736	0.042	0.02	5.1	2	0.392	0.08	4	0.848	0.015	2	3.44	0.143	0.142	11.71		0.512		0.726	1.26	0.476	SS 1-4
GRADE	DI-2B	6	17+76 R	0.00	0.7	0	0	4	0	0	0	0.042	0.02	#N/A	2	#N/A	0.08	4	#N/A	0.015	2	3.44	0.143	#N/A	#N/A		#N/A		#N/A	#N/A	#N/A	[redacted]
GRADE	DI-2B	6	19+35 R	0.17	0.7	0.119	0.119	4	0.476	0.045	0.521	0.026	0.02	2.3	2	0.87	0.08	4	0.995	0.015	2	3.44	0.143	0.163	5.633		1		1	0.521	0	SS 1-15
GRADE	DI-2B	6	20+66 R	0.33	0.7	0.231	0.231	4	0.924	0	0.924	0.026	0.02	3.9	2	0.513	0.08	4	0.941	0.015	2	3.44	0.143	0.155	7.377		0.813		0.951	0.879	0.045	SS 1-17
HIGH POINT			24+50 R																														
				0.75	0.7	0.525	0.525	4	2.1		2.1	0.001	0.02	9.2	Flow Approaching From Down Station																	
SUMP	DI-2C	12	26+43 R								2.1	0.001	0.02		2		0.08								15.6		0.13		0.42	0.31	6.5	SS 1-54
				0	0	0	0	4	0		0	0.001	0.02	#N/A	Flow Approaching From Up Station																	
GRADE	DI-2B	6	27+21 R	0.08	0.7	0.056	0.056	4	0.224	0	0.224	0.023	0.02	1.3	2	1.538	0.08	4	1	0.015	2	3.44	0.143	0.163	3.779		1		1	0.224	0	SS 1-53
GRADE	DI-2B	6	31+13 R	0.36	0.7	0.252	0.252	4	1.008	0	1.008	0.021	0.02	4.6	2	0.435	0.08	4	0.888	0.015	2	3.44	0.143	0.147	7.385		0.812		0.951	0.958	0.05	SS 1-45
GRADE	DI-2B	8	32+45 R	0.12	0.7	0.084	0.084	4	0.336	0.05	0.386	0.021	0.02	2	2	1	0.08	4	1	0.015	2	3.44	0.143	0.163	4.637		1		1	0.386	0	SS 1-43
GRADE	DI-2E	10	34+26 R	1.64	0.73	1.197	1.197	4	4.789	0	4.789	0.021	0.02	9.7	2	0.206	0.08	4	0.564	0.015	2	3.44	0.143	0.101	17.84		0.56		0.772	3.698	1.091	SS 1-40
GRADE	DI-2E	8	35+29 R	0.06	0.7	0.042	0.042	4	0.168	1.091	1.259	0.021	0.02	5.2	2	0.385	0.08	4	0.848	0.015	2	3.44	0.143	0.142	8.303		0.963		0.997	1.256	0.003	SS 1-38
				0.14	0.7	0.098	0.098	4	0.392	0.003	0.395	0.001	0.02	6.4	Flow Approaching From Down Station 35+29 R																	
SUMP	DI-2F	6	36+33 R								0.759	0.001	0.02		2		0.08								9.6		0.11		0.42	0.262	5.5	SS 1-36
				0.13	0.7	0.091	0.091	4	0.364	0	0.364	0.001	0.02	6.1	Flow Approaching From Up Station 39+23 R																	
GRADE	DI-2D	4.67	38+64 R	0.11	0.7	0.077	0.077	4	0.308	0	0.308	0.001	0.02	5.6	2	0.357	0.08	4	0.767	0.015	2	3.44	0.143	0.13	1.947		1		1	0.308	0	SS 1-29
HIGH POINT			39+23 R																														
GRADE	DI-2D	4.67	39+81 R	0.10	0.7	0.07	0.07	4	0.28	0	0.28	0.036	0.02	1.2	2	1.667	0.08	4	1	0.015	2	3.44	0.143	0.163	4.787		0.976		0.999	0.28	0	SS 1-27
GRADE	DI-2D	4.67	40+29 R	0.07	0.7	0.049	0.049	4	0.196	0	0.196	0.04	0.02	1.2	2	1.667	0.08	4	1	0.015	2	3.44	0.143	0.163	4.237		1		1	0.196	0	SS 1-24
				0.38	0.7	0.266	0.266	4	1.064	0	1.064	0.001	0.02	9.6	Flow Approaching From Down Station 40+29 R																	
SUMP	DI-2E	8	42+44 R								1.44	0.001	0.02		2		0.08								11.6		0.11		0.42	0.262	5.5	SS 1-22
				0.12	0.7	0.084	0.084	4	0.336	0.04	0.376	0.001	0.02	6.2	Flow Approaching From Up Station 14+63 R																	

PARKING LOT ADDITION

WindsorMeade - Windsor Hall
CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM 1 (Upper)
8818-6
12/19/2003

II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site)

A. Post-Development Drainage Area to Point of Concern = 27.4 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# for Land Use (CN)	Adjusted (CN)
1)	8-B	C	Landscaped Open Space	2.8	74	204
2)	8-B	C	Commercial	0.9	94	85
3)	10-C	C	Landscaped Open Space	4.1	74	306
4)	10-C	C	Commercial	7.7	94	721
5)	14-B Emporia Fine Sandy Loam	C	Landscaped Open Space	0.2	74	15
6)	14-B Emporia Fine Sandy Loam	C	Commercial	0.0	94	0
7)	15-D Emporia Complex	C	Landscaped Open Space	4.6	74	340
8)	15-D Emporia Complex	C	Commercial	7.1	94	667
	Total Adjusted CN =			27.4		2,337
	Composite CN =					85

* INCREASE IN COMM. USE OF 4,578 sf (0.10 ACRES)

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 fe Segment C-D

Surface description (table 3-1)	Grass, Dense
Manning's roughness coefficient., n (table 3-1)	0.24
Length of overland flow, L	150 Feet
2-year 24-hour rainfall, P2	3.5 inches
Average slope of overland flow , s	0.010 feet per foot
Travel time, Tt = (0.007 x (n x L)^0.8) / (P2^0.5 x s^0.4)	0.42 hours

2) Shallow concentrated flow Segment B-C

Surface description, paved or unpaved	Grass (unpaved)
Length of shallow concentrated flow, L	300 Feet
Average slope of shallow concentrated flow, s	0.270 feet per foot
Average velocity, v (figure 3-1)	2.6 feet per second
Travel time, Tt = L/(3600 x v)	0.03 hours

3) Channel or Pipe Flow Segment A-B

Length of channel flow, L	2050 Feet
Average velocity in channel / pipes, v	3.0 feet per second
Travel time, Tt = L/(3600 x v)	0.19 hours
Total Time of Concentration =	0.64 hours
or	38 minutes
25-year 24-hour rainfall, P25	3.6 inches
Average slope of overland flow , s	0.01 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.30 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved
Length of shallow concentrated flow, L	300 Feet
Average slope of shallow concentrated flow, s	0.27 feet per foot
Average velocity, v	2.6 feet per second
Travel time, Tt = L/(3600*v)	0.03 hours

3) Channel or Pipe Flow

Length of channel flow, L	2050 Feet
Average velocity of channel flow, v	3 feet per second
Travel time, Tt = L/(3600*v)	0.19 hours
Total Time of Concentration =	0.52 hours
or	31 minutes

WindsorMeade - Windsor Hall
CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM 1 (Upper)
8818-6
12/19/2003

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2)	8-B	C	Commercial	0.9	94	85
3)	10-C	C	Landscaped Open Space	4.1	74	306
4)	10-C	C	Commercial	7.7	94	721
5)	14-B Emporia Fine Sandy Loam	C	Landscaped Open Space	0.2	74	15
6)	14-B Emporia Fine Sandy Loam	C	Commercial	0.0	94	0
7)	15-D Emporia Complex	C	Landscaped Open Space	4.7	74	346
8)	15-D Emporia Complex	C	Commercial	7.0	94	660
	Total Adjusted CN =			27.4		2,336
	Composite CN =					85

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 ft Segment C-D

Surface description (table 3-1)	Grass, Dense
Manning's roughness coefficient., n (table 3-1)	0.24
Length of overland flow, L	150 Feet
2-year 24-hour rainfall, P2	3.5 inches
Average slope of overland flow , s	0.010 feet per foot
Travel time, Tt = (0.007 x (n x L)^0.8) / (P2^0.5 x s^0.4)	0.42 hours

2) Shallow concentrated flow Segment B-C

Surface description, paved or unpaved	Grass (unpaved)
Length of shallow concentrated flow, L	300 Feet
Average slope of shallow concentrated flow, s	0.270 feet per foot
Average velocity, v (figure 3-1)	2.6 feet per second
Travel time, Tt = L/(3600 x v)	0.03 hours

3) Channel or Pipe Flow Segment A-B

Length of channel flow, L		2050 Feet
Average velocity in channel / pipes, v		3.0 feet per second
Travel time, Tt = L/(3600 x v)		0.19 hours
Total Time of Concentration =		0.64 hours
	or	38 minutes
25-year 24-hour rainfall, P25		3.6 inches
Average slope of overland flow , s		0.01 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)		0.30 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved
Length of shallow concentrated flow, L	300 Feet
Average slope of shallow concentrated flow, s	0.27 feet per foot
Average velocity, v	2.6 feet per second
Travel time, Tt = L/(3600*v)	0.03 hours

3) Channel or Pipe Flow

Length of channel flow, L		2050 Feet
Average velocity of channel flow, v		3 feet per second
Travel time, Tt = L/(3600*v)		0.19 hours
Total Time of Concentration =		0.52 hours
	or	31 minutes

DRAINAGE CALCULATIONS

FOR

WindsorMeade of Williamsburg – WINDSOR HALL

OCT 2005
RECEIVED
PLANNING DEPARTMENT

SITE:
James City County

SUBMITTED TO:

James City County Environmental Division

Prepared By:

AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188

October 26, 2005

COMMONWEALTH OF VIRGINIA
JASON A. GRIMES
No. 40170
10/26/05
PROFESSIONAL ENGINEER

AES Project No. 8818-06

S:\Jobs\8818\06-WM_Windsor Hall\Wordproc\Reports\Drain Calcs Cover.doc

AES CONSULTING ENGINEERS

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        b. 1yr 24hr Channel Protection Calculations
        c. BMP/Road Crossing Routings
        d. Original/Revised Post Development Drainage Reports
- **Drainage Calculations**
    a. Storm System Calculations
    b. Spread Calculations

WINDSOR MEADE SP AMENDMENT SP-134-05 AMENDS SP-04-04

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM
WindsorMeade Overall
AES Project = 8818 - 5&6
TOTAL AREA = 105.93 ACRE(s)

27.4 / 105.93 = 0.2587 × 10 = 2.58

A. STRUCTURAL BMP POINT ALLOCATION

WAS 24.40 AC HALL BMP 1 + 2

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
Hall BMP 1	27.40	10	X	? 0.221 .2587	=	2.21 2.58
Villa BMP 1	18.10	10	X	0.171	=	1.71
Villa BMP 2	10.00	10	X	0.094	=	0.94
Entrance BMP	2.10	4	X	0.020	=	0.08
Offsite Credit **	4.20	2.0	X	0.040	=	0.08
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				5.02

5.39

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
29.95	28.27	(0.1 per 1%)	=	2.83
15.17	14.32	(0.15 per 1%)	=	2.15
		TOTAL OPEN SPACE POINTS:		4.98

45.12

C. TOTAL WEIGHTED POINTS

5.02	+	4.98	=	10.00
Structural BMP Points		Natural Open Space Points		TOTAL

WAS 5.12 5.39 10.37 points

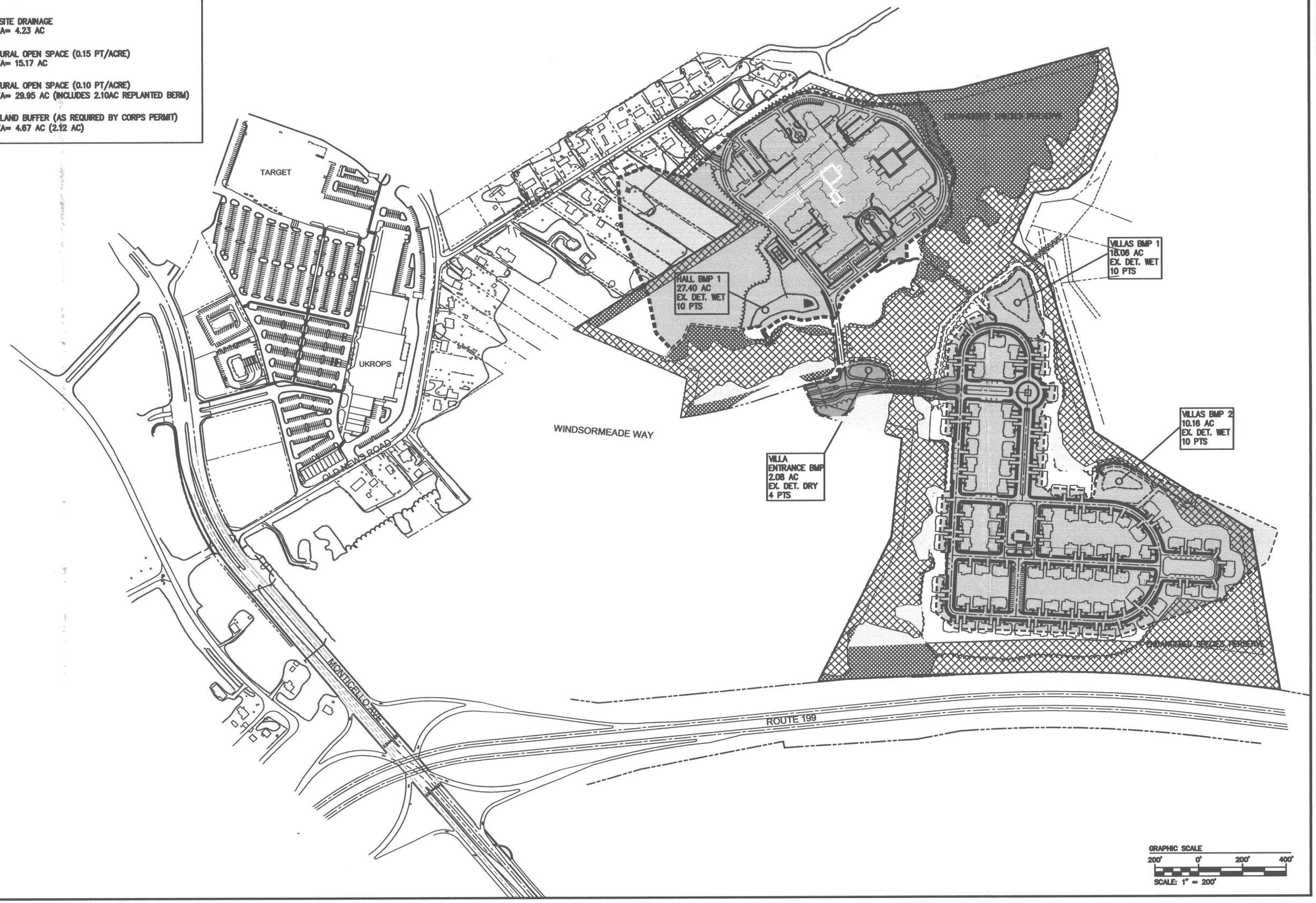
** Note: Assumes a 15% impervious cover on existing offsite to BMP compared to a 60% impervious cover on site to BMP. Credit was taken at a 80% reduction.

RECEIVED JAN 0 2 2006

SSC WOULD NOT APPLY AS IT IS A PLAN AMENDMENT

TOTAL SITE AREA= 105.93 ACRES

- DRAINAGE AREA TO 10PT BMP (ON-SITE) AREA= 51.39 AC
- DRAINAGE AREA TO 4PT BMP AREA= 2.08 AC
- OFFSITE DRAINAGE AREA= 4.23 AC
- NATURAL OPEN SPACE (0.15 PT/ACRE) AREA= 15.17 AC
- NATURAL OPEN SPACE (0.10 PT/ACRE) AREA= 29.95 AC (INCLUDES 2.10AC REPLANTED BERM)
- WETLAND BUFFER (AS REQUIRED BY CORPS PERMIT) AREA= 4.67 AC (2.12 AC)



No.	DATE	REVISION / COMMENT / NOTE	BY
4	10/25/05	SITE PLAN AMENDMENT (BUILDING/PARKING REVISION)	JAG
3	12/17/04	SHEETS 3 & 10 REVISED PER JCC COMMENTS DATED 5/04	VMB
2	5/12/04	REVISED PER JCC COMMENTS DATED 4/04	VMB
1	3/29/04	REVISED PER JCC COMMENTS DATED 2/10/04	VMB

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AES CONSULTING ENGINEERS

BMP POINT DISPLAY

WINDSORMEADE OF WILLIAMSBURG

VILLA ENTRANCE & SEWER CONSTRUCTION PLAN

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed JAG	Drawn GVC
Scale 1"=200'	Date 1/9/04
Project No. 8818-05	
Drawing No. 1 OF 1	

JAG WINDSORMEADE OWNERS BMP POINTS.DWG

WindsorMeade Overall
CALCULATION FOR SCS HYDROGRAPH GENERATION
FOR HALL BMP 1
8818-5
12/12/2003 **(REV 10/19/2005)**

II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site)

A. Post-Development Drainage Area to Point of Concern = 27.4 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# for Land Use (CN)	Adjusted (CN)
1)	8-B	C	Landscaped Open Space	0.93	74	69
2)	8-B	C	Pavement/Roof	2.78	98	272
3)	10-C	C	Landscaped Open Space	3.97	74	294
4)	10-C	C	Pavement/Roof	7.37	98	722
5)	14-B	C	Landscaped Open Space	1.40	74	104
6)	14-B	C	Pavement/Roof	0.30	98	29
7)	15-D,E Emporia Complex	C	Landscaped Open Space	3.74	74	277
8)	15-D,E Emporia Complex	C	Pavement/Roof	6.94	98	680
	Total Adjusted CN =			27.4		2,447
	Composite CN =					89

27.4 AC.

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 3-1)	Grass, Dense	
Manning's roughness coefficient., n (table 3-1)	0.24	
Length of overland flow, L	150	Feet
25-year 24-hour rainfall, P25	3.6	inches
Average slope of overland flow , s	0.030	feet per foot
Travel time, Tt = (0.007 x (n x L)^0.8) / (P2^0.5 x s^0.4)	0.26	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	paved	
Length of shallow concentrated flow, L	150	Feet
Average slope of shallow concentrated flow, s	0.27	feet per foot
Average velocity, v	2.6	feet per second
Travel time, Tt = L/(3600*v)	0.02	hours

3) Channel or Pipe Flow

Length of channel flow, L	1250	Feet
Average velocity of channel flow, v	3.5	feet per second
Travel time, Tt = L/(3600*v)	0.10	hours
Total Time of Concentration =	0.38	hours
or	23	minutes

PREVIOUS
WAS 27.4
CN 89
TC 23 MIN

III. PROPOSED ESTIMATED POND(S) VOLUME ABOVE LOWER STAGE or 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.)	
48.0		9445	0				
50.0	2.0	12135	21580	799	21580	799	
52.0	2.0	14790	26925	997	48505	1796	
54.0	2.0	17575	32365	1199	80870	2995	
55.0	1.0	17575	17575	651	98445	3646	(Normal Pool)
56.0	1.0	20605	19090	707	99960	3702	
58.0	2.0	28430	49035	1816	148995	5518	
60.0	2.0	35310	63740	2361	212735	7879	
62.0	2.0	42330	77640	2876	290375	10755	
64.0	2.0	49635	91965	3406	382340	14161	

NP 55.0

IV. DETERMINING REQUIRED WATER QUALITY VOLUME

Percent Impervious of the BMP Watershed, Post-Development	60%		
Drainage Area of the BMP Watershed	27.43	acres	(Total Site Area BMP 1)
Impervious Acres of BMP Watershed	16.46	acres	WAS 17.06AC.

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) *	16.46	=	119485 cu. Ft
1/2 WQ_v =	59743 cu. Ft		Required Volume for Permanent Pool
	98445 cu. Ft		Design Volume for Permanent Pool
1/2 WQ_v =	59743 cu. Ft		Volume to be Released in 24-Hours
Elevation of 1/2 WQv (above WSE)=	58.25 ft		Elevation of 59,743 cu.ft. over WSE
Elevation of release inlet for 1/2 water quality volume =	55.0 ft		
Average head, in feet, on release inlet =	1.6 ft		

Average release rate calculation

$$\frac{59{,}743.0 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.7 \text{ cfs}$$

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 = 0.50 feet, or 6 inches ✓

AES Projet No.: 8818-6
Project Title: WINDSORMEADE HALL BMP 1

CONSULTING ENGINEERS

Channel Protection

Channel Protection Volume

Post Development Watershed Data

Area = 27.40 Acres 0.0428sq.mi.
Runoff Curve No. = 89
Time of Concentration = 0.380 hr.
Return Period = 1 Yr.

Runoff Depth = 2.8 in.

Initial Abstraction (From TR55 Equation 2-2)

Ia = (200/CN)-2

Ia = 0.247

Unit Peak Discharge (From TR55 Equation for Exhibit 4)

log(Qu) = C0+C1 log(Tc)+C2(log(Tc))²

Qu = 606.44 csm/in

Ratio of Peak Outflow Discharge to Peak Inflow Discarge

(From Maryland Stormwater Design Manual Figure D.11.2)

Qo/Qi = 0.029

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 = 0.642

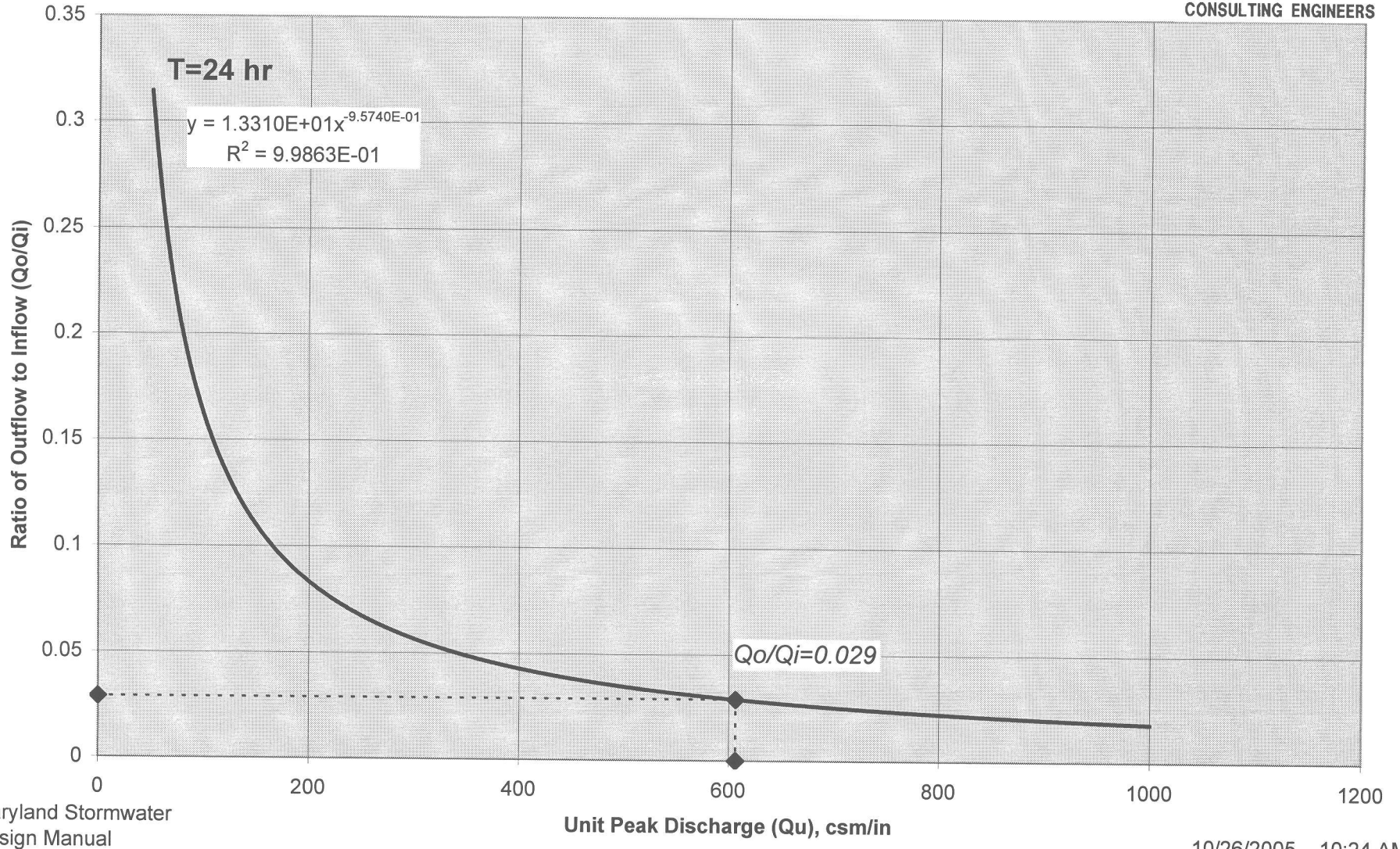
Vs = 2.522 Ac-Ft
Vs = 109851 cu.ft.

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 = 44.66 cfs
Qo/Qi = 0.03
Qo = 1.29 cfs

Detention Time Versus Discharge Ratios



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

10/26/2005 10:24 AM
Hall BMP_1YR_24HR.amend.xls
Chart1 1

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

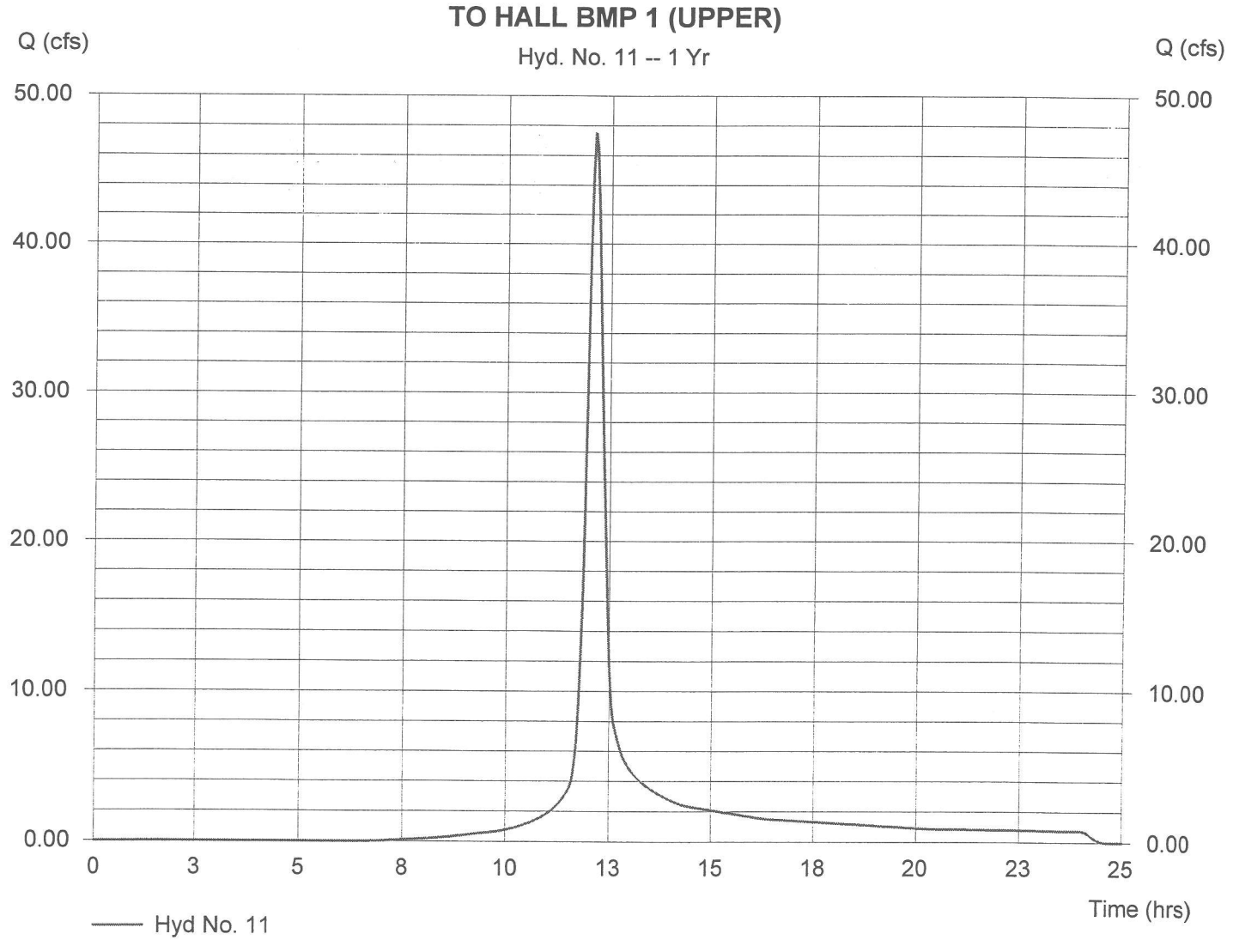
Tuesday, Oct 25 2005, 5:21 PM

Hyd. No. 11

TO HALL BMP 1 (UPPER)

Hydrograph type	= SCS Runoff	Peak discharge	= 47.49 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Drainage area	= 27.40 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 23 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 166,802 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

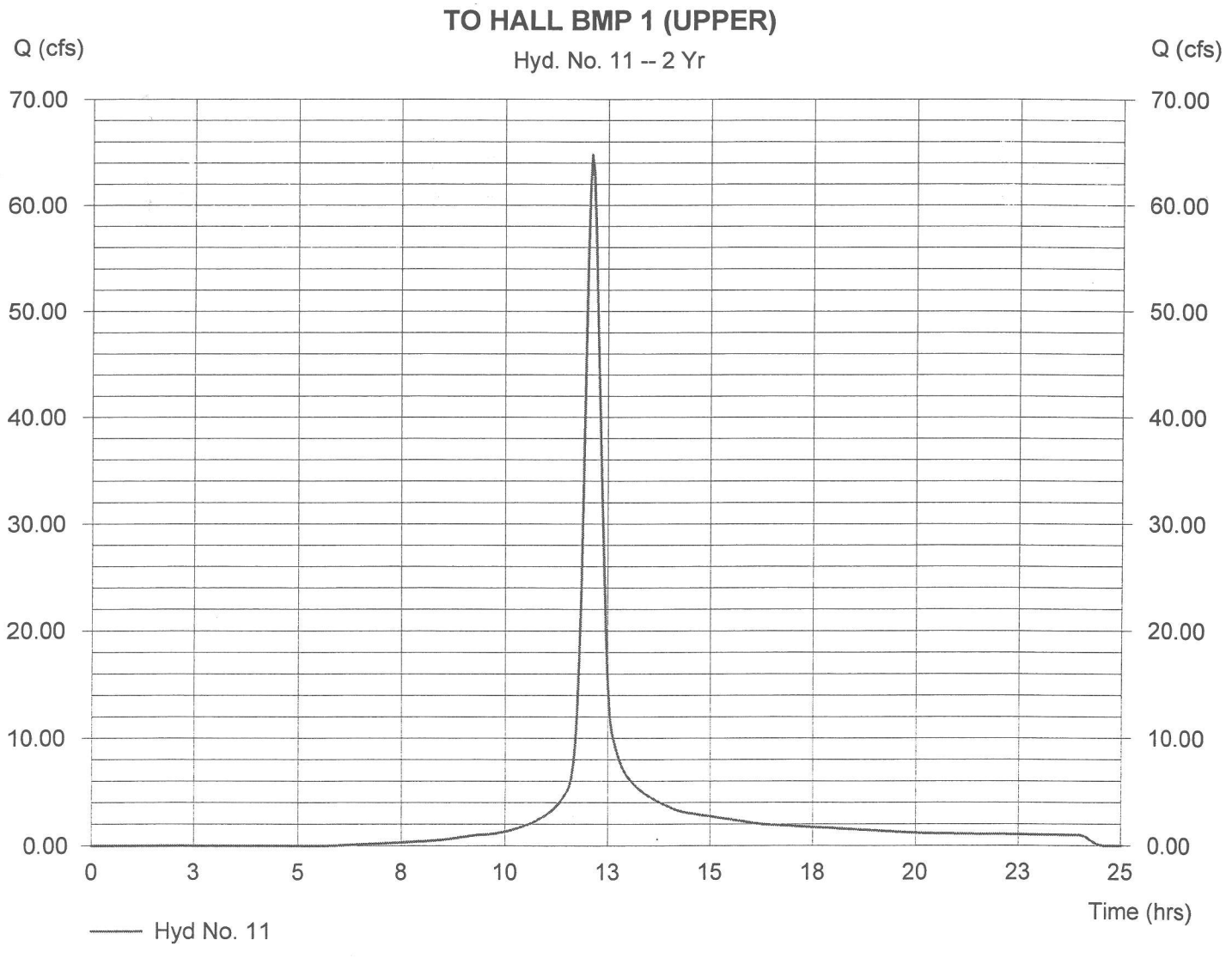
Tuesday, Oct 25 2005, 5:21 PM

Hyd. No. 11

TO HALL BMP 1 (UPPER)

Hydrograph type	= SCS Runoff	Peak discharge	= 64.77 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Drainage area	= 27.40 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 23 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 228,587 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

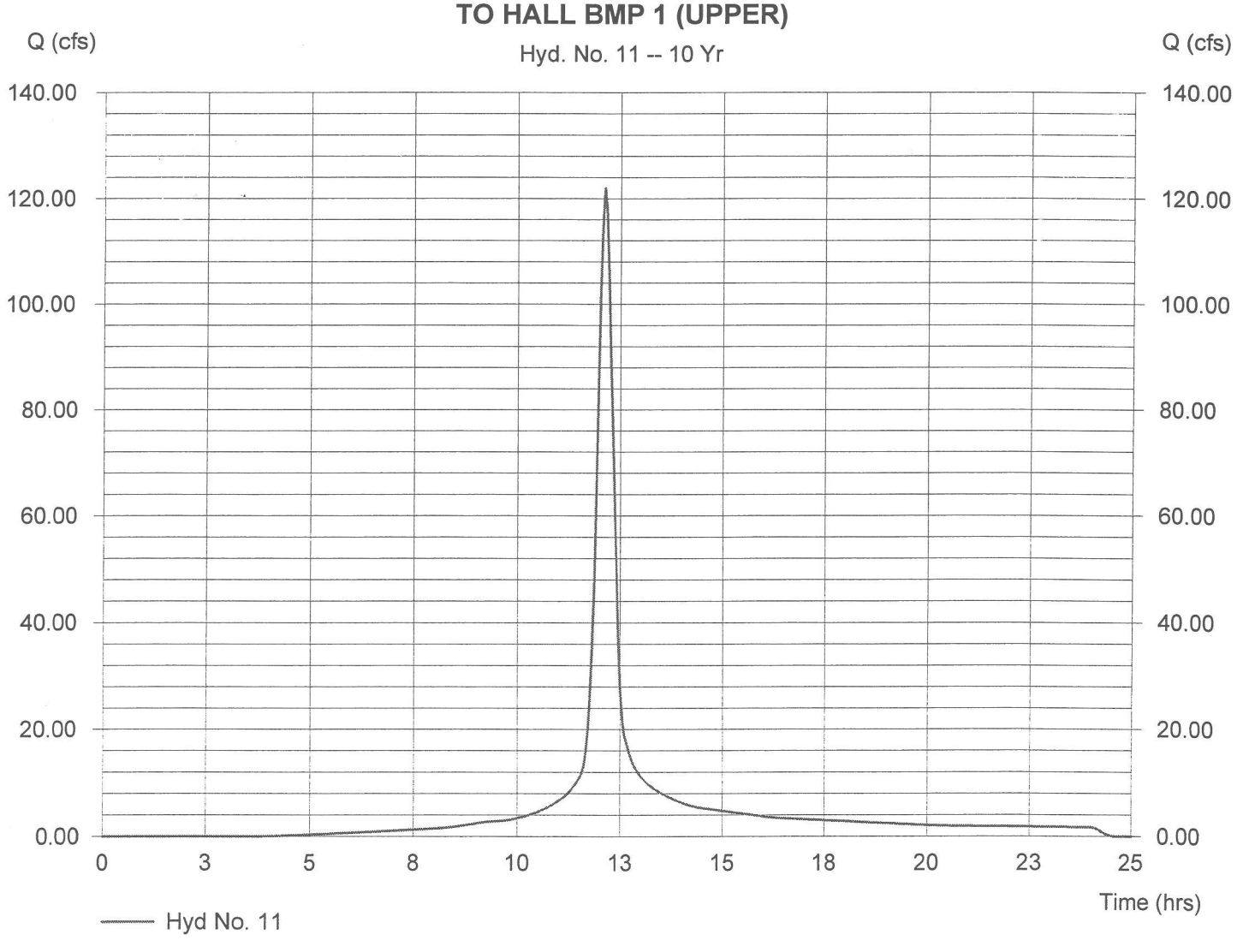
Tuesday, Oct 25 2005, 5:21 PM

Hyd. No. 11

TO HALL BMP 1 (UPPER)

Hydrograph type	= SCS Runoff	Peak discharge	= 121.93 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Drainage area	= 27.40 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 23 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 440,450 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

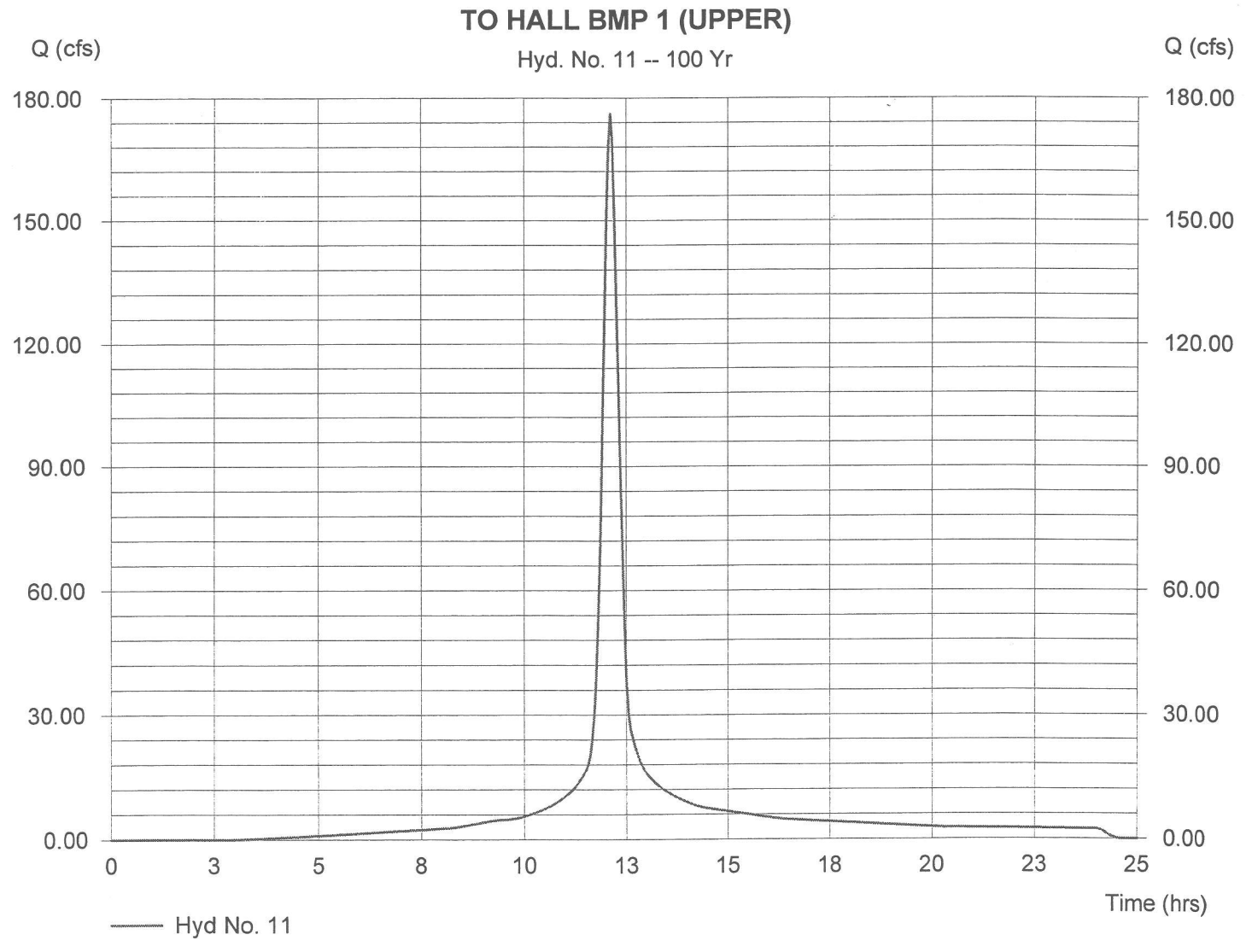
Tuesday, Oct 25 2005, 5:21 PM

Hyd. No. 11

TO HALL BMP 1 (UPPER)

Hydrograph type	= SCS Runoff	Peak discharge	= 176.14 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Drainage area	= 27.40 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 23 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 648,455 cuft



Pond Report

Hydraflow Hydrographs by Intelisolve — Tuesday, Oct 25 2005, 5:28 PM

Pond No. 7 - HALL 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	48.00	9,445	0	0
2.00	50.00	12,135	21,580	21,580
4.00	52.00	14,790	26,925	48,505
6.00	54.00	17,575	32,365	80,870
8.00	56.00	20,605	38,180	119,050
9.00	57.00	23,700	22,153	141,203
10.00	58.00	28,430	26,065	167,268
12.00	60.00	35,310	63,740	231,008
14.00	62.00	42,330	77,640	308,648
16.00	64.00	49,635	91,965	400,613

Culvert / Orifice Structures

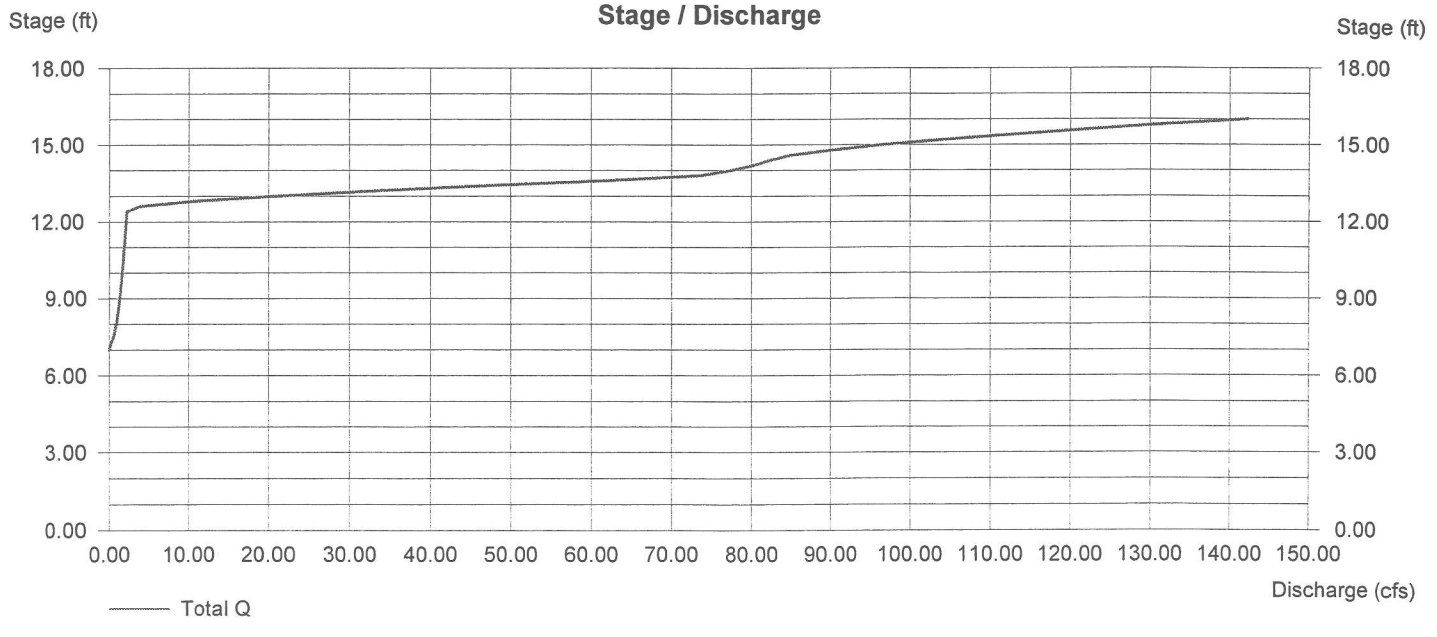
	[A]	[B]	[C]	[D]
Rise (in)	= 36.00	6.00	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 54.70	55.00	0.00	0.00
Length (ft)	= 65.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.75	10.00	0.00	0.00
Crest El. (ft)	= 60.50	62.50	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 = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:22 PM

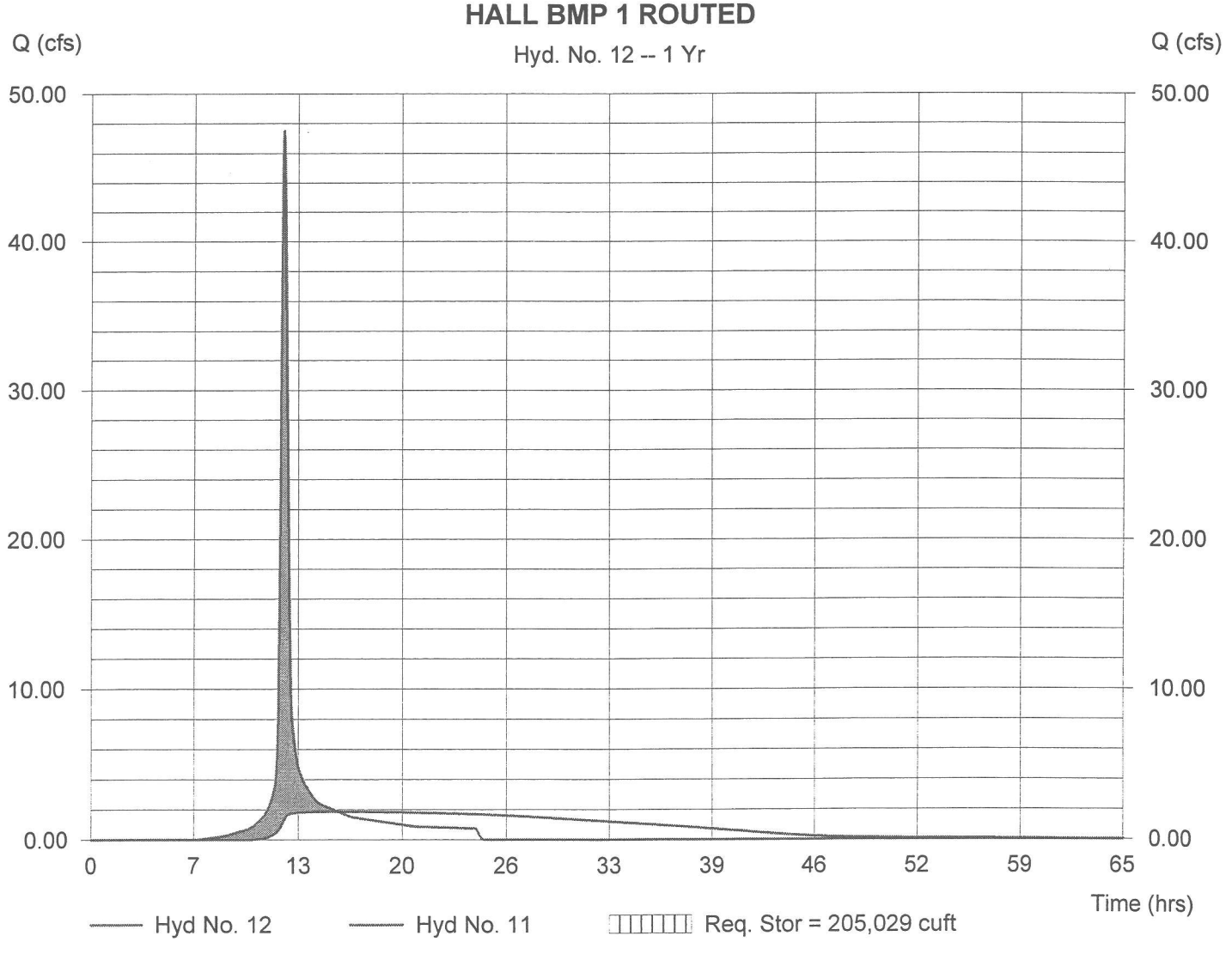
Hyd. No. 12

HALL BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 1.88 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 59.18 ft
Reservoir name	= HALL BMP 1	Max. Storage	= 205,029 cuft

Storage Indication method used. Wet pond routing start elevation = 54.80 ft.

Hydrograph Volume = 162,950 cuft



Hydrograph Plot

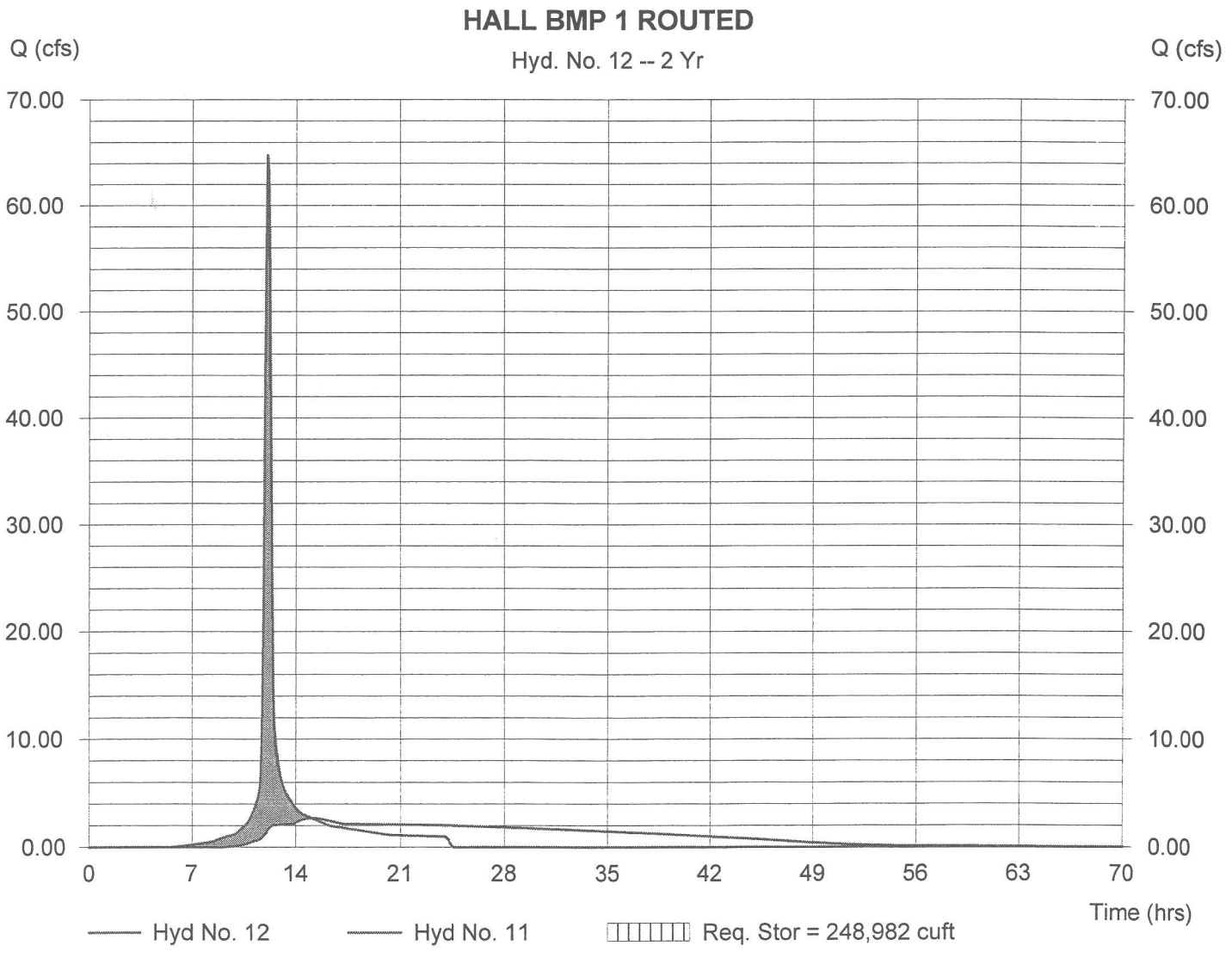
Hydraflow Hydrographs by Intelisolve | Tuesday, Oct 25 2005, 5:22 PM

Hyd. No. 12

HALL BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 2.67 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 60.46 ft
Reservoir name	= HALL BMP 1	Max. Storage	= 248,982 cuft

Storage Indication method used. Wet pond routing start elevation = 54.80 ft. | Hydrograph Volume = 224,736 cuft



Hydrograph Plot

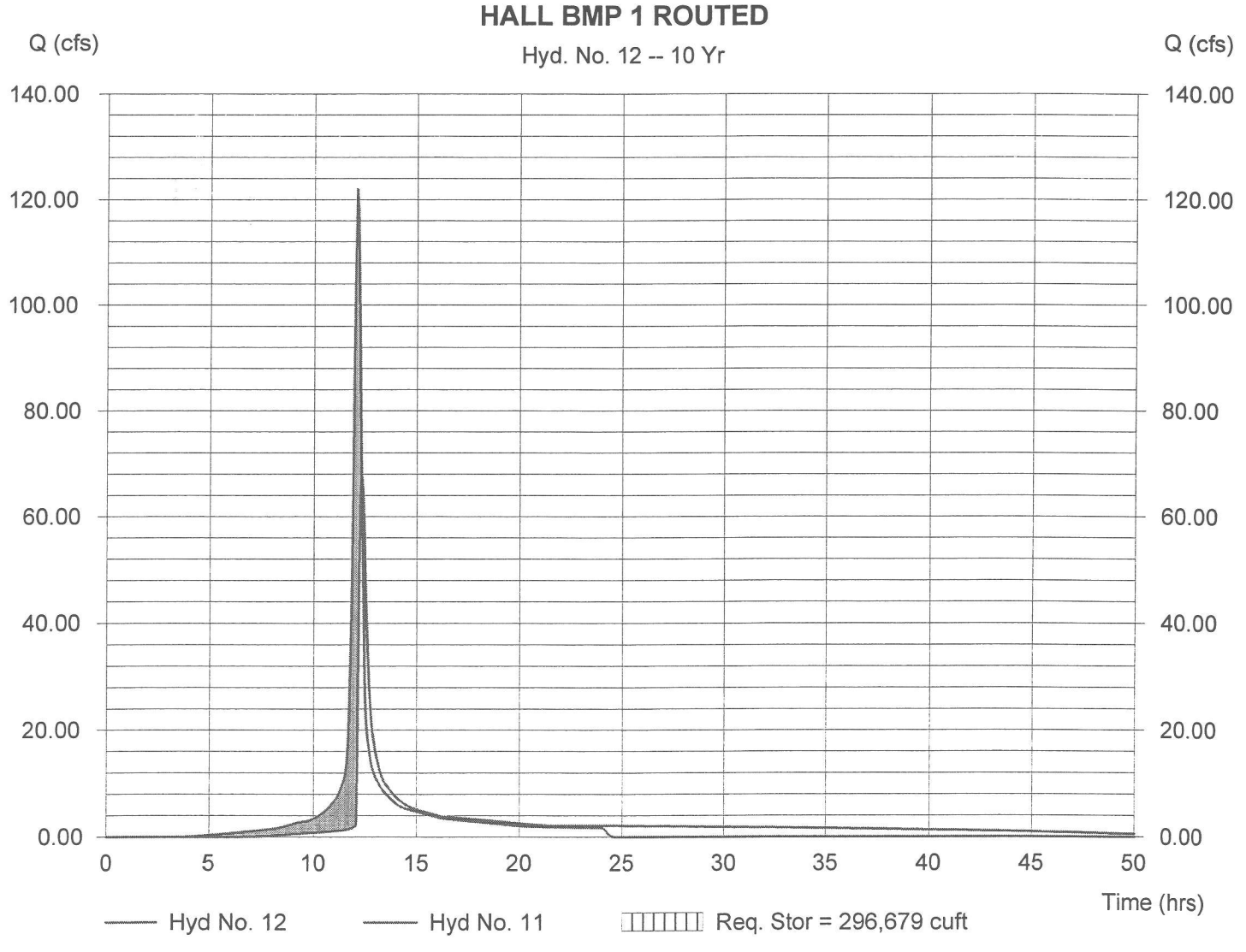
Hydraflow Hydrographs by Intelisolve | Tuesday, Oct 25 2005, 5:22 PM

Hyd. No. 12

HALL BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 67.27 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 61.69 ft
Reservoir name	= HALL BMP 1	Max. Storage	= 296,679 cuft

Storage Indication method used. Wet pond routing start elevation = 54.80 ft. | Hydrograph Volume = 436,599 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:22 PM

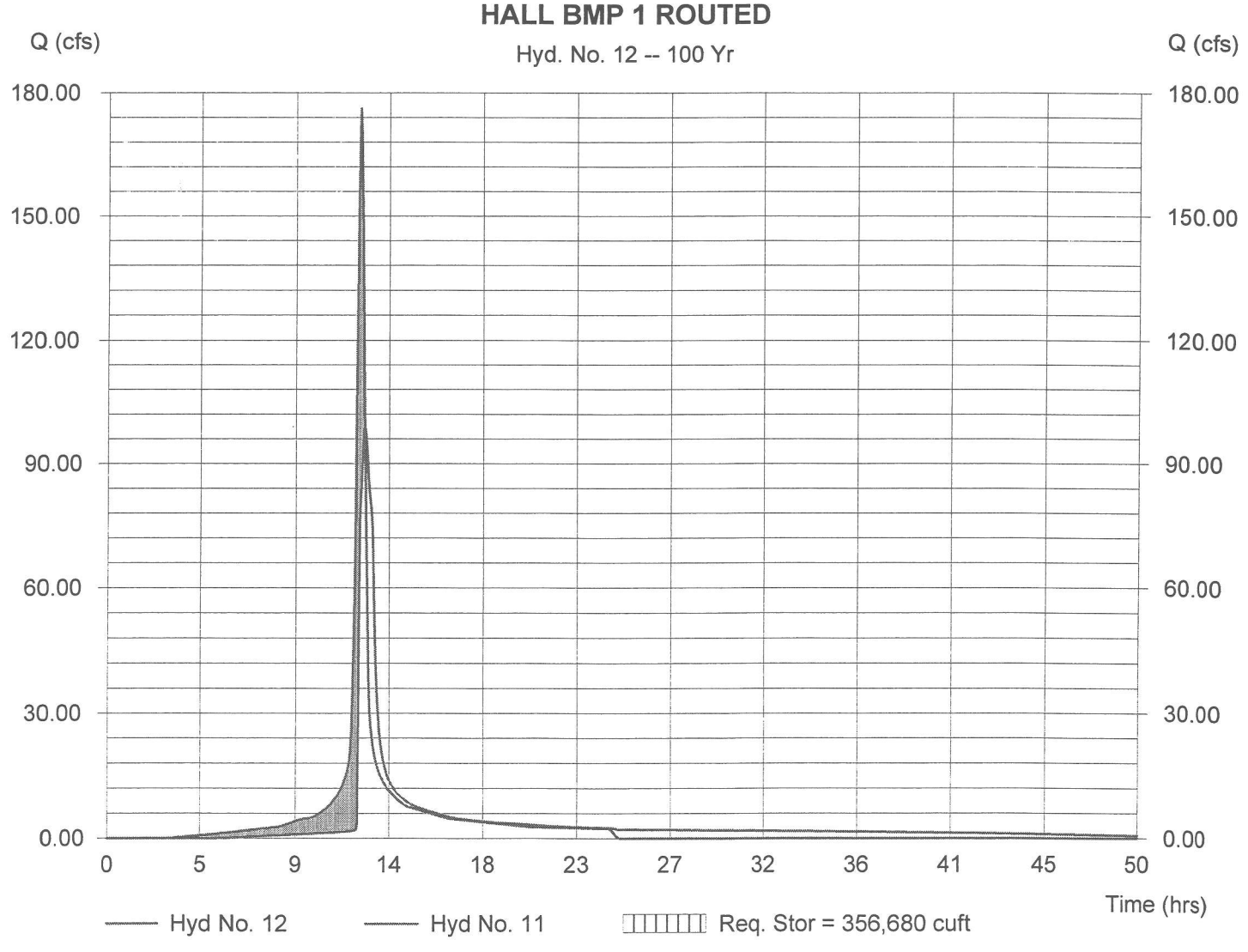
Hyd. No. 12

HALL BMP 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 98.44 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 63.04 ft
Reservoir name	= HALL BMP 1	Max. Storage	= 356,680 cuft

Storage Indication method used. Wet pond routing start elevation = 54.80 ft.

Hydrograph Volume = 644,603 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

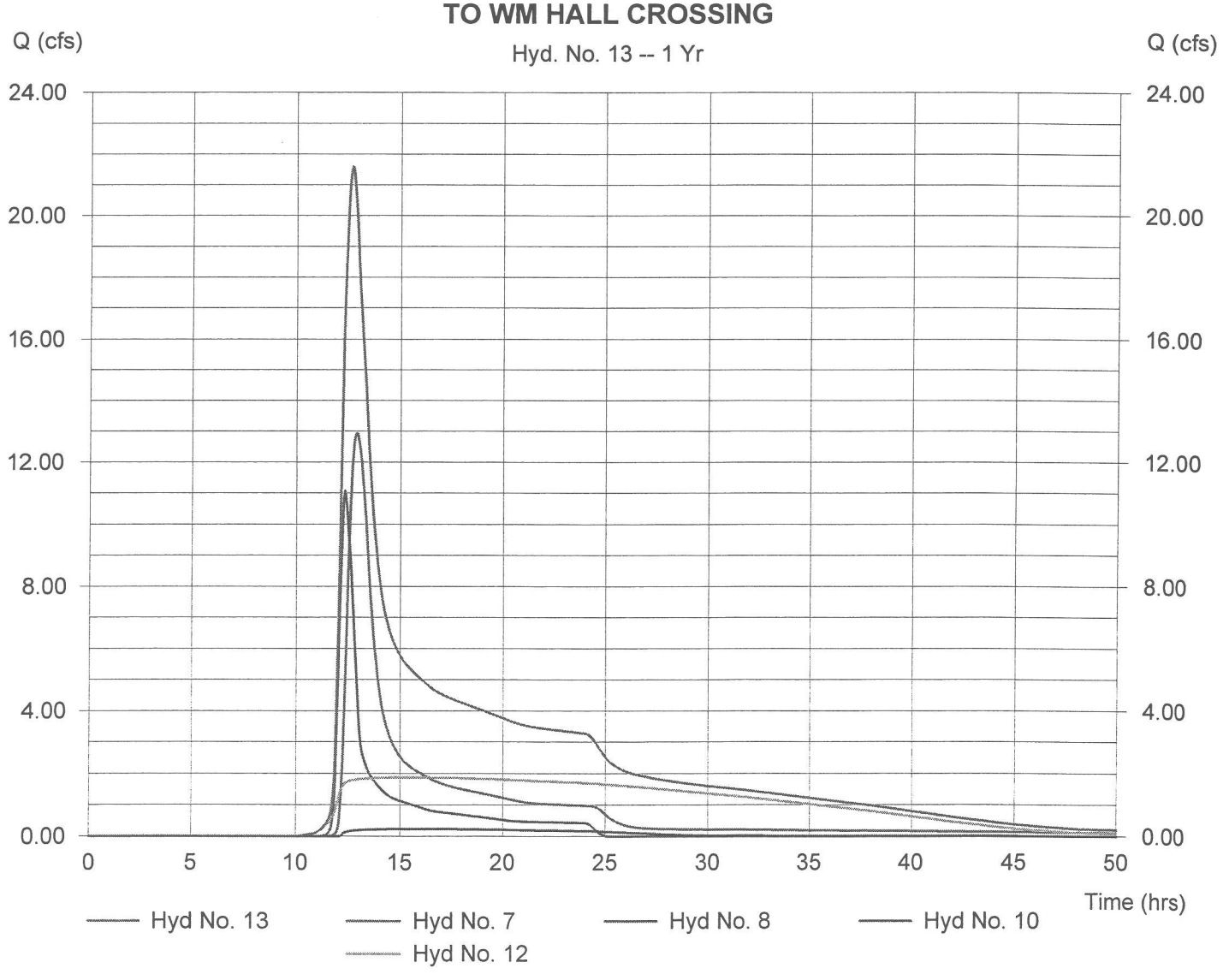
Tuesday, Oct 25 2005, 5:22 PM

Hyd. No. 13

TO WM HALL CROSSING

Hydrograph type	= Combine	Peak discharge	= 21.59 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyds.	= 7, 8, 10, 12		

Hydrograph Volume = 378,092 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

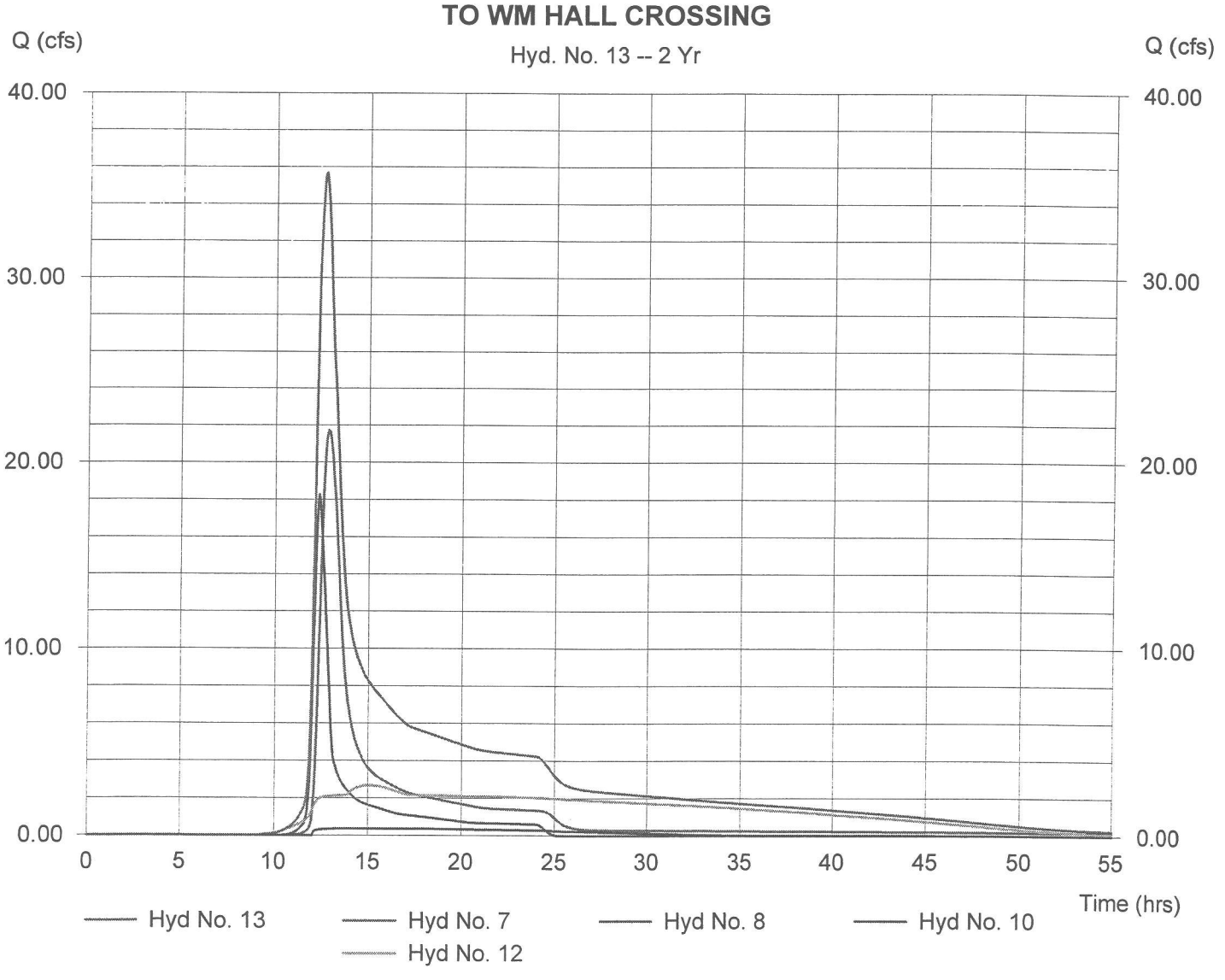
Tuesday, Oct 25 2005, 5:22 PM

Hyd. No. 13

TO WM HALL CROSSING

Hydrograph type	= Combine	Peak discharge	= 35.67 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyds.	= 7, 8, 10, 12		

Hydrograph Volume = 560,985 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

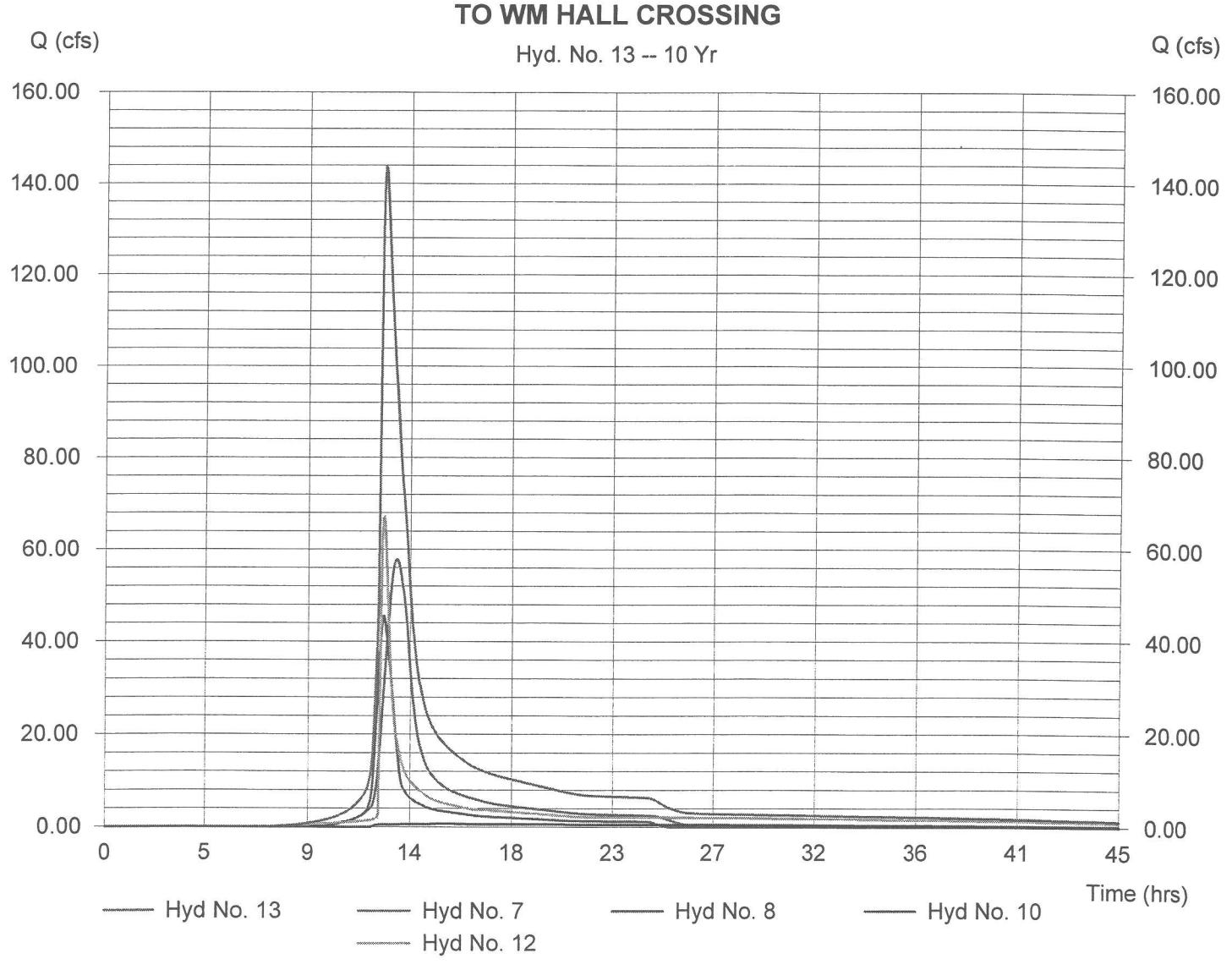
Tuesday, Oct 25 2005, 5:22 PM

Hyd. No. 13

TO WM HALL CROSSING

Hydrograph type	= Combine	Peak discharge	= 143.85 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyds.	= 7, 8, 10, 12		

Hydrograph Volume = 1,234,398 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

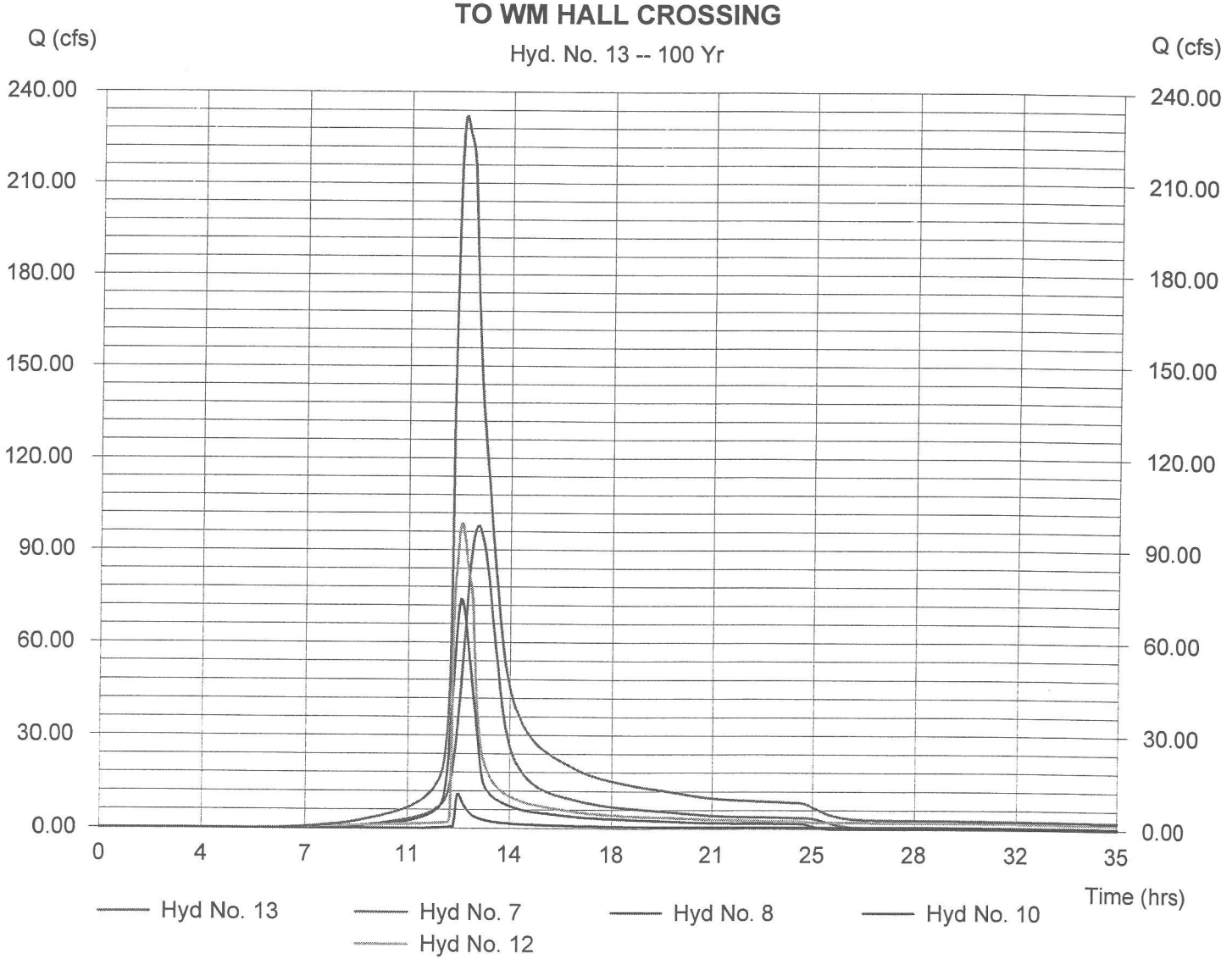
Tuesday, Oct 25 2005, 5:22 PM

Hyd. No. 13

TO WM HALL CROSSING

Hydrograph type	= Combine	Peak discharge	= 232.06 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyds.	= 7, 8, 10, 12		

Hydrograph Volume = 1,930,162 cuft



Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:28 PM

Pond No. 4 - WM HALL 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	27,952	0	0
2.00	48.00	49,162	77,114	77,114
4.00	50.00	74,857	124,019	201,133
6.00	52.00	111,202	186,059	387,192
8.00	54.00	160,097	271,299	658,491
10.00	56.00	217,712	377,809	1,036,300
12.00	58.00	285,202	502,914	1,539,214

Culvert / Orifice Structures

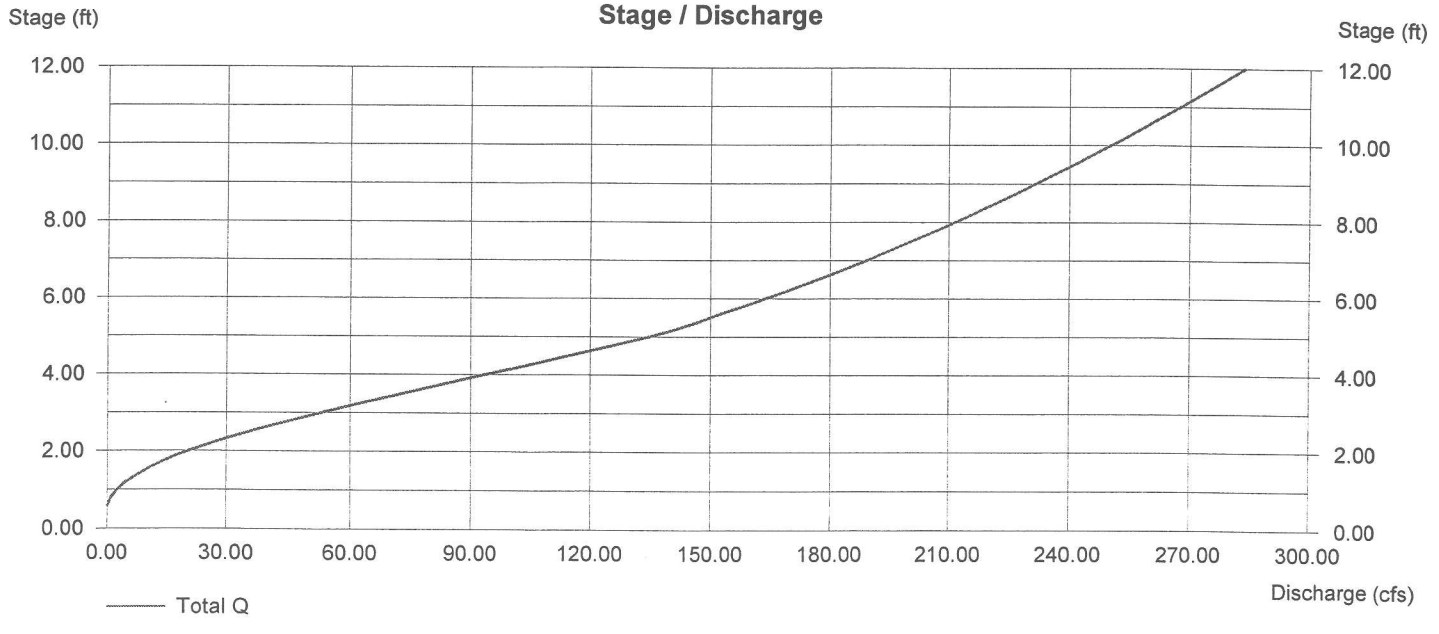
	[A]	[B]	[C]	[D]
Rise (in)	= 60.00	0.00	0.00	0.00
Span (in)	= 60.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 46.50	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

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. = 0.00 ft

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



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:23 PM

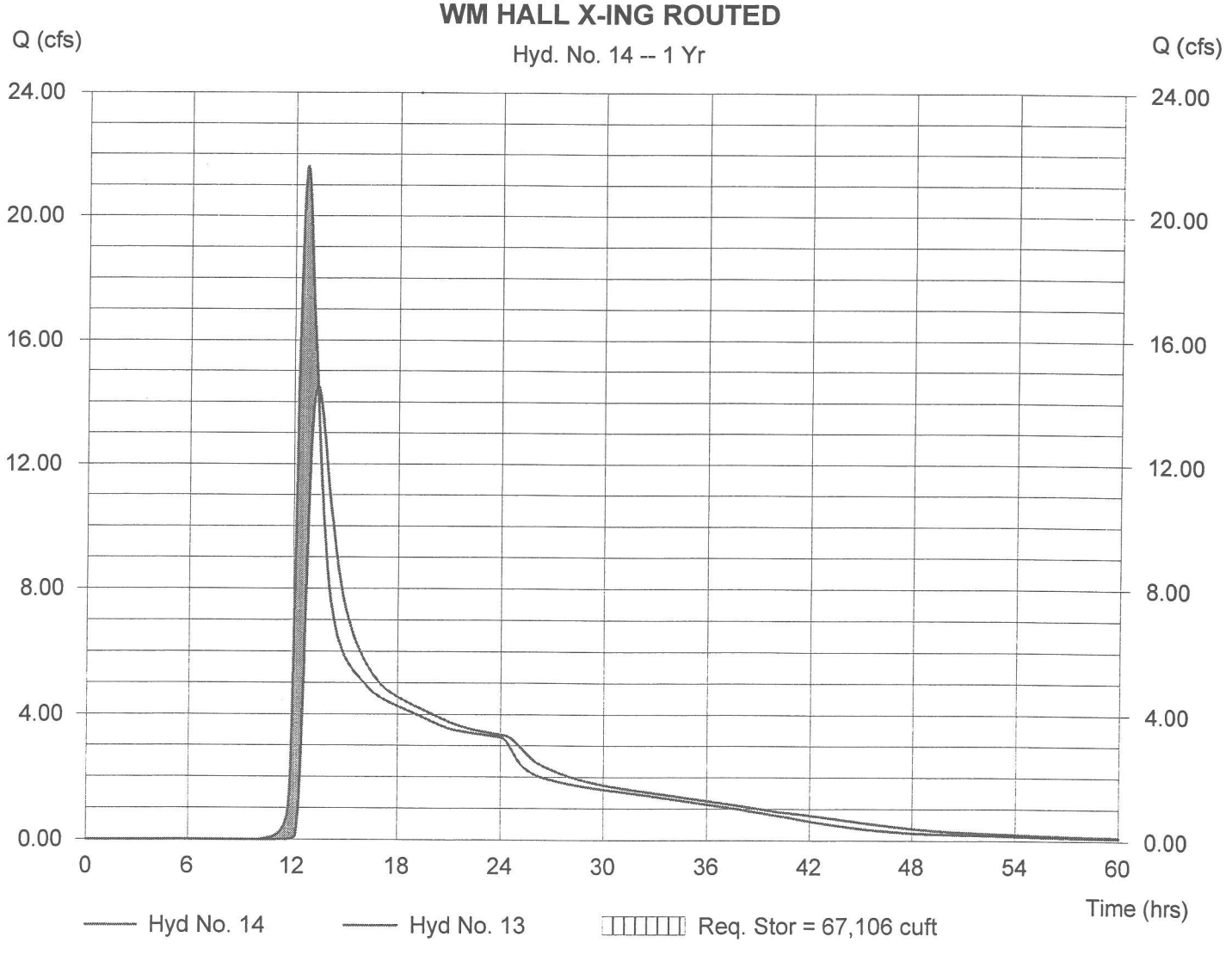
Hyd. No. 14

WM HALL X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 14.50 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 13	Max. Elevation	= 47.74 ft
Reservoir name	= WM HALL CROSSING	Max. Storage	= 67,106 cuft

Storage Indication method used. Wet pond routing start elevation = 46.40 ft.

Hydrograph Volume = 377,852 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:23 PM

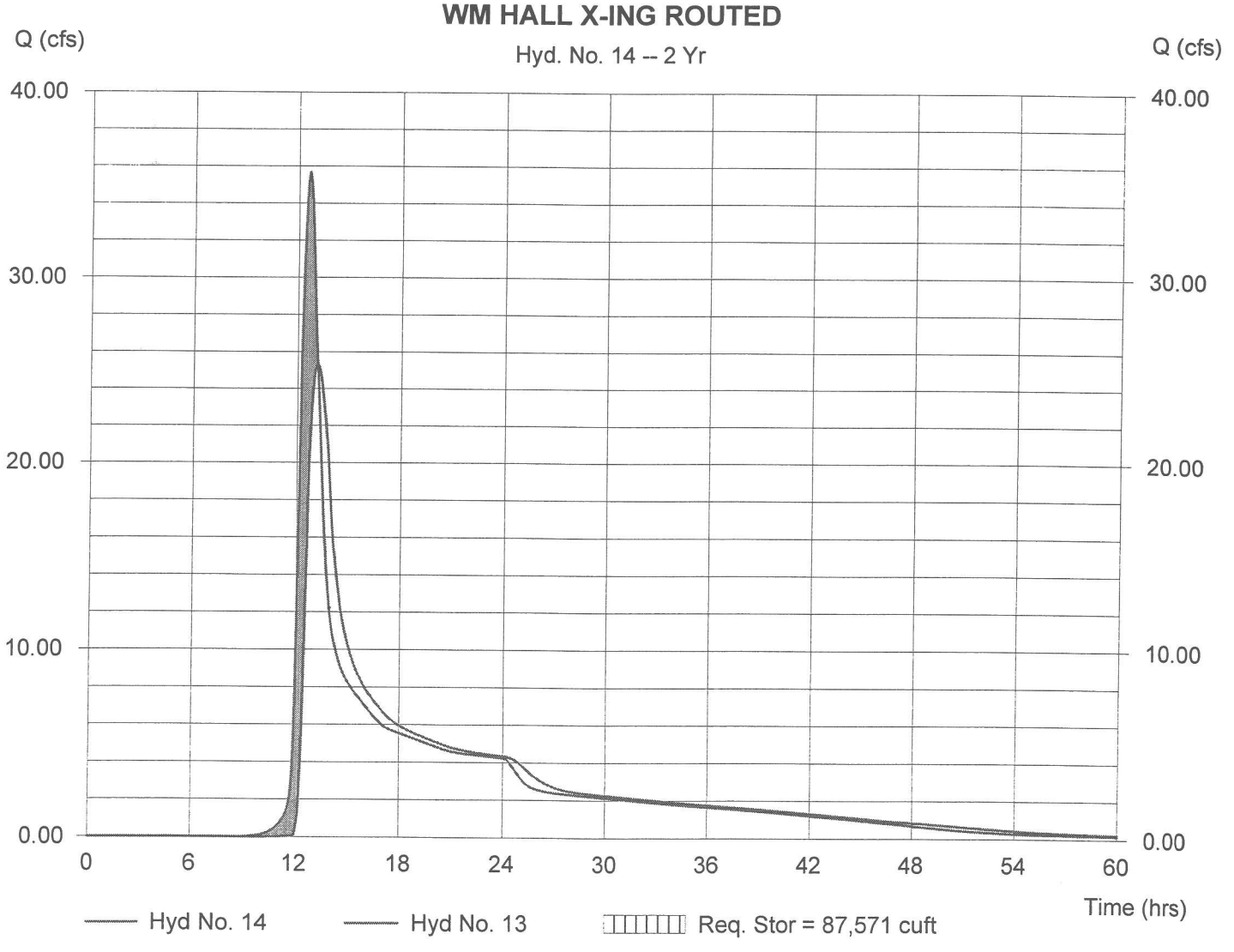
Hyd. No. 14

WM HALL X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 25.31 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 13	Max. Elevation	= 48.17 ft
Reservoir name	= WM HALL CROSSING	Max. Storage	= 87,571 cuft

Storage Indication method used. Wet pond routing start elevation = 46.40 ft.

Hydrograph Volume = 560,588 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:23 PM

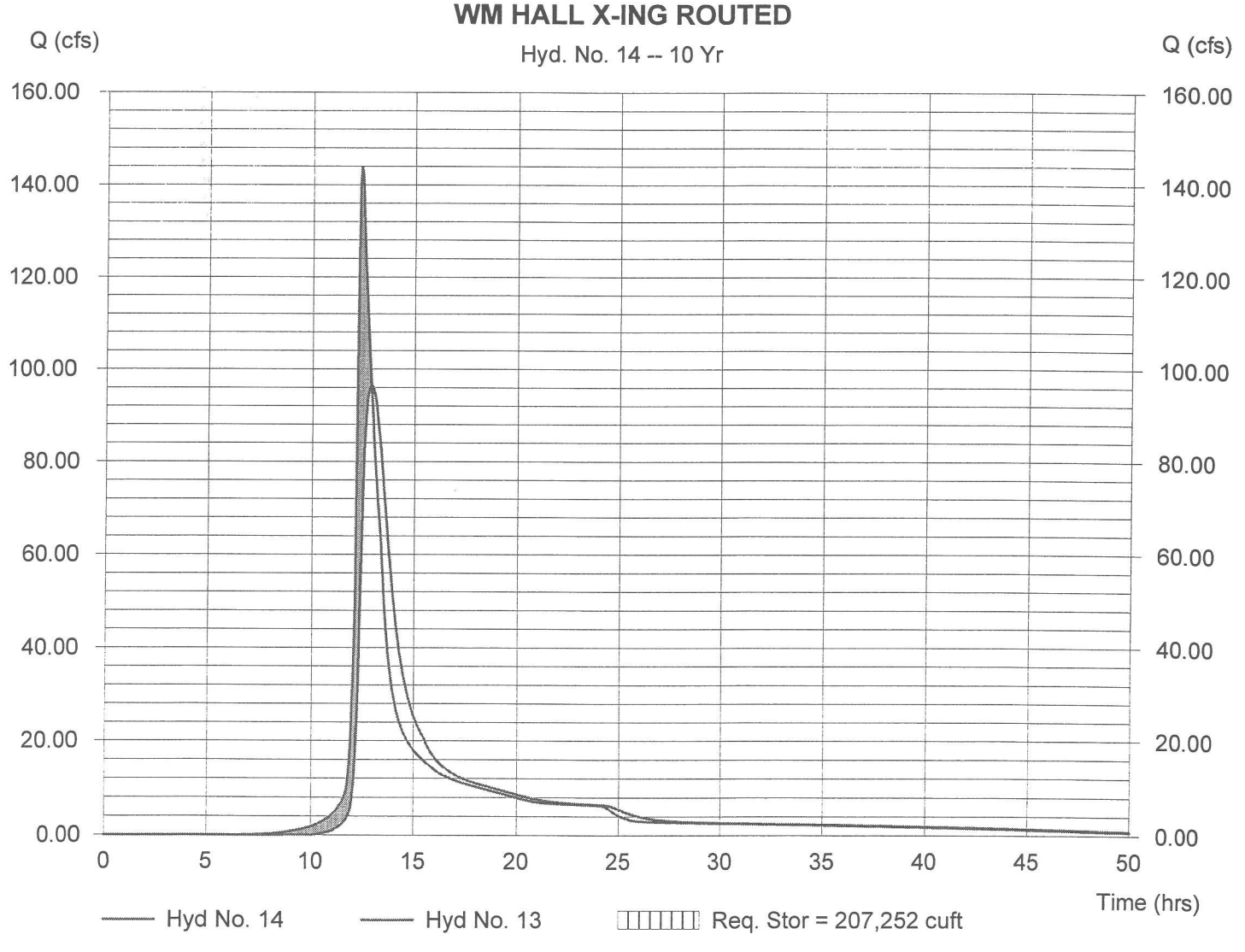
Hyd. No. 14

WM HALL X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 96.32 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 13	Max. Elevation	= 50.07 ft
Reservoir name	= WM HALL CROSSING	Max. Storage	= 207,252 cuft

Storage Indication method used. Wet pond routing start elevation = 46.40 ft.

Hydrograph Volume = 1,233,919 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Oct 25 2005, 5:23 PM

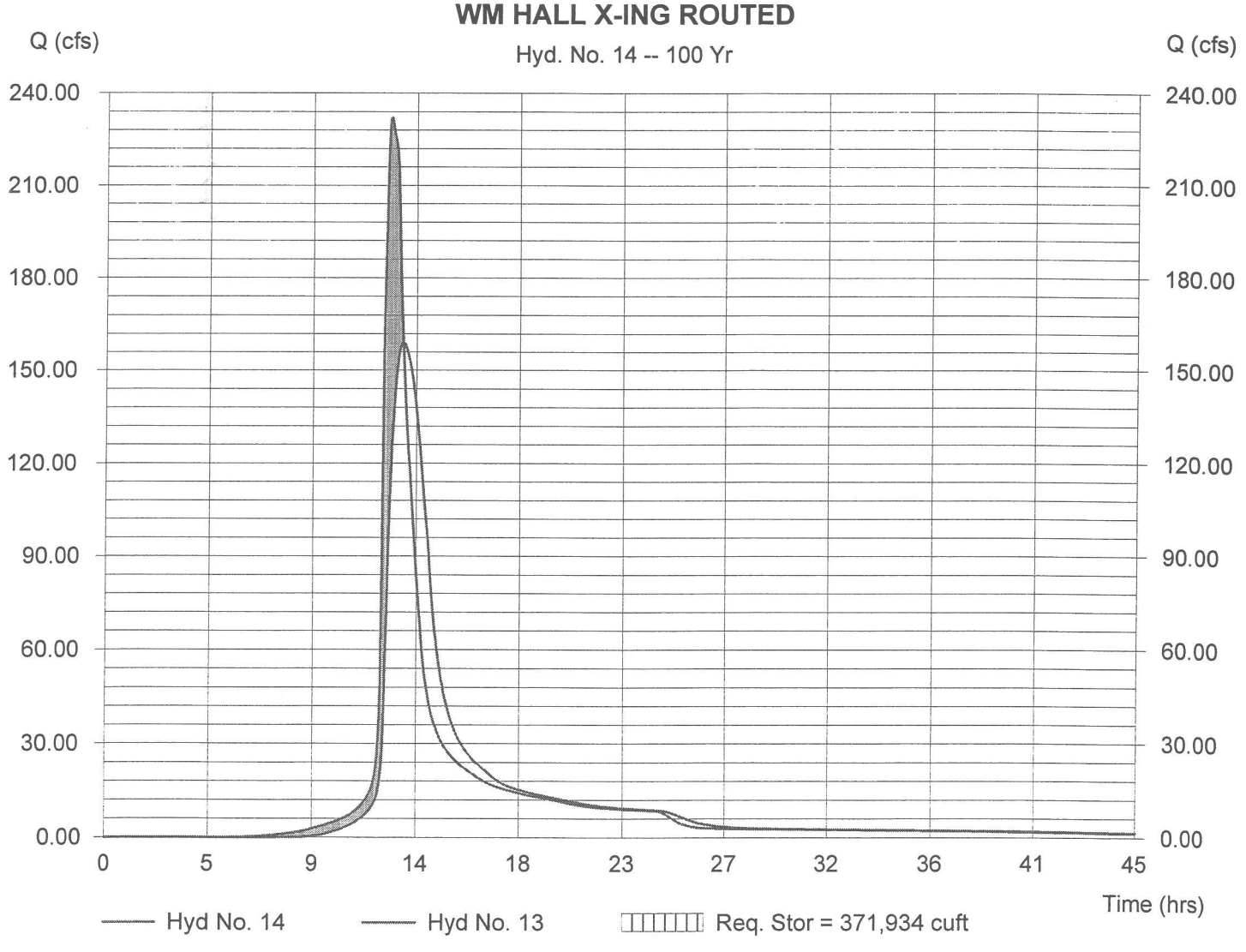
Hyd. No. 14

WM HALL X-ING ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 159.18 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 13	Max. Elevation	= 51.84 ft
Reservoir name	= WM HALL CROSSING	Max. Storage	= 371,934 cuft

Storage Indication method used. Wet pond routing start elevation = 46.40 ft.

Hydrograph Volume = 1,929,675 cuft



Hydrograph Summary Report

CALCULATIONS AS ORIGINALLY APPROVED - POST DEVELOPMENT

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	8.80	3	726	31,480	----	------	------	TO WM WAY BMP1
2	Reservoir	0.24	3	1140	31,392	1	75.24	68,604	WM WAY BMP 1 ROUTED
3	Reach	0.24	3	1167	30,597	2	------	------	REACH 1
4	SCS Runoff	15.13	3	750	109,066	----	------	------	POST DEV AREA 1
5	Combine	15.26	3	750	139,662	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	14.96	3	756	139,660	5	61.21	6,556	WM WAY CROSSING ROUTED
7	Reach	12.93	3	774	139,635	6	------	------	REACH 2
8	SCS Runoff	11.06	3	741	64,309	----	------	------	POST DEV AREA 2
9	SCS Runoff	7.18	3	720	19,674	----	------	------	TO WM WAY BMP 2
10	Reservoir	0.23	3	948	11,197	9	60.79	12,686	WM WAY BMP 2 ROUTED
11	Combine	19.81	3	762	215,142	7, 8, 10	------	------	TO WM HALL CROSSING
12	Reservoir	12.46	3	801	214,945	11	47.65	63,486	WM HALL X-ING ROUTED
13	SCS Runoff	3.76	3	720	10,219	----	------	------	TO VILLA ENTR. BMP 1
14	Reservoir	0.26	3	789	10,207	13	55.38	5,238	VILLA ENTR BMP 1 ROUTE
15	Combine	12.73	3	801	225,152	12, 14	------	------	TO REACH 4
16	Reach	10.21	3	840	224,588	15	------	------	REACH 4
17	SCS Runoff	11.53	3	747	80,333	----	------	------	POST DEV AREA 3
18	Reservoir	10.96	3	756	80,330	17	47.07	6,954	WM VILLA X-ING ROUTED
19	Reach	7.61	3	786	80,301	18	------	------	REACH 5
20	SCS Runoff	47.49	3	726	166,802	----	------	------	TO HALL BMP 1 (UPPER)
21	Reservoir	29.25	3	738	166,418	20	59.15	163,124	HALL BMP 1 ROUTED
22	SCS Runoff	1.81	3	720	4,913	----	------	------	DRAINAGE TO HALL BMP 2 (LOWE
23	Combine	29.62	3	738	171,330	21, 22	------	------	TO HALL BMP 2
24	Reservoir	1.83	3	987	162,897	23	55.02	87,531	HALL BMP 2 ROUTED
25	SCS Runoff	31.56	3	723	100,903	----	------	------	TO VILLA BMP 1
26	Reservoir	0.78	3	1092	100,787	25	54.11	71,707	VILLA BMP 1 ROUTED
27	SCS Runoff	19.02	3	723	60,722	----	------	------	TO VILLA BMP 2
28	Reservoir	0.39	3	1164	60,656	27	71.80	101,148	VILLA BMP 2 ROUTED
29	SCS Runoff	3.56	3	732	15,533	----	------	------	POST DEV AREA 4
30	Combine	3.86	3	732	76,189	28, 29	------	------	TO POINT OF CONCERN 4

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	2.53	3	750	75,587	30	------	------	REACH 9
32	SCS Runoff	17.88	3	729	67,019	----	------	------	TO FC SECT 30 BMP
33	Reservoir	1.75	3	813	67,014	32	53.99	29,785	FC BMP ROUTED
34	Reach	1.69	3	927	66,969	33	------	------	REACH 7
35	SCS Runoff	8.65	3	729	32,824	----	------	------	POST DEV AREA 5
36	SCS Runoff	5.15	3	738	26,356	----	------	------	POST DEV AREA 6
37	Combine	17.61	3	813	447,445	16, 19, 31, 34,	------	------	REACH 4,5,7+9
→ 38	Combine	14.09	3	732	322,864	24, 26, 35, 36,	------	------	HALL BMP, VILLA BMP 1, AREAS 5
→ 39	Combine	21.66	3	810	770,308	37, 38	------	------	TO POINT OF CONCERN 5

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	13.00	3	726	45,867	----	------	------	TO WM WAY BMP1
2	Reservoir	0.30	3	1176	45,733	1	75.81	80,291	WM WAY BMP 1 ROUTED
3	Reach	0.30	3	1200	44,984	2	------	------	REACH 1
4	SCS Runoff	25.08	3	750	170,544	----	------	------	POST DEV AREA 1
5	Combine	25.25	3	750	215,528	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	24.80	3	753	215,526	5	61.63	8,833	WM WAY CROSSING ROUTED
7	Reach	21.72	3	771	215,501	6	------	------	REACH 2
8	SCS Runoff	18.25	3	741	100,559	----	------	------	POST DEV AREA 2
9	SCS Runoff	10.57	3	720	28,666	----	------	------	TO WM WAY BMP 2
10	Reservoir	0.36	3	915	20,189	9	62.14	18,235	WM WAY BMP 2 ROUTED
11	Combine	33.61	3	759	336,250	7, 8, 10	------	------	TO WM HALL CROSSING
12	Reservoir	23.35	3	789	335,898	11	48.10	83,107	WM HALL X-ING ROUTED
13	SCS Runoff	5.40	3	720	14,621	----	------	------	TO VILLA ENTR. BMP 1
14	Reservoir	0.45	3	771	14,609	13	56.02	7,711	VILLA ENTR BMP 1 ROUTE
15	Combine	23.77	3	789	350,507	12, 14	------	------	TO REACH 4
16	Reach	19.40	3	825	350,099	15	------	------	REACH 4
17	SCS Runoff	19.92	3	747	128,568	----	------	------	POST DEV AREA 3
18	Reservoir	19.29	3	753	128,565	17	47.44	9,377	WM VILLA X-ING ROUTED
19	Reach	13.64	3	780	128,536	18	------	------	REACH 5
20	SCS Runoff	64.77	3	726	228,587	----	------	------	TO HALL BMP 1 (UPPER)
21	Reservoir	45.85	3	735	228,201	20	59.56	175,310	HALL BMP 1 ROUTED
22	SCS Runoff	2.59	3	720	7,029	----	------	------	DRAINAGE TO HALL BMP 2 (LOWE
23	Combine	46.57	3	735	235,230	21, 22	------	------	TO HALL BMP 2
24	Reservoir	9.20	3	792	226,797	23	55.76	107,240	HALL BMP 2 ROUTED
25	SCS Runoff	44.45	3	723	141,862	----	------	------	TO VILLA BMP 1
26	Reservoir	1.57	3	933	141,725	25	54.90	94,485	VILLA BMP 1 ROUTED
27	SCS Runoff	26.49	3	723	84,639	----	------	------	TO VILLA BMP 2
28	Reservoir	0.45	3	1200	84,534	27	72.82	121,231	VILLA BMP 2 ROUTED
29	SCS Runoff	5.83	3	732	24,289	----	------	------	POST DEV AREA 4
30	Combine	6.19	3	732	108,823	28, 29	------	------	TO POINT OF CONCERN 4

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	4.18	3	747	108,260	30	------	------	REACH 9
32	SCS Runoff	28.56	3	729	103,651	----	------	------	TO FC SECT 30 BMP
33	Reservoir	1.93	3	849	103,645	32	54.73	53,340	FC BMP ROUTED
34	Reach	1.91	3	978	103,601	33	------	------	REACH 7
35	SCS Runoff	14.06	3	729	51,326	----	------	------	POST DEV AREA 5
36	SCS Runoff	8.17	3	738	40,330	----	------	------	POST DEV AREA 6
37	Combine	32.12	3	801	690,496	16, 19, 31, 34,	------	------	REACH 4,5,7+9
38	Combine	22.64	3	729	460,179	24, 26, 35, 36,	------	------	HALL BMP, VILLA BMP 1, AREAS 5
39	Combine	45.24	3	795	1,150,669	37, 38	------	------	TO POINT OF CONCERN 5

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	27.78	3	726	97,867	----	------	------	TO WM WAY BMP1
2	Reservoir	9.00	3	747	97,707	1	76.52	96,047	WM WAY BMP 1 ROUTED
3	Reach	5.33	3	774	96,985	2	------	------	REACH 1
4	SCS Runoff	62.94	3	750	407,737	----	------	------	POST DEV AREA 1
5	Combine	66.32	3	750	504,721	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	62.77	3	759	504,719	5	62.69	24,374	WM WAY CROSSING ROUTED
7	Reach	57.75	3	774	504,694	6	------	------	REACH 2
8	SCS Runoff	45.50	3	741	240,417	----	------	------	POST DEV AREA 2
9	SCS Runoff	22.41	3	720	61,165	----	------	------	TO WM WAY BMP 2
10	Reservoir	0.73	3	897	52,688	9	65.82	41,927	WM WAY BMP 2 ROUTED
11	Combine	84.01	3	759	797,798	7, 8, 10	------	------	TO WM HALL CROSSING
12	Reservoir	67.07	3	783	797,364	11	49.36	161,650	WM HALL X-ING ROUTED
13	SCS Runoff	11.02	3	720	30,275	----	------	------	TO VILLA ENTR. BMP 1
14	Reservoir	5.88	3	729	30,263	13	56.69	11,593	VILLA ENTR BMP 1 ROUTE
15	Combine	68.06	3	783	827,627	12, 14	------	------	TO REACH 4
16	Reach	57.75	3	813	827,300	15	------	------	REACH 4
17	SCS Runoff	52.59	3	747	318,630	----	------	------	POST DEV AREA 3
18	Reservoir	49.37	3	753	318,626	17	48.40	19,996	WM VILLA X-ING ROUTED
19	Reach	38.47	3	777	318,598	18	------	------	REACH 5
20	SCS Runoff	121.93	3	726	440,450	----	------	------	TO HALL BMP 1 (UPPER)
21	Reservoir	83.31	3	738	440,059	20	60.68	212,427	HALL BMP 1 ROUTED
22	SCS Runoff	5.30	3	720	14,555	----	------	------	DRAINAGE TO HALL BMP 2 (LOWE
23	Combine	84.69	3	735	454,614	21, 22	------	------	TO HALL BMP 2
24	Reservoir	70.95	3	750	446,180	23	56.78	137,821	HALL BMP 2 ROUTED
25	SCS Runoff	88.04	3	723	285,275	----	------	------	TO VILLA BMP 1
26	Reservoir	41.28	3	738	285,112	25	56.32	136,917	VILLA BMP 1 ROUTED
27	SCS Runoff	51.56	3	723	167,774	----	------	------	TO VILLA BMP 2
28	Reservoir	11.53	3	744	167,612	27	74.22	149,727	VILLA BMP 2 ROUTED
29	SCS Runoff	14.45	3	729	58,071	----	------	------	POST DEV AREA 4
30	Combine	21.88	3	741	225,682	28, 29	------	------	TO POINT OF CONCERN 4

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	16.58	3	753	225,176	30	------	------	REACH 9
32	SCS Runoff	69.31	3	726	243,557	----	------	------	TO FC SECT 30 BMP
33	Reservoir	32.07	3	744	243,552	32	55.94	92,420	FC BMP ROUTED
34	Reach	17.08	3	768	243,506	33	------	------	REACH 7
35	SCS Runoff	34.88	3	726	122,711	----	------	------	POST DEV AREA 5
36	SCS Runoff	19.39	3	735	93,180	----	------	------	POST DEV AREA 6
37	Combine	112.35	3	786	1,614,579	16, 19, 31, 34,	------	------	REACH 4,5,7+9
38	Combine	137.62	3	741	947,181	24, 26, 35, 36,	------	------	HALL BMP, VILLA BMP 1, AREAS 5
39	Combine	195.28	3	747	2,561,760	37, 38	------	------	TO POINT OF CONCERN 5

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	42.29	3	726	150,773	----	------	------	TO WM WAY BMP1
2	Reservoir	18.19	3	744	150,612	1	77.29	113,647	WM WAY BMP 1 ROUTED
3	Reach	12.89	3	771	149,890	2	------	------	REACH 1
4	SCS Runoff	102.33	3	750	660,491	----	------	------	POST DEV AREA 1
5	Combine	112.33	3	750	810,382	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	105.57	3	759	810,379	5	63.78	45,675	WM WAY CROSSING ROUTED
7	Reach	97.80	3	774	810,355	6	------	------	REACH 2
8	SCS Runoff	73.94	3	738	389,451	----	------	------	POST DEV AREA 2
9	SCS Runoff	33.99	3	720	94,230	----	------	------	TO WM WAY BMP 2
10	Reservoir	11.01	3	735	85,753	9	66.65	49,329	WM WAY BMP 2 ROUTED
11	Combine	143.38	3	756	1,285,557	7, 8, 10	------	------	TO WM HALL CROSSING
12	Reservoir	114.21	3	783	1,285,117	11	50.49	246,557	WM HALL X-ING ROUTED
13	SCS Runoff	16.46	3	720	46,021	----	------	------	TO VILLA ENTR. BMP 1
14	Reservoir	7.16	3	732	46,010	13	57.62	16,954	VILLA ENTR BMP 1 ROUTE
15	Combine	115.68	3	780	1,331,128	12, 14	------	------	TO REACH 4
16	Reach	102.47	3	810	1,330,806	15	------	------	REACH 4
17	SCS Runoff	87.16	3	747	524,236	----	------	------	POST DEV AREA 3
18	Reservoir	82.45	3	753	524,232	17	49.24	34,427	WM VILLA X-ING ROUTED
19	Reach	64.38	3	774	524,204	18	------	------	REACH 5
20	SCS Runoff	176.14	3	726	648,455	----	------	------	TO HALL BMP 1 (UPPER)
21	Reservoir	97.67	3	741	648,061	20	62.18	266,221	HALL BMP 1 ROUTED
22	SCS Runoff	7.91	3	720	22,126	----	------	------	DRAINAGE TO HALL BMP 2 (LOWE
23	Combine	99.04	3	738	670,186	21, 22	------	------	TO HALL BMP 2
24	Reservoir	92.08	3	753	661,753	23	57.38	156,348	HALL BMP 2 ROUTED
25	SCS Runoff	129.83	3	723	428,043	----	------	------	TO VILLA BMP 1
26	Reservoir	80.12	3	735	427,871	25	57.29	169,781	VILLA BMP 1 ROUTED
27	SCS Runoff	75.48	3	723	250,133	----	------	------	TO VILLA BMP 2
28	Reservoir	38.43	3	735	249,965	27	75.25	172,585	VILLA BMP 2 ROUTED
29	SCS Runoff	23.48	3	729	94,068	----	------	------	POST DEV AREA 4
30	Combine	60.08	3	735	344,034	28, 29	------	------	TO POINT OF CONCERN 4

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	44.66	3	747	343,534	30	------	------	REACH 9
32	SCS Runoff	111.28	3	726	391,572	----	------	------	TO FC SECT 30 BMP
33	Reservoir	93.48	3	732	391,566	32	56.31	111,661	FC BMP ROUTED
34	Reach	40.35	3	753	391,520	33	------	------	REACH 7
35	SCS Runoff	56.55	3	726	198,779	----	------	------	POST DEV AREA 5
36	SCS Runoff	30.95	3	735	148,701	----	------	------	POST DEV AREA 6
37	Combine	203.68	3	777	2,590,059	16, 19, 31, 34,	------	------	REACH 4,5,7+9
38	Combine	232.16	3	732	1,437,104	24, 26, 35, 36,	------	------	HALL BMP, VILLA BMP 1, AREAS 5
39	Combine	360.30	3	747	4,027,164	37, 38	------	------	TO POINT OF CONCERN 5

CALCULATIONS FOR REVISED BMP

Hydrograph Summary Report

POST DEVELOPMENT

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	8.80	3	726	31,480	----	------	------	TO WM WAY BMP1
2	Reservoir	0.24	3	1140	31,392	1	75.24	68,604	WM WAY BMP 1 ROUTED
3	Reach	0.24	3	1167	30,597	2	------	------	REACH 1
4	SCS Runoff	15.13	3	750	109,066	----	------	------	POST DEV AREA 1
5	Combine	15.26	3	750	139,662	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	14.96	3	756	139,660	5	61.21	6,556	WM WAY CROSSING ROUTED
7	Reach	12.93	3	774	139,635	6	------	------	REACH 2
8	SCS Runoff	11.06	3	741	64,309	----	------	------	POST DEV AREA 2
9	SCS Runoff	7.18	3	720	19,674	----	------	------	TO WM WAY BMP 2
10	Reservoir	0.23	3	948	11,197	9	60.79	12,686	WM WAY BMP 2 ROUTED
11	SCS Runoff	47.49	3	726	166,802	----	------	------	TO HALL BMP 1 (UPPER)
12	Reservoir	1.88	3	927	162,950	11	59.18	205,029	HALL BMP 1 ROUTED
13	Combine	21.59	3	762	378,092	7, 8, 10, 12	------	------	TO WM HALL CROSSING
14	Reservoir	14.50	3	801	377,852	13	47.74	67,106	WM HALL X-ING ROUTED
15	SCS Runoff	3.76	3	720	10,219	----	------	------	TO VILLA ENTR. BMP 1
16	Reservoir	0.26	3	789	10,207	15	55.38	5,238	VILLA ENTR BMP 1 ROUTE
17	Combine	14.76	3	801	388,059	14, 16	------	------	TO REACH 4
18	Reach	12.03	3	837	387,540	17	------	------	REACH 4
19	SCS Runoff	11.53	3	747	80,333	----	------	------	POST DEV AREA 3
20	Reservoir	10.96	3	756	80,330	19	47.07	6,954	WM VILLA X-ING ROUTED
21	Reach	7.61	3	786	80,301	20	------	------	REACH 5
22	SCS Runoff	31.56	3	723	100,903	----	------	------	TO VILLA BMP 1
23	Reservoir	0.78	3	1092	100,787	22	54.11	71,707	VILLA BMP 1 ROUTED
24	SCS Runoff	19.02	3	723	60,722	----	------	------	TO VILLA BMP 2
25	Reservoir	0.39	3	1164	60,656	24	71.80	101,148	VILLA BMP 2 ROUTED
26	SCS Runoff	3.56	3	732	15,533	----	------	------	POST DEV AREA 4
27	Combine	3.86	3	732	76,189	25, 26	------	------	TO POINT OF CONCERN 4
28	Reach	2.53	3	750	75,587	27	------	------	REACH 9
29	SCS Runoff	17.88	3	729	67,019	----	------	------	TO FC SECT 30 BMP
30	Reservoir	1.75	3	813	67,014	29	53.99	29,785	FC BMP ROUTED

1-YR VOL

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	1.69	3	927	66,969	30	------	------	REACH 7
32	SCS Runoff	10.12	3	729	37,931	----	------	------	POST DEV AREA 5
33	SCS Runoff	5.15	3	738	26,356	----	------	------	POST DEV AREA 6
34	Combine	19.38	3	816	610,397	18, 21, 28, 31,	------	------	REACH 4,5,7+9
35	Combine	14.88	3	729	165,073	23, 32, 33,	------	------	VILLA BMP 1, AREAS 5+6
36	Combine	21.77	3	813	775,469	34, 35	------	------	TO POINT OF CONCERN 5

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	13.00	3	726	45,867	----	------	------	TO WM WAY BMP1
2	Reservoir	0.30	3	1176	45,733	1	75.81	80,291	WM WAY BMP 1 ROUTED
3	Reach	0.30	3	1200	44,984	2	------	------	REACH 1
4	SCS Runoff	25.08	3	750	170,544	----	------	------	POST DEV AREA 1
5	Combine	25.25	3	750	215,528	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	24.80	3	753	215,526	5	61.63	8,833	WM WAY CROSSING ROUTED
7	Reach	21.72	3	771	215,501	6	------	------	REACH 2
8	SCS Runoff	18.25	3	741	100,559	----	------	------	POST DEV AREA 2
9	SCS Runoff	10.57	3	720	28,666	----	------	------	TO WM WAY BMP 2
10	Reservoir	0.36	3	915	20,189	9	62.14	18,235	WM WAY BMP 2 ROUTED
11	SCS Runoff	64.77	3	726	228,587	----	------	------	TO HALL BMP 1 (UPPER)
12	Reservoir	2.67	3	906	224,736	11	60.46	248,982	HALL BMP 1 ROUTED
13	Combine	35.67	3	759	560,985	7, 8, 10, 12	------	------	TO WM HALL CROSSING
14	Reservoir	25.31	3	789	560,588	13	48.17	87,571	WM HALL X-ING ROUTED
15	SCS Runoff	5.40	3	720	14,621	----	------	------	TO VILLA ENTR. BMP 1
16	Reservoir	0.45	3	771	14,609	15	56.02	7,711	VILLA ENTR BMP 1 ROUTE
17	Combine	25.72	3	789	575,197	14, 16	------	------	TO REACH 4
18	Reach	21.42	3	825	574,835	17	------	------	REACH 4
19	SCS Runoff	19.92	3	747	128,568	----	------	------	POST DEV AREA 3
20	Reservoir	19.29	3	753	128,565	19	47.44	9,377	WM VILLA X-ING ROUTED
21	Reach	13.64	3	780	128,536	20	------	------	REACH 5
22	SCS Runoff	44.45	3	723	141,862	----	------	------	TO VILLA BMP 1
23	Reservoir	1.57	3	933	141,725	22	54.90	94,485	VILLA BMP 1 ROUTED
24	SCS Runoff	26.49	3	723	84,639	----	------	------	TO VILLA BMP 2
25	Reservoir	0.45	3	1200	84,534	24	72.82	121,231	VILLA BMP 2 ROUTED
26	SCS Runoff	5.83	3	732	24,289	----	------	------	POST DEV AREA 4
27	Combine	6.19	3	732	108,823	25, 26	------	------	TO POINT OF CONCERN 4
28	Reach	4.18	3	747	108,260	27	------	------	REACH 9
29	SCS Runoff	28.56	3	729	103,651	----	------	------	TO FC SECT 30 BMP
30	Reservoir	1.93	3	849	103,645	29	54.73	53,340	FC BMP ROUTED

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	1.91	3	978	103,601	30	------	------	REACH 7
32	SCS Runoff	16.16	3	729	58,663	----	------	------	POST DEV AREA 5
33	SCS Runoff	8.17	3	738	40,330	----	------	------	POST DEV AREA 6
34	Combine	33.98	3	801	915,231	18, 21, 28, 31,	------	------	REACH 4,5,7+9
35	Combine	23.74	3	729	240,718	23, 32, 33,	------	------	VILLA BMP 1, AREAS 5+6
36	Combine	38.24	3	798	1,155,950	34, 35	------	------	TO POINT OF CONCERN 5

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	27.78	3	726	97,867	----	------	------	TO WM WAY BMP1
2	Reservoir	9.00	3	747	97,707	1	76.52	96,047	WM WAY BMP 1 ROUTED
3	Reach	5.33	3	774	96,985	2	------	------	REACH 1
4	SCS Runoff	62.94	3	750	407,737	----	------	------	POST DEV AREA 1
5	Combine	66.32	3	750	504,721	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	62.77	3	759	504,719	5	62.69	24,374	WM WAY CROSSING ROUTED
7	Reach	57.75	3	774	504,694	6	------	------	REACH 2
8	SCS Runoff	45.50	3	741	240,417	----	------	------	POST DEV AREA 2
9	SCS Runoff	22.41	3	720	61,165	----	------	------	TO WM WAY BMP 2
10	Reservoir	0.73	3	897	52,688	9	65.82	41,927	WM WAY BMP 2 ROUTED
11	SCS Runoff	121.93	3	726	440,450	----	------	------	TO HALL BMP 1 (UPPER)
12	Reservoir	67.27	3	741	436,599	11	61.69	296,679	HALL BMP 1 ROUTED
13	Combine	143.85	3	741	1,234,398	7, 8, 10, 12	------	------	TO WM HALL CROSSING
14	Reservoir	96.32	3	774	1,233,919	13	50.07	207,252	WM HALL X-ING ROUTED
15	SCS Runoff	11.02	3	720	30,275	----	------	------	TO VILLA ENTR. BMP 1
16	Reservoir	5.88	3	729	30,263	15	56.69	11,593	VILLA ENTR BMP 1 ROUTE
17	Combine	97.53	3	771	1,264,182	14, 16	------	------	TO REACH 4
18	Reach	81.98	3	804	1,263,899	17	------	------	REACH 4
19	SCS Runoff	52.59	3	747	318,630	----	------	------	POST DEV AREA 3
20	Reservoir	49.37	3	753	318,626	19	48.40	19,996	WM VILLA X-ING ROUTED
21	Reach	38.47	3	777	318,598	20	------	------	REACH 5
22	SCS Runoff	88.04	3	723	285,275	----	------	------	TO VILLA BMP 1
23	Reservoir	41.28	3	738	285,112	22	56.32	136,917	VILLA BMP 1 ROUTED
24	SCS Runoff	51.56	3	723	167,774	----	------	------	TO VILLA BMP 2
25	Reservoir	11.53	3	744	167,612	24	74.22	149,727	VILLA BMP 2 ROUTED
26	SCS Runoff	14.45	3	729	58,071	----	------	------	POST DEV AREA 4
27	Combine	21.88	3	741	225,682	25, 26	------	------	TO POINT OF CONCERN 4
28	Reach	16.58	3	753	225,176	27	------	------	REACH 9
29	SCS Runoff	69.31	3	726	243,557	----	------	------	TO FC SECT 30 BMP
30	Reservoir	32.07	3	744	243,552	29	55.94	92,420	FC BMP ROUTED

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	17.08	3	768	243,506	30	------	------	REACH 7
32	SCS Runoff	39.23	3	726	137,846	----	------	------	POST DEV AREA 5
33	SCS Runoff	19.39	3	735	93,180	----	------	------	POST DEV AREA 6
34	Combine	139.33	3	786	2,051,179	18, 21, 28, 31,	------	------	REACH 4,5,7+9
35	Combine	89.65	3	735	516,137	23, 32, 33,	------	------	VILLA BMP 1, AREAS 5+6
36	Combine	155.46	3	783	2,567,323	34, 35	------	------	TO POINT OF CONCERN 5

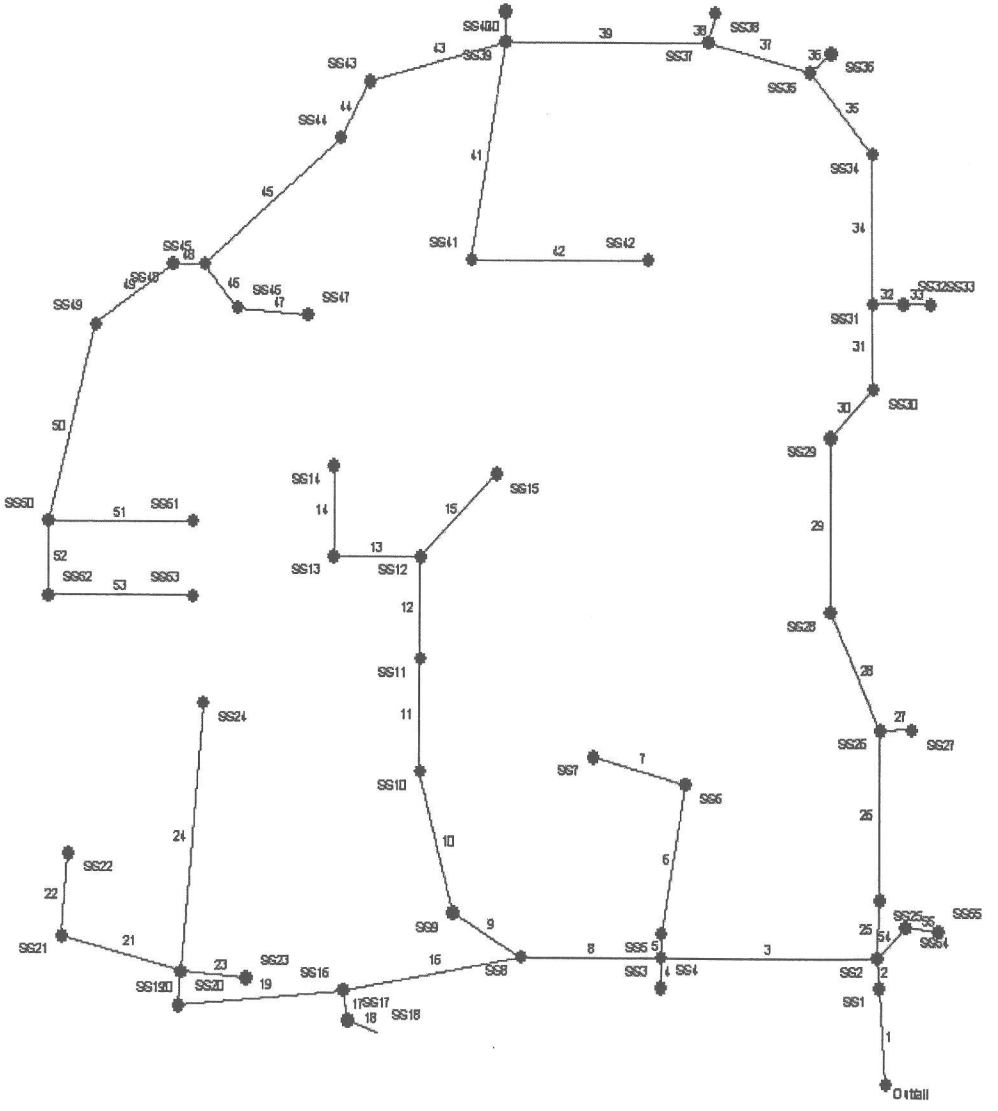
Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	42.29	3	726	150,773	----	------	------	TO WM WAY BMP1
2	Reservoir	18.19	3	744	150,612	1	77.29	113,647	WM WAY BMP 1 ROUTED
3	Reach	12.89	3	771	149,890	2	------	------	REACH 1
4	SCS Runoff	102.33	3	750	660,491	----	------	------	POST DEV AREA 1
5	Combine	112.33	3	750	810,382	3, 4	------	------	TO WM WAY CROSSING
6	Reservoir	105.57	3	759	810,379	5	63.78	45,675	WM WAY CROSSING ROUTED
7	Reach	97.80	3	774	810,355	6	------	------	REACH 2
8	SCS Runoff	73.94	3	738	389,451	----	------	------	POST DEV AREA 2
9	SCS Runoff	33.99	3	720	94,230	----	------	------	TO WM WAY BMP 2
10	Reservoir	11.01	3	735	85,753	9	66.65	49,329	WM WAY BMP 2 ROUTED
11	SCS Runoff	176.14	3	726	648,455	----	------	------	TO HALL BMP 1 (UPPER)
12	Reservoir	98.44	3	738	644,603	11	63.04	356,680	HALL BMP 1 ROUTED
13	Combine	232.06	3	744	1,930,162	7, 8, 10, 12	------	------	TO WM HALL CROSSING
14	Reservoir	159.18	3	774	1,929,675	13	51.84	371,934	WM HALL X-ING ROUTED
15	SCS Runoff	16.46	3	720	46,021	----	------	------	TO VILLA ENTR. BMP 1
16	Reservoir	7.16	3	732	46,010	15	57.62	16,954	VILLA ENTR BMP 1 ROUTE
17	Combine	161.15	3	774	1,975,684	14, 16	------	------	TO REACH 4
18	Reach	143.14	3	807	1,975,414	17	------	------	REACH 4
19	SCS Runoff	87.16	3	747	524,236	----	------	------	POST DEV AREA 3
20	Reservoir	82.45	3	753	524,232	19	49.24	34,427	WM VILLA X-ING ROUTED
21	Reach	64.38	3	774	524,204	20	------	------	REACH 5
22	SCS Runoff	129.83	3	723	428,043	----	------	------	TO VILLA BMP 1
23	Reservoir	80.12	3	735	427,871	22	57.29	169,781	VILLA BMP 1 ROUTED
24	SCS Runoff	75.48	3	723	250,133	----	------	------	TO VILLA BMP 2
25	Reservoir	38.43	3	735	249,965	24	75.25	172,585	VILLA BMP 2 ROUTED
26	SCS Runoff	23.48	3	729	94,068	----	------	------	POST DEV AREA 4
27	Combine	60.08	3	735	344,034	25, 26	------	------	TO POINT OF CONCERN 4
28	Reach	44.66	3	747	343,534	27	------	------	REACH 9
29	SCS Runoff	111.28	3	726	391,572	----	------	------	TO FC SECT 30 BMP
30	Reservoir	93.48	3	732	391,566	29	56.31	111,661	FC BMP ROUTED

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
31	Reach	40.35	3	753	391,520	30	------	------	REACH 7
32	SCS Runoff	62.98	3	726	221,617	----	------	------	POST DEV AREA 5
33	SCS Runoff	30.95	3	735	148,701	----	------	------	POST DEV AREA 6
34	Combine	244.30	3	780	3,234,666	18, 21, 28, 31,	------	------	REACH 4,5,7+9
35	Combine	164.90	3	732	798,189	23, 32, 33,	------	------	VILLA BMP 1, AREAS 5+6
36	Combine	293.84	3	747	4,032,863	34, 35	------	------	TO POINT OF CONCERN 5

Hydraflow Plan View



Windsor Hall (revised)	No. Lines: 55	10-26-2005

Hydraflow Storm Sewers 2005

Storm Sewer Tabulation

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	77.0	0.07	13.20	0.90	0.06	9.24	5.0	17.1	4.9	44.96	201.1	6.36	36	9.09	55.00	48.00	62.25	61.90	66.03	0.00	SS-1-Outfall
2	1	24.0	0.22	13.13	0.65	0.14	9.18	5.0	17.0	4.9	44.72	253.6	6.33	36	14.46	58.47	55.00	62.46	62.35	66.23	66.03	SS2-SS1
3	2	191.0	0.08	6.00	0.90	0.07	3.93	5.0	13.1	5.4	21.30	58.23	7.27	24	6.63	71.13	58.47	72.76	63.08	76.63	66.23	SS3-SS2
4	3	24.0	0.10	0.10	0.90	0.09	0.09	5.0	5.0	7.1	0.64	17.44	0.64	15	7.29	72.88	71.13	73.69	73.69	76.63	76.63	SS4-SS3
5	3	19.0	0.33	0.71	0.90	0.30	0.58	5.0	7.2	6.6	3.82	20.26	3.92	15	9.84	73.00	71.13	73.78	73.55	77.00	76.63	SS5-SS3
6	5	120.0	0.05	0.38	0.75	0.04	0.29	5.0	6.0	6.9	1.96	9.92	2.70	15	2.36	75.83	73.00	76.39	74.09	80.00	77.00	SS6-SS5
7	6	84.0	0.33	0.33	0.75	0.25	0.25	5.0	5.0	7.1	1.76	4.57	2.93	15	0.50	76.25	75.83	76.78	76.57	80.00	80.00	SS7-SS6
8	3	124.0	0.26	5.11	0.55	0.14	3.18	5.0	12.8	5.5	17.43	20.21	5.82	24	0.80	72.12	71.13	73.83	73.22	83.46	76.63	SS8-SS3
9	8	70.0	0.19	1.23	0.75	0.14	0.92	5.0	12.5	5.5	5.10	11.91	2.89	18	1.29	73.02	72.12	74.77	74.60	79.00	83.46	SS9-SS8
10	9	116.0	0.19	1.04	0.75	0.14	0.78	5.0	11.8	5.6	4.40	7.43	2.49	18	0.50	73.60	73.02	75.10	74.90	81.00	79.00	SS10-SS9
11	10	89.0	0.03	0.85	0.75	0.02	0.64	5.0	11.4	5.7	3.65	4.59	2.97	15	0.51	74.05	73.60	75.41	75.13	81.00	81.00	SS11-SS10
12	11	82.0	0.18	0.82	0.75	0.14	0.62	5.0	11.0	5.8	3.56	4.51	2.91	15	0.49	74.45	74.05	75.67	75.44	79.50	81.00	SS12-SS11
13	12	76.0	0.08	0.15	0.75	0.06	0.11	5.0	9.0	6.2	0.69	4.57	0.58	15	0.50	74.83	74.45	75.94	75.93	92.00	79.50	SS13-SS12
14	13	73.0	0.07	0.07	0.75	0.05	0.05	5.0	5.0	7.1	0.37	7.56	2.21	15	1.37	89.00	88.00	89.24	88.24	92.00	92.00	SS14-SS13
15	12	95.0	0.49	0.49	0.75	0.37	0.37	5.0	5.0	7.1	2.62	6.63	3.11	15	1.05	75.45	74.45	76.10	75.87	79.50	79.50	SS15-SS12
16	8	159.0	0.22	3.62	0.75	0.17	2.12	5.0	8.4	6.3	13.34	49.55	5.23	24	4.80	79.75	72.12	81.04	74.45	86.48	83.46	SS16-SS8
17	16	24.0	0.14	1.98	0.90	0.13	0.86	5.0	5.2	7.1	6.11	7.43	3.46	18	0.50	79.87	79.75	81.54	81.46	86.48	86.48	SS17-SS16
18	17	27.0	1.84	1.84	0.40	0.74	0.74	5.0	5.0	7.1	5.24	7.29	2.97	18	0.48	80.00	79.87	81.82	81.75	80.00	86.48	SS18-SS17
19	16	147.0	0.31	1.42	0.70	0.22	1.09	5.0	7.8	6.4	7.02	17.64	4.75	18	2.82	83.90	79.75	84.91	81.40	91.58	86.48	SS19-SS16
20	19	27.0	0.07	1.11	0.85	0.06	0.87	5.0	7.7	6.5	5.65	22.50	4.23	18	4.59	85.14	83.90	86.05	85.23	88.35	91.58	SS20-SS19
21	20	109.0	0.24	0.62	0.85	0.20	0.49	5.0	5.7	6.9	3.40	11.11	3.17	18	1.12	86.36	85.14	87.06	86.39	89.50	88.35	SS21-SS20

Windsor Hall (revised)

Number of lines: 55

Run Date: 10-26-2005

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

Storm Sewer Tabulation

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)	
22	21	66.0	0.38	0.38	0.75	0.29	0.29	5.0	5.0	7.1	2.03	8.49	2.90	15	1.73	87.50	86.36	88.07	87.29	90.00	89.50	SS22-SS21
23	20	58.0	0.11	0.11	0.85	0.09	0.09	5.0	5.0	7.1	0.67	6.46	0.74	15	1.00	85.72	85.14	86.42	86.42	88.00	88.35	SS23-SS20
24	20	215.0	0.31	0.31	0.75	0.23	0.23	5.0	5.0	7.1	1.66	6.98	2.41	15	1.17	87.65	85.14	88.17	86.42	91.40	88.35	SS24-SS20
25	2	46.0	0.22	6.61	0.85	0.19	4.85	5.0	16.8	4.9	23.76	120.8	3.36	36	3.28	59.98	58.47	63.59	63.53	67.70	66.23	SS25-SS2
26	25	135.0	0.21	6.39	0.85	0.18	4.66	5.0	16.1	5.0	23.25	121.8	4.83	36	3.33	64.48	59.98	66.02	63.62	73.60	67.70	SS26-SS25
27	26	28.0	0.31	0.31	0.85	0.26	0.26	5.0	5.0	7.1	1.88	17.77	2.58	15	7.57	66.60	64.48	67.15	66.61	70.52	73.60	SS27-SS26
28	26	104.0	0.30	5.87	0.85	0.26	4.22	5.0	15.7	5.0	21.27	29.00	5.93	30	0.50	65.00	64.48	66.58	66.36	78.85	73.60	SS28-SS26
29	28	139.0	0.28	5.57	0.85	0.24	3.96	5.0	15.2	5.1	20.29	28.90	4.81	30	0.50	65.69	65.00	67.51	67.29	78.85	78.85	SS29-SS28
30	29	53.0	0.17	5.29	0.85	0.14	3.72	5.0	14.9	5.2	19.18	28.72	4.29	30	0.49	65.95	65.69	68.00	67.94	75.81	78.85	SS30-SS29
31	30	68.0	0.03	5.12	0.85	0.03	3.58	5.0	14.7	5.2	18.59	29.00	4.16	30	0.50	66.29	65.95	68.31	68.23	75.91	75.81	SS31-SS30
32	31	27.0	0.15	0.18	0.80	0.12	0.15	5.0	7.6	6.5	0.95	26.27	1.84	15	16.56	70.76	66.29	71.15	68.90	74.80	75.91	SS32-SS31
33	32	24.0	0.03	0.03	0.90	0.03	0.03	5.0	5.0	7.1	0.19	4.57	0.50	15	0.50	70.88	70.76	71.27	71.27	74.80	74.80	SS33-SS32
34	31	119.0	0.19	4.91	0.85	0.16	3.41	5.0	14.1	5.3	17.95	28.88	4.18	30	0.50	66.88	66.29	68.74	68.61	75.55	75.91	SS34-SS31
35	34	85.0	0.35	4.72	0.65	0.23	3.25	5.0	13.7	5.3	17.29	28.83	4.34	30	0.49	67.30	66.88	69.04	68.97	72.80	75.55	SS35-SS34
36	35	24.0	0.17	0.17	0.78	0.13	0.13	5.0	5.0	7.1	0.94	17.44	1.09	15	7.29	69.05	67.30	69.72	69.73	72.80	72.80	SS36-SS35
37	35	93.0	0.54	4.20	0.50	0.27	2.89	5.0	13.5	5.4	15.50	31.11	5.78	24	1.89	69.06	67.30	70.45	69.39	73.56	72.80	SS37-SS35
38	37	24.0	0.28	0.28	0.65	0.18	0.18	5.0	5.0	7.1	1.30	11.42	1.06	15	3.13	69.81	69.06	71.13	71.12	73.56	73.56	SS38-SS37
39	37	180.0	0.15	3.38	0.70	0.11	2.43	5.0	12.8	5.5	13.33	29.10	5.34	24	1.66	72.04	69.06	73.33	70.86	76.89	73.56	SS39-SS37
40	39	24.0	0.51	0.51	0.75	0.38	0.38	5.0	5.0	7.1	2.73	13.82	3.17	15	4.58	73.14	72.04	73.80	73.85	76.89	76.89	SS40-SS39
41	39	177.0	0.30	0.52	0.50	0.15	0.26	5.0	9.1	6.2	1.60	8.31	2.37	15	1.66	74.97	72.04	75.48	73.90	79.50	76.89	SS41-SS39
42	41	156.0	0.22	0.22	0.50	0.11	0.11	5.0	5.0	7.1	0.78	4.57	1.94	15	0.50	75.75	74.97	76.10	75.65	79.50	79.50	SS42-SS41

Windsor Hall (revised) | Number of lines: 55 | Run Date: 10-26-2005

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

Storm Sewer Tabulation

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	39	124.0	0.13	2.20	0.85	0.11	1.69	5.0	12.2	5.6	9.41	15.99	3.82	24	0.50	72.66	72.04	73.94	73.79	79.36	76.89	SS43-SS39
44	43	52.0	0.33	2.07	0.85	0.28	1.58	5.0	11.9	5.6	8.87	15.99	3.76	24	0.50	72.92	72.66	74.23	74.19	79.71	79.36	SS44-SS43
45	44	158.0	0.06	1.74	0.70	0.04	1.30	5.0	11.3	5.7	7.41	7.43	4.44	18	0.50	73.71	72.92	75.00	74.33	81.80	79.71	SS45-SS44
46	45	45.0	0.18	0.24	0.90	0.16	0.22	5.0	8.3	6.3	1.36	4.52	1.11	15	0.49	73.93	73.71	75.65	75.63	78.00	81.80	SS46-SS45
47	46	63.0	0.06	0.06	0.90	0.05	0.05	5.0	5.0	7.1	0.38	4.60	0.31	15	0.51	74.25	73.93	75.69	75.69	78.00	78.00	SS47-SS46
48	45	28.0	0.25	1.44	0.70	0.18	1.04	5.0	11.2	5.7	5.95	24.38	5.32	15	14.25	77.70	73.71	78.68	75.33	82.20	81.80	SS48-SS45
49	48	83.0	0.63	1.19	0.65	0.41	0.86	5.0	10.9	5.8	5.00	14.70	4.70	15	5.18	82.00	77.70	82.89	78.94	86.50	82.20	SS49-SS48
50	49	161.0	0.09	0.56	0.90	0.08	0.45	5.0	9.9	6.0	2.71	9.62	3.17	15	2.22	85.57	82.00	86.23	83.26	91.75	86.50	SS50-SS49
51	50	127.0	0.10	0.10	0.75	0.08	0.08	5.0	5.0	7.1	0.53	5.53	1.50	15	0.73	86.50	85.57	86.79	86.49	90.25	91.75	SS51-SS50
52	50	60.0	0.19	0.37	0.85	0.16	0.30	5.0	7.7	6.4	1.91	4.57	2.53	15	0.50	85.87	85.57	86.51	86.46	90.95	91.75	SS52-SS50
53	52	127.0	0.18	0.18	0.75	0.14	0.14	5.0	5.0	7.1	0.96	4.55	1.78	15	0.50	86.50	85.87	86.93	86.78	90.25	90.95	SS53-SS52
54	2	35.0	0.19	0.30	0.85	0.16	0.26	5.0	5.8	6.9	1.80	15.05	1.46	15	5.43	60.37	58.47	63.70	63.67	64.87	66.23	SS54-SS2
55	54	29.0	0.11	0.11	0.90	0.10	0.10	5.0	5.0	7.1	0.71	11.12	0.57	15	2.97	61.23	60.37	63.76	63.75	64.98	64.87	SS55-SS54

Windsor Hall (revised) | Number of lines: 55 | Run Date: 10-26-2005

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

CONSULTING ENGINEERS

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

PROJECT: Windsor Hall
PROJECT NO.: 8818-06
SUBJECT: Loop Road (Left Side)
SHEET NO.: 1
DATE: May 16,2005
BY: MJR

STORM WATER INLET COMPUTATIONS

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 P Effec L	L/Lt (ft)	d E(#16) (ft)	h	Q Int CFS d/h	Q Carryover Spread	Remark
Loop Road																															
LEFT SIDE																															
Tallow = (12'/2) + 2' = 8'																															
HIGH POINT			10+76 L																												
				0.09	0.85	0.077	0.077	4	0.306	0	0.306	0.001	0.02	5.6	Flow Approaching From Down Station																
SUMP	DI-2A	6	11+76 L								0.81	0.00	0.02		2		0.08								9.6	0.112	0.42	0.267	5.6		
				0.13	0.85	0.111	0.111	4	0.442	0.062	0.504	0.001	0.02	7.2	Flow Approaching From Up Station																
GRADE	DI-2D	4.7	14+61L	0.07	0.90	0.063	0.063	4	0.252	0.317	0.569	0.04	0.02	1.9	2	1.053	0.08	4	1	0.015	2	3.44	0.143	0.163	6.643	0.707	0.891	0.507	0.062		
GRADE	DI-2A	2.2	16+55L	0.10	0.90	0.09	0.09	4	0.36	0.27	0.63	0.04	0.02	2	2	1	0.08	4	1	0.015	2	3.44	0.143	0.163	6.934	0.317	0.497	0.313	0.317		
GRADE	DI-2A	2.2	19+35 L	0.14	1.00	0.14	0.14	4	0.56	0	0.56	0.04	0.02	1.9	2	1.053	0.08	4	1	0.015	2	3.44	0.143	0.163	6.599	0.333	0.518	0.29	0.27		
HIGH POINT			24+20 L																												
GRADE	DI-2B	6	32+45 L	0.51	0.90	0.459	0.459	4	1.836	0	1.836	0.04	0.02	5.3	2	0.377	0.08	4	0.821	0.015	2	3.44	0.143	0.138	12.04	0.498	0.711	1.306	0.53		
GRADE	DI-2B	6	34+26 L	0.20	0.65	0.13	0.13	4	0.52	0.53	1.05	0.04	0.02	3.3	2	0.606	0.08	4	0.977	0.015	2	3.44	0.143	0.16	8.7	0.69	0.878	0.922	0.128		
				0.10	0.70	0.07	0.07	4	0.28	0.128	0.408	0.001	0.02	6.5	Flow Approaching From Down Station																
SUMP	DI-2A	2.2	35+27 L								0.66	0.00	0.02		2		0.08								5.8	0.122	0.42	0.29	6.1		
				0.07	0.90	0.063	0.063	4	0.252	0	0.252	0.001	0.02	4.8	Flow Approaching From Up Station																
GRADE	DI-2A	2.2	37.56 L	0.03	0.90	0.027	0.027	4	0.108	0	0.108	0.04	0.02	#N/A	2	#N/A	0.08	4	#N/A	0.015	2	3.44	0.143	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
HIGH POINT			38+70 L																												
GRADE	DI-2A	2.2	42+45 L	0.11	0.90	0.099	0.099	4	0.396	0	0.396	0.04	0.02	#N/A	2	#N/A	0.08	4	#N/A	0.015	2	3.44	0.143	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Carryover to 11+76R	

CONSULTING ENGINEERS

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

PROJECT: Windsor Hall
PROJECT NO.: 8818-06
SUBJECT: Loop Road (Right Side)
SHEET NO.: 2
DATE: May 16, 2005
BY: MJR

STORM WATER INLET COMPUTATIONS

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 P Effec L	L/Lt (ft)	d (ft)	E(#16)	h (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
Loop Road																																
RIGHT SIDE																																
Tallow = (12'/2) + 2' = 8'																																
HIGH POINT			10+76 R																													
				0.05	0.90	0.045	0.045	4	0.18	0	0.18	0.001	0.02	4	Flow Approaching From Down Station																
SUMP	DI-2A	2.2	11+76 R								0.504	0.00	0.02		2		0.08								5.8	0.114	0.42	0.271		5.7	Carryover from 42+25L
				0.09	0.90	0.081	0.081	4	0.324	0	0.324	0.001	0.02	5.7	Flow Approaching From Up Station																
HIGH POINT			14+24 R																													
GRADE	DI-2D	4.7	14+63 R	0.22	0.65	0.143	0.143	4	0.572	0	0.572	0.04	0.02	1.9	2	1.053	0.08	4	1	0.015	2	3.44	0.143	0.163	6.658	0.706	0.889	0.509		0.063		
GRADE	DI-2A	2.2	16+55 R	0.08	0.80	0.064	0.064	4	0.256	0.795	1.051	0.04	0.02	3.3	2	0.606	0.08	4	0.977	0.015	2	3.44	0.143	0.16	8.704	0.253	0.408	0.429		0.622		
GRADE	DI-2A	2.2	17+76 R	0.26	0.55	0.143	0.143	4	0.572	0.698	1.27	0.04	0.02	3.9	2	0.513	0.08	4	0.941	0.015	2	3.44	0.143	0.155	9.61	0.229	0.374	0.474		0.795		
GRADE	DI-2A	2.2	19+35 R	0.22	0.75	0.165	0.165	4	0.66	0.486	1.146	0.04	0.02	3.6	2	0.556	0.08	4	0.955	0.015	2	3.44	0.143	0.157	9.131	0.241	0.391	0.448		0.698		
GRADE	DI-2A	2.2	20+88 R	0.31	0.70	0.217	0.217	4	0.868	0	0.868	0.04	0.02	2.8	2	0.714	0.08	4	0.989	0.015	2	3.44	0.143	0.162	7.979	0.276	0.44	0.382		0.486		
HIGH POINT			24+20 R																													
GRADE	DI-2A	2.2	28+13 R	0.63	0.65	0.41	0.41	4	1.638	0	1.638	0.04	0.02	4.8	2	0.417	0.08	4	0.875	0.015	2	3.44	0.143	0.145	11.1	0.198	0.328	0.537		1.101		Carryover to Loading
GRADE	DI-2A	2.2	31+12 R	0.20	0.85	0.17	0.17	4	0.68	0	0.68	0.04	0.02	2.2	2	0.909	0.08	4	1	0.015	2	3.44	0.143	0.163	7.16	0.307	0.484	0.329		0.351		A=0.13 AC
				0.13																												
GRADE	DI-2A	2.2	32+45 R	0.15	0.70	0.105	0.105	4	0.42	0.351	0.771	0.04	0.02	2.5	2	0.8	0.08	4	0.995	0.015	2	3.44	0.143	0.163	7.571	0.291	0.461	0.355		0.416		
GRADE	DI-2B	6	34+26 R	0.54	0.50	0.27	0.27	4	1.08	0.416	1.496	0.04	0.02	4.5	2	0.444	0.08	4	0.902	0.015	2	3.44	0.143	0.149	10.53	0.57	0.781	1.168		0.327		
				0.11	0.70	0.077	0.077	4	0.308	0.327	0.635	0.001	0.02	5	Flow Approaching From Down Station																
SUMP	DI-2F	6	35+27 R								1.278	0.001	0.02		2		0.08								9.6	0.134	0.27	0.496		6.7	
				0.24	0.65	0.156	0.156	4	0.624	0.019	0.643	0.001	0.02	5	Flow Approaching From Up Station																
GRADE	DI-2B	6	37+56 R	0.20	0.80	0.16	0.16	4	0.64	0	0.64	0.04	0.02	2.1	2	0.952	0.08	4	1	0.015	2	3.44	0.143	0.163	6.98	0.86	0.971	0.621		0.019		A=0.15 AC
				0.15																												
HIGH POINT			38+70 R																													
GRADE	DI-2A	2.2	40+90 R	0.31	0.85	0.264	0.264	4	1.054	0	1.054	0.04	0.02	3.3	2	0.606	0.08	4	0.977	0.015	2	3.44	0.143	0.16	8.714	0.252	0.408	0.43		0.624		
				0.14	0.65	0.091	0.091	4	0.364	0.624	0.988	0.001	0.02	6.4	Flow Approaching From Down Station																
SUMP	DI-2A	6	42+45 R								1.118	0.001	0.02		2		0.08								9.6	0.128	0.27	0.474		6.4	
				0.05	0.65	0.033	0.033	4	0.13	0	0.13	0.001	0.02	1.7	Flow Approaching From Up Station																

MAY 2004
RECEIVED
PLANNING DEPARTMENT

WINDSORMEADE
Of Williamsburg

Calculations
For
James City County Environmental Division

SP-04-04
3RD SUB.

Prepared by

AES Consulting Engineers
5248 Olde Towne Road. Suite 1
Williamsburg, VA 23188
(757) 253-0040 Fax: (757) 220-8994
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AES CONSULTING ENGINEERS

AES Project Number 8818-6
May 2004

Best Management Practice (BMP) Routing
For
Windsor Hall BMPs #1 & 2

FINAL H&H

The Windsor Hall portion of the WindsorMeade project contains two 10-point extended detention wet ponds (these ponds are inter-connected by a 36" pipe). The volume and water quality aspects of the Windsor Hall BMPs are calculated jointly. Due to software limitations the ponds were routed as two separate entities with Hall BMP #1 flowing into Hall BMP #2. At the request of JCC Environmental, the ponds were routed using alternative software to evaluate the effects of the interconnectivity.

Modeling for pond routing was preformed using Hydraflow by Intelisovle and Pond Pack by Haestead Methods. The Hydraflow software was used to model the overall stormwater drainage for the entire site, however the software does not account for pond interconnectivity. Using the Pond Pack software the ponds were tested using a more accurate interconnectivity analysis. Tables of post development flows are provided to show an evaluation of the two software results. Net increase/decrease in elevation between the two software analyses is provided in parenthesis for ease of review.

Evaluation of Pond Interconnectivity (Pond Pack)

	Windsor Hall BMP #1	Windsor Hall BMP #2
1 Year Elevation	59.15 (0')	55.02 (0') ✓
2 Year Elevation	59.56 (0')	55.76 (0') ✓
10 Year Elevation	61.16 (0.48')	56.59 (-0.19') ✓
100 Year Elevation	62.92 (0.74')	57.02 (-0.36') ✓

Pond Elevations on Plan (Hydraflow)

	Windsor Hall BMP #1	Windsor Hall BMP #2
1 Year Elevation	59.15	55.02 ✓
2 Year Elevation	59.56	55.76 ✓
10 Year Elevation	60.68	56.78 ✓
100 Year Elevation	62.18	57.38 ✓

Conclusion

Based upon the results, the pond interconnectivity does not substantially affect the overall function of the BMPs. The pond interconnectivity only affects the results during higher storm events. For the purposes of the overall stormwater evaluation the previous Hydraflow results will be sufficient to perform the downstream evaluation at the point of concern to verify a reduction in post development flow rates.

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For
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TABLE 3

WORKSHEET FOR BMP POINT SYSTEM
WindsorMeade Overall
AES Project = 8818 - 5&6
TOTAL AREA = 105.93 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
Hall BMP 1&2	24.40	10	X	0.230	=	2.30
Villa BMP 1	18.10	10	X	0.171	=	1.71
Villa BMP 2	10.00	10	X	0.094	=	0.94
Entrance BMP	2.10	4	X	0.020	=	0.08
Offsite Credit **	4.20	2.1	X	0.040	=	0.08
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				5.12

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
29.95	28.27	(0.1 per 1%)	=	2.83
15.17	14.32	(0.15 per 1%)	=	2.15
		TOTAL OPEN SPACE POINTS:		4.98

C. TOTAL WEIGHTED POINTS

5.12	+	4.98	=	10.09
Structural BMP Points		Natural Open Space Points		TOTAL

** Note: Assumes a 15% impervious cover on existing offsite to BMP compared to a 70% impervious cover on site to BMP. Credit was taken at a 80% reduction.

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Offsite Credit **	4.20	2.1	X	0.040	=	0.08
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				5.12

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
29.95	28.27	(0.1 per 1%)	=	2.83
15.17	14.32	(0.15 per 1%)	=	2.15
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C. TOTAL WEIGHTED POINTS

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Structural BMP Points		Natural Open Space Points		TOTAL

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Villa BMP 2	10.00	10	X	0.094	=	0.94
Entrance BMP	2.10	4	X	0.020	=	0.08
			X		=	
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				5.04

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
29.95	28.27	(0.1 per 1%)	=	2.83
15.17	14.32	(0.15 per 1%)	=	2.15
		TOTAL OPEN SPACE POINTS:		4.98

C. TOTAL WEIGHTED POINTS

5.04	+	4.98	=	10.01
Structural BMP Points		Natural Open Space Points		TOTAL

** Note: Assumes a 15% impervious cover on existing offsite to BMP compared to a 70% impervious cover on site to BMP. Credit was taken at a 80% reduction.

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM
WindsorMeade Overall
AES Project = 8818 - 5&6
TOTAL AREA = 105.93 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
Hall BMP 1&2	24.40	10	X	0.230	=	2.30
Villa BMP 1	18.10	10	X	0.171	=	1.71
Villa BMP 2	10.00	10	X	0.094	=	0.94
Entrance BMP	2.10	4	X	0.020	=	0.08
			X		=	
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				5.04

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
29.95	28.27	(0.1 per 1%)	=	2.83
15.17	14.32	(0.15 per 1%)	=	2.15
		TOTAL OPEN SPACE POINTS:		4.98

C. TOTAL WEIGHTED POINTS

5.04	+	4.98	=	10.01
Structural BMP Points		Natural Open Space Points		TOTAL

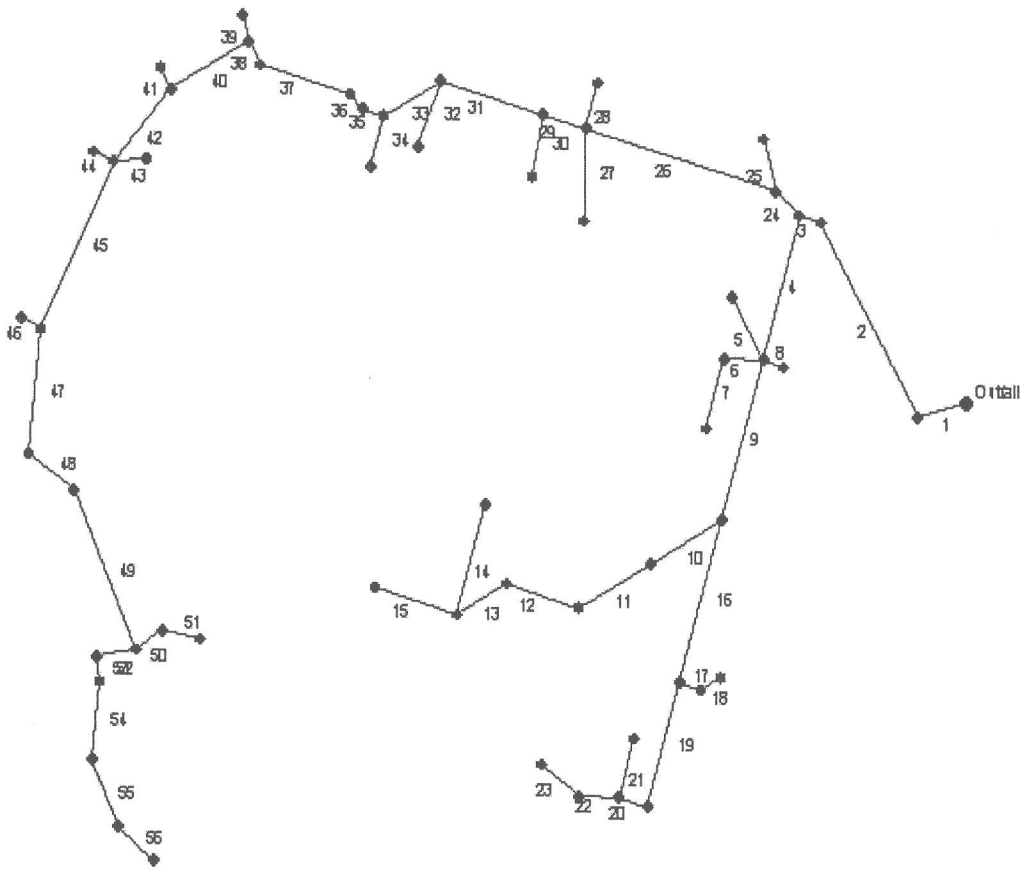
** Note: Assumes a 15% impervious cover on existing offsite to BMP compared to a 70% impervious cover on site to BMP. Credit was taken at a 80% reduction.

Hydraflow Plan View

WINDSOR MEADE WINDSOR HALL

STORM SYSTEM 1

FINAL STORM COMPS



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Project file: 8818-06-STM-1.vab.stm	No. Lines: 56	05-12-2004

Hydraflow Storm Sewers 2003

Storm Sewer Tabulation

WINDSOR MEADE WINDSOR HALL 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	54.0	0.00	17.91	0.00	0.00	12.33	0.0	14.9	5.2	63.59	167.0	5.06	48	1.35	48.73	48.00	61.16	61.05	66.00	61.50	1-1 to Outfall
2	1	216.0	0.18	17.91	0.70	0.13	12.33	5.0	14.1	5.3	64.91	167.6	5.17	48	1.36	51.67	48.73	62.00	61.55	65.50	66.00	1-2 to 1-1
3	2	24.0	0.09	17.73	0.70	0.06	12.20	5.0	14.1	5.3	64.40	203.1	5.13	48	2.00	52.15	51.67	62.35	62.31	65.68	65.50	1-3 to 1-2
4	3	146.0	0.11	8.44	0.70	0.08	5.53	5.0	13.0	5.4	30.14	113.6	6.97	30	7.68	63.36	52.15	65.19	62.76	71.29	65.68	1-4 to 1-3
5	4	70.0	0.20	0.20	0.70	0.14	0.14	5.0	5.0	7.1	1.00	3.56	1.27	12	1.00	64.06	63.36	66.20	66.14	68.26	71.29	1-5 to 1-4
6	4	43.0	0.52	1.01	0.80	0.42	0.76	5.0	5.4	7.0	5.33	12.22	5.48	15	3.58	69.08	67.54	70.00	68.46	75.79	71.29	1-6 to 1-4
7	6	71.0	0.49	0.49	0.70	0.34	0.34	5.0	5.0	7.1	2.44	4.37	4.42	12	1.51	73.36	72.29	74.02	72.95	76.86	75.79	1-7 to 1-6
8	4	24.0	0.88	0.88	0.70	0.62	0.62	5.0	5.0	7.1	4.39	10.50	2.48	18	1.00	64.06	63.82	66.18	66.14	71.29	71.29	1-8 to 1-4
9	4	164.0	0.26	6.24	0.70	0.18	3.94	5.0	12.6	5.5	21.73	45.34	7.83	24	4.02	71.36	64.77	73.01	66.42	78.17	71.29	1-9 to 1-4
10	9	89.0	0.26	2.13	0.70	0.18	1.50	5.0	7.4	6.5	9.80	11.46	5.55	18	1.19	72.42	71.36	74.50	73.73	79.62	78.17	1-9A to 1-9
11	10	90.0	0.13	1.87	0.70	0.09	1.32	5.0	7.1	6.6	8.71	11.50	4.93	18	1.20	73.50	72.42	75.19	74.57	81.06	79.62	1-10 to 1-9A
12	11	83.0	0.44	1.74	0.70	0.31	1.23	5.0	6.8	6.7	8.20	11.53	4.67	18	1.20	74.50	73.50	75.94	75.48	79.40	81.06	1-11 to 1-10
13	12	62.0	0.44	1.30	0.73	0.32	0.92	5.0	6.5	6.7	6.21	11.47	4.04	18	1.19	75.24	74.50	76.32	76.20	79.25	79.40	1-12 to 1-11
14	13	111.0	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.1	2.14	11.54	2.41	18	1.21	76.58	75.24	77.14	76.64	79.25	79.25	1-13 to 1-12
15	13	93.0	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.1	2.14	12.61	2.41	18	1.44	76.58	75.24	77.14	76.64	79.25	79.25	1-14 to 1-12
16	9	165.0	0.17	3.85	0.70	0.12	2.26	5.0	12.2	5.6	12.58	17.84	7.55	18	2.88	77.34	72.58	78.68	73.92	84.83	78.17	1-15 to 1-9
17	16	24.0	0.59	1.94	0.60	0.35	0.83	8.0	12.1	5.6	4.62	2.52	5.88	12	0.50	77.46	77.34	79.97	79.57	84.83	84.83	1-16 to 1-15
18	17	25.0	1.35	1.35	0.35	0.47	0.47	12.0	12.0	5.6	2.65	11.24	3.98	12	9.96	79.95	77.46	80.64	80.37	79.75	84.83	1-16A to 1-16
19	16	126.0	0.33	1.74	0.70	0.23	1.31	5.0	5.7	6.9	9.09	20.20	5.70	18	3.70	82.00	77.34	83.15	79.57	89.40	84.83	1-17 to 1-15
20	19	33.0	0.08	1.41	0.85	0.07	1.08	5.0	5.6	7.0	7.52	20.60	4.98	18	3.85	83.27	82.00	84.32	83.76	90.07	89.40	1-18 to 1-17
21	20	60.0	0.45	0.45	0.80	0.36	0.36	5.0	5.0	7.1	2.57	3.62	4.52	12	1.03	86.62	86.00	87.30	86.68	90.12	90.07	1-19 to 1-18

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 05-12-2004

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

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Storm Sewer Tabulation

WINDSOR MEADE WINDSOR HALL

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	43.0	0.64	0.88	0.70	0.45	0.65	5.0	5.5	7.0	4.56	10.49	5.99	12	8.67	87.50	83.77	88.39	84.82	91.04	90.07	1-20 to 1-18
23	22	52.0	0.24	0.24	0.85	0.20	0.20	5.0	5.0	7.1	1.45	7.73	2.72	12	4.71	89.95	87.50	90.46	88.84	93.45	91.04	1-21 to 1-20
24	3	35.0	0.50	9.20	0.70	0.35	6.60	5.0	13.9	5.3	35.02	142.3	3.64	42	2.00	52.85	52.15	62.81	62.76	64.23	65.68	1-22 to 1-3
25	24	52.0	0.15	0.15	0.70	0.11	0.11	5.0	5.0	7.1	0.75	6.79	0.95	12	3.63	57.24	55.35	62.98	62.96	64.31	64.23	1-23 to 1-22
26	24	217.0	0.10	8.55	0.70	0.07	6.15	5.0	12.8	5.5	33.64	100.6	3.50	42	1.00	55.02	52.85	63.20	62.96	72.24	64.23	1-24 to 1-22
27	26	89.0	0.33	0.33	0.70	0.23	0.23	5.0	5.0	7.1	1.65	9.71	2.93	12	7.43	64.13	57.52	64.67	63.39	68.33	72.24	1-25 to 1-24
28	26	47.0	0.12	0.12	0.70	0.08	0.08	5.0	5.0	7.1	0.60	13.79	1.72	12	15.00	64.57	57.52	64.90	63.39	72.25	72.24	1-26 to 1-24
29	26	49.0	0.10	8.00	0.70	0.07	5.76	5.0	12.6	5.5	31.77	100.6	3.30	42	1.00	55.51	55.02	63.44	63.39	73.88	72.24	1-27 to 1-24
30	29	61.0	0.61	0.61	0.70	0.43	0.43	5.0	5.0	7.1	3.04	15.72	4.38	12	19.49	69.90	58.01	70.64	63.61	75.40	73.88	1-28 to 1-27
31	29	117.0	0.11	7.29	0.70	0.08	5.26	5.0	11.9	5.6	29.61	100.6	3.08	42	1.00	56.68	55.51	63.71	63.61	74.17	73.88	1-29 to 1-27
32	31	69.0	0.50	0.50	0.70	0.35	0.35	5.0	5.0	7.1	2.49	15.05	3.82	12	17.86	71.50	59.18	72.17	63.86	77.00	74.17	1-30 to 1-29
33	31	71.0	0.38	6.68	0.70	0.27	4.84	5.0	11.5	5.7	27.57	100.6	2.87	42	1.00	57.39	56.68	63.91	63.86	69.94	74.17	1-31 to 1-29
34	33	52.0	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.1	1.10	29.77	0.78	18	8.04	63.07	58.89	64.01	64.01	68.32	69.94	1-32 to 1-31
35	33	24.0	0.03	6.08	0.90	0.03	4.42	5.0	11.3	5.7	25.30	100.6	2.63	42	1.00	57.63	57.39	64.02	64.01	70.07	69.94	1-33 to 1-31
36	35	20.0	0.14	6.05	0.70	0.10	4.39	5.0	11.2	5.8	25.25	100.6	2.62	42	1.00	57.83	57.63	64.09	64.07	69.30	70.07	1-34 to 1-33
37	36	102.0	0.07	5.91	0.70	0.05	4.29	5.0	10.5	5.9	25.21	100.6	2.62	42	1.00	58.85	57.83	64.20	64.13	69.55	69.30	1-35 to 1-34
38	37	26.0	0.27	5.84	0.70	0.19	4.24	5.0	10.3	5.9	25.06	100.6	2.61	42	1.00	59.11	58.85	64.29	64.28	68.90	69.55	1-36 to 1-35
39	38	27.0	0.30	0.30	0.70	0.21	0.21	5.0	5.0	7.1	1.50	24.03	2.29	15	13.85	65.35	61.61	65.84	64.40	68.85	68.90	1-37 to 1-36
40	38	98.0	0.06	5.27	0.80	0.05	3.84	5.0	9.6	6.0	23.23	100.6	2.41	42	1.00	60.09	59.11	64.45	64.40	70.23	68.90	1-38 to 1-36
41	40	24.0	0.14	0.14	0.70	0.10	0.10	5.0	5.0	7.1	0.70	10.48	1.85	12	8.67	64.67	62.59	65.02	64.54	70.13	70.23	1-39 to 1-38
42	40	94.0	1.64	5.07	0.73	1.20	3.70	8.0	8.9	6.2	22.86	100.6	2.38	42	1.00	61.03	60.09	64.59	64.54	72.31	70.23	1-40 to 1-38

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 05-12-2004

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

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Storm Sewer Tabulation

WINDSOR MEADE WINDSOR HALL

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)	
43	42	35.0	0.07	0.07	0.70	0.05	0.05	5.0	5.0	7.1	0.35	14.23	0.28	15	4.86	62.73	61.03	64.68	64.68	68.53	72.31	1-41 to 1-40
44	42	24.0	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.1	1.10	15.35	2.33	12	18.58	67.99	63.53	68.43	64.68	72.31	72.31	1-42 to 1-40
45	42	181.0	0.12	3.14	0.70	0.08	2.30	5.0	8.3	6.3	14.54	38.96	5.53	24	2.97	67.90	62.53	69.25	64.68	76.06	72.31	1-43 to 1-40
46	45	24.0	0.56	0.56	0.70	0.39	0.39	5.0	5.0	7.1	2.79	4.60	3.56	12	1.67	68.40	68.00	70.04	69.90	76.06	76.06	1-44 to 1-43
47	45	124.0	0.36	2.46	0.70	0.25	1.82	5.0	7.7	6.4	11.75	27.55	4.82	24	1.48	69.74	67.90	70.95	69.90	78.82	76.06	1-45 to 1-43
48	47	60.0	0.46	2.10	0.70	0.32	1.57	5.0	7.4	6.5	10.24	22.62	4.61	24	1.00	70.34	69.74	71.47	71.41	79.61	78.82	1-46 to 1-45
49	48	170.0	0.14	1.64	0.90	0.13	1.25	5.0	6.3	6.8	8.46	22.62	4.47	24	1.00	72.04	70.34	73.07	71.69	80.83	79.61	1-47 to 1-46
50	49	34.0	0.17	0.54	0.90	0.15	0.43	5.0	5.3	7.1	3.06	3.56	4.89	12	1.00	73.38	73.04	74.12	73.78	81.50	80.83	1-48 to 1-47
51	50	42.0	0.37	0.37	0.76	0.28	0.28	5.0	5.0	7.1	2.00	3.56	3.04	12	1.00	73.80	73.38	74.48	74.40	78.00	81.50	1-49 to 1-48
52	49	44.0	0.03	0.96	0.70	0.02	0.69	5.0	6.0	6.8	4.71	41.34	4.35	18	15.50	79.36	72.54	80.19	73.49	83.86	80.83	1-50 to 1-47
53	52	24.0	0.02	0.93	0.70	0.01	0.67	5.0	5.9	6.9	4.60	15.90	3.88	18	2.29	79.91	79.36	80.73	80.53	84.41	83.86	1-51 to 1-50
54	53	77.0	0.08	0.91	0.90	0.07	0.65	5.0	5.5	7.0	4.56	17.78	5.10	15	7.58	86.50	80.66	87.35	81.51	90.25	84.41	1-52 to 1-51
55	54	71.0	0.08	0.83	0.70	0.06	0.58	5.0	5.2	7.1	4.11	5.99	4.33	15	0.86	87.11	86.50	87.92	87.54	90.86	90.25	1-53 to 1-52
56	55	50.0	0.75	0.75	0.70	0.53	0.53	5.0	5.0	7.1	3.74	5.26	5.11	12	2.18	88.20	87.11	89.02	88.09	91.70	90.86	1-54 to 1-53

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 05-12-2004

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

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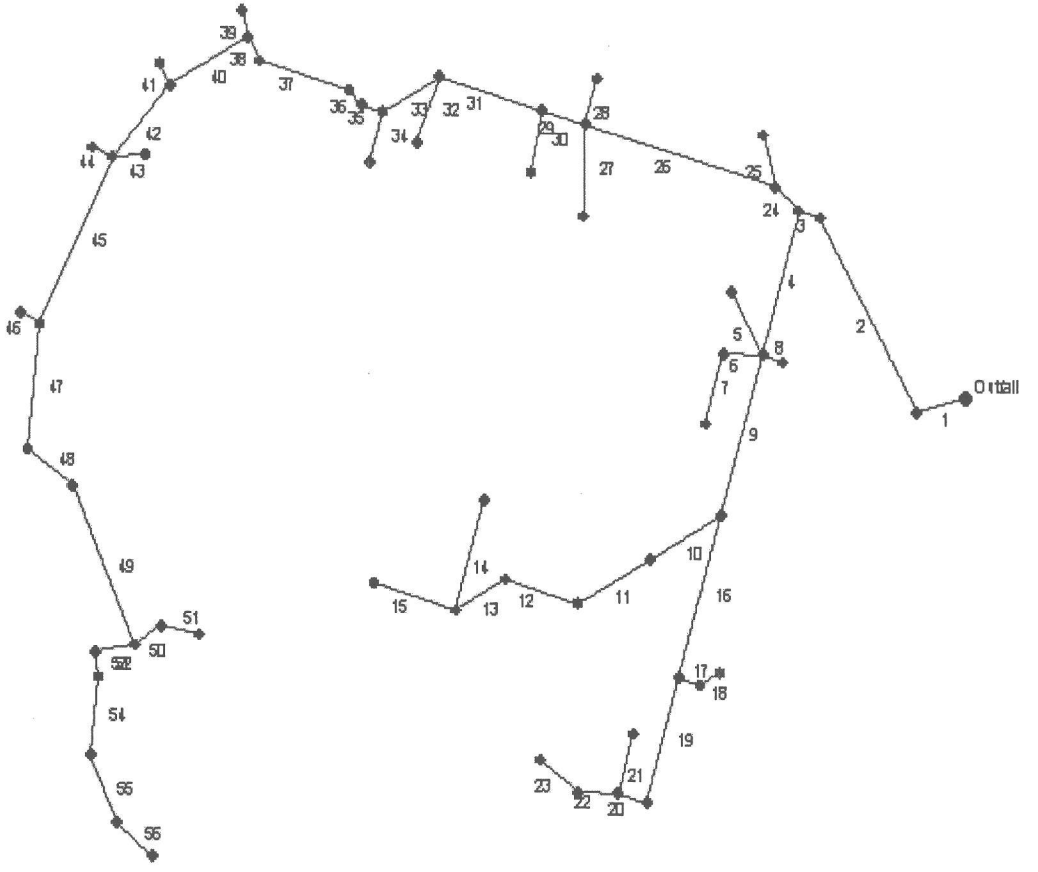
Hydraflow Plan View

WINDSOR MEADE WINDSOR HALL

STORM SYSTEM 1



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Project file: 8818-06-STM-1.vab.stm	No. Lines: 56	05-12-2004

Hydraflow Storm Sewers 2003

Storm Sewer Tabulation

WINDSOR MEADE WINDSOR HALL 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	54.0	0.00	17.91	0.00	0.00	12.33	0.0	14.9	5.2	63.59	167.0	5.06	48	1.35	48.73	48.00	61.16	61.05	66.00	61.50	1-1 to Outfall
2	1	216.0	0.18	17.91	0.70	0.13	12.33	5.0	14.1	5.3	64.91	167.6	5.17	48	1.36	51.67	48.73	62.00	61.55	65.50	66.00	1-2 to 1-1
3	2	24.0	0.09	17.73	0.70	0.06	12.20	5.0	14.1	5.3	64.40	203.1	5.13	48	2.00	52.15	51.67	62.35	62.31	65.68	65.50	1-3 to 1-2
4	3	146.0	0.11	8.44	0.70	0.08	5.53	5.0	13.0	5.4	30.14	113.6	6.97	30	7.68	63.36	52.15	65.19	62.76	71.29	65.68	1-4 to 1-3
5	4	70.0	0.20	0.20	0.70	0.14	0.14	5.0	5.0	7.1	1.00	3.56	1.27	12	1.00	64.06	63.36	66.20	66.14	68.26	71.29	1-5 to 1-4
6	4	43.0	0.52	1.01	0.80	0.42	0.76	5.0	5.4	7.0	5.33	12.22	5.48	15	3.58	69.08	67.54	70.00	68.46	75.79	71.29	1-6 to 1-4
7	6	71.0	0.49	0.49	0.70	0.34	0.34	5.0	5.0	7.1	2.44	4.37	4.42	12	1.51	73.36	72.29	74.02	72.95	76.86	75.79	1-7 to 1-6
8	4	24.0	0.88	0.88	0.70	0.62	0.62	5.0	5.0	7.1	4.39	10.50	2.48	18	1.00	64.06	63.82	66.18	66.14	71.29	71.29	1-8 to 1-4
9	4	164.0	0.26	6.24	0.70	0.18	3.94	5.0	12.6	5.5	21.73	45.34	7.83	24	4.02	71.36	64.77	73.01	66.42	78.17	71.29	1-9 to 1-4
10	9	89.0	0.26	2.13	0.70	0.18	1.50	5.0	7.4	6.5	9.80	11.46	5.55	18	1.19	72.42	71.36	74.50	73.73	79.62	78.17	1-9A to 1-9
11	10	90.0	0.13	1.87	0.70	0.09	1.32	5.0	7.1	6.6	8.71	11.50	4.93	18	1.20	73.50	72.42	75.19	74.57	81.06	79.62	1-10 to 1-9A
12	11	83.0	0.44	1.74	0.70	0.31	1.23	5.0	6.8	6.7	8.20	11.53	4.67	18	1.20	74.50	73.50	75.94	75.48	79.40	81.06	1-11 to 1-10
13	12	62.0	0.44	1.30	0.73	0.32	0.92	5.0	6.5	6.7	6.21	11.47	4.04	18	1.19	75.24	74.50	76.32	76.20	79.25	79.40	1-12 to 1-11
14	13	111.0	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.1	2.14	11.54	2.41	18	1.21	76.58	75.24	77.14	76.64	79.25	79.25	1-13 to 1-12
15	13	93.0	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.1	2.14	12.61	2.41	18	1.44	76.58	75.24	77.14	76.64	79.25	79.25	1-14 to 1-12
16	9	165.0	0.17	3.85	0.70	0.12	2.26	5.0	12.2	5.6	12.58	17.84	7.55	18	2.88	77.34	72.58	78.68	73.92	84.83	78.17	1-15 to 1-9
17	16	24.0	0.59	1.94	0.60	0.35	0.83	8.0	12.1	5.6	4.62	2.52	5.88	12	0.50	77.46	77.34	79.97	79.57	84.83	84.83	1-16 to 1-15
18	17	25.0	1.35	1.35	0.35	0.47	0.47	12.0	12.0	5.6	2.65	11.24	3.98	12	9.96	79.95	77.46	80.64	80.37	79.75	84.83	1-16A to 1-16
19	16	126.0	0.33	1.74	0.70	0.23	1.31	5.0	5.7	6.9	9.09	20.20	5.70	18	3.70	82.00	77.34	83.15	79.57	89.40	84.83	1-17 to 1-15
20	19	33.0	0.08	1.41	0.85	0.07	1.08	5.0	5.6	7.0	7.52	20.60	4.98	18	3.85	83.27	82.00	84.32	83.76	90.07	89.40	1-18 to 1-17
21	20	60.0	0.45	0.45	0.80	0.36	0.36	5.0	5.0	7.1	2.57	3.62	4.52	12	1.03	86.62	86.00	87.30	86.68	90.12	90.07	1-19 to 1-18

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 05-12-2004

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

JAG

Storm Sewer Tabulation

WINDSOR MEADE WINDSOR HALL

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	43.0	0.64	0.88	0.70	0.45	0.65	5.0	5.5	7.0	4.56	10.49	5.99	12	8.67	87.50	83.77	88.39	84.82	91.04	90.07	1-20 to 1-18
23	22	52.0	0.24	0.24	0.85	0.20	0.20	5.0	5.0	7.1	1.45	7.73	2.72	12	4.71	89.95	87.50	90.46	88.84	93.45	91.04	1-21 to 1-20
24	3	35.0	0.50	9.20	0.70	0.35	6.60	5.0	13.9	5.3	35.02	142.3	3.64	42	2.00	52.85	52.15	62.81	62.76	64.23	65.68	1-22 to 1-3
25	24	52.0	0.15	0.15	0.70	0.11	0.11	5.0	5.0	7.1	0.75	6.79	0.95	12	3.63	57.24	55.35	62.98	62.96	64.31	64.23	1-23 to 1-22
26	24	217.0	0.10	8.55	0.70	0.07	6.15	5.0	12.8	5.5	33.64	100.6	3.50	42	1.00	55.02	52.85	63.20	62.96	72.24	64.23	1-24 to 1-22
27	26	89.0	0.33	0.33	0.70	0.23	0.23	5.0	5.0	7.1	1.65	9.71	2.93	12	7.43	64.13	57.52	64.67	63.39	68.33	72.24	1-25 to 1-24
28	26	47.0	0.12	0.12	0.70	0.08	0.08	5.0	5.0	7.1	0.60	13.79	1.72	12	15.00	64.57	57.52	64.90	63.39	72.25	72.24	1-26 to 1-24
29	26	49.0	0.10	8.00	0.70	0.07	5.76	5.0	12.6	5.5	31.77	100.6	3.30	42	1.00	55.51	55.02	63.44	63.39	73.88	72.24	1-27 to 1-24
30	29	61.0	0.61	0.61	0.70	0.43	0.43	5.0	5.0	7.1	3.04	15.72	4.38	12	19.49	69.90	58.01	70.64	63.61	75.40	73.88	1-28 to 1-27
31	29	117.0	0.11	7.29	0.70	0.08	5.26	5.0	11.9	5.6	29.61	100.6	3.08	42	1.00	56.68	55.51	63.71	63.61	74.17	73.88	1-29 to 1-27
32	31	69.0	0.50	0.50	0.70	0.35	0.35	5.0	5.0	7.1	2.49	15.05	3.82	12	17.86	71.50	59.18	72.17	63.86	77.00	74.17	1-30 to 1-29
33	31	71.0	0.38	6.68	0.70	0.27	4.84	5.0	11.5	5.7	27.57	100.6	2.87	42	1.00	57.39	56.68	63.91	63.86	69.94	74.17	1-31 to 1-29
34	33	52.0	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.1	1.10	29.77	0.78	18	8.04	63.07	58.89	64.01	64.01	68.32	69.94	1-32 to 1-31
35	33	24.0	0.03	6.08	0.90	0.03	4.42	5.0	11.3	5.7	25.30	100.6	2.63	42	1.00	57.63	57.39	64.02	64.01	70.07	69.94	1-33 to 1-31
36	35	20.0	0.14	6.05	0.70	0.10	4.39	5.0	11.2	5.8	25.25	100.6	2.62	42	1.00	57.83	57.63	64.09	64.07	69.30	70.07	1-34 to 1-33
37	36	102.0	0.07	5.91	0.70	0.05	4.29	5.0	10.5	5.9	25.21	100.6	2.62	42	1.00	58.85	57.83	64.20	64.13	69.55	69.30	1-35 to 1-34
38	37	26.0	0.27	5.84	0.70	0.19	4.24	5.0	10.3	5.9	25.06	100.6	2.61	42	1.00	59.11	58.85	64.29	64.28	68.90	69.55	1-36 to 1-35
39	38	27.0	0.30	0.30	0.70	0.21	0.21	5.0	5.0	7.1	1.50	24.03	2.29	15	13.85	65.35	61.61	65.84	64.40	68.85	68.90	1-37 to 1-36
40	38	98.0	0.06	5.27	0.80	0.05	3.84	5.0	9.6	6.0	23.23	100.6	2.41	42	1.00	60.09	59.11	64.45	64.40	70.23	68.90	1-38 to 1-36
41	40	24.0	0.14	0.14	0.70	0.10	0.10	5.0	5.0	7.1	0.70	10.48	1.85	12	8.67	64.67	62.59	65.02	64.54	70.13	70.23	1-39 to 1-38
42	40	94.0	1.64	5.07	0.73	1.20	3.70	8.0	8.9	6.2	22.86	100.6	2.38	42	1.00	61.03	60.09	64.59	64.54	72.31	70.23	1-40 to 1-38

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 05-12-2004

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

JAG

Storm Sewer Tabulation

WINDSOR MEADE WINDSOR HALL

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)	
43	42	35.0	0.07	0.07	0.70	0.05	0.05	5.0	5.0	7.1	0.35	14.23	0.28	15	4.86	62.73	61.03	64.68	64.68	68.53	72.31	1-41 to 1-40
44	42	24.0	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.1	1.10	15.35	2.33	12	18.58	67.99	63.53	68.43	64.68	72.31	72.31	1-42 to 1-40
45	42	181.0	0.12	3.14	0.70	0.08	2.30	5.0	8.3	6.3	14.54	38.96	5.53	24	2.97	67.90	62.53	69.25	64.68	76.06	72.31	1-43 to 1-40
46	45	24.0	0.56	0.56	0.70	0.39	0.39	5.0	5.0	7.1	2.79	4.60	3.56	12	1.67	68.40	68.00	70.04	69.90	76.06	76.06	1-44 to 1-43
47	45	124.0	0.36	2.46	0.70	0.25	1.82	5.0	7.7	6.4	11.75	27.55	4.82	24	1.48	69.74	67.90	70.95	69.90	78.82	76.06	1-45 to 1-43
48	47	60.0	0.46	2.10	0.70	0.32	1.57	5.0	7.4	6.5	10.24	22.62	4.61	24	1.00	70.34	69.74	71.47	71.41	79.61	78.82	1-46 to 1-45
49	48	170.0	0.14	1.64	0.90	0.13	1.25	5.0	6.3	6.8	8.46	22.62	4.47	24	1.00	72.04	70.34	73.07	71.69	80.83	79.61	1-47 to 1-46
50	49	34.0	0.17	0.54	0.90	0.15	0.43	5.0	5.3	7.1	3.06	3.56	4.89	12	1.00	73.38	73.04	74.12	73.78	81.50	80.83	1-48 to 1-47
51	50	42.0	0.37	0.37	0.76	0.28	0.28	5.0	5.0	7.1	2.00	3.56	3.04	12	1.00	73.80	73.38	74.48	74.40	78.00	81.50	1-49 to 1-48
52	49	44.0	0.03	0.96	0.70	0.02	0.69	5.0	6.0	6.8	4.71	41.34	4.35	18	15.50	79.36	72.54	80.19	73.49	83.86	80.83	1-50 to 1-47
53	52	24.0	0.02	0.93	0.70	0.01	0.67	5.0	5.9	6.9	4.60	15.90	3.88	18	2.29	79.91	79.36	80.73	80.53	84.41	83.86	1-51 to 1-50
54	53	77.0	0.08	0.91	0.90	0.07	0.65	5.0	5.5	7.0	4.56	17.78	5.10	15	7.58	86.50	80.66	87.35	81.51	90.25	84.41	1-52 to 1-51
55	54	71.0	0.08	0.83	0.70	0.06	0.58	5.0	5.2	7.1	4.11	5.99	4.33	15	0.86	87.11	86.50	87.92	87.54	90.86	90.25	1-53 to 1-52
56	55	50.0	0.75	0.75	0.70	0.53	0.53	5.0	5.0	7.1	3.74	5.26	5.11	12	2.18	88.20	87.11	89.02	88.09	91.70	90.86	1-54 to 1-53

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 05-12-2004

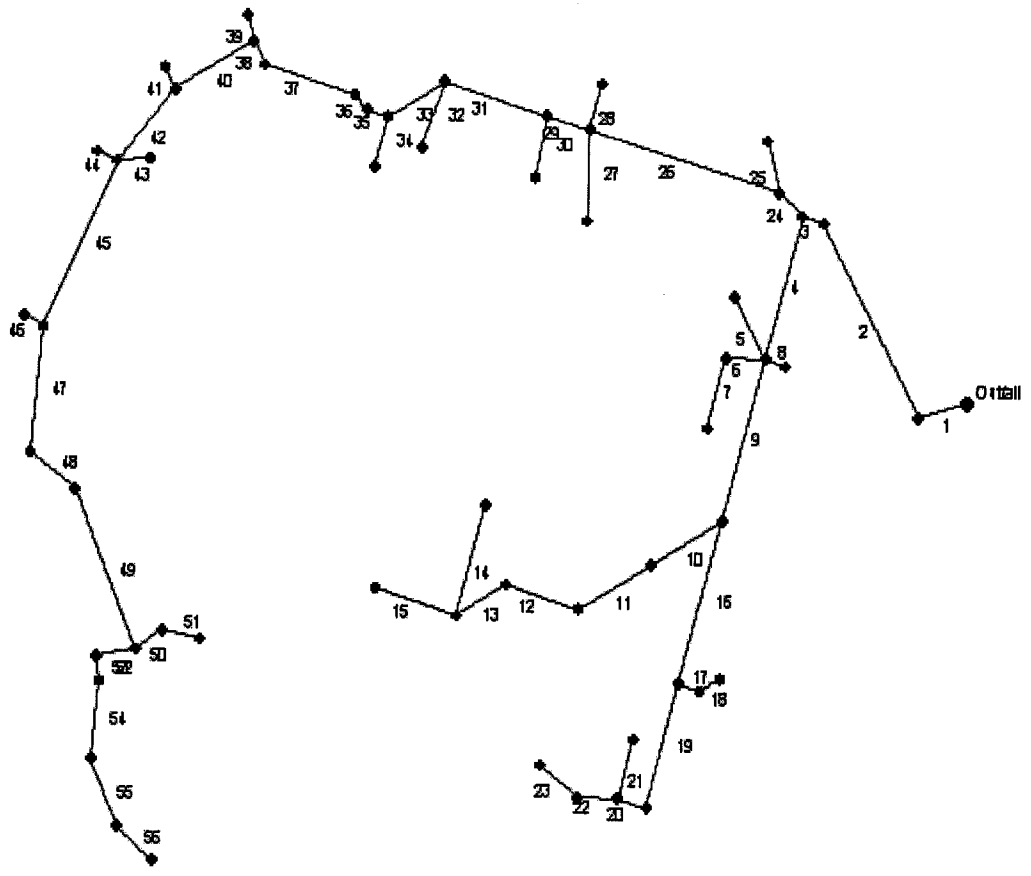
NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.

JAG

Hydraflow Plan View

WINDSOR HALL

STORM SYSTEM 1



Storm Comps.

Project file: 8818-06-STM-1.vab.stm	No. Lines: 56	REV 04-07-2004

Hydraflow Storm Sewers 2003

Storm Sewer Tabulation

STORM SYSTEM 1

Station Line	Station To Line	Len (ft)	Drng Area Incr (ac)	Drng Area Total (ac)	Rnoff coeff (C)	Area x C Incr	Area x C Total	Tc Inlet (min)	Tc Syst (min)	Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe Size (in)	Pipe Slope (%)	Invert Elev Up (ft)	Invert Elev Dn (ft)	HGL Elev Up (ft)	HGL Elev Dn (ft)	Grnd / Rim Elev Up (ft)	Grnd / Rim Elev Dn (ft)	Line ID
1	End	54.0	0.00	17.91	0.00	0.00	12.33	0.0	14.9	5.2	63.59	167.0	5.06	48	1.35	48.73	48.00	61.16	61.05	66.00	61.50	1-1 to Outfall
2	1	216.0	0.18	17.91	0.70	0.13	12.33	5.0	14.1	5.3	64.91	167.6	5.17	48	1.36	51.67	48.73	62.00	61.55	65.50	66.00	1-2 to 1-1
3	2	24.0	0.09	17.73	0.70	0.06	12.20	5.0	14.1	5.3	64.40	203.1	5.13	48	2.00	52.15	51.67	62.35	62.31	65.68	65.50	1-3 to 1-2
4	3	146.0	0.11	8.44	0.70	0.08	5.53	5.0	13.0	5.4	30.14	113.6	6.97	30	7.68	63.36	52.15	65.19	62.76	71.29	65.68	1-4 to 1-3
5	4	70.0	0.20	0.20	0.70	0.14	0.14	5.0	5.0	7.1	1.00	3.56	1.27	12	1.00	64.06	63.36	66.20	66.14	68.26	71.29	1-5 to 1-4
6	4	43.0	0.52	1.01	0.80	0.42	0.76	5.0	5.4	7.0	5.33	12.22	5.48	15	3.58	69.08	67.54	70.00	68.46	75.79	71.29	1-6 to 1-4
7	6	71.0	0.49	0.49	0.70	0.34	0.34	5.0	5.0	7.1	2.44	4.37	4.42	12	1.51	73.36	72.29	74.02	72.95	76.86	75.79	1-7 to 1-6
8	4	24.0	0.88	0.88	0.70	0.62	0.62	5.0	5.0	7.1	4.39	10.50	2.48	18	1.00	64.06	63.82	66.18	66.14	71.29	71.29	1-8 to 1-4
9	4	164.0	0.26	6.24	0.70	0.18	3.94	5.0	12.6	5.5	21.73	45.34	7.83	24	4.02	71.36	64.77	73.01	66.42	78.17	71.29	1-9 to 1-4
10	9	89.0	0.26	2.13	0.70	0.18	1.50	5.0	7.4	6.5	9.80	11.46	5.55	18	1.19	72.42	71.36	74.50	73.73	79.62	78.17	1-9A to 1-9
11	10	90.0	0.13	1.87	0.70	0.09	1.32	5.0	7.1	6.6	8.71	11.50	4.93	18	1.20	73.50	72.42	75.19	74.57	81.06	79.62	1-10 to 1-9A
12	11	83.0	0.44	1.74	0.70	0.31	1.23	5.0	6.8	6.7	8.20	11.53	4.67	18	1.20	74.50	73.50	75.94	75.48	79.40	81.06	1-11 to 1-10
13	12	62.0	0.44	1.30	0.73	0.32	0.92	5.0	6.5	6.7	6.21	11.47	4.04	18	1.19	75.24	74.50	76.32	76.20	79.25	79.40	1-12 to 1-11
14	13	111.0	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.1	2.14	11.54	2.41	18	1.21	76.58	75.24	77.14	76.64	79.25	79.25	1-13 to 1-12
15	13	93.0	0.43	0.43	0.70	0.30	0.30	5.0	5.0	7.1	2.14	12.61	2.41	18	1.44	76.58	75.24	77.14	76.64	79.25	79.25	1-14 to 1-12
16	9	165.0	0.17	3.85	0.70	0.12	2.26	5.0	12.2	5.6	12.58	17.84	7.55	18	2.88	77.34	72.58	78.68	73.92	84.83	78.17	1-15 to 1-9
17	16	24.0	0.59	1.94	0.60	0.35	0.83	8.0	12.1	5.6	4.62	2.52	5.88	12	0.50	77.46	77.34	79.97	79.57	84.83	84.83	1-16 to 1-15
18	17	25.0	1.35	1.35	0.35	0.47	0.47	12.0	12.0	5.6	2.65	2.66	3.37	12	0.56	77.60	77.46	80.51	80.37	79.75	84.83	1-16A to 1-16
19	16	126.0	0.33	1.74	0.70	0.23	1.31	5.0	5.7	6.9	9.09	20.20	5.70	18	3.70	82.00	77.34	83.15	79.57	89.40	84.83	1-17 to 1-15
20	19	33.0	0.08	1.41	0.85	0.07	1.08	5.0	5.6	7.0	7.52	20.60	4.98	18	3.85	83.27	82.00	84.32	83.76	90.07	89.40	1-18 to 1-17
21	20	60.0	0.45	0.45	0.80	0.36	0.36	5.0	5.0	7.1	2.57	3.62	4.52	12	1.03	86.62	86.00	87.30	86.68	90.12	90.07	1-19 to 1-18

NEEDS TO REFLECT DEV NOT UNDEV CONDITIONS.

CREDIT TAKEN FOR OFFSITE DEV

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 04-07-2004

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	43.0	0.64	0.88	0.70	0.45	0.65	5.0	5.5	7.0	4.56	10.49	5.99	12	8.67	87.50	83.77	88.39	84.82	91.04	90.07	1-20 to 1-18
23	22	52.0	0.24	0.24	0.85	0.20	0.20	5.0	5.0	7.1	1.45	7.73	2.72	12	4.71	89.95	87.50	90.46	88.84	93.45	91.04	1-21 to 1-20
24	3	35.0	0.50	9.20	0.70	0.35	6.60	5.0	13.9	5.3	35.02	142.3	3.64	42	2.00	52.85	52.15	62.81	62.76	64.23	65.68	1-22 to 1-3
25	24	52.0	0.15	0.15	0.70	0.11	0.11	5.0	5.0	7.1	0.75	6.79	0.95	12	3.63	57.24	55.35	62.98	62.96	64.31	64.23	1-23 to 1-22
26	24	217.0	0.10	8.55	0.70	0.07	6.15	5.0	12.8	5.5	33.64	100.6	3.50	42	1.00	55.02	52.85	63.20	62.96	72.24	64.23	1-24 to 1-22
27	26	89.0	0.33	0.33	0.70	0.23	0.23	5.0	5.0	7.1	1.65	9.71	2.93	12	7.43	64.13	57.52	64.67	63.39	68.33	72.24	1-25 to 1-24
28	26	47.0	0.12	0.12	0.70	0.08	0.08	5.0	5.0	7.1	0.60	13.79	1.72	12	15.00	64.57	57.52	64.90	63.39	72.25	72.24	1-26 to 1-24
29	26	49.0	0.10	8.00	0.70	0.07	5.76	5.0	12.6	5.5	31.77	100.6	3.30	42	1.00	55.51	55.02	63.44	63.39	73.88	72.24	1-27 to 1-24
30	29	61.0	0.61	0.61	0.70	0.43	0.43	5.0	5.0	7.1	3.04	15.72	4.38	12	19.49	69.90	58.01	70.64	63.61	75.40	73.88	1-28 to 1-27
31	29	117.0	0.11	7.29	0.70	0.08	5.26	5.0	11.9	5.6	29.61	100.6	3.08	42	1.00	56.68	55.51	63.71	63.61	74.17	73.88	1-29 to 1-27
32	31	69.0	0.50	0.50	0.70	0.35	0.35	5.0	5.0	7.1	2.49	15.05	3.82	12	17.86	71.50	59.18	72.17	63.86	77.00	74.17	1-30 to 1-29
33	31	71.0	0.38	6.68	0.70	0.27	4.84	5.0	11.5	5.7	27.57	100.6	2.87	42	1.00	57.39	56.68	63.91	63.86	69.94	74.17	1-31 to 1-29
34	33	52.0	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.1	1.10	29.77	0.78	18	8.04	63.07	58.89	64.01	64.01	68.32	69.94	1-32 to 1-31
35	33	24.0	0.03	6.08	0.90	0.03	4.42	5.0	11.3	5.7	25.30	100.6	2.63	42	1.00	57.63	57.39	64.02	64.01	70.07	69.94	1-33 to 1-31
36	35	20.0	0.14	6.05	0.70	0.10	4.39	5.0	11.2	5.8	25.25	100.6	2.62	42	1.00	57.83	57.63	64.09	64.07	69.30	70.07	1-34 to 1-33
37	36	102.0	0.07	5.91	0.70	0.05	4.29	5.0	10.5	5.9	25.21	100.6	2.62	42	1.00	58.85	57.83	64.20	64.13	69.55	69.30	1-35 to 1-34
38	37	26.0	0.27	5.84	0.70	0.19	4.24	5.0	10.3	5.9	25.06	100.6	2.61	42	1.00	59.11	58.85	64.29	64.28	68.90	69.55	1-36 to 1-35
39	38	27.0	0.30	0.30	0.70	0.21	0.21	5.0	5.0	7.1	1.50	24.03	2.29	15	13.85	65.35	61.61	65.84	64.40	68.85	68.90	1-37 to 1-36
40	38	98.0	0.06	5.27	0.80	0.05	3.84	5.0	9.6	6.0	23.23	100.6	2.41	42	1.00	60.09	59.11	64.45	64.40	70.23	68.90	1-38 to 1-36
41	40	24.0	0.14	0.14	0.70	0.10	0.10	5.0	5.0	7.1	0.70	10.48	1.85	12	8.67	64.67	62.59	65.02	64.54	70.13	70.23	1-39 to 1-38
42	40	94.0	1.64	5.07	0.73	1.20	3.70	8.0	8.9	6.2	22.86	100.6	2.38	42	1.00	61.03	60.09	64.59	64.54	72.31	70.23	1-40 to 1-38

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 04-07-2004

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)	
43	42	35.0	0.07	0.07	0.70	0.05	0.05	5.0	5.0	7.1	0.35	14.23	0.28	15	4.86	62.73	61.03	64.68	64.68	68.53	72.31	1-41 to 1-40
44	42	24.0	0.22	0.22	0.70	0.15	0.15	5.0	5.0	7.1	1.10	15.35	2.33	12	18.58	67.99	63.53	68.43	64.68	72.31	72.31	1-42 to 1-40
45	42	181.0	0.12	3.14	0.70	0.08	2.30	5.0	8.3	6.3	14.54	41.08	5.53	24	3.30	68.50	62.53	69.85	64.68	76.06	72.31	1-43 to 1-40
46	45	24.0	0.56	0.56	0.70	0.39	0.39	5.0	5.0	7.1	2.79	8.48	4.12	12	5.67	69.86	68.50	70.57	70.50	76.06	76.06	1-44 to 1-43
47	45	124.0	0.36	2.46	0.70	0.25	1.82	5.0	7.7	6.4	11.75	22.62	4.82	24	1.00	69.74	68.50	70.95	70.50	78.82	76.06	1-45 to 1-43
48	47	60.0	0.46	2.10	0.70	0.32	1.57	5.0	7.4	6.5	10.24	22.62	4.61	24	1.00	70.34	69.74	71.47	71.41	79.61	78.82	1-46 to 1-45
49	48	170.0	0.14	1.64	0.90	0.13	1.25	5.0	6.3	6.8	8.46	22.62	4.47	24	1.00	72.04	70.34	73.07	71.69	80.83	79.61	1-47 to 1-46
50	49	34.0	0.17	0.54	0.90	0.15	0.43	5.0	5.3	7.1	3.06	3.56	4.89	12	1.00	73.38	73.04	74.12	73.78	81.50	80.83	1-48 to 1-47
51	50	42.0	0.37	0.37	0.76	0.28	0.28	5.0	5.0	7.1	2.00	3.56	3.04	12	1.00	73.80	73.38	74.48	74.40	78.00	81.50	1-49 to 1-48
52	49	44.0	0.03	0.96	0.70	0.02	0.69	5.0	6.0	6.8	4.71	41.34	4.35	18	15.50	79.36	72.54	80.19	73.49	83.86	80.83	1-50 to 1-47
53	52	24.0	0.02	0.93	0.70	0.01	0.67	5.0	5.9	6.9	4.60	15.90	3.88	18	2.29	79.91	79.36	80.73	80.53	84.41	83.86	1-51 to 1-50
54	53	77.0	0.08	0.91	0.90	0.07	0.65	5.0	5.5	7.0	4.56	17.78	5.10	15	7.58	86.50	80.66	87.35	81.51	90.25	84.41	1-52 to 1-51
55	54	71.0	0.08	0.83	0.70	0.06	0.58	5.0	5.2	7.1	4.11	5.99	4.33	15	0.86	87.11	86.50	87.92	87.54	90.86	90.25	1-53 to 1-52
56	55	50.0	0.75	0.75	0.70	0.53	0.53	5.0	5.0	7.1	3.74	5.26	5.11	12	2.18	88.20	87.11	89.02	88.09	91.70	90.86	1-54 to 1-53

Project File: 8818-06-STM-1.vab.stm

Number of lines: 56

Run Date: 04-07-2004

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

Hydraflow Plan View

WINDSOR HALL

STORM SYSTEM 2

Project file: 8818-06-STM-2.vab.stm	No. Lines: 4	REV 04-07-2004

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	96.0	0.08	0.40	0.85	0.07	0.34	5.0	6.8	6.7	2.26	12.55	2.88	12	12.42	53.92	42.00	57.17	56.78	62.47	43.00	Outfall to SS 2-1
2	1	24.0	0.06	0.06	0.85	0.05	0.05	5.0	5.0	7.1	0.36	3.56	0.46	12	1.00	54.16	53.92	57.30	57.30	62.47	62.47	SS 2-1 to SS 2-2
3	1	153.0	0.16	0.26	0.85	0.14	0.22	5.0	5.5	7.0	1.54	5.11	2.56	12	2.06	57.07	53.92	57.67	57.30	60.81	62.47	SS 2-1 to SS 2-3
4	3	24.0	0.10	0.10	0.85	0.09	0.09	5.0	5.0	7.1	0.61	3.56	1.23	12	1.00	57.31	57.07	57.82	57.82	60.81	60.81	SS 2-4 to SS 2-3

Project File: 8818-06-STM-2.vab.stm

Number of lines: 4

Run Date: 04-07-2004

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

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

County BMP ID Code (if known): PC-281

Name of Facility: Windsor Meade Hall BMP No.: 1 of 1 Date: 8/1/08

Location: Southeastern Corner of project, south of entrance to development.

Name of Owner: Virginia United Methodist Home, Inc.

Name of Inspector: Joe Buchite

Type of Facility: A-3 Extended Retention

Weather Conditions: 91° 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		✓		
Vegetation Condition		✓		needs additional stabilization
Tree Growth	✓			
Erosion	✓			
Trash & Debris	✓			
Seepage	✓			
Fencing or Benches	N/A			
Interior Landscaping/Planted Areas: ☐ None ☐ Constructed Wetland/Shallow Marsh ☐ Naturally Established Vegetation Aquatic Bench Plantings				
Vegetated Conditions		✓		Bench is inundated w/ cat tails
Trash & Debris	✓			
Floating Material	✓			
Erosion	✓			
Sediment	✓			
Dead Plant	✓			
Aesthetics	✓			
Other	✓			

Notes: Plan calls for aquatic bench plantings. No evidence of planted material. Bench is covered with cat tails.

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: ☒ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☐ None, Dry (Detention Basin)				
Shoreline Erosion	✓			
Algae	✓			
Trash & Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other	✓			
Inflows (Describe Types/Locations):				
Condition of Structure				
Erosion				
Trash and Debris				
Sediment				
Outlet Protection				
Other				
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):				
Condition of Structure	✓			
Corrosion	✓			
Trash and Debris	✓			
Sediment	✓			
Vegetation		✓		minor
Other	✓			Potential piping
Principal Outlet Structure - Barrel, Conduit, etc. :				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris	✓			
Erosion/Sediment		✓		potential piping
Outlet Protection		✓		not to plan
Other				
Emergency Spillway (Overflow):				
Vegetation				
Lining				
Erosion				
Trash & Debris				
Other				
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other	✓			
Surrounding Perimeter Conditions:				
Land Uses	✓			
Vegetation		✓		approx. 1 acre in need of PS
Trash & Debris	✓			
Aesthetics	✓			
Access /Maintenance Roads or Paths	✓ N/A			
Other				

Remarks:

Overall Environmental Division Internal Rating: _____

Signature: _____ **Date:** _____

Title: _____

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

County BMP ID Code (if known): PC-237

Name of Facility: Windsor Meade Way BMP #2 BMP No.: 2 of 2 Date: _____

Location: Right hand side of Windsor Meade Way just befor guard shacr.

Name of Owner: _____

Name of Inspector: Gregory B. Johnson

Type of Facility: Detention Pond

Weather Conditions: Sunny 48° 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	✓			
Vegetation Condition	✓			
Tree Growth	NA			
Erosion			✓	SLOPES ON ROAD SIDE NEED STABILIZED
Trash & Debris	✓			
Seepage	✓			
Fencing or Benches	NA			
Interior Landscaping/Planted Areas: ☐ None ☐ Constructed Wetland/Shallow Marsh ☐ Naturally Established Vegetation				
Vegetated Conditions	✓			
Trash & Debris	✓			
Floating Material	✓			
Erosion	✓			
Sediment	✓			
Dead Plant	✓			
Aesthetics	✓			
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	✓			
Algae	✓			
Trash & Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other	—			
Inflows (Describe Types/Locations):				
Condition of Structure			✓	LT SIDE INLET BLOCKED WITH DEBRIS
Erosion			✓	SLOPES BY FLARE ERODING
Trash and Debris	✓			
Sediment			✓	SEDIMENT NEEDS TO BE REMOVED AND RIP RAP NEEDS TO BE RECONSTRUCTED
Outlet Protection	✓			
Other	—			
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):				
Condition of Structure	✓			
Corrosion	✓			
Trash and Debris			✓	DEBRIS AND SEDIMENT NEEDS TO BE REMOVED FROM INTERIOR OF STRUCTURE.
Sediment			✓	Needs cleaned from inside of structure
Vegetation	✓			
Other	—			
Principal Outlet Structure - Barrel, Conduit, etc. : Conduit "24 inch RCP				
Condition of Structure			✓	SEE BELOW
Settlement			✓	Possible under Pipe - Flow
Trash & Debris			✓	TRASH NEEDS TO BE REMOVED FROM OUTLET TREES NEEDS TO BE REMOVED
Erosion/Sediment		✓		Slopes need more vegetation
Outlet Protection	✓			RIP RAP NEEDS TO BE CONSTRUCTED PER PLAN
Other	—			
Emergency Spillway (Overflow):				
Vegetation	NA			
Lining				
Erosion				
Trash & Debris				
Other				
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other	✓			
Surrounding Perimeter Conditions:				
Land Uses				
Vegetation				
Trash & Debris				
Aesthetics				
Access /Maintenance Roads or Paths				
Other				

Remarks:
Outfall needs to be redesign/configured for positive flow

Overall Environmental Division Internal Rating: ___ _____

Signature: _____ **Date:** _____

Title: _____

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KBA Orig File

AES CONSULTING ENGINEERS
Engineering, Surveying, and Planning
5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188

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

LETTER OF TRANSMITTAL

ATTN:

CO.: James City County Environmental Division

Address: 101-E Mounts Bay Road

Williamsburg, Virginia 23187

cc:

DATE	JOB NO.
January 22, 2009	8818-04

FROM: Marc Bennett

RE WindsorMeade Way

RECEIVED 23 2009 ENVIRONMENTAL DIVISION

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

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

☐ Copy of letter(s) ☐ Other:

COPIES	DATE	No. of Pages	DESCRIPTION
2	12/22/08	3	Record Drawings of BMP #1 for Windsormeade Way
1	12/22/08	12	BMP #1 Certification Forms for James City County
2	12/22/08	3	Record Drawings of BMP #2 for Windsormeade Way
1	12/22/08	12	BMP #2 Certification Forms for James City County

THESE ARE TRANSMITTED as checked below:

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

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

☐ Other:

REMARKS:

Marc Bennett

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

File name: S:\Jobs\8818\04-Windsormeade Way\Wordproc\Document\01-21-09 Transmittal to JCC Environmental.doc

Form Rev. 7/02

WINDSORMEADE WAY
CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM 2
8818-04
5/14/2003

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 2.31 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)	10-C Craven	C	Woods (good)	0.70	72	50
2)	17 - Johnston	D	Pavement and Roofs (Com.)	0.04	98	4
3)	17 - Johnston	D	Woods (good)	0.08	79	6
4)	15-D Emporia	C	Pavement and Roofs (Com.)	0.29	98	28
5)	15-D Emporia	C	Woods (good)	1.20	72	86
6)					0	0
7)					0	0
	Totals =			2.31		175
	Composite CN =					76

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Woods (light underbrush)
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	0.097 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.43 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved
Length of shallow concentrated flow, L	110 Feet
Average slope of shallow concentrated flow, s	0.054 feet per foot
Average velocity, v	3.6 feet per second
Travel time, Tt = L/(3600*v)	0.01 hours

3) Channel or Pipe Flow

Length of channel flow, L	Feet
Average velocity of channel flow, v	2.5 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours

Total Time of Concentration = 0.44 hours or 26 minutes

II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site)

A. Post-Development Drainage Area to Point of Concern = 4.43 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)	15-D Emporia	C	Woods (good)	0.19	72	14
2)	15-D Emporia	C	Road	0.19	98	19
3)	17 - Johnston	D	Woods (good)	0.57	79	45
4)	17 - Johnston	D	Road	0.78	98	76
5)	15-D Emporia	C	Woods (good)	1.50	72	108
6)	15-D Emporia	C	Road	0.51	98	50
7)	10-C Craven	C	Woods (good)	0.69	72	50
8)					0	0
9)					0	0
10)					0	0
11)					0	0
	Total Adjusted CN =			4.43		361
	Composite CN =					82

TOTAL OF IMPERVIOUS AREA = 1.48A

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Woods (light underbrush)	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	200	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.13	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.21	hours

2) Shallow concentrated flow (maximum 300 feet)

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

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours

Total Time of Concentration = 0.21 hours or 12 minutes

CONSULTING ENGINEERS

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

PROJECT WindsorMeade Way
PROJECT NO. 8818-04
SUBJECT Spread Calc's
SHEET NO. 1
DATE 3/14/02 **REV 5/2003 by J.Grimes**
BY R. Smith

STORM WATER INLET COMPUTATIONS FOR WINDSORMEADE WAY

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	Sw =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 Effec L	L/Lt (ft)	E(#16) (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
HIGH POINT																														
⇩			11+06 L	0.14	0.95	0.133	0.133	4	0.532		0.532	0.001	0.02	7.3	Flow Approaching From Down Station 10+00 L															
SUMP	DI-4C	6									1.036	0.001	0.02		2		0.08								9.6	0.124	0.27	0.459	6.2	
⇧			11+06 L	0.14	0.7	0.098	0.098	4	0.392	0.112	0.504	0.001	0.02	7.2	Flow Approaching From Up Station 12+00 L															
GRADE	DI-3B	8	12+00 L	0.5	0.37	0.185	0.185	4	0.74	0.184	0.924	0.033	0.02	3.3	2	0.606	0.08	4	0.977	0.015	2	3.44	0.143	0.16	11.6	0.69	0.878	0.812	0.112	Assumes future connection
⇧																														
GRADE	DI-3B	8	12+95 L	1.05	0.36	0.378	0.378	4	1.512	0	1.512	0.025	0.02	5.4	2	0.37	0.08	4	0.821	0.015	2	3.44	0.143	0.138	11.6	0.69	0.878	1.328	0.184	Assumes future connection
HIGH POINT			16+05 L																											
HIGH POINT			16+05 L																											
GRADE	DI-3B	8	18+25 L	1.58	0.34	0.537	0.537	4	2.149	0	2.149	0.015	0.02	7.8	2	0.256	0.08	4	0.634	0.015	2	3.44	0.143	0.111	11.6	0.69	0.878	1.887	0.262	Assumes future connection
GRADE	DI-3B	6	19+25 L	0.46	0.36	0.166	0.166	4	0.662	0.262	0.924	0.034	0.02	3.2	2	0.625	0.08	4	0.979	0.015	2	3.44	0.143	0.16	9.6	0.625	0.829	0.766	0.158	Assumes future connection
GRADE	DI-3B	6	21+00 L	0.67	0.53	0.355	0.355	4	1.42	0.158	1.578	0.015	0.02	6.5	2	0.308	0.08	4	0.74	0.015	2	3.44	0.143	0.126	9.6	0.625	0.829	1.308	0.27	
GRADE	DI-3B	8	22+00 L	0.79	0.33	0.261	0.261	4	1.043	0.27	1.313	0.019	0.02	5.5	2	0.364	0.08	4	0.821	0.015	2	3.44	0.143	0.138	11.6	0.69	0.878	1.153	0.16	
⇩				0.43	0.47	0.202	0.202	4	0.808	0.16	0.968	0.001	0.02	9.3	Flow Approaching From Down Station 22+00 L															T(Max.)=11.5'
SUMP	DI-3C	6	23+82 L								1.386	0.001	0.02		2		0.08								9.6	0.14	0.27	0.519	7	
⇧				0.11	0.95	0.105	0.105	4	0.418	0	0.418	0.001	0.02	6.6	Flow Approaching From Up Station 25+40 L															
HIGH POINT			25+40 L																											
HIGH POINT			25+40 L																											
⇩																														
GRADE	DI-3B	4	30+25 L	0.52	0.62	0.322	0.322	4	1.29	0	1.29	0.014	0.02	5.8	2	0.345	0.08	4	0.767	0.015	2	3.44	0.143	0.13	7.6	0.526	0.739	0.954	0.336	
⇩			30+74 L	0.05	0.69	0.035	0.035	4	0.138	0.336	0.474	0.001	0.02	7	Flow Approaching From Down Station 28+50 L															
SUMP	DI-3C	6									0.77	0.001	0.02		2		0.08								9.6	0.11	0.27	0.407	5.5	
⇧			30+74 L	0.08	0.7	0.056	0.056	4	0.224	0.072	0.296	0.001	0.02	5.4	Flow Approaching From Up Station 33+69 L															
GRADE	DI-3B	8	31+60 L	0.21	0.7	0.147	0.147	4	0.588	0	0.588	0.016	0.02	3.3	2	0.606	0.08	4	0.977	0.015	2	3.44	0.143	0.16	11.6	0.69	0.878	0.516	0.072	
HIGH POINT			33+69 L																											

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PROJECT	WindsorMeade Way
PROJECT NO.	8818-04
SUBJECT	Spread Calc's
SHEET NO.	2
DATE	3/14/02
BY	R. Smith REV 5/2003 by J.Grimes

STORM WATER INLET COMPUTATIONS FOR WINDSORMEADE WAY

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	Stw =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 Effec L	P	L/Lt (ft)	d	E(#16) (ft)	h	Q Int CFS d/h	Q Carryover Spread	Remark
HIGH POINT			33+69 L																														
⇩																																	
GRADE	DI-3B	4	36+00 L	0.21	0.69	0.145	0.145	4	0.58	0	0.58	0.023	0.02	2.7	2	0.741	0.08	4	0.989	0.015	2	3.44	0.143	0.162	7.6		0.526		0.739		0.429	0.151	
⇩				0.26	0.83	0.216	0.216	4	0.863	0.151	1.014	0.001	0.02	9.4	Flow Approaching From Down Station 36+00 L																	T(Max.) = 10.0'
SUMP	DI-3C	6	37+25 L								1.294	0.001	0.02		2		0.08								9.6		0.134		0.27		0.496	6.7	
⇧				0.1	0.7	0.07	0.07	4	0.28	0	0.28	0.001	0.02	5.2	Flow Approaching From Up Station 37+62 L																		
HIGH POINT																																	

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PROJECT WindsorMeade Way
PROJECT NO. 8818-04
SUBJECT Spread Calc's
SHEET NO. 3
DATE 3/14/02
BY R. Smith **REV 5/2003 by J.Grimes**

STORM WATER INLET COMPUTATIONS FOR WINDSORMEADE WAY

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	Sw =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 Effec L	P	L/Lt (ft)	d	E(#16) (ft)	h	Q Int CFS d/h	Q Carryover Spread	Remark
HIGH POINT																																	
GRADE	DI-3B	10	10+95 R	0.38	0.81	0.308	0.308	4	1.231	0	1.231	0.014	0.02	5.7	2	0.351	0.08	4	0.767	0.015	2	3.44	0.143	0.13	13.6		0.735		0.909		1.119	0.113	
⇩				0.15	0.8	0.12	0.12	4	0.48	0.113	0.593	0.001	0.02	7.6	Flow Approaching From Down Station 10+95 L																	
SUMP	DI-4C	6	11+17 R								1.103	0.001	0.02		2		0.08								9.6		0.128		0.27		0.474	6.4	
⇧				0.1	0.73	0.073	0.073	4	0.292	0.219	0.511	0.001	0.02	7.2	Flow Approaching From Up Station 12+00 L																	
GRADE	DI-3B	4	12+00 R	0.22	0.75	0.165	0.165	4	0.66	0.179	0.839	0.033	0.02	2.9	2	0.69	0.08	4	0.987	0.015	2	3.44	0.143	0.161	7.6		0.526		0.739		0.621	0.219	
⇧																																	
GRADE	DI-3B	6	13+00 R	0.25	0.75	0.188	0.188	4	0.75	0.297	1.047	0.025	0.02	4.3	2	0.465	0.08	4	0.915	0.015	2	3.44	0.143	0.151	9.6		0.625		0.829		0.868	0.179	
⇧																																	
GRADE	DI-3B	4	14+00 R	0.38	0.75	0.285	0.285	4	1.14	0	1.14	0.015	0.02	5.4	2	0.37	0.08	4	0.821	0.015	2	3.44	0.143	0.138	7.6		0.526		0.739		0.843	0.297	
⇧																																	
HIGH POINT			16+05 R																														
HIGH POINT			16+05 R																														
GRADE	DI-3B	6	18+25 R	0.33	0.76	0.251	0.251	4	1.003	0	1.003	0.015	0.02	5.1	2	0.392	0.08	4	0.848	0.015	2	3.44	0.143	0.142	9.6		0.625		0.829		0.832	0.172	
⇩																																	
GRADE	DI-3B	6	19+25 R	0.11	0.76	0.084	0.084	4	0.334	0.172	0.506	0.034	0.02	1.9	2	1.053	0.08	4	1	0.015	2	3.44	0.143	0.163	9.6		0.625		0.829		0.419	0.087	
⇩																																	
GRADE	DI-3B	6	20+00 R	0.19	0.76	0.144	0.144	4	0.578	0.087	0.664	0.015	0.02	3.8	2	0.526	0.08	4	0.948	0.015	2	3.44	0.143	0.156	9.6		0.625		0.829		0.551	0.114	
⇩																																	
GRADE	DI-3B	4	22+00 R	0.22	0.73	0.161	0.161	4	0.642	0.114	0.756	0.019	0.02	3.9	2	0.513	0.08	4	0.941	0.015	2	3.44	0.143	0.155	7.6		0.526		0.739		0.559	0.197	
⇩				0.17	0.73	0.124	0.124	4	0.496	0.197	0.693	0.001	0.02	8.1	Flow Approaching From Down Station 22+00 L																	T(Max.) = 11.5'
SUMP	DI-3C	6	23+82 R								1.233	0.001	0.02		2		0.08								9.6		0.132		0.27		0.489	6.6	
⇧				0.18	0.75	0.135	0.135	4	0.54	0	0.54	0.001	0.02	7.4	Flow Approaching From Up Station 25+66 L																	
HIGH POINT			25+40 R																														
HIGH POINT			25+40 R																														
GRADE	DI-3A	2.8	28+50 R	0.28	0.7	0.196	0.196	4	0.784	0	0.784	0.015	0.02	4.3	2	0.465	0.08	4	0.915	0.015	2	3.44	0.143	0.151	6.4		0.438		0.645		0.506	0.278	
GRADE	DI-3B	4	30+25 R	0.18	0.7	0.126	0.126	4	0.504	0.278	0.782	0.015	0.02	4.3	2	0.465	0.08	4	0.915	0.015	2	3.44	0.143	0.151	7.6		0.526		0.739		0.578	0.204	
⇩				0.06	0.7	0.042	0.042	4	0.168	0.204	0.372	0.001	0.02	6.2	Flow Approaching From Down Station 30+25 L																	
SUMP	DI-3C	6	30+74 R								1.268	0.001	0.02		2		0.08								9.6		0.134		0.27		0.496	6.7	
⇧				0.32	0.7	0.224	0.224	4	0.896	0	0.896	0.001	0.02	9	Flow Approaching From Up Station 33+69 L																	T(Max.) = 10.0'
HIGH POINT			33+69 R																														

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PROJECT WindsorMeade Way
PROJECT NO. 8818-04
SUBJECT Spread Calc's
SHEET NO. 4
DATE 3/14/02
BY R. Smith **REV 5/2003 by J.Grimes**

STORM WATER INLET COMPUTATIONS FOR WINDSORMEADE WAY

INLET Number	Type	Length	Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Qt Gutter Flow	S Gutter Slope (ft/ft)	Sx Cross Slope (ft/ft)	T(Spread)	W (ft)	W/T	Sw (ft/ft)	Sw/Sx	Eo(#10)	n	Local Dep.	a	S'w =a/(12W)	Se (ft/ft) =Sx+SwEo	Lt (ft) 15 P Effec L	L/Lt (ft) d	E(#16) (ft) h	Q Int CFS d/h	Q Carryover Spread	Remark
HIGH POINT			33+69 R																											
⇩																														
GRADE	DI-3B	6	36+00 R	0.23	0.7	0.161	0.161	4	0.644	0	0.644	0.015	0.02	3.7	2	0.541	0.08	4	0.955	0.015	2	3.44	0.143	0.157	9.6	0.625	0.829	0.534	0.11	
⇩																														
GRADE	DI-3B	6	37+25 R	0.12	0.7	0.084	0.084	4	0.336	0.11	0.446	0.015	0.02	2.7	2	0.741	0.08	4	0.989	0.015	2	3.44	0.143	0.162	9.6	0.625	0.829	0.37	0.076	

Date Record Created: [redacted]

Created By: [redacted]

WS_BMPNO: PC237

Print Record

PRINTED ON
Thursday, March 11, 2010
4:19:55 PM

WATERSHED	PC
BMP ID NO	237
PLAN NO	SP-62-03
TAX PARCEL	38-4
PIN NO	01-00-0001
CONSTRUCTION DATE	5/1/2005
PROJECT NAME	WindsorMeade Way BMP # 2
FACILITY LOCATION	Between Monticello Market Place and Wind
CITY-STATE	Williamsburg, Va
CURRENT OWNER	C.C. Casey, LTD.CO
OWNER ADDRESS	721 Richmond Rd
OWNER ADDRESS 2	
CITY-STATE-ZIP CODE	Williamsburg, VA 23185
OWNER PHONE	757-258-5042
MAINT AGREEMENT	Yes
EMERG ACTION PLAN	Yes

Get Last BMP No

Return to Menu

MAINTENANCE PLAN	Yes	CTRL STRUC DESC	Trash Rack
SITE AREA acre		CTRL STRUC SIZE inches	
LAND USE	Mixed Use	OTLT BARRL DESC	RCP
old BMP TYP	Wet Pond	OTLT BARRL SIZE inch	24
JCC BMP CODE	A2 Wet Pond		
POINT VALUE		EMERG SPILLWAY	No
		DESIGN HW ELEV	
		PERM POOL ELEV	
SVC DRAIN AREA acres		2-YR OUTFLOW cfs	63.25
		10-YR OUTFLOW cfs	65.93
		REC DRAWING	Yes
SERVICE AREA DESCRI	Services Road		
IMPERV AREA acres	0.00	CONSTR CERTIF	No
RECV STREAM	Powhatan Creek		
EXT DET-WQ-CTRL	No	LAST INSP DATE	Inspected by: [redacted]
WTR QUAL VOL acre-ft		INTERNAL RATING	
CHAN PROT CTRL	No	MISC/COMMENTS	
CHAN PROT VOL acre-ft		BMP 2 north side of road before wall crossing	
SW/FLOOD CONTROL	No		
GEOTECH REPORT	No		

Additional Comments: [redacted]