CERTIFICATE OF AUTHENTICITY

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

BMP NUMBER: **MC056**

DATE VERIFIED: **December 4, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

Date: March 30, 2012

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

From: Leah Hardenbergh

PO: 110426

Re: Files Approved for Scanning

General File ID or BMP ID: **MC056**

PIN: **4830800033**

Owner Name (if known): **KENNINGTON WOODS**

Legal Property Description: **NOS, GREENWAY, CONSERVATION EASEMENT KENSINGTON WOODS**

Site Address:

(For internal use only):

Box # 3

Agreements (in file as of scan date): Y Book or Doc #: 030024585 DB 405 p 657

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 7th day of August, 2003, between KENSINGTON WOODS, LLC, and all successors in interest, ("COVENANTOR(S),") owner(s) of the following property: 2705 LAKE POWELL ROAD, project name, KENSINGTON WOODS, Document No. _____, Deed Book 405, Page No. 657; 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, 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 # 030024585
Recorded on Aug. 20, 2003

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)

Kensington Woods, LLC

Print Name/Title By HENRY H STEPHENS
PRESIDENT of Manager

ATTEST:

Lynn Andreen

COVENANTOR(S)

Print Name/Title

ATTEST:

COMMONWEALTH OF VIRGINIA
CITY/~~COUNTY OF~~ Newport News

I hereby certify that on this 7th day of August, 2003, before the subscribed, a Notary Public of the State of Virginia, and for the City/~~County~~ of Newport News, aforesaid personally appeared Henry H. Stephens and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 7th day of August, 2003.

Carol Lynn Andrews
Notary Public

My Commission expires: May 31, 2004

Approved as to form:

Leo P. Rogers
County Attorney

This Declaration of Covenants prepared by:

AES CONSULTING ENGINEERS
(Print Name)

CIVIL ENGINEER
(Title)

5248 OLDE TOWNE ROAD, #1
(Address)

WILLIAMSBURG VA 23188
(City) (State) (Zip)

drainage.pre

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: Kensington Woods
Structure/BMP Name: SWM/BMP#1 Wet Pond
Project Location: Between 2697 and 2755 Lake Powell Rd.
BMP Location: Adjacent to Lots 17 - 21
County Plan No.: S - 112 - 02

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

Tax Map/Parcel No.: (46-3)(1-16)
BMP ID Code (if known): mc 056
Zoning District: R2
Land Use: General Residential District, Cluster
Site Area (sf or acres): 10.895 Ac.

Brief Description of Stormwater Management/BMP Facility: 10 Point extended detention Wet Pond Facility

Nearest Visible Landmark to SWM/BMP Facility: Brixton Road

Nearest Vertical Ground Control (if known):
☐ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☒ Other
Station Number or Name: D.I. right side of Intersection Brixton Rd. and Alley.
Datum or Reference Elevation: 60.82
Control Description: Top of D.I.at 30" pipe.
Control Location from Subject Facility: North of outlet structure

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: 8/2003
Facility Monitored by County Representative during Construction: ☒ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: H.B. Hankins
Name of Professional Firm Who Routinely Monitored Construction: ECS
Date of Completion for SWM/BMP Facility: 11/2004
Date of Record Drawing/Construction Certification Submittal: 12/22/04

(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: Associated Developers, Inc.
Mailing Address: 5300 Mercury Blvd.
Newport News, Va. 23605
Business Phone: (757) 838-2739 Fax:(757)838-6337
Contact Person: Henry Stephens Title:President

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

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Business Phone: (757) 253-0040
Fax: (757) 220-8994
Responsible Plan Preparer: Charles B. Records
Title: Project Engineer
Plan Name: Kensington Woods
Firm's Project No. 9225-00
Plan Date: 12-23-02
Sheet No.'s Applicable to SWM/BMP Facility: 1 / 10 / 11 / ____ / ____

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

Name: H. B. Hankins, Inc
Mailing Address: 739 Thimble Shoals Blvd., Suite 704
Newport News, Virginia 23606
Business Phone: (757) 873-2196
Fax: (757) 873-0943
Contact Person: Hank Mullens
Site Foreman/Supervisor:
Specialty Subcontractors & Purpose (for BMP Construction Only):

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

Project Name: Kensington Woods Subdivision
County Plan No.: S-112-02
Stormwater Management Facility: Wet Pond
BMP Phase #: ☐ I ☐ II ☒ III

- ☐ Information Package Received. Date/By: _____
- ☑ Completeness Check:
  - ☑ Record Drawing Date/By: 4/7/05 Charles B. Records
  - ☑ Construction Certification Date/By: 4/12/05 Michael J. Calli
  - ☑ RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001Only)
  - ☑ Insp/Maint Agreement # / Date: 030024586 / 8/20/03
  - ☑ BMP Maintenance Plan Location: File 1 Kensington Woods
  - ☐ Other: _____
- ☑ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review
  - ☑ Yes ☐ No Location: Sheet 11 of 13
- ☑ Assign **County BMP ID Code #**: Code: MC056
- ☑ 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: 9/28/07
- ☑ Record Drawing (RD) Review Date: 9/28/07
- ☑ Construction Certification (CC) Review Date: 9/28/07
- ☐ Actions:
  - ☐ No comments.
  - ☐ Comments. Letter Forwarded. Date: _____
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☐ Construction-Related (CR)
  - ☑ Site Issues (SI)
  - ☐ Other : All site issues addressed
- ☑ Second Submission: NA
- ☑ Reinspection (if necessary): 10/10/07
- ☑ 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: 11/28/07

Chief Engineer: _____ Date: _____

*** See separate checklist, if needed.

Section 4 – Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

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

Name: Charles Records, P.E.
Title: Project Manager
Signature:
Date: 4/7/05

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
CHARLES B. RECORDS
No. 038172
PROFESSIONAL ENGINEER

_____ (Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

Construction Certification

Firm Name: E.C.S., Ltd.
Mailing Address: 108 Ingram Rd.
Williamsburg, Va. 23188
Business Phone: (757) 229-6677
Fax: (757) 229-9978

Name: Michael Galli
Title: Project Manager
Signature:
Date: 4/12/05

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
No. 030084
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.

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. **(Only 9" of Freeboard provided)**

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.
E.C.S. XX	12.	Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
E.C.S. XX	13.	Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
XX	14.	Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
XX	15.	Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
XX	16.	Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
INC	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.
XX	19.	Fencing location and type, if applicable to facility. **(Guardrail)**
XX	20.	BMP vicinity properly cleaned of stockpiles and construction debris.
XX	21.	No visual signs of erosion or channel degradation immediately downstream of facility.
N/A	22.	Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

XX 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.

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

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

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

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

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

XX A11. A pond drain pipe with valve was provided.

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

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

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.

RECEIVED
APR 13 2005
ENVIRONMENTAL DIVISION

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities Record Drawing and Construction Certification

Standard Forms & Instructions

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Record Drawing and Construction Certification Forms

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Record Drawing Checklist

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Issue Date
February 1, 2001

James City County, Virginia
Environmental Division

Erosion and Sediment Control and Stormwater Management Design Plan Checklists

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GENERAL INFORMATION

Project Name: KENSINGTON WOODS
Owner / Applicant: ASSOCIATED DEVELOPERS, INC
Plan Preparer: AES CONSULTING ENGINEERS Email: crecords@aesva.com
Project Location: LAKE POWELL ROAD
Tax Map / Parcel: (48-3)(1-6)
County Plan No. (if known): S-112-02
County BMP Type: WET ED POND (A-3)

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

- [x] Design or Construction Drawings (Plans, Profiles, Details, etc.).
- [x] Erosion & Sediment Control Plan (Plans, Details, etc.).
- [x] Erosion & Sediment Control Plan Design Report.
- [x] Stormwater Management Design Plan (Plans, Profiles, Details, etc.).
- [x] Stormwater Management Design Report.
- [x] Other, List: GEOTECH REPORT

Issue Date
March 1, 2001

MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS_015

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

EROSION AND SEDIMENT CONTROL PLAN CHECKLIST

I. *GENERAL:*

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

II. *SITE PLAN:*

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

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

Yes	No	N/A	
☑	☐	☐	*MAINTENANCE PLAN* or alternately, appropriate reference to current minimum standards and specifications of the VESCH, outlining the inspection frequency and maintenance requirements for all erosion and sediment control measures proposed for the project.
☐	☐	☑	*TRENCH DEWATERING* methods and erosion and sediment controls, if anticipated for the project.
☑	☐	☐	*CONSTRUCTION SEQUENCE* outlining the anticipated sequence for installation of erosion and sediment controls and site, grading and utility work to be performed for the project by the site contractor.
☐	☐	☑	*PHASING PLAN* if required for larger project sites that are to be developed in stages or phases.
☑	☐	☐	*STANDARD COUNTY NOTES* are required to be placed on the erosion and sediment control plan. Refer to the standard James City County Erosion and Sediment Control Notes dated May 5, 1999.
☑	☐	☐	*PROFESSIONAL SEAL AND SIGNATURE* required on final and complete approved plans, drawings, technical reports and specifications.

III. *NARRATIVE:*

Yes	No	N/A	
☑	☐	☐	*PROJECT DESCRIPTION* briefly describing the nature and purpose of the land disturbing activity and the acreage to be disturbed.
☑	☐	☐	*EXISTING SITE CONDITIONS* description of existing topography, land use, cover and drainage patterns at the site.
☑	☐	☐	*ADJACENT AREA* descriptions of neighboring onsite or offsite areas such as streams, lakes, property, roads, etc. and potential impacts due to concentrated flow or runoff from the land disturbing activity.
☐	☐	☑	*OFFSITE DISTURBED AREA* descriptions of proposed borrow sites, waste or surplus areas, utility extensions and erosion and sediment controls to be implemented.
☑	☐	☐	*SOILS DESCRIPTION* briefly summarizing site, disturbed area and drainage basin soils including name, unit, hydrologic soil group (HSG) classification, surface runoff potential, erodibility, permeability, depth, texture, structure, erosion hazards, shrink-swell potential, limitations for use and anticipated depths to bedrock and the seasonal water table, as applicable.
☑	☐	☐	*CRITICAL AREAS* on the site which many have potentially serious erosion and sediment control problems and special considerations required (ie. steep slopes, hydric soils, channels, springs, sinkholes, water supply reservoirs, groundwater recharge areas, etc.)

Yes No N/A

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

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

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

IV. *CALCULATIONS:*

Yes No N/A

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

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

JAMES CITY COUNTY, VIRGINIA
ENVIRONMENTAL DIVISION

STORMWATER MANAGEMENT DESIGN PLAN CHECKLIST

I. *GENERAL:*

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

Yes No N/A

☑ ☐ ☐ *SOILS MAP* with soil symbols, boundaries and legend in accordance with the current Soil Survey of James City and York Counties and the City of Williamsburg, Virginia with approximate locations of the project site, BMPs and applicable drainage basins.

☑ ☐ ☐ *STORMWATER MANAGEMENT NARRATIVE* in a brief and simple format which describes the project; location; site and drainage basin soil characteristics; receiving water or drainage facility; existing site and drainage basin conditions (topography, land use, cover, slopes, etc.); proposed site development; proposed stormwater management and drainage plan including County BMP type selected; summary of hydrology and hydraulics; maintenance program; and any special assumptions utilized for development of the stormwater management and drainage design plan or computations.

☑ ☐ ☐ *TEMPORARY STORMWATER MANAGEMENT* (if applicable) for control of stormwater runoff encountered during construction activities in addition to measures provided in the erosion and sediment control plan or stormwater management/drainage plan for the site. Adequate protection measures or sequencing provided.

☑ ☐ ☐ *MODIFICATION PLAN* clearly defined for temporary sediment control structures which will be converted to permanent SWM/BMP structures. Includes appropriate hydrologic and hydraulic computations, conversions, sequencing and cleanout information or details. Normally related to primary control structures associated with dry detention or wet retention ponds. Normally not permitted for Group C or D categories such as bioretention, infiltration and filtering system facilities.

☑ ☐ ☐ *STORMWATER MANAGEMENT and DRAINAGE DESIGN REPORT* in a bound 8-1/2 x 11 inch size format. Report shall generally include a title sheet, date, project identification, owner and preparer information, table of contents, narrative, summaries and computations as required. Computations may include: backwater, closed conduit, headwater, hydraulic, hydraulic grade line, hydrology, inlet, open channel, storm sewer, water quality, extended detention or stream channel protection and muti-stage storm routing calculations, as applicable, for the project. Computation data may include hand or computer generated computations, maps or schematics. All information should be presented in a clear, easy to follow format and should closely match construction plan information.

☑ ☐ ☐ *PLAN VIEW* at 1 inch = 50 ft. scale or less (1" = 40', 1" = 30', etc.)

- ☑ ☐ ☐ North arrow and plan legend.
- ☑ ☐ ☐ Property lines.
- ☑ ☐ ☐ Adjacent property information.
- ☑ ☐ ☐ Existing site features and existing impervious cover areas.
- ☑ ☐ ☐ Impervious cover tabulations.
- ☑ ☐ ☐ Existing drainage facilities (natural or manmade).
- ☑ ☐ ☐ Existing environmentally sensitive areas (RPA, wetlands, floodplain, steep slopes, critical soils, buffers, etc.).
- ☑ ☐ ☐ Existing and proposed contours (1' or 2' contour interval) and spot elevations as necessary to define high and low topography.
- ☑ ☐ ☐ Existing and proposed easement locations.

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

II. *STORMWATER CONVEYANCE SYSTEMS:*

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

Yes No N/A

☑ ☐ ☐ *STORMWATER CONVEYANCE SYSTEM COMPUTATIONS*

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

III. *STORMWATER MANAGEMENT / BMP FACILITIES*:

Yes No N/A

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

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

☑ ☐ ☐ *FACILITY CONFIGURATION and MINIMUM SEPARATIONS*

- ☑ ☐ ☐ Screening and layout consistent with Section 24-98(d) of the Chapter 24 Zoning ordinance (landscaping, screening, visibility, etc.).
- ☑ ☐ ☐ Basic considerations for safety and unauthorized entry.
- ☑ ☐ ☐ Proper length to width ratio (Typically 2H:1V).
- ☐ ☐ ☑ Facilities with deep pools (4 feet or more in depth) provided with two benches. Fifteen (15) ft. safety bench outward from normal pool at maximum 6 percent slope and aquatic bench inward from normal shoreline below normal pool. Narrower widths may be considered on a case-by-case basis. 4:1SS, 5' AQUATIC BENCH
- ☑ ☐ ☐ Pond buffer minimum 25 feet outward from maximum design WSEL. Additional setbacks may be required to permanent structures.
- ☐ ☐ ☑ No trees, shrubs or woody plants within 15 feet of embankment toe or 25 feet from principal spillway structure.

N/A See 24-98(d)

Yes	No	N/A	
☐	☐	☑	Infiltration and filtering system facilities generally located at least 100 feet horizontally from any water supply well; 100 feet from any downslope building; and 25 feet from any upslope buildings, unless site specific investigation allows for reduced separation.

Yes	No	N/A	
☑	☐	☐	*HYDRAULIC COMPUTATIONS*
☑	☐	☐	Elevation- or Stage- Storage curve and/or tabular data.
☑	☐	☐	Weir / Orifice Control - Extended Detention.
☑	☐	☐	Weir / Orifice Control - riser 1-year control for channel protection.
☑	☐	☐	Weir / Orifice Control - riser 2-year control for quantity (if required).
☑	☐	☐	Weir / Orifice Control - riser 10-year control for quantity (if required).
☑	☐	☐	Inlet / Outlet (barrel) control - (All Storms).
☑	☐	☐	Check for barrel control prior to riser orifice flow to prevent slug flow-water hammer conditions.
☑	☐	☐	Emergency spillway capacity and depth of flow.
☑	☐	☐	Elevation - Discharge (Outlet Rating) curve and/or table. Provide all supporting calculations and/or design assumptions.
☑	☐	☐	Adequate channel computations for receiving channel. May be waived if facility is designed based on current Stream Channel Protection criteria.
☑	☐	☐	*POND or RESERVOIR ROUTING*
☑	☐	☐	Storage-Indication Routing of postdeveloped inflow hydrographs for the 1-, 2-, 10-, and 100-year design storms. Preference is for structure to discharge up to the 10-year storm through the principal spillway and pass the 100-year storm with a minimum 1 foot of freeboard through a combination principal and emergency spillways. If no emergency spillway is provided, riser must be large enough to pass the design high water flow and trash without overtopping the facility, have 3 square feet or more of cross-sectional area, contain a hood type inlet and have a minimum freeboard of 2 feet. Token spillways with minimum 8 ft. width are also recommended at or above the design 100-year storm elevation.
☑	☐	☐	Downstream hydrographs at established study points, if conditions warrant (ie. facility discharge combined with uncontrolled bypass).
☑	☐	☐	*MISCELLANEOUS COMPUTATIONS*
☑	☐	☐	Water quality volume for permanent pool based on selected BMP treatment volume (WQv).
☑	☐	☐	Water quality volume for extended detention based on selected BMP treatment volume (WQv) with drawdown computations.
☑	☐	☐	Drawdown computations for the 1-year, 24 hour detention for stream channel protection criteria.
☑	☐	☐	Pond drain computations (within 24 hours).
☐	☐	☑	Anti-seep collar design (concrete preferred) or match material type.
☐	☐	☑	Filter diaphragm design (or alternative method of controlling seepage).

Yes	No	N/A	
☑	☐	☐	Riser / base structure flotation analyses. FS = 1.25 minimum.
☐	☐	☑	Downstream danger reach study and/or emergency action plan (if conditions warrant).
☐	☐	☑	Upstream backwater analyses onto offsite adjacent property (if conditions warrant).
☐	☐	☑	100 year floodplain impacts (if conditions warrant).

Yes	No	N/A	
☑	☐	☐	*GEOTECHNICAL REQUIREMENTS*
☑	☐	☐	Geotechnical Report with recommendations specific to BMP facility type selected. Report prepared by a registered professional engineer. Requires submission, review and approval prior to issuance of Land Disturbance Permit.
☐	☐	☑	Initial Feasibility Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
☐	☐	☑	Concept Design Testing requirements satisfied as per Appendix E of the James City County Guidelines for Design and Construction of Stormwater Management BMPs manual. (Infiltration, Bioretention and Filtering System BMP types only).
☑	☐	☐	Minimum Boring locations: borrow area, pool area, principal control structure, top of facility near one abutment and emergency spillway if provided.
☑	☐	☐	Boring logs with Unified Soil Classification (ASTM D2487), soils descriptions and depths to bedrock and the seasonal water table indicated.
☑	☐	☐	Standard County Record Drawing/Construction Certification note provided on plan. *Note: It is understood that preparation of record drawings and construction certifications as required for project facilities may not necessarily be performed by the plan preparer. These components may be performed by others.*
☑	☐	☐	*PRINCIPAL SPILLWAY PROFILE AND ASSOCIATED DETAILS*
☑	☐	☐	*EXISTING GROUND AND PROPOSED GRADE*
☑	☐	☐	Embankment or excavation side slopes labeled (3H:1V maximum).
☑	☐	☐	Minimum top width labeled (per VESCH or VSMH requirements).
☑	☐	☐	Removal of unsuitable material under proposed facility (per Geotechnical Report requirements).

Yes No N/A

☐ ☐ ☑ *CORE TRENCH*

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

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

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

☑ ☐ ☐ *PRINCIPAL CONTROL STRUCTURE OUTLET BARREL*

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

☐ ☑ ☐ *SEEPAGE CONTROL*

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

☐ ☐ ☐ *ANTI-SEEP COLLARS*

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

☐ ☐ ☐ *FILTER DIAPHRAGMS*

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

Yes No N/A

☑ ☐ ☐ *ELEVATION AND DIMENSIONAL DESIGN DATA*

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

☑ ☐ ☐ *CROSS SECTION THROUGH FACILITY*

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

☑ ☐ ☐ *EMERGENCY SPILLWAY PROFILE*

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

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

Yes	No	N/A	
☑	☐	☐	*CONSTRUCTION SPECIFICATIONS and NOTES*
☑	☐	☐	Anticipated sequence of construction for BMP (consistent with erosion and sediment control plan).
☐	☐	☑	Provisions to control base stream or storm flow conditions encountered during construction.
☑	☐	☐	Site and subgrade preparation requirements.
☑	☐	☐	Embankment, fill and backfill material soil and placement (lift) thickness requirements.
☑	☐	☐	Compaction and soil moisture content requirements.
☑	☐	☐	Geosynthetics for drainage, filtration, moisture barrier, separation, and reinforcement purposes.
☐	☐	☑	Clay or synthetic (PVC or HDPE) pond liners.
☑	☐	☐	Storm drain, underdrain and pipe conduit requirements.
☑	☐	☐	Minimum depth of pipe cover for temporary (construction) and final cover conditions.
☑	☐	☐	Permanent shutoff valve and pond drain.
☑	☐	☐	Concrete requirements for structural components.
☑	☐	☐	Riprap and slope protection.
☑	☐	☐	Access or maintenance road surface, base, subbase.
☑	☐	☐	Temporary and permanent stabilization measures.
☑	☐	☐	Temporary or permanent safety fencing.
☑	☐	☐	BMP Landscaping (deep, shallow, fringe, perimeter,etc.)
☑	☐	☐	Dust and traffic control (if warranted).
☑	☐	☐	Construction monitoring and certification by professional.
☐	☐	☐	Other: _____
☐	☐	☐	Other: _____.
☑	☐	☐	*MAINTENANCE PROVISIONS*
☑	☐	☐	Entity responsible for maintenance identified..
☑	☐	☐	Maintenance Plan which outlines the long-term schedule for inspection/maintenance of the facility and forebays
☑	☐	☐	Maintenance access from public right-of-way or publicly traveled road.
☐	☐	☑	Maintenance easement provided encompassing high water pool and buffer, principal and emergency spillways, outlet structures, forebays, embankment area and possible sediment-removal stockpile areas.
☐	☑	☐	Minimum 6 foot wide public safety shelf (landing) or alternative fencing.

5 foot wide

IV. *OUTLET PROTECTIONS:*

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

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

Plan Preparer: Charles Reeves

Date: 4/15/03

SWMProg/BMP/Checklist/ChkList

KENSINGTON WOODS

DEVELOPER: ASSOCIATED DEVELOPERS, INC.

JAMES CITY COUNTY, VIRGINIA

JAMESTOWN DISTRICT

GENERAL NOTES

1. PROPERTY IS ZONED R-2, GENERAL RESIDENTIAL DISTRICT, CLUSTER.
2. PROPERTY IS TAX PARCEL: (48-3) (1-16)
3. ALL LOTS HAVE A MINIMUM WIDTH OF 45' AT AT SETBACK LINE.
4. KENSINGTON WOODS RECEIVED CLUSTER MASTER PLAN APPROVAL ON SEPTEMBER 15, 1993 AND IS THEREFORE GRANDFATHERED IN TERMS OF DENSITY CHANGES APPROVED BY THE BOARD OF SUPERVISORS ON MARCH 25, 1997 AND CLARIFIED BY THE BOARD ON SEPTEMBER 9, 1997. AS SUCH, THE PROJECT HAS VESTED RIGHTS UNDER THE REGULATIONS IN EFFECT PRIOR TO THE ADOPTION OF THE COMPREHENSIVE REVISIONS.
5. THIS SITE SHALL BE SERVED BY PUBLIC SEWER (GRINDER PUMPS) AND WATER SYSTEMS OF THE JAMES CITY SERVICE AUTHORITY. ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ON EXISTING WATER MAIN AND SANITARY FORCE MAIN.
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15. THIS PROPERTY IS IN FIRM ZONE "X" AS SHOWN ON COMMUNITY PANEL 510201-0045B, DATED 2/6/1991 OF THE FLOOD INSURANCE RATE MAPS FOR JAMES CITY COUNTY, VIRGINIA. ZONE X IS DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 500 YEAR FLOOD PLAIN.
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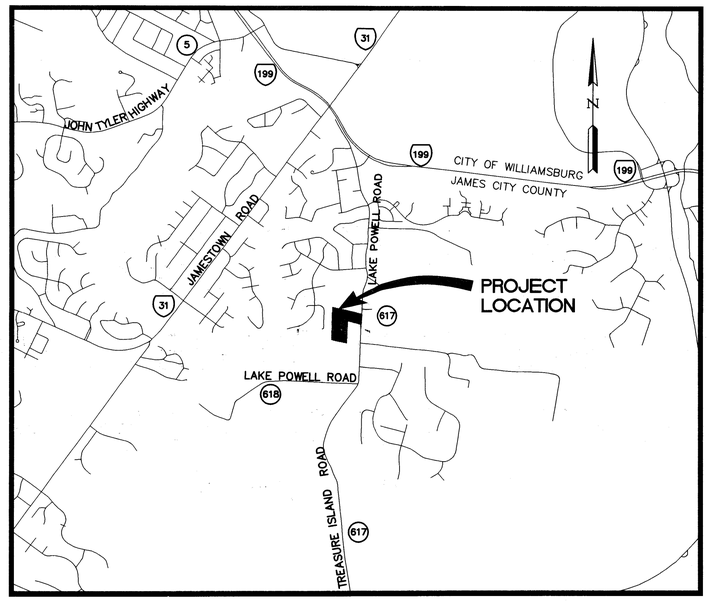
DEVELOPER: ASSOCIATED DEVELOPERS, INC.
5300 MERCURY BLVD.
NEWPORT NEWS, VA. 23605
(757) 838-2739
CONTACT: HENRY STEPHENS

CERTIFIED RESPONSIBLE LAND DISTURBER:

G. ARCHER MARSTON III, P.E.
AES CONSULTING ENGINEERS
5248 OLDE TOWNE ROAD, SUITE 1
WILLIAMSBURG, VIRGINIA. 23188
TELEPHONE: 757-253-0040

* FOR SITE PLAN REVIEW PROCESS ONLY. OWNER OR CONTRACTOR SHALL NAME RESPONSIBLE LAND DISTURBER FOR CONSTRUCTION PROCESS.



VICINITY MAP (APPROX. SCALE 1"=2000')

DATE: 12/23/02
REVISED: 6/20/03
PROJECT NO.: 9225-00

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	COVER SHEET
2	PRELIMINARY PLAT
3	ENVIRONMENTAL INVENTORY
4	ROAD PLAN
5	UTILITY PLAN
6	DRAINAGE PLAN
7	GRADING, EROSION AND SEDIMENT CONTROL PLAN
8	LANDSCAPE PLAN
9	ROAD AND UTILITY PROFILES
10	ROAD AND UTILITY PROFILES
11	NOTES AND DETAILS
12	NOTES AND DETAILS
13	NOTES AND DETAILS

LEGEND

EXISTING		PROPOSED
W	WATER	W
FM	FORCE MAIN	FM
S	GRAVITY SEWER	S
S	GRAVITY SEWER (BY OTHERS)	S
	STORM SEWER	
EX. FM	FORCE MAIN	FM
	MANHOLE	
	CURB DROP INLET	
	YARD DROP INLET	
	VALVE	
	FIRE HYDRANT ASSEMBLY	
	BLOW-OFF ASSEMBLY	
	AIR RELEASE VALVE	
	SEWER GRINDER PUMP	
	CLEAN OUT	
	WATER METER	
	CENTERLINE/BASELINE	
	RIGHT OF WAY	
	PROPERTY LINE	
	℄ DITCH/SWALE	
	TREELINE/CLEARING LIMITS	
25.1	GROUND ELEVATION	25.1
80	CONTOUR ELEV.	80

RECORD DRAWING BASED ON INFORMATION AS SURVEYED 7/04 & 11/04 BY AES CONSULTING ENGINEERS

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

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

COMMONWEALTH OF VIRGINIA
CHARLES B. RECORDS
No. 038172
12/22/04
PROFESSIONAL ENGINEER

S-112-02
MC056

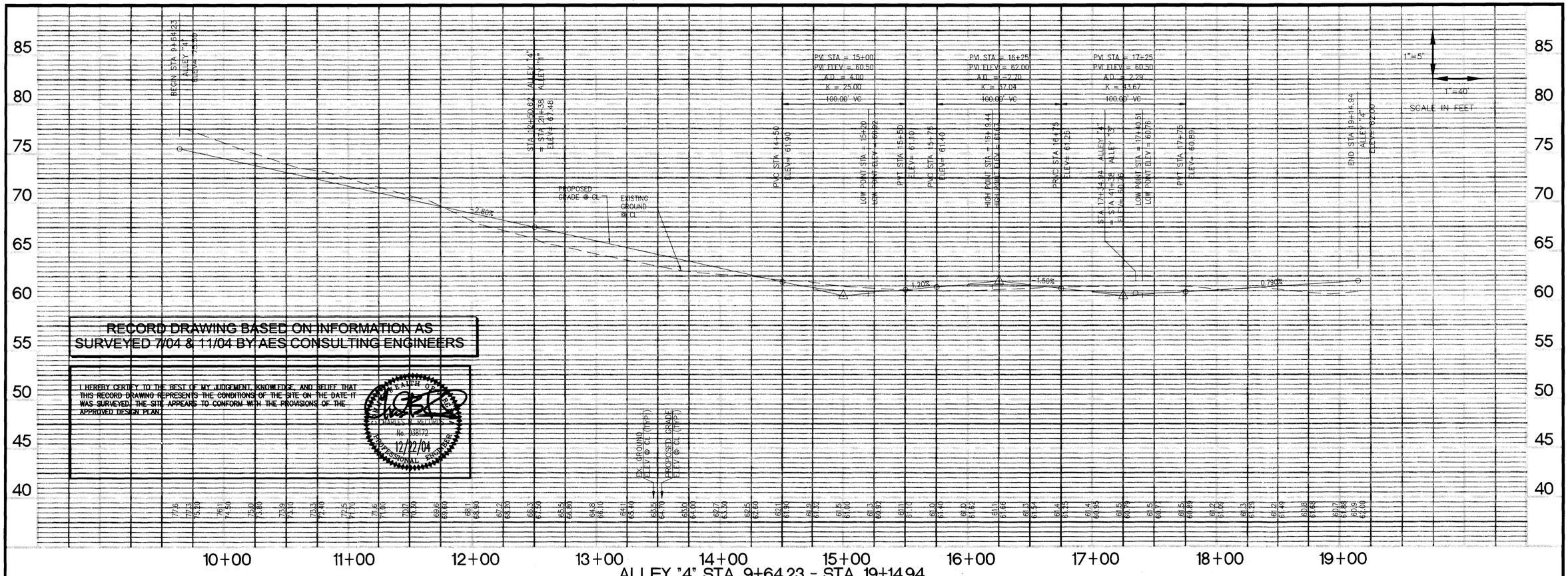
APPROVED
James City County
Environmental Division
By: _____
Date: _____

APPROVAL DATE	No.	DATE	REVISION / COMMENT / NOTE	BY
	4	10/03/07	RECORD DRAWING REVISIONS	MEG
	3	12/22/04	RECORD DRAWING	CBR
	2	6/20/03	REVISED PER JCC COMMENTS DATED 5/1/03	CBR
	1	4/15/03	REVISED PER JCC AND VDOT COMMENTS	CBR

DLD 12.22.04-10:58 9225R01.dwg

MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 030

SWM RECORD DRAWING-12/22/04



RECORD DRAWING BASED ON INFORMATION AS SURVEYED 7/04 & 11/04 BY AES CONSULTING ENGINEERS

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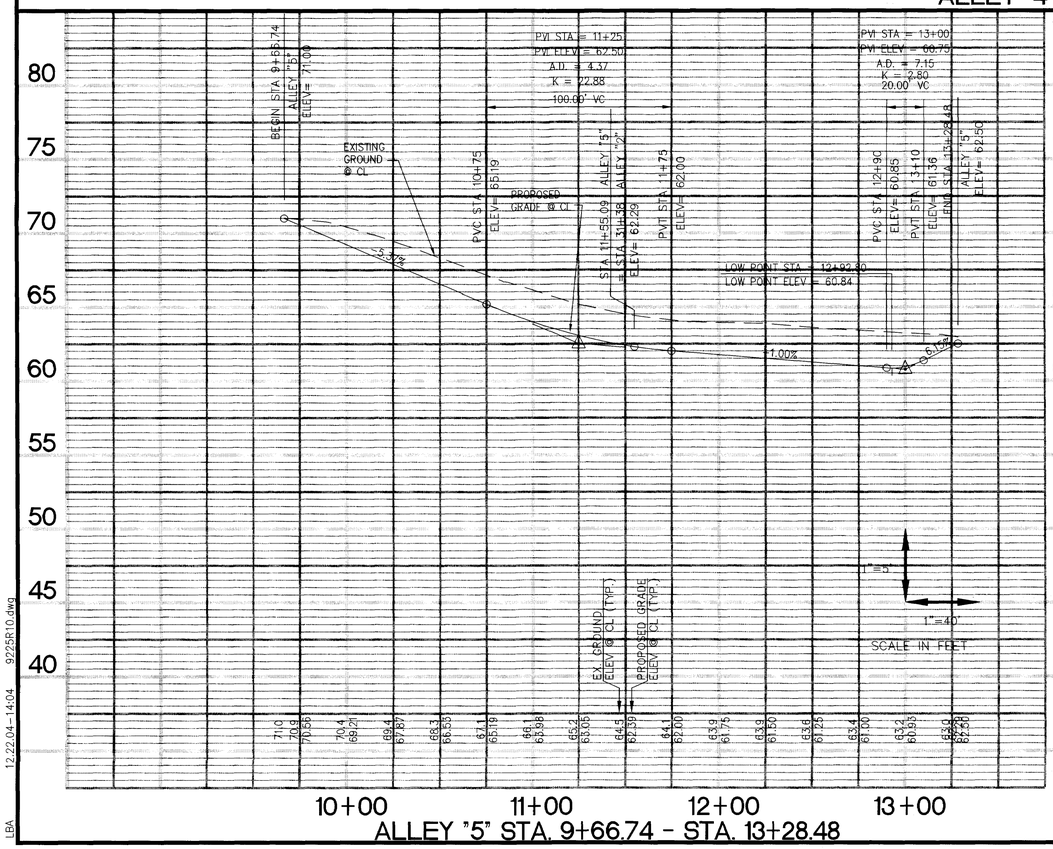
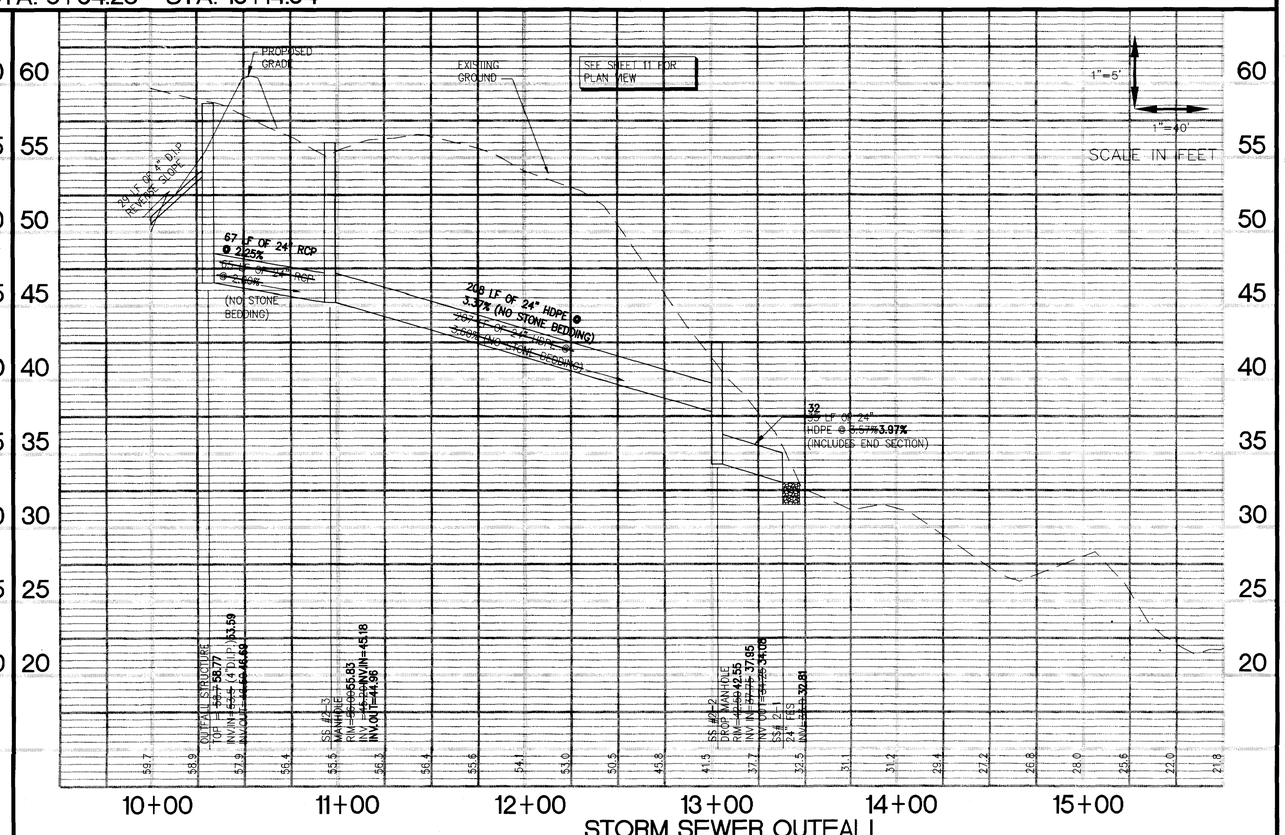
COMMONWEALTH OF VIRGINIA
C. CHARLES L. RECORDS
No. 038172
12/22/04
PROFESSIONAL ENGINEER





No.	DATE	REVISION / COMMENT / NOTE	BY
4	10/03/07	RECORD DRAWING REVISED COMMENT LETTER	MEC
3	12/22/04	RECORD DRAWING	JFS
2	6/20/03	REVISED PER JCC COMMENTS DATED 5/1/03	CBR
1	4/15/03	REVISED PER JCC AND VDOT COMMENTS	CBR

COMMONWEALTH OF VIRGINIA
G. ARCHER MARSTON, III
No. 018232
6/20/03
PROFESSIONAL ENGINEER

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

ROAD AND UTILITY PROFILES

KENSINGTON WOODS

OWNER/DEVELOPER:
ASSOCIATED DEVELOPERS, INC.

JAMESTOWN DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
CBR/QAM	LBA/DLD
Scale	Date
1"=40'	12/23/02

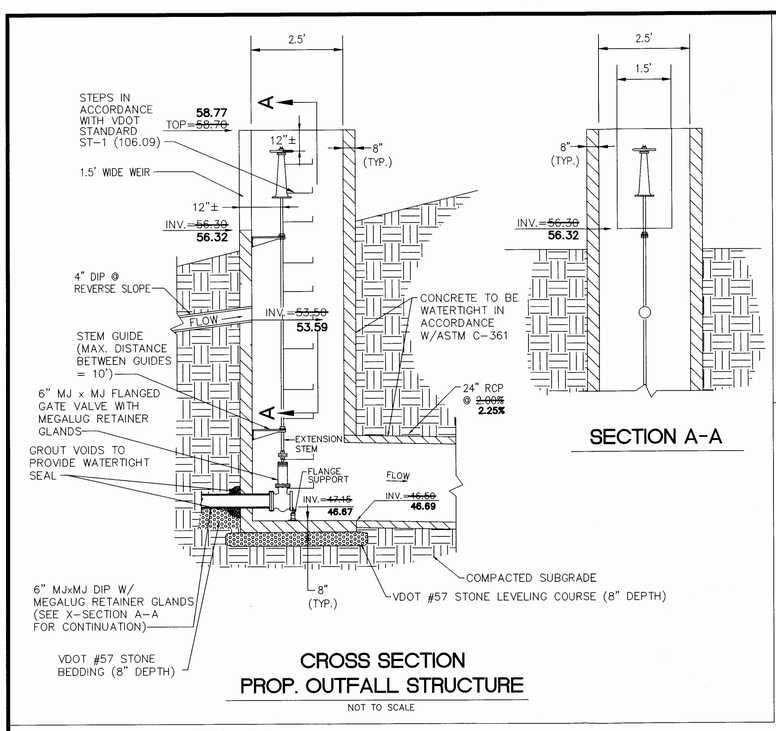
Project No. 9225-00

Drawing No. 10 OF 13

9225R10.dwg 12.22.04-14:04 LBA

SWM RECORD DRAWING-12/22/04

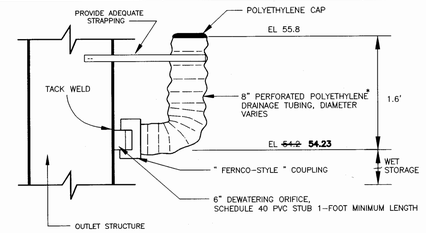
MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 031



CROSS SECTION PROP. OUTFALL STRUCTURE

NOT TO SCALE

SECTION A-A

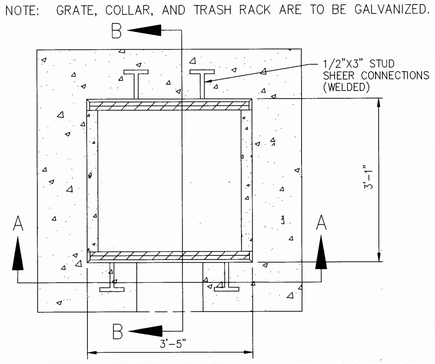


TEMPORARY SEDIMENT BASIN CONFIGURATION

N.T.S.

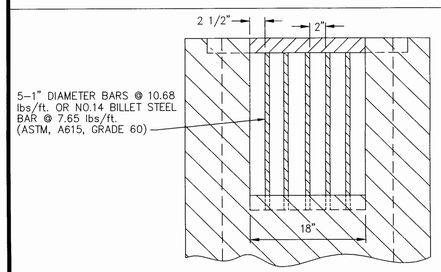
NOTE:
1. THE SWM/BMP FACILITY SHALL ACT AS A TEMPORARY SEDIMENT BASIN DURING CONSTRUCTION ACTIVITIES. SEDIMENT CLEANOUT LEVEL IS EL 52.5. SEE THE SEQUENCE OF CONSTRUCTION FOR FEATURES OF THE PERMANENT FACILITY THAT MUST BE IN PLACE DURING THE TEMPORARY CONSTRUCTION PHASE.
2. REVERSE SLOPE 4" D.I.P. @ EL 53.5 TO BE PLUGGED DURING CONSTRUCTION. UPON COMPLETION & STABILIZATION OF ALL DEVELOPMENT UPSTREAM THE 6" TEMPORARY DEWATERING ORIFICE SHALL BE PERMANENTLY REMOVED AND PLUGGED AND THE PERMANENT 4" REVERSE SLOPE PIPE AND ORIFICE SHALL BE MADE FUNCTIONAL.

NOTE: GRATE, COLLAR, AND TRASH RACK ARE TO BE GALVANIZED.

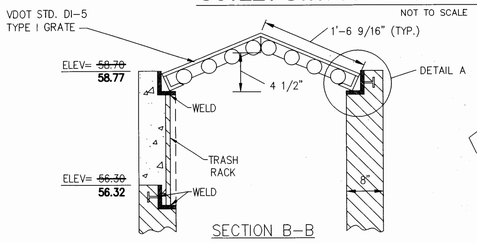


OUTLET STRUCTURE GRATE AND TRASH RACK

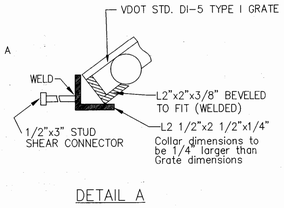
NOT TO SCALE



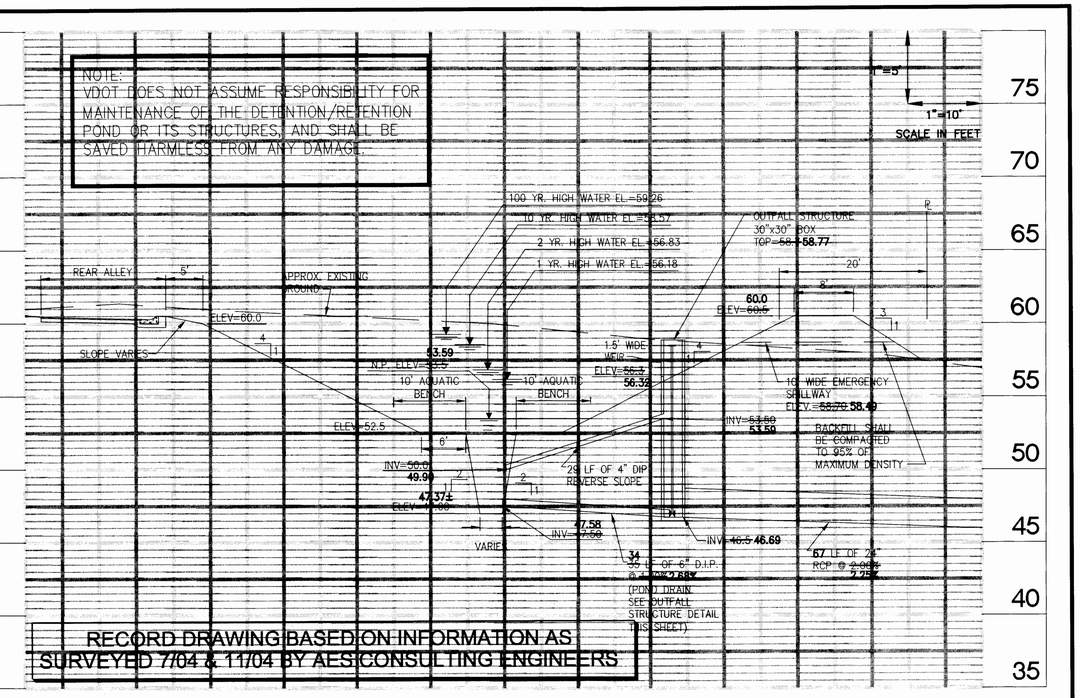
SECTION A-A



SECTION B-B



DETAIL A



SWM/BMP #1 FACILITY WET POND - SECTION A-A

No.	DATE	REVISION / COMMENT / NOTE	BY
3	12/22/04	RECORD DRAWING	JFS
2	6/20/03	REVISED PER JCC COMMENTS DATED 5/1/03	CBR
1	4/15/03	REVISED PER JCC AND VDOT COMMENTS	CBR

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

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

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE SWM 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. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. 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:

NOTE:
1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 1.5 FT. ABOVE THE BOTTOM OF SEDIMENT FOREBAY (i.e. CLEANOUT ELEVATION 48.5), REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM, OUTLET PIPE AND THE SUMP OF STRUCTURE #1-1 OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.
2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWCE 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.
3. PERFORM SOIL SAMPLING ON STABILIZED 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 POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACE, LIME FERTILIZER 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 RISER SECTION, CREST OF SPILLWAY AND STRUCTURE #1-1 FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
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 INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
8. RECORD KEEPING. THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT 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.
10. DEAD OR DYING PLANT MATERIAL SHALL BE REPLACED AFTER THE FIRST GROWING SEASON. THE POND SLOPE SHOULD BE MAINTAINED IN A NATURAL STATE WITH THE EXCEPTION THAT CHOKING VINES AND NON-NATIVE INVASIVE SPECIES SHOULD BE REMOVED BY HAND METHODS ONLY AT THE ONSET OF THE SECOND GROWING SEASON.

REPRESENTS AREAS OF 25% SLOPE OR GREATER

REPRESENTS AREAS OF 25% SLOPE OR GREATER (PROJECT IMPACTS)

NOTE: ALL SOILS WITHIN OFF-SITE DISTURBED AREA ARE HIGHLY ERODIBLE.

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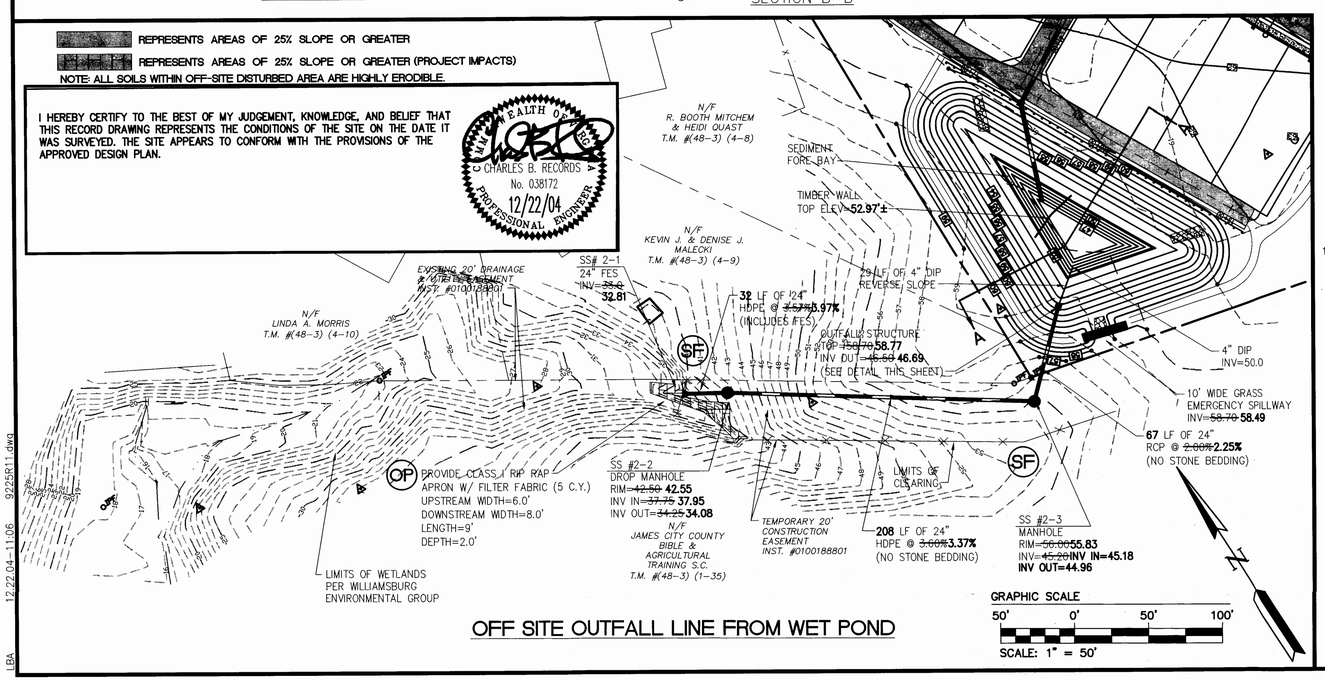
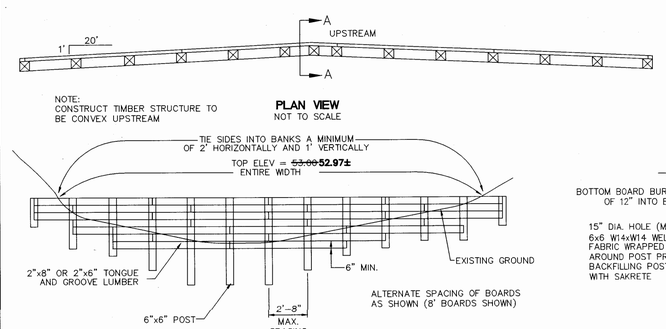
COMMONWEALTH OF VIRGINIA
C. CHARLES B. RECORDS
No. 038172
12/22/04
PROFESSIONAL ENGINEER

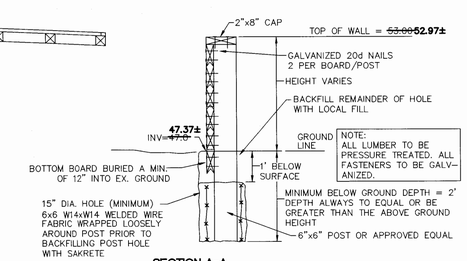


OFF SITE OUTFALL LINE FROM WET POND



PLAN VIEW
NOT TO SCALE

UPSTREAM ELEVATION
NOT TO SCALE



SECTION A-A
NOT TO SCALE

PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.

D-WDS-1.dwg

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

AES CONSULTING ENGINEERS

NOTES AND DETAILS

KENSINGTON WOODS
OWNER/DEVELOPER:
ASSOCIATED DEVELOPERS, INC.

JAMESTOWN DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CBR/QAM	LBA/DLD
Scale	Date
NONE	12/23/02

Project No. 9225-00

Drawing No. 11 OF 13

12/22/04-11:06 9225R11.dwg LBA

SWM RECORD DRAWING-12/22/04

MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 032

KENSINGTON WOODS

DEVELOPER: ASSOCIATED DEVELOPERS, INC.

JAMES CITY COUNTY, VIRGINIA

JAMESTOWN DISTRICT

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5300 MERCURY BLVD.
NEWPORT NEWS, VA. 23605
(757) 838-2739
CONTACT: HENRY STEPHENS

CERTIFIED RESPONSIBLE LAND DISTURBER:

G. ARCHER MARSTON III, P.E.
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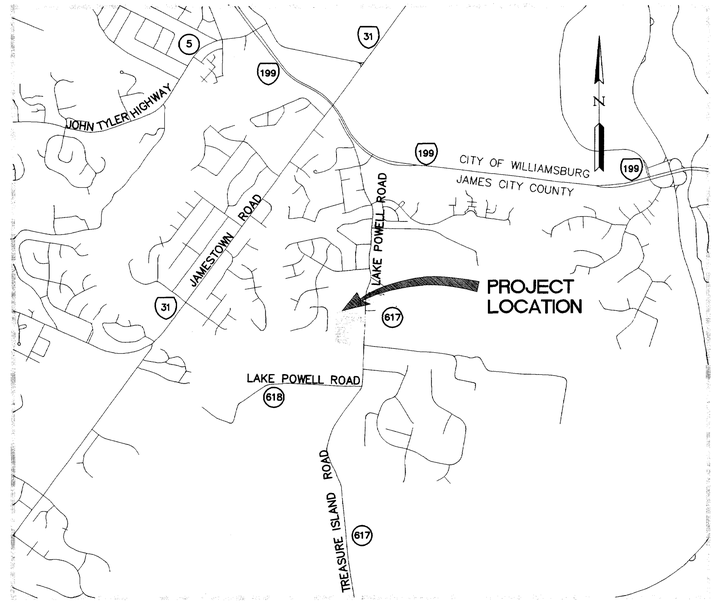
5248 OLDE TOWNE ROAD, SUITE 1
WILLIAMSBURG, VIRGINIA. 23188
TELEPHONE: 757-253-0040

* FOR SITE PLAN REVIEW PROCESS ONLY. OWNER OR CONTRACTOR SHALL NAME RESPONSIBLE LAND DISTURBER FOR CONSTRUCTION PROCESS.



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10	ROAD AND UTILITY PROFILES
11	NOTES AND DETAILS

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FM	FORCE MAIN
S	GRAVITY SEWER
S	GRAVITY SEWER (BY OTHERS)
	STORM SEWER
EX. FM	FORCE MAIN
	MANHOLE
	CURB DROP INLET
	YARD DROP INLET
	VALVE
	FIRE HYDRANT ASSEMBLY
	BLOW-OFF ASSEMBLY
	AIR RELEASE VALVE
	SEWER GRINDER PUMP
	CLEAN OUT
	WATER METER
	CENTERLINE/BASELINE
	RIGHT OF WAY
	PROPERTY LINE
	℄ DITCH/SWALE
	TREELINE/CLEARING LIMITS
25.1	GROUND ELEVATION
80	CONTOUR ELEV.

RECORD DRAWING BASED ON INFORMATION AS SURVEYED 7/04 & 11/04 BY AES CONSULTING ENGINEERS

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

COMMONWEALTH OF VIRGINIA
CHARLES B. RECORDS
No. 036172
12/22/04
PROFESSIONAL ENGINEER

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

RECEIVED
JUL 3 2007
ENVIRONMENTAL DIVISION

APPROVAL DATE	No.	DATE	REVISION / COMMENT / NOTE	BY
	3	12/22/04	RECORD DRAWING	CBR
	2	6/20/03	REVISED PER JCC COMMENTS DATED 5/1/03	CBR
	1	4/15/03	REVISED PER JCC AND VDOT COMMENTS	CBR

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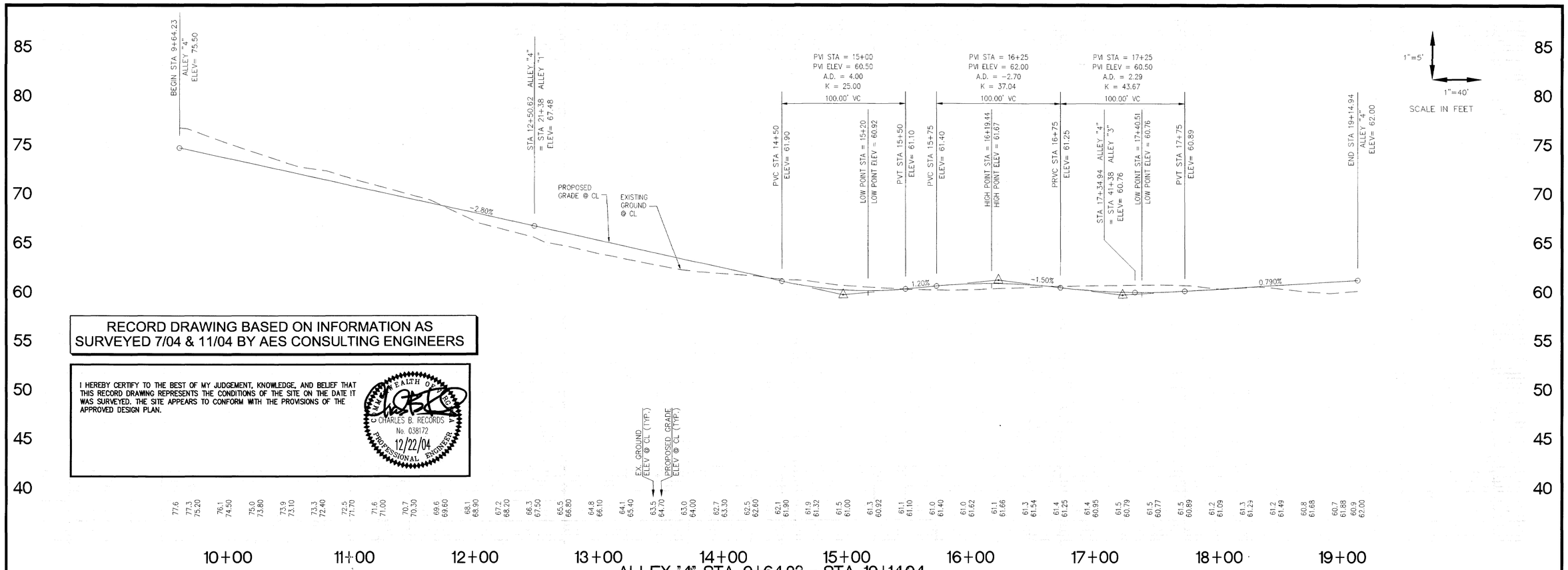
MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 033

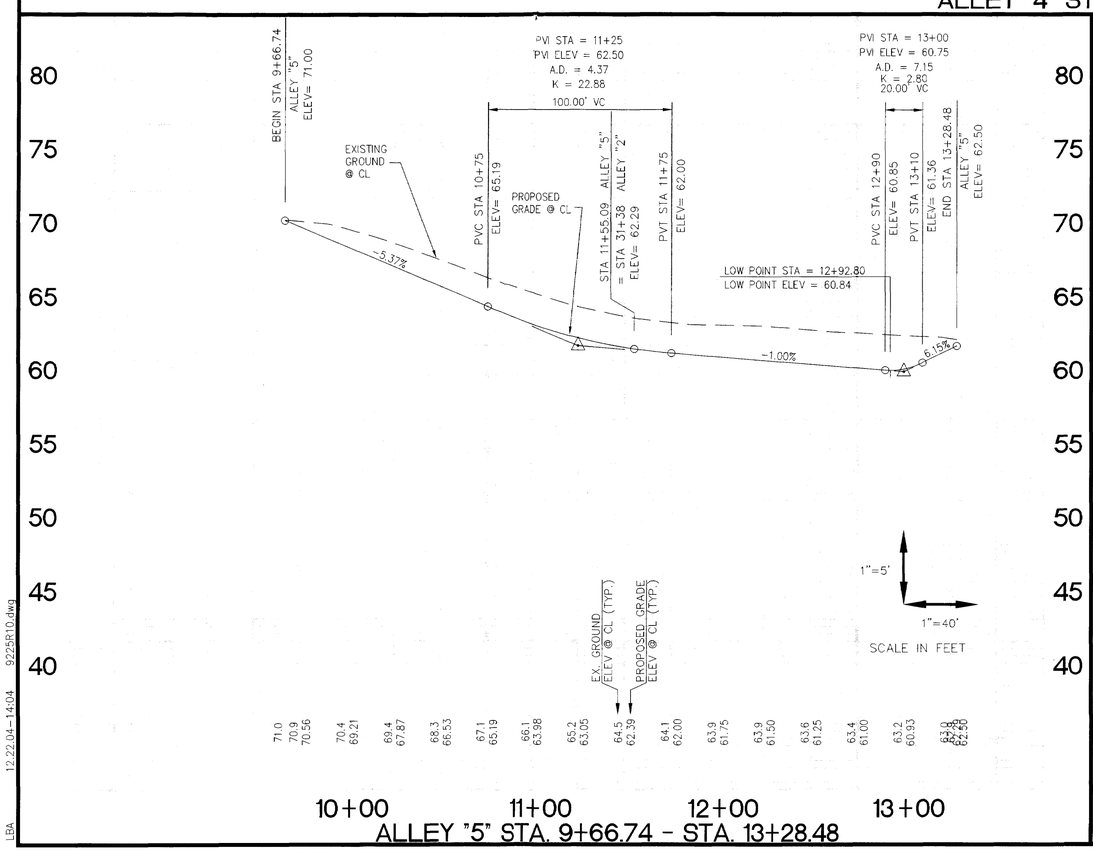


ALLEY "4" STA. 9+64.23 - STA. 19+14.94

RECORD DRAWING BASED ON INFORMATION AS SURVEYED 7/04 & 11/04 BY AES CONSULTING ENGINEERS

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

COMMONWEALTH OF VIRGINIA
CHARLES B. RECORDS
No. 038172
12/22/04
PROFESSIONAL ENGINEER



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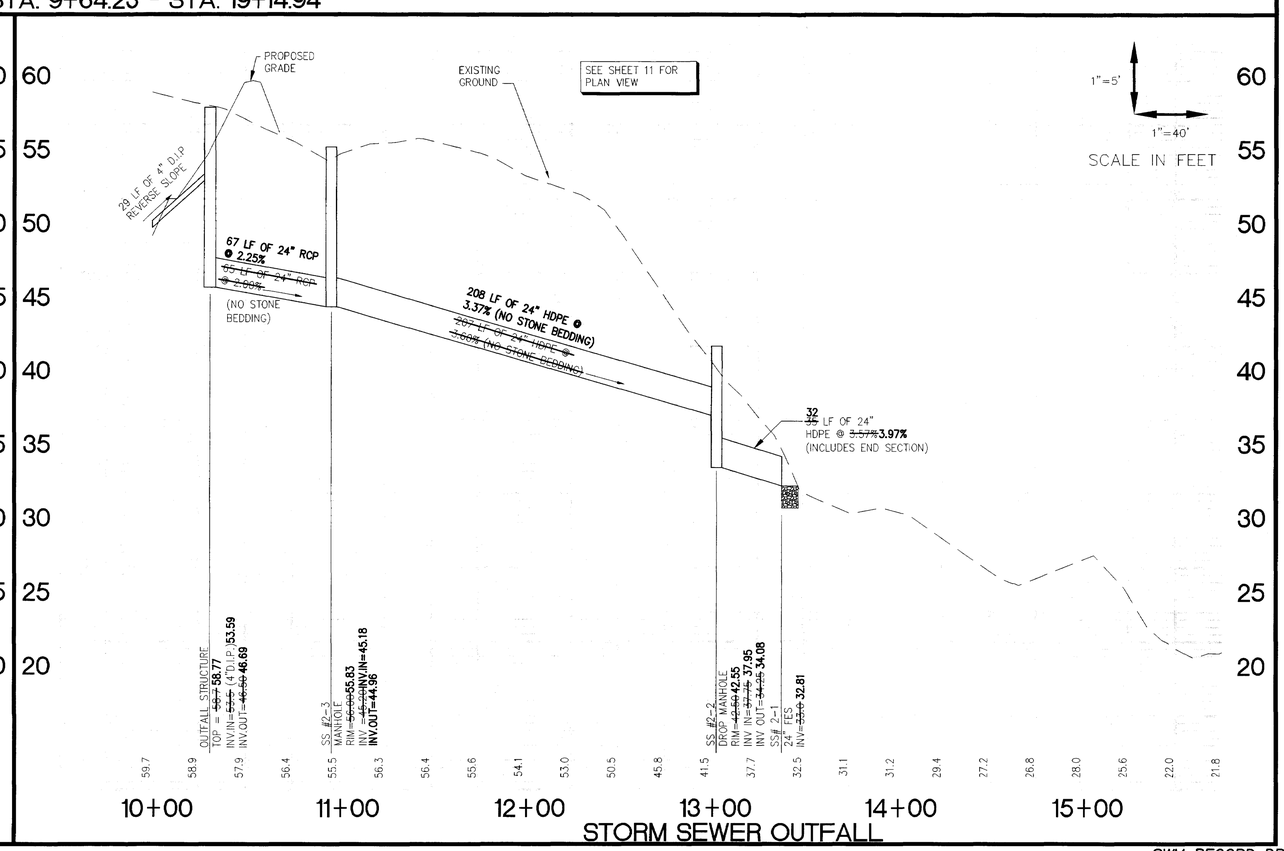

STORM SEWER OUTFALL

No.	DATE	REVISION / COMMENT / NOTE	BY
3	12/22/04	RECORD DRAWING	JFS
2	6/20/03	REVISED PER JCC COMMENTS DATED 5/7/03	CBR
1	4/15/03	REVISED PER JCC AND VDOT COMMENTS	CBR

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ROAD AND UTILITY PROFILES
KENSINGTON WOODS
OWNER/DEVELOPER:
ASSOCIATED DEVELOPERS, INC.
JAMESTOWN DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CBR/QAM	LBA/DLD
Scale	Date
1"=40'	12/23/02

Project No. 9225-00

Drawing No. 10 OF 13

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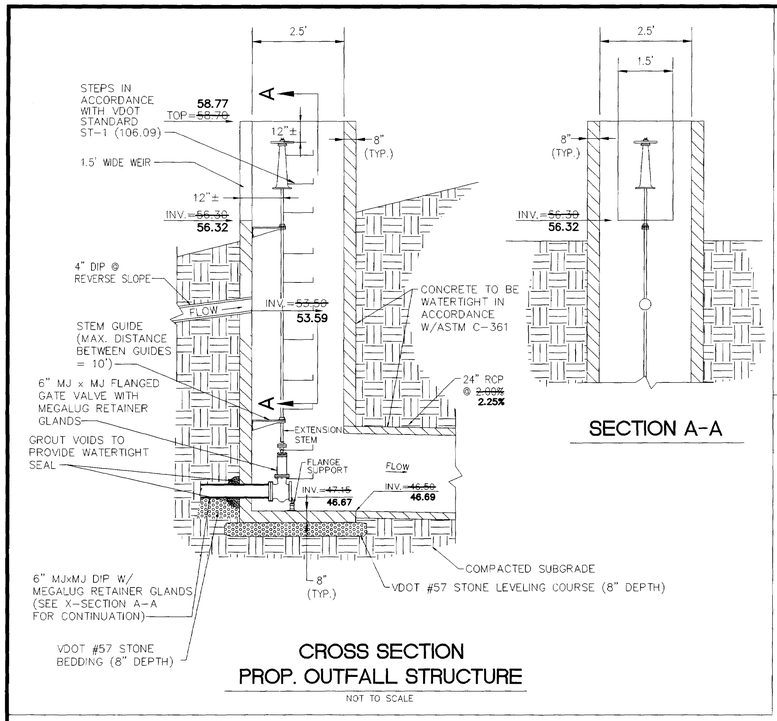
MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 034

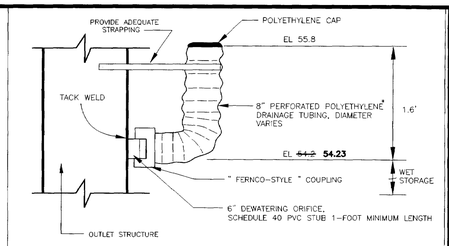
SWM RECORD DRAWING-12/22/04



CROSS SECTION PROP. OUTFALL STRUCTURE

NOT TO SCALE

SECTION A-A

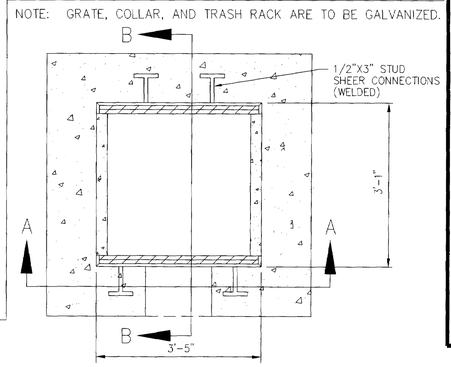


TEMPORARY SEDIMENT BASIN CONFIGURATION

N.T.S.

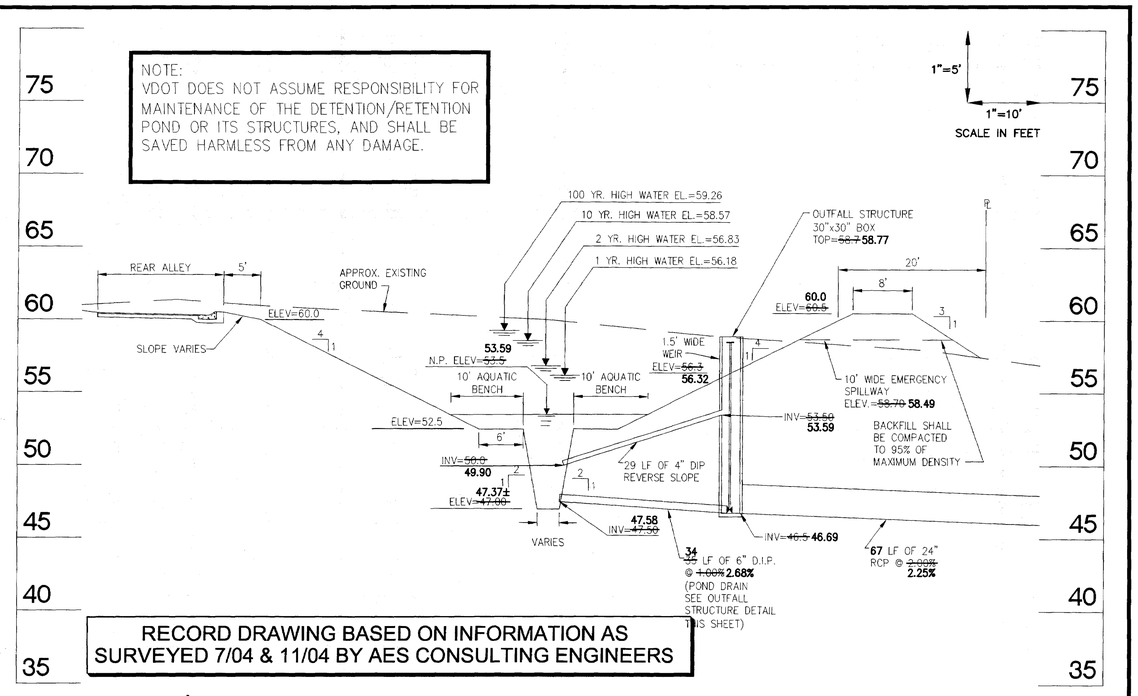
NOTE:
1. THE SWM/BMP FACILITY SHALL ACT AS A TEMPORARY SEDIMENT BASIN DURING CONSTRUCTION ACTIVITIES. SEDIMENT CLEANOUT LEVEL IS EL 52.5. SEE THE SEQUENCE OF CONSTRUCTION FOR FEATURES OF THE PERMANENT FACILITY THAT MUST BE IN PLACE DURING THE TEMPORARY CONSTRUCTION PHASE.
2. REVERSE SLOPE 4" D.I.P. @ EL 53.5 TO BE PLUGGED DURING CONSTRUCTION. UPON COMPLETION & STABILIZATION OF ALL DEVELOPMENT UPSTREAM THE 6" TEMPORARY DEWATERING ORIFICE SHALL BE PERMANENTLY REMOVED AND PLUGGED AND THE PERMANENT 4" REVERSE SLOPE PIPE AND ORIFICE SHALL BE MADE FUNCTIONAL.

NOTE: GRATE, COLLAR, AND TRASH RACK ARE TO BE GALVANIZED.



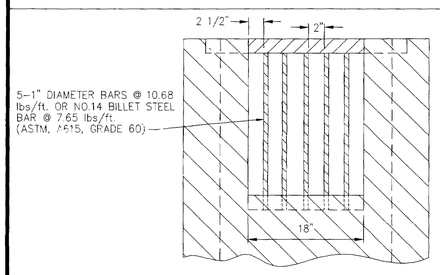
OUTLET STRUCTURE GRATE AND TRASH RACK

NOT TO SCALE



RECORD DRAWING BASED ON INFORMATION AS SURVEYED 7/04 & 11/04 BY AES CONSULTING ENGINEERS

SWM/BMP #1 FACILITY WET POND - SECTION A-A



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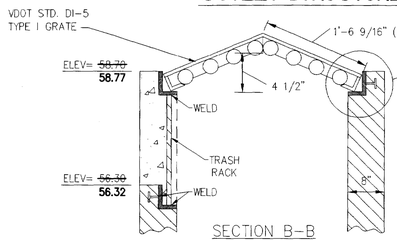
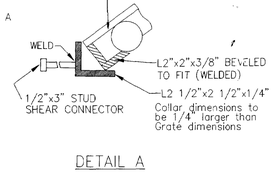


SECTION B-B



DETAIL A

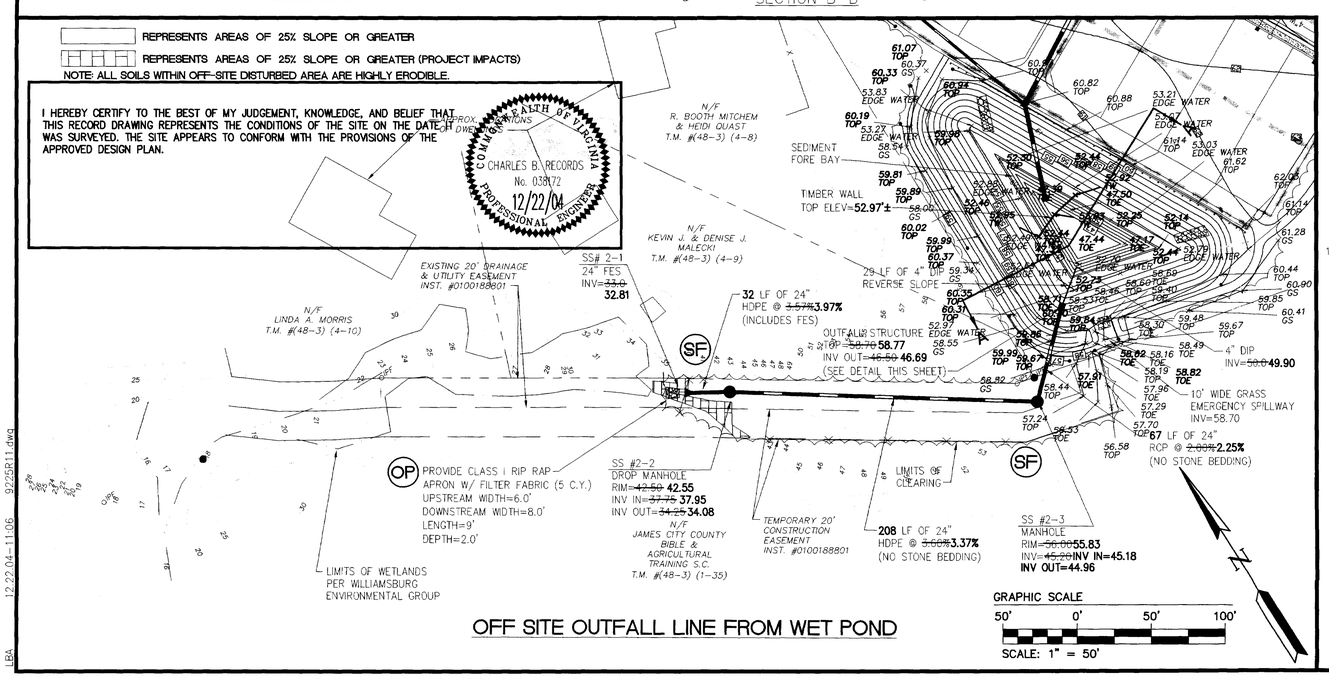
STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

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

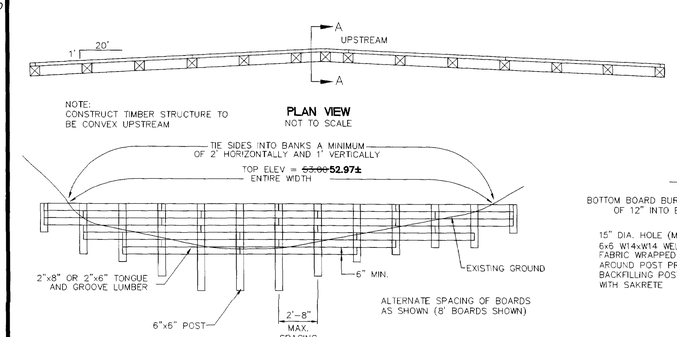
A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE SWM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER 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. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

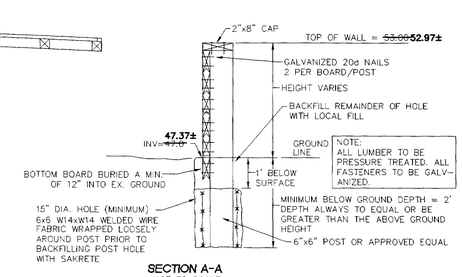
INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

NOTE:
1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 1.5 FT. ABOVE THE BOTTOM OF SEDIMENT FOREBAY (i.e. CLEANOUT ELEVATION 48.5), REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM, OUTLET PIPE AND THE SUMP OF STRUCTURE #1-1 OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.
2. PERFORM MAINTENANCE MOWING OF POND GRASSES 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.
3. PERFORM SOIL SAMPLING ON STABILIZED 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 POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACE, LIME FERTILIZER 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 RISER SECTION, CREST OF SPILLWAY AND STRUCTURE #1-1 FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
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 INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
8. RECORD KEEPING. THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT 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.
10. DEAD OR DYING PLANT MATERIAL SHALL BE REPLACED AFTER THE FIRST GROWING SEASON. THE POND SLOPE SHOULD BE MAINTAINED IN A NATURAL STATE WITH THE EXCEPTION THAT CHOKING VINES AND NON-NATIVE INVASIVE SPECIES SHOULD BE REMOVED BY HAND METHODS ONLY AT THE ONSET OF THE SECOND GROWING SEASON.



OFF SITE OUTFALL LINE FROM WET POND





SECTION A-A
NOT TO SCALE

PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.

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No.	DATE	REVISION / COMMENT / NOTE	BY
3	12/22/04	RECORD DRAWING	JFS
2	6/20/03	REVISED PER JCC COMMENTS DATED 5/1/03	CBR
1	4/15/03	REVISED PER JCC AND VDOT COMMENTS	CBR

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AES CONSULTING ENGINEERS

NOTES AND DETAILS
KENSINGTON WOODS
OWNER/DEVELOPER:
ASSOCIATED DEVELOPERS, INC.
JAMESTOWN DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CBR/QAM	LBA/DLD
Scale	Date
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Project No.	
9225-00	
Drawing No.	
11 OF 13	

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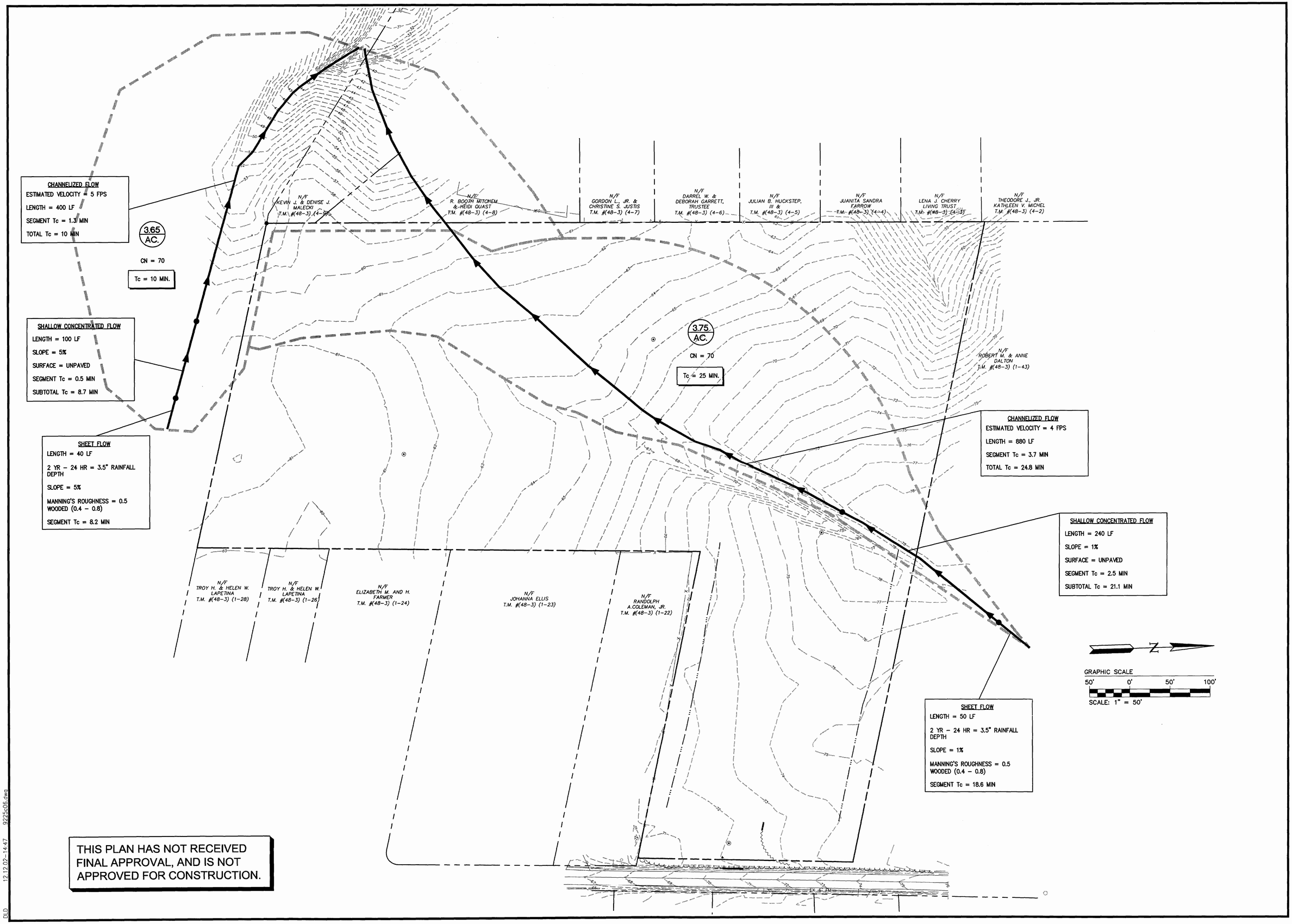
SWM RECORD DRAWING-12/22/04

MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 035



THIS PLAN HAS NOT RECEIVED FINAL APPROVAL, AND IS NOT APPROVED FOR CONSTRUCTION.

No.	DATE	REVISION / COMMENT / NOTE	BY

COMMONWEALTH OF VIRGINIA
G. ARCHER MARSTON, III
No. 028232
12/24/02
PROFESSIONAL ENGINEER

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

PRE-DEVELOPMENT DRAINAGE AREA MAP

KENSINGTON WOODS

OWNER/DEVELOPER:
ASSOCIATED DEVELOPERS, INC.

JAMESTOWN DISTRICT JAMES CITY COUNTY VIRGINIA

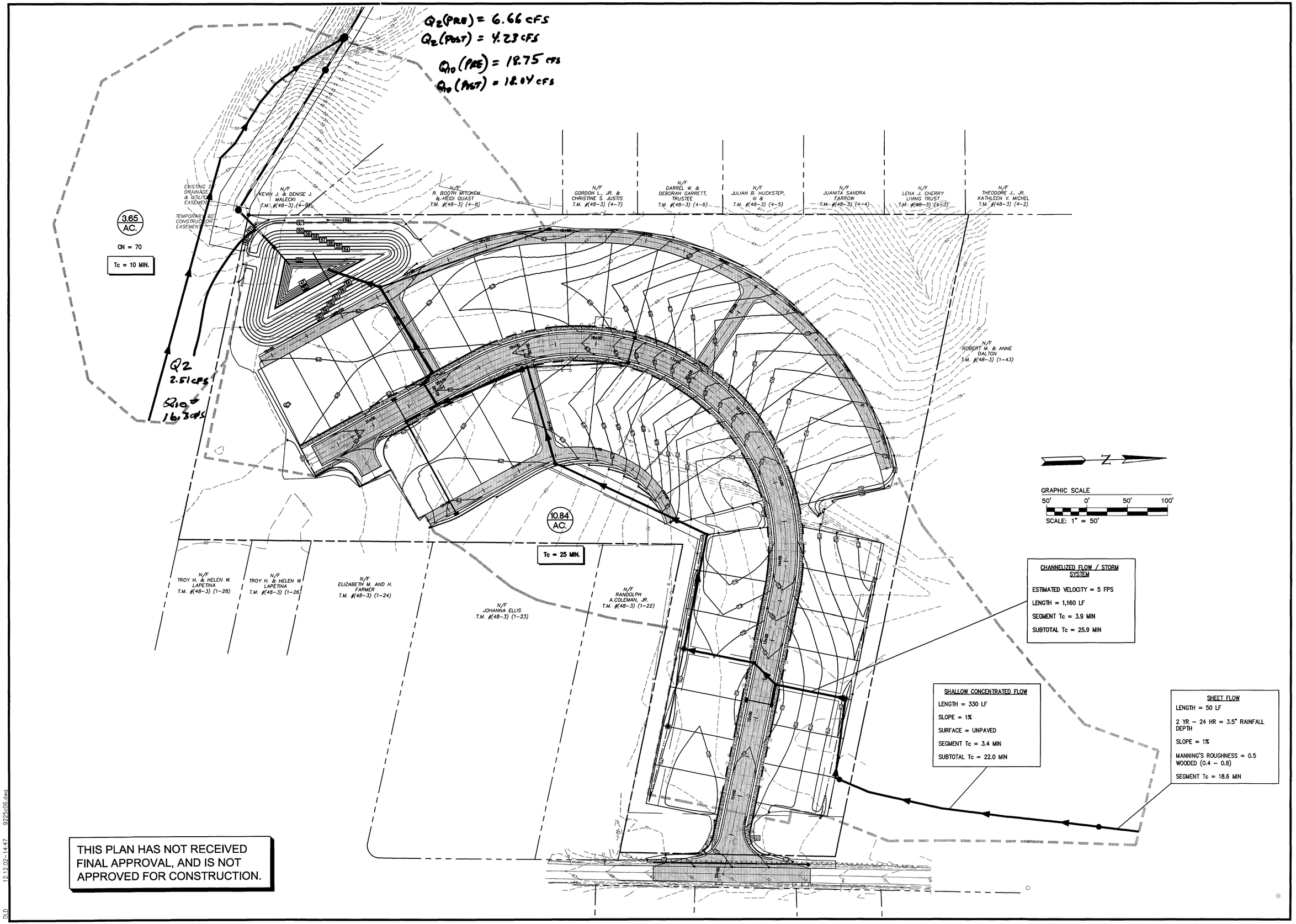
Designed	Drawn
CBR/QAM	LBA/DLD
Scale	Date
1"=50'	12/24/02

Project No. 9225-00

Drawing No. 1 OF 1

DLD 12.12.02-14:47 9225c06.dwg

MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 036



THIS PLAN HAS NOT RECEIVED FINAL APPROVAL, AND IS NOT APPROVED FOR CONSTRUCTION.

No.	DATE	REVISION / COMMENT / NOTE	BY

COMMONWEALTH OF VIRGINIA
G. ARCHER MARSTON, III
No. 018232
12/24/02
PROFESSIONAL ENGINEER

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CONSULTING ENGINEERS

POST-DEVELOPMENT DRAINAGE AREA MAP

KENSINGTON WOODS

OWNER/DEVELOPER:
ASSOCIATED DEVELOPERS, INC.

JAMESTOWN DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CBR/QAM	LBA/DLD
Scale	Date
1"=50'	12/24/02

Project No.
9225-00

Drawing No.
1 OF 1

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MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 037

STORMWATER MANAGEMENT PLAN

FOR

KENNSINGTON WOODS SUBDIVISION

SITE:

Lake Powell Road, S.R 617

SUBMITTED TO:

James City County

DEC 2002
RECEIVED
PLANNING DEPARTMENT

S-112-02
. 1ST SUB
. FINAL

Prepared By:

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

December 2002
AES Project No. 9225-0

9225 swmp.rec.doc

CONSULTING ENGINEERS

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II EXISTING SITE CONDITIONS

III PROPOSED STORMWATER MANAGEMENT PLAN

IV TEMPORARY SEDIMENT BASIN

APPENDICES

CONSULTING ENGINEERS

I INTRODUCTION

The Kensington Woods subdivision shall be a small community of 40 lots with a single road with alleyway accesses. The subdivision is located at the high point of two drainage systems. The smaller of the existing systems drains to a well defined ravine which contributes to Lake Powell. The remainder of the site flows overland onto an adjacent property and eventually to the roadside ditch. The proposed condition will collect most of the runoff to a single BMP that will outfall into the well defined ravine. The following drainage study verifies the site and BMP will adequately reduce the flows and provide water quality benefits to the existing downstream channels and lakes.

II EXISTING SITE CONDITIONS

The existing site is a wooded area with moderately sloped areas. Currently the drainage divided is located on the eastern edge of the property. The east portion of the property appears to drain overland to an adjacent ravine which contributes to Lake Powell. The western portion of the property collects some runoff in a small conveyance channel which ends on the property. The flow is then directed overland by sheet flow onto the adjacent property and eventually appears to flow to the roadside ditch for Lake Powell Road.

Analysis of the predeveloped conditions will not consider the existing drainage area that flows towards Lake Powell Road. The proposed condition removes several acres of drainage area from this system, and will not be adding significant flows into the roadside system. The analysis will be confined to the existing drainage area associated with the ravine that will be discharged into. The drainage area for this ravine includes not only the onsite wooded area, but also the offsite drainage areas which contribute directly to this ravine.

CONSULTING ENGINEERS

III PROPOSED STORMWATER MANAGEMENT PLAN

Water Quality

Based on the James city County BMP Design and Construction Guidelines a Wet Extended Detention Pond (BMP A-3) shall be utilized to treat the pollutant loading for the site. The water quality volume in the BMP is sized for 1 inch/impervious acre to be stored in the wet pool. In addition, another 1 inch/impervious acre is stored in an extended detention pool and released over a 24 hour period. The water quality volume stored in the extended detention pool is released through a 4-inch orifice at elevation 53.5. A ten foot aquatic bench is provided beneath the normal pool elevation to further enhance the BMP. In addition a sediment forebay is utilized to further enhance the BMP.

	BMP (A-3)
Impervious Area	4.25 Acre
Volume Required	1" per impervious acre
Volume Required	15,428 ft^3
Wet Pool Volume Provided (Elev. 47-53.5)	15,748 ft^3
Extended Detention Volume Provided (Elev. 53.5- 55.4) – Released over 24 hour period	15,817 ft^3

WQ ok
SCR ?

The sediment forebay is sized for at least a tenth of an inch per impervious acre. The results of the sediment forebay sizing are as summarized below. Due to space and volume limitations the sediment forebay for the BMP will be separated from the remaining portion of the BMP by a timber wall with a top elevation of 53.0, or 6 inches below the normal pool elevation.

	Sediment Forebay
Impervious Area	4.25 Acre
Volume Required	0.1" per impervious acre
Volume Required	1,543 ft^3
Wet Pool Volume Provided (Elev. 47-53.0)	2,237 ft^3

Water Quantity

The existing condition and proposed conditions are modeled using Hydraflow by Intelisolve. Hydrographs are generated using a SCS Type II 24 hour storm. The existing and proposed conditions are both analyzed using a control point within the outfall ravine at the first point of available outfall. The BMP is planned to outfall further in the ravine adjacent to the outfall from the BMP associated with the neighboring development. In addition to controlling the 2 and 10 year storm peak flow values to the existing peak flow conditions the 1 year storm volume is contained within the BMP and released over at least a 24 hour period.

? comp.

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A single outfall structure with two control points is utilized for this BMP. In addition a ten foot wide emergency spillway is provided to pass the larger storm events. A four inch orifice is utilized to control the release of the water quality volume and the 1 year storm. An 18-inch weir at elevation 56.30 shall provide control for the 2 and 10 year peak flows. The top of structure and an emergency spillway shall pass the 25 and 100 year storm events without overtopping the BMP.

The peak flows and elevation within the BMP are as follows:

Return Period	Q pre (cfs)	Q post (cfs)	BMP Elevation
1 year	3.63	2.49	56.18
2 year	6.66	4.23	56.83
10 year	18.75	18.04	58.57
100 year	31.79	51.38	59.26

DHW

E.S 58.70,
Depth 0.56'

CONSULTING ENGINEERS

IV TEMPORARY SEDIMENT BASIN

The proposed BMP shall be utilized as the temporary sediment basin during construction. The temporary sediment basin is sized to provide "wet" and "dry" volume for the entire drainage area, which shall be directed to the basin. The basin is also analyzed for the 2 and 25 year storm to verify the basin is capable of passing these storm events. The Hydrologic condition assumed for this was the full buildout condition of the site area. To provide the adequate "wet" storage volume the normal pool water surface elevation will be raised to elevation 54.2. The "dry" storage volume is contained at elevation 56.30. To release the "dry" storage volume in the minimum 6 hour drawdown time a 6 inch orifice is required. Therefore the only modification to the BMP outlet structure shall be to temporarily install a 6 inch orifice at elevation 54.20 which will be replaced after site stabilization with the 4-inch orifice at elevation 53.5.

	Sediment Basin
Drainage Area	10.84 Acre
"Wet" and "Dry" Volume Required	67 CY per acre
Volume Required	19,610 ft^3
"Wet" Volume Provided (Elev. 47-54.2)	20,850 ft^3
"Dry" Volume Provided (Elev. 54.2- 56.3) – Released over 6 hour period	20,458 ft^3

The peak flows and elevation within the temporary sediment basin is as follows:

Return Period	Q post (cfs)	Basin Elevation
2 year	3.98	56.97
25 year	24.80	58.88

CONSULTING ENGINEERS

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project Kensington Woods

Basin # _____ Location _____

Total area draining to basin: 10.84 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x 10.84 acres = 726.3 cu. yds.

2. Available basin volume = 772.2 cu. yds. at elevation 54.2. (From storage - elevation curve)

3. Excavate _____ cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

   33 cu. yds. x 10.84 acres = 359.7 cu. yds.

5. Elevation corresponding to cleanout level = 52.5.

   (From Storage - Elevation Curve)

   364.1 CY Below Cleanout Elev. ✓

6. Distance from invert of the dewatering orifice to cleanout level = 1.7 ft. (Min. = 1.0 ft.)

Dry Storage:

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

   67 cu. yds. x 10.84 acres = 726.3 cu. yds.

8. Total available basin volume at crest of riser* = 757.7 cu. yds. at elevation 56.3. (From Storage - Elevation Curve)

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

9. Diameter of dewatering orifice = 6 in.

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

TR-55
Tc=25 min
CN = 91 8.25 AC
CN = 70 2.59 AC
CN comp = 86
Q2 = 20.6 CFS
Q25 = 47.0 CFS

HIGHER DURING LD ACTIVITY

Preliminary Design Elevations

11. Crest of Riser = 58.7

Top of Dam = 60.3

Design High Water = 58.86

Upstream Toe of Dam = 48

Basin Shape

12. Length of Flow / Effective Width — L / We = 140 / 56 = 2.5:1

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

		Inflow		Outflow from Routing
13.	Q_2 =	15.58 cfs	(From Chapter 5)	3.77
14.	Q_{25} =	40.22 cfs	(From Chapter 5)	23.76

2-YEAR CN=80 DA=10.84

Principal Spillway Design

SEE ROUTING

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

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

16. With emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_2)

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

Without emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = N/A in. Actual head (h) = N/A ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = N/A ft.

Head (H) on barrel through embankment = N/A ft.

(From Plate 3.14-7).

19. Barrel diameter = N/A in.

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

20. Trash rack and anti-vortex device

Diameter = N/A inches.

Height = N/A inches.

(From Table 3.14-D).

Emergency Spillway Design See Routing

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = N/A cfs.

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

MC056_GREENWAY_CONSERV_EASE_KENSINGTON_WOODS - 046

Anti-Seep Collar Design N/A

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

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

Slope of principal spillway barrel (S_b) = _____%

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

24. Number of collars required = _____ dimensions = _____

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 60.3

Design High Water = 58.86

Emergency Spillway Crest = 58.7

Principal Spillway Crest = 56.3 control weir 58.7 Top Structure

Dewatering Orifice Invert = 54.2

Cleanout Elevation = 52.5

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 47.0

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Kennsington Woods
James City County

NP

Pond Volumes **Wet Pool Volume**

Elev.	Countour Area (in s.f.)	Storage (Between contours)	Cumulative Storage Volume
53.5	Area = 6706 s.f.		Cumulative Storage = 583.3 c.y.
		Storage = 5916 c.f.= 219.1 c.y.	
52.5	Area = 5126 s.f.		Cumulative Storage = 364.1 c.y.
		Storage = 0 c.f.= 0.0 c.y.	
52.5	Area = 3118 s.f.		Cumulative Storage = 364.1 c.y.
		Storage = 1488 c.f.= 55.1 c.y.	
52	Area = 2832 s.f.		Cumulative Storage = 309.1 c.y.
		Storage = 2566 c.f.= 95.0 c.y.	
51	Area = 2300 s.f.		Cumulative Storage = 214.0 c.y.
		Storage = 2062 c.f.= 76.4 c.y.	
50	Area = 1824 s.f.		Cumulative Storage = 137.6 c.y.
		Storage = 1614 c.f.= 59.8 c.y.	
49	Area = 1403 s.f.		Cumulative Storage = 77.9 c.y.
		Storage = 1221 c.f.= 45.2 c.y.	
48	Area = 1038 s.f.		Cumulative Storage = 32.7 c.y.
		Storage = 883 c.f.= 32.7 c.y.	
47	Area = 727 s.f.		Cumulative Storage = 0.0 c.y.
		Storage = 0 c.f.= 0.0 c.y.	

Volume Required
2 * WQV
WQV = 1/2" per impervious acre

County type A-3 is 2" per impervious acre
OK Perm pool & EXT. DET
1" PP
1" EXDET

Total Impervious Area = 4.25 acre

WQV = 7714 c.f.
Volume Required = 15428 c.f. 30,000

Volume Provided = 583.3 c.y.
Volume Provided = 15748 c.f. ✓

Adequate Water Quality Volume is provided in BMP

12/22/02

9225-WQV.xls
Wet Area

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Project #9225

Kennsington Woods
James City County

Pond Volumes **Detention Volume**

Elev.	Countour Area (in s.f.)	Storage (Between contours)	Cumulative Storage Volume
60	Area = 19453 s.f.		Cumulative Storage = 3065.0 c.y.
		Storage = 18334 c.f.= 679.0 c.y.	
59	Area = 17215 s.f.		Cumulative Storage = 2386.0 c.y.
		Storage = 16147 c.f.= 598.0 c.y.	
58	Area = 15078 s.f.		Cumulative Storage = 1788.0 c.y.
		Storage = 14060 c.f.= 520.7 c.y.	
57	Area = 13042 s.f.		Cumulative Storage = 1267.2 c.y.
		Storage = 8651 c.f.= 320.4 c.y.	
56.3	Area = 11676 s.f.		Cumulative Storage = 946.8 c.y.
		Storage = 3417 c.f.= 126.6 c.y.	
56	Area = 11106 s.f.		Cumulative Storage = 820.2 c.y.
		Storage = 6330 c.f.= 234.4 c.y.	
55.4	Area = 9993 s.f.		Cumulative Storage = 585.8 c.y.
		Storage = 3853 c.f.= 142.7 c.y.	
55	Area = 9271 s.f.		Cumulative Storage = 443.1 c.y.
		Storage = 8404 c.f.= 311.2 c.y.	
54	Area = 7536 s.f.		Cumulative Storage = 131.9 c.y.
		Storage = 3561 c.f.= 131.9 c.y.	
53.5	Area = 6706 s.f.		Cumulative Storage = 0.0 c.y.
		Storage = 0 c.f.= 0.0 c.y.	

Volume Required
2 * WQV
WQV = 1/2" per impervious acre

Total Impervious Area = 4.25 acre

WQV = 7714 c.f.
Volume Required = 15428 c.f.

Volume Provided = 585.8 c.y. at Elevation 55.4
Volume Provided = 15817 c.f.

Adequate Water Quality Volume is provided in BMP

12/22/02

9225-WQV.xls
Dry Area

AES Consulting Engineers
Project #9225

Kennsington Woods
James City County

Pond Volumes **Sediment Forebay**

Elev.	Countour Area (in s.f.)	Storage (Between contours)			Cumulative Storage Volume
53	Area = 1938 s.f.				Cumulative Storage = 82.8 c.y.
		Storage =	884 c.f.=	32.7 c.y.	
52.5	Area = 1597 s.f.				Cumulative Storage = 50.1 c.y.
		Storage =	0 c.f.=	0.0 c.y.	
52.5	Area = 768 s.f.				Cumulative Storage = 50.1 c.y.
		Storage =	357 c.f.=	13.2 c.y.	
52	Area = 659 s.f.				Cumulative Storage = 36.9 c.y.
		Storage =	563 c.f.=	20.8 c.y.	
51	Area = 466 s.f.				Cumulative Storage = 16.1 c.y.
		Storage =	0 c.f.=	0.0 c.y.	
50	Area = 306 s.f.				Cumulative Storage = 16.1 c.y.
		Storage =	243 c.f.=	9.0 c.y.	
49	Area = 180 s.f.				Cumulative Storage = 7.1 c.y.
		Storage =	134 c.f.=	4.9 c.y.	
48	Area = 87 s.f.				Cumulative Storage = 2.1 c.y.
		Storage =	57 c.f.=	2.1 c.y.	
47	Area = 27 s.f.				Cumulative Storage = 0.0 c.y.
		Storage =	0 c.f.=	0.0 c.y.	

Volume Required
0.1" per impervious acre (Minimum)

Total Impervious Area = 4.25 acre

Minimum Volume = 1543 c.f.

Volume Provided = 82.8 c.y.
Volume Provided = 2237 c.f.

Adequate Volume is provided in Sediment Forebay

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Project #9225

Kennsington Woods
James City County

Temporary Sediment Basin Volumes **"Wet" and "Dry" Volume**

Elev.	Countour Area (in s.f.)	Storage (Between contours)	Cumulative Storage Volume
60	Area = 19453 s.f.		Cumulative Storage = 3648.1 c.y.
		Storage = 18334 c.f.= 679.0 c.y.	
59	Area = 17215 s.f.		Cumulative Storage = 2969.1 c.y.
		Storage = 16147 c.f.= 598.0 c.y.	
58	Area = 15078 s.f.		Cumulative Storage = 2371.1 c.y.
		Storage = 14060 c.f.= 520.7 c.y.	
57	Area = 13042 s.f.		Cumulative Storage = 1850.3 c.y.
		Storage = 8651 c.f.= 320.4 c.y.	
56.3	Area = 11676 s.f.		Cumulative Storage = 1529.9 c.y.
		Storage = 3417 c.f.= 126.6 c.y.	
56	Area = 11106 s.f.		Cumulative Storage = 1403.4 c.y.
		Storage = 6330 c.f.= 234.4 c.y.	
55.4	Area = 9993 s.f.		Cumulative Storage = 1168.9 c.y.
		Storage = 3853 c.f.= 142.7 c.y.	
55	Area = 9271 s.f.		Cumulative Storage = 1026.2 c.y.
		Storage = 6858 c.f.= 254.0 c.y.	
54.2	Area = 7875 s.f.		Cumulative Storage = 772.2 c.y.
		Storage = 1541 c.f.= 57.1 c.y.	
54	Area = 7536 s.f.		Cumulative Storage = 715.1 c.y.
		Storage = 3561 c.f.= 131.9 c.y.	
53.5	Area = 6706 s.f.		Cumulative Storage = 583.3 c.y.
		Storage = 5916 c.f.= 219.1 c.y.	
52.5	Area = 5126 s.f.		Cumulative Storage = 364.1 c.y.
		Storage = 0 c.f.= 0.0 c.y.	
52.5	Area = 3118 s.f.		Cumulative Storage = 364.1 c.y.
		Storage = 1488 c.f.= 55.1 c.y.	
52	Area = 2832 s.f.		Cumulative Storage = 309.1 c.y.
		Storage = 2566 c.f.= 95.0 c.y.	
51	Area = 2300 s.f.		Cumulative Storage = 214.0 c.y.
		Storage = 2062 c.f.= 76.4 c.y.	
50	Area = 1824 s.f.		Cumulative Storage = 137.6 c.y.
		Storage = 1614 c.f.= 59.8 c.y.	
49	Area = 1403 s.f.		Cumulative Storage = 77.9 c.y.
		Storage = 1221 c.f.= 45.2 c.y.	
48	Area = 1038 s.f.		Cumulative Storage = 32.7 c.y.
		Storage = 883 c.f.= 32.7 c.y.	
47	Area = 727 s.f.		Cumulative Storage = 0.0 c.y.
		Storage = 0 c.f.= 0.0 c.y.	

Volume Required
67 CY per acre "Wet"

12/22/02

9225-WQV.xls
Sediment Basin

AES Consulting Engineers
Project #9225

Kennsington Woods
James City County

67 CY per acre "Dry"

Total Drainage Area =	10.84	acre
Volume Required =	726.28	c.y.
Volume Required =	19609.56	c.f.
"Wet" Volume Provided =	772.2	c.y. at Elevation 54.2
"Wet" Volume Provided =	20850	c.f.

Adequate "Wet" Volume is provided in Sediment Basin

"Dry" Volume Provided =	757.7	c.y. at Elevation 56.3
"Dry" Volume Provided =	20458	c.f.

Adequate "Dry" Volume is provided in Sediment Basin

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	1.70	3.10	-------	-------	8.71	10.33	-------	14.93	Pre-developed (Onsite)
2	SCS Runoff	-------	2.10	3.72	-------	-------	10.52	12.51	-------	18.03	Pre-developed (Offsite)
3	Combine	1, 2	3.63	6.66	-------	-------	18.75	22.22	-------	31.79	Pre-Developed
5	SCS Runoff	-------	10.34	15.58	-------	-------	34.96	40.22	-------	54.38	Post developed
7	Reservoir	5	0.67	2.51	-------	-------	16.30	23.72	-------	45.70	BMP
8	Combine	2, 7	2.49	4.23	-------	-------	18.04	26.08	-------	51.38	BMP
10	Reservoir	5	1.28	3.98	-------	-------	17.40	24.80	-------	45.85	Temp Sed Basin

Proj. file: 9225-BMP.gpw

Run date: 12-22-2002

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - BMP

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	53.50 ✓	6,706	0	0
0.50	54.00	7,536	3,561	3,561
1.50	55.00	9,271	8,404	11,964
2.50	56.00	11,106	10,189	22,153
3.50	57.00	13,042	12,074	34,227
4.50	58.00	15,078	14,060	48,287
5.50	59.00 ✓	17,215	16,147	64,433
6.50	60.00 ✓	19,453	18,334	82,767

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0 ✓	4.0 ✓	0.0	0.0
Span in	= 24.0 ✓	4.0 ✓	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 47.00 46.5	53.50 ✓	0.00	0.00
Length ft	= 63.0 65	0.0	0.0	0.0
Slope %	= 2.00 ✓	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	= 1.50	8.50	10.00	0.00
Crest El. ft	= 56.30 ✓	58.70 ✓	58.70	0.00
Weir Coeff.	= 3.00	3.00	2.60	0.00
Weir Type	= Rect	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

INLET SS #2-3

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

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	53.50	0.00	0.00	---	---	0.00	0.00	0.00	---	---	0.00
0.50	3,561	54.00	35.47	0.24	---	---	0.00	0.00	0.00	---	---	0.24
1.50	11,964	55.00	35.47	0.49	---	---	0.00	0.00	0.00	---	---	0.49
2.50	22,153	56.00	35.47	0.64	---	---	0.00	0.00	0.00	---	---	0.64
3.50	34,227	57.00	35.47	0.77	---	---	2.64	0.00	0.00	---	---	3.40
4.50	48,287	58.00	35.47	0.87	---	---	9.97	0.00	0.00	---	---	10.85
5.50	64,433	59.00	35.47	0.97	---	---	19.96	4.19	4.27	---	---	29.40
6.50	82,767	60.00	50.97	0.34	---	---	18.77	31.86	38.54	---	---	89.51

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 2 - Temp Sed Basin

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	54.20	7,875	0	0
0.80	55.00	9,271	6,858	6,858
1.80	56.00	11,106	10,188	17,047
2.10	56.30	11,676	3,417	20,464
2.80	57.00	13,042	8,651	29,115
3.80	58.00	15,078	14,060	43,176
4.80	59.00	17,215	16,147	59,322
5.80	60.00	19,453	18,334	77,656

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	6.0	0.0	0.0
Span in	= 24.0	6.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 47.00	54.20	0.00	0.00
Length ft	= 63.0	0.0	0.0	0.0
Slope %	= 2.00	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	= 1.50	8.50	10.00	0.00
Crest El. ft	= 56.30	58.70	58.70	0.00
Weir Coeff.	= 3.00	3.00	2.60	0.00
Weir Type	= Rect	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

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

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	54.20	0.00	0.00	---	---	0.00	0.00	0.00	---	---	0.00
0.80	6,858	55.00	37.66	0.70	---	---	0.00	0.00	0.00	---	---	0.70
1.80	17,047	56.00	37.66	1.18	---	---	0.00	0.00	0.00	---	---	1.18
2.10	20,464	56.30	37.66	1.29	---	---	0.00	0.00	0.00	---	---	1.29
2.80	29,115	57.00	37.66	1.51	---	---	2.64	0.00	0.00	---	---	4.15
3.80	43,176	58.00	37.66	1.78	---	---	9.97	0.00	0.00	---	---	11.76
4.80	59,322	59.00	37.66	2.02	---	---	19.96	4.19	4.27	---	---	30.44
5.80	77,656	60.00	51.00	0.75	---	---	18.61	31.64	38.54	---	---	89.54

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	1.70	6	732	8,250	----	------	------	Pre-developed (Onsite)
2	SCS Runoff	2.10	6	726	7,528	----	------	------	Pre-developed (Offsite)
3	Combine	3.63	6	726	15,777	1, 2	------	------	Pre-Developed
5	SCS Runoff	10.34	6	732	43,366	----	------	------	Post developed
7	Reservoir	0.67	6	900	43,366	5	56.18	24,323	BMP
8	Combine	2.49	6	726	50,893	2, 7	------	------	BMP
10	Reservoir	1.28	6	792	43,366	5	56.29	20,365	Temp Sed Basin

Proj. file: 9225-BMP.gpw | Return Period: 1 yr | Run date: 12-22-2002

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

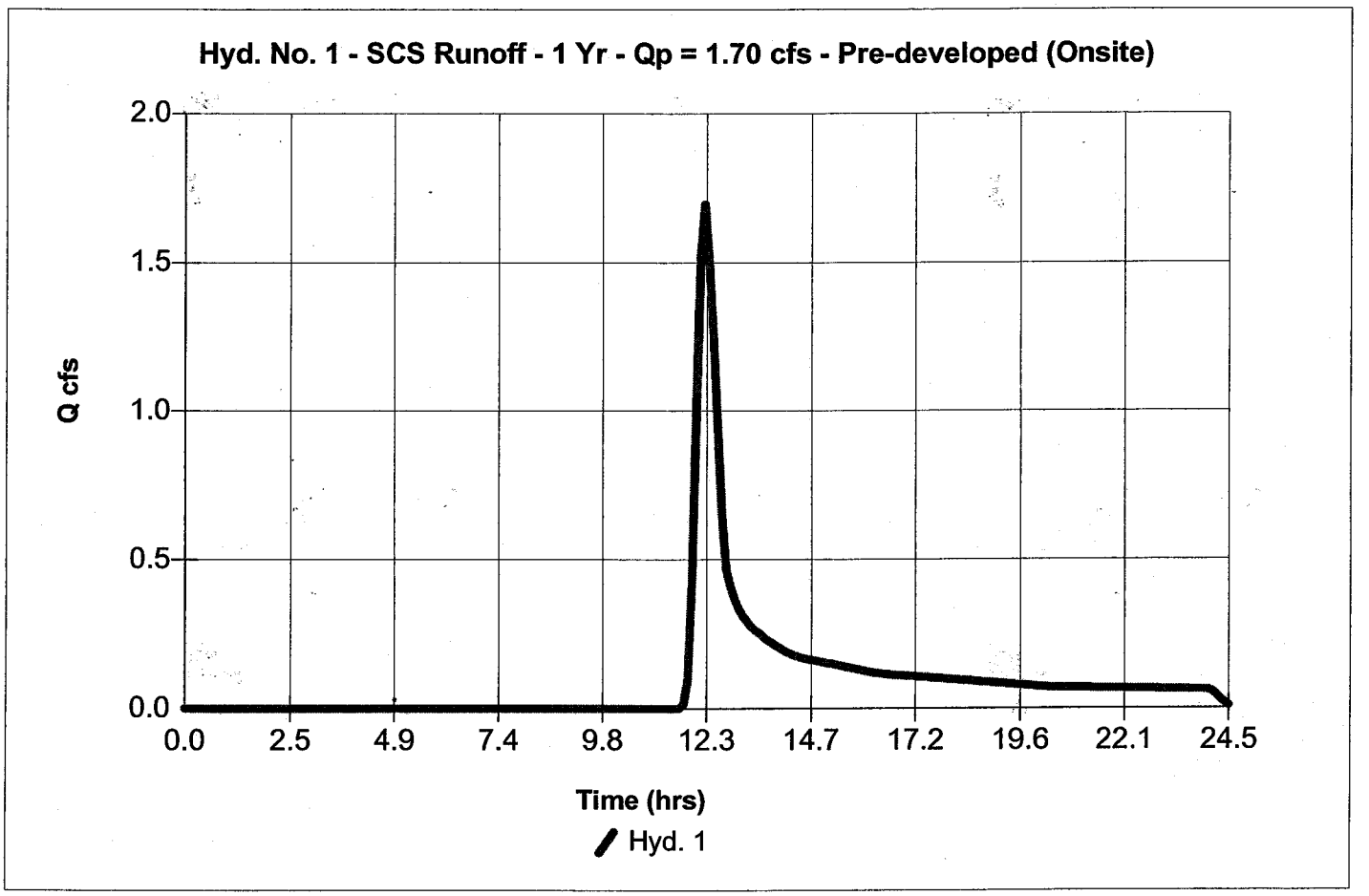
Pre-developed (Onsite)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.70 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 3.75 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8,250 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
11.80	0.10
11.90	0.43
12.00	1.01
12.10	1.53
12.20	1.70 <<
12.30	1.50
12.40	1.25
12.50	0.95
12.60	0.65
12.70	0.47
12.80	0.41
12.90	0.37
13.00	0.34
13.10	0.31
13.20	0.29
13.30	0.28
13.40	0.26
13.50	0.25
13.60	0.24
13.70	0.23
13.80	0.22
13.90	0.21
14.00	0.20
14.10	0.19
14.20	0.18
14.30	0.18
14.40	0.17
14.50	0.17
14.60	0.17
14.70	0.16
14.80	0.16
14.90	0.16


Hyd. No. 1 - SCS Runoff - 1 Yr - Qp = 1.70 cfs - Pre-developed (Onsite)
Q cfs
2.0
1.5
1.0
0.5
0.0
0.0
2.5
4.9
7.4
9.8
12.3
14.7
17.2
19.6
22.1
24.5
Time (hrs)
Hyd. 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

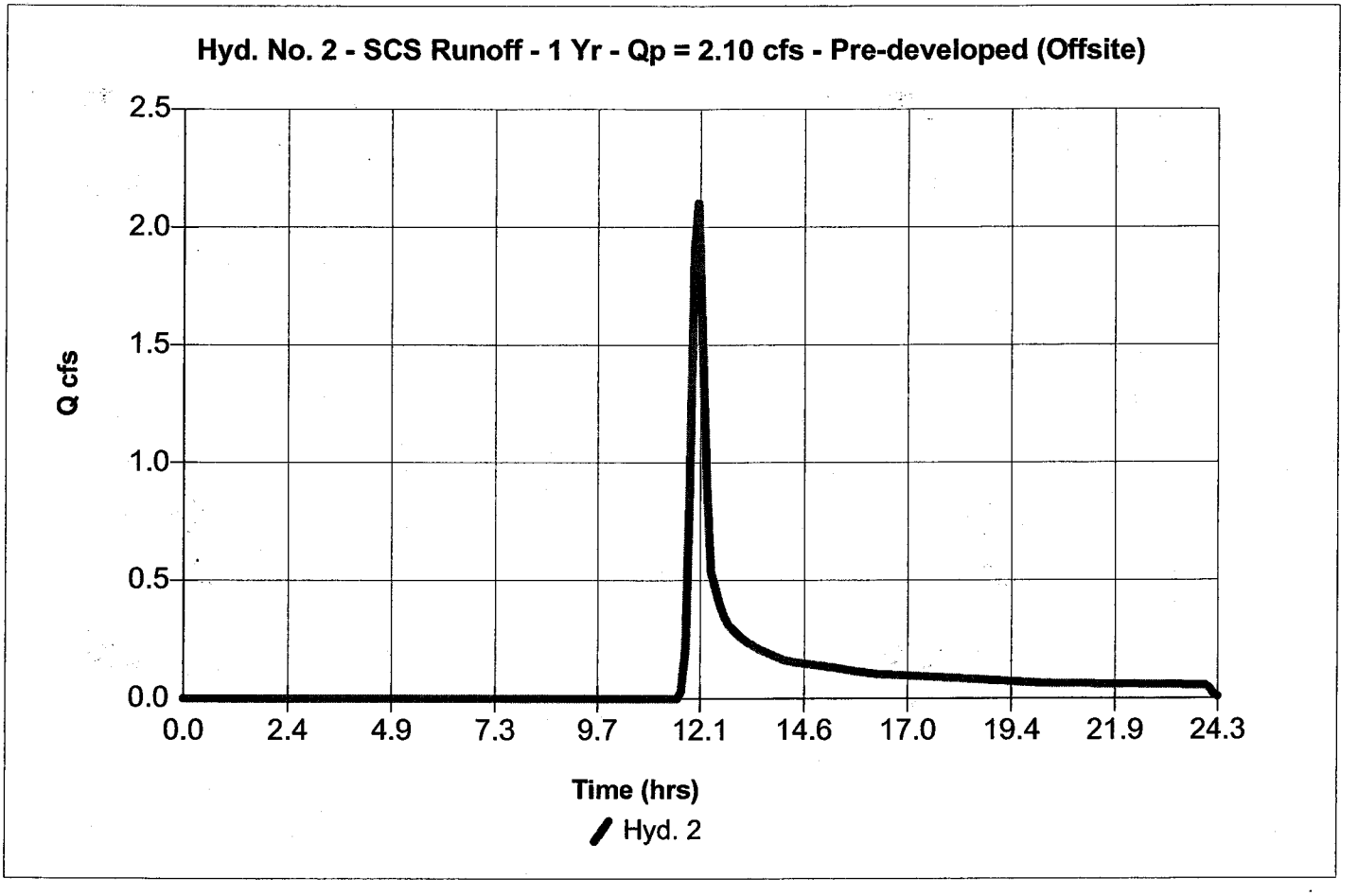
Pre-developed (Offsite)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.10 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 3.65 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 7,528 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
11.70	0.03
11.80	0.21
11.90	0.90
12.00	1.90
12.10	2.10 <<
12.20	1.50
12.30	0.88
12.40	0.54
12.50	0.47
12.60	0.40
12.70	0.35
12.80	0.31
12.90	0.29
13.00	0.28
13.10	0.26
13.20	0.24
13.30	0.23
13.40	0.22
13.50	0.21
13.60	0.20
13.70	0.19
13.80	0.19
13.90	0.18
14.00	0.17
14.10	0.16
14.20	0.16
14.30	0.15
14.40	0.15
14.50	0.15
14.60	0.15
14.70	0.14
14.80	0.14


Hyd. No. 2 - SCS Runoff - 1 Yr - Qp = 2.10 cfs - Pre-developed (Offsite)
Q cfs
2.5
2.0
1.5
1.0
0.5
0.0
0.0
2.4
4.9
7.3
9.7
12.1
14.6
17.0
19.4
21.9
24.3
Time (hrs)
Hyd. 2

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

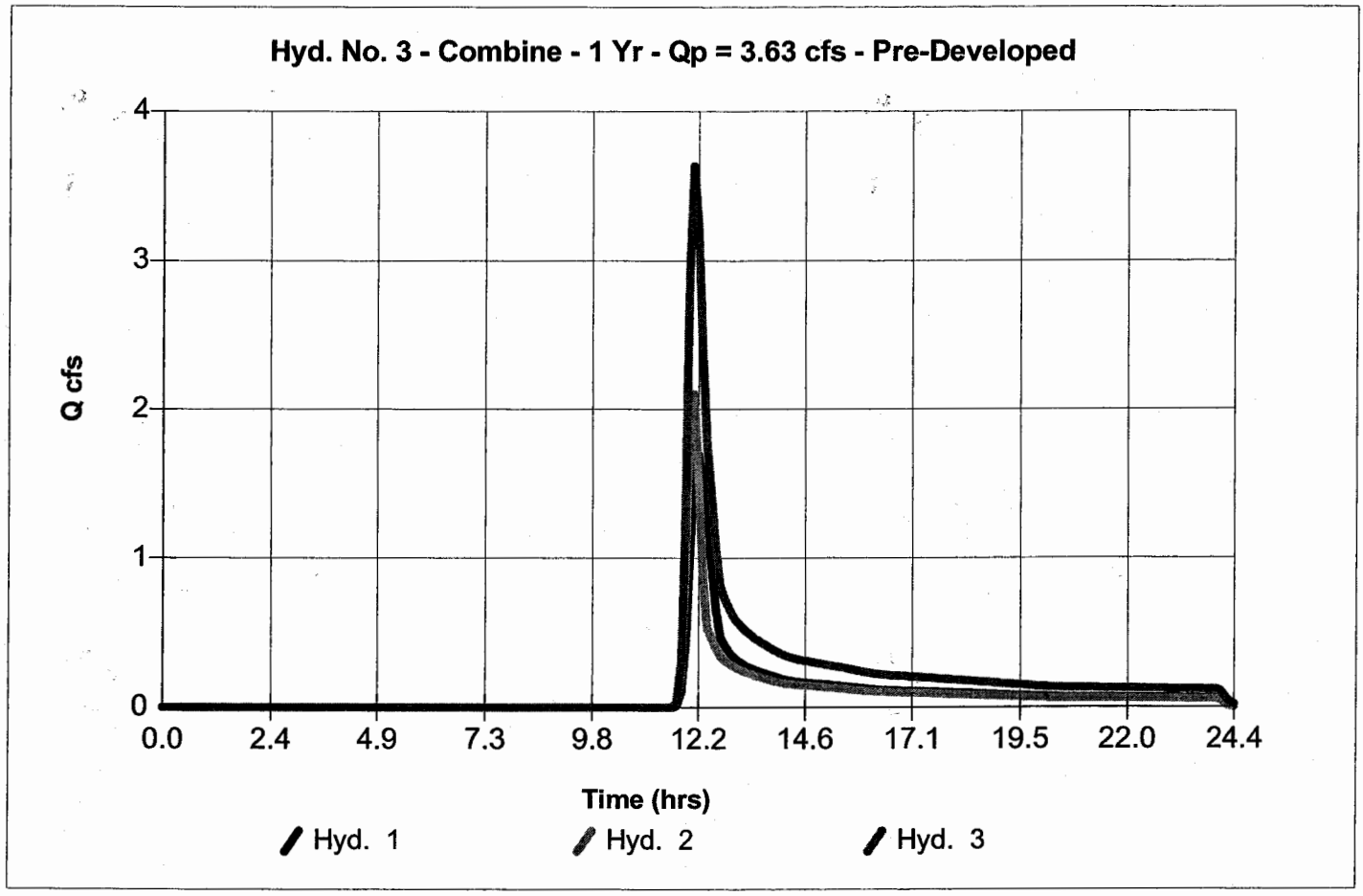
Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 3.63 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Inflow hyds.	= 1, 2		

Hydrograph Volume = 15,777 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
11.70	0.01	0.03	0.04
11.80	0.10	0.21	0.31
11.90	0.43	0.90	1.33
12.00	1.01	1.90	2.91
12.10	1.53	2.10 <<	3.63 <<
12.20	1.70 <<	1.50	3.19
12.30	1.50	0.88	2.38
12.40	1.25	0.54	1.78
12.50	0.95	0.47	1.42
12.60	0.65	0.40	1.05
12.70	0.47	0.35	0.81
12.80	0.41	0.31	0.73
12.90	0.37	0.29	0.66
13.00	0.34	0.28	0.61
13.10	0.31	0.26	0.57
13.20	0.29	0.24	0.54
13.30	0.28	0.23	0.51
13.40	0.26	0.22	0.48
13.50	0.25	0.21	0.46
13.60	0.24	0.20	0.44
13.70	0.23	0.19	0.42
13.80	0.22	0.19	0.40
13.90	0.21	0.18	0.39
14.00	0.20	0.17	0.37
14.10	0.19	0.16	0.35
14.20	0.18	0.16	0.34
14.30	0.18	0.15	0.33
14.40	0.17	0.15	0.32
14.50	0.17	0.15	0.32
14.60	0.17	0.15	0.31
14.70	0.16	0.14	0.31
14.80	0.16	0.14	0.30
14.90	0.16	0.14	0.30
15.00	0.15	0.14	0.29
15.10	0.15	0.13	0.29
15.20	0.15	0.13	0.28
15.30	0.15	0.13	0.28
15.40	0.14	0.13	0.27


Hyd. No. 3 - Combine - 1 Yr - Qp = 3.63 cfs - Pre-Developed
Q cfs
4
3
2
1
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 1
Hyd. 2
Hyd. 3

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

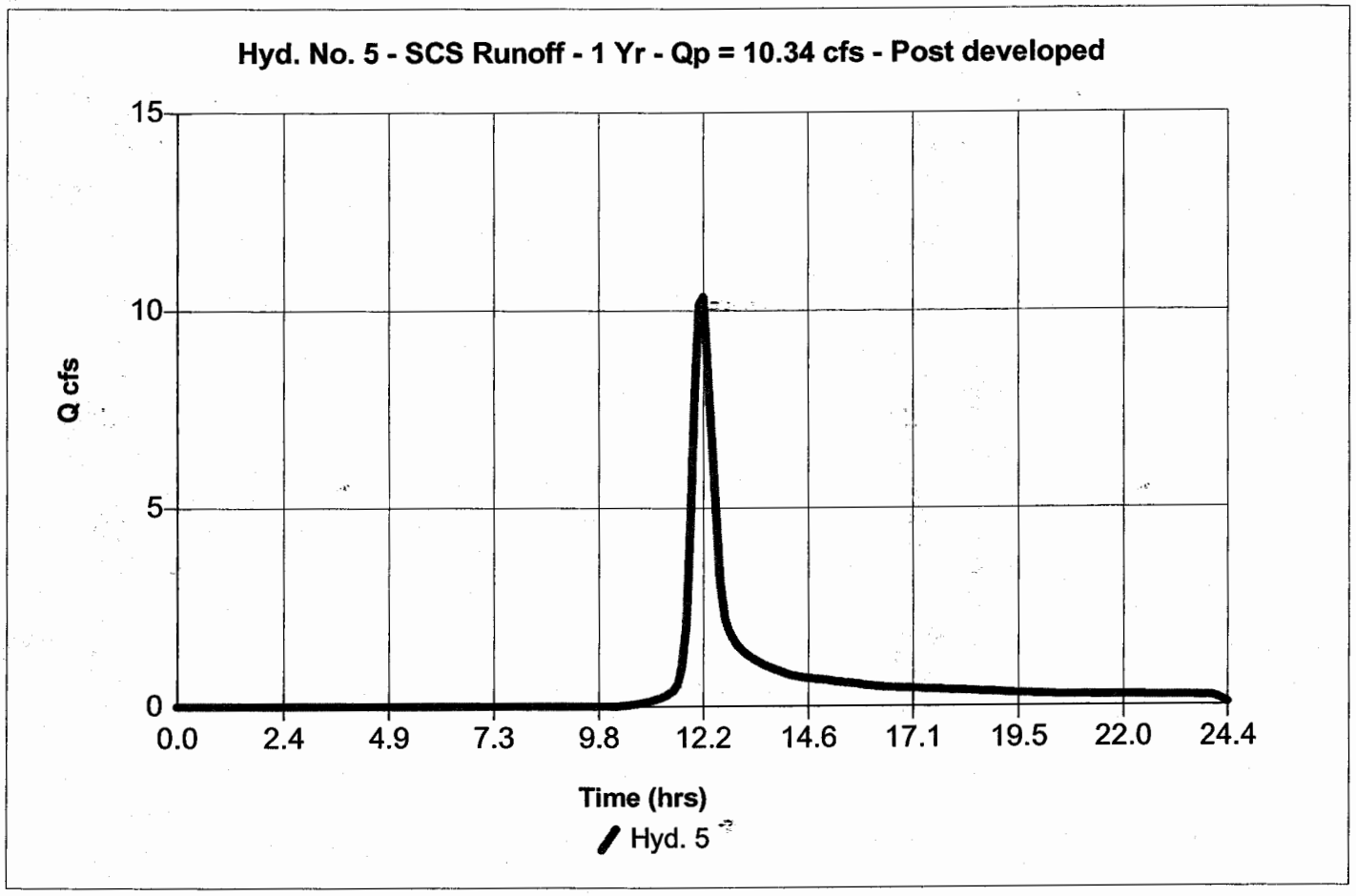
Post developed

Hydrograph type	= SCS Runoff	Peak discharge	= 10.34 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 10.84 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 43,366 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
10.90	0.11
11.00	0.14
11.10	0.17
11.20	0.21
11.30	0.26
11.40	0.32
11.50	0.40
11.60	0.56
11.70	0.99
11.80	2.02
11.90	4.44
12.00	7.69
12.10	10.15
12.20	10.34 <<
12.30	8.66
12.40	6.79
12.50	4.87
12.60	3.14
12.70	2.19
12.80	1.91
12.90	1.69
13.00	1.53
13.10	1.41
13.20	1.31
13.30	1.23
13.40	1.17
13.50	1.11
13.60	1.05
13.70	1.00
13.80	0.96
13.90	0.91
14.00	0.87


Hyd. No. 5 - SCS Runoff - 1 Yr - Qp = 10.34 cfs - Post developed
Q cfs
15
10
5
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 5

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

BMP

Hydrograph type	= Reservoir	Peak discharge	= 0.67 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= BMP
Max. Elevation	= 56.18 ft	Max. Storage	= 24,323 cuft

Storage Indication method used.

Outflow hydrograph volume = 43,366 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
11.30	0.26	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
11.40	0.32	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
11.50	0.40	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
11.60	0.56	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
11.70	0.99	53.64	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
11.80	2.02	53.72	35.47	0.10	-----	-----	-----	-----	-----	-----	-----	0.10
11.90	4.44	53.87	35.47	0.19	-----	-----	-----	-----	-----	-----	-----	0.19
12.00	7.69	54.14	35.47	0.29	-----	-----	-----	-----	-----	-----	-----	0.29
12.10	10.15	54.51	35.47	0.39	-----	-----	-----	-----	-----	-----	-----	0.39
12.20	10.34 <<	54.93	35.47	0.47	-----	-----	-----	-----	-----	-----	-----	0.47
12.30	8.66	55.26	35.47	0.53	-----	-----	-----	-----	-----	-----	-----	0.53
12.40	6.79	55.51	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
12.50	4.87	55.70	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
12.60	3.14	55.82	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62
12.70	2.19	55.89	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
12.80	1.91	55.94	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
12.90	1.69	55.98	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
13.00	1.53	56.01	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
13.10	1.41	56.04	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
13.20	1.31	56.06	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
13.30	1.23	56.08	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
13.40	1.17	56.09	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
13.50	1.11	56.11	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
13.60	1.05	56.12	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
13.70	1.00	56.13	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
13.80	0.96	56.14	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
13.90	0.91	56.15	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
14.00	0.87	56.16	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
14.10	0.83	56.16	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
14.20	0.80	56.17	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
14.30	0.77	56.17	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
14.40	0.75	56.17	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
14.50	0.73	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
14.60	0.71	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
14.70	0.70	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
14.80	0.69	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67

14.90	0.68	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
15.00	0.66	56.18 <<	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67 <<

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
15.10	0.65	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
15.20	0.64	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
15.30	0.62	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
15.40	0.61	56.18	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
15.50	0.60	56.17	35.47	0.67	-----	-----	-----	-----	-----	-----	-----	0.67
15.60	0.58	56.17	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
15.70	0.57	56.17	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
15.80	0.55	56.17	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
15.90	0.54	56.16	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.00	0.53	56.16	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.10	0.51	56.15	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.20	0.50	56.15	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.30	0.49	56.15	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.40	0.48	56.14	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.50	0.48	56.13	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.60	0.47	56.13	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.70	0.47	56.12	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.80	0.46	56.12	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
16.90	0.46	56.11	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
17.00	0.45	56.11	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
17.10	0.45	56.10	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
17.20	0.44	56.09	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.30	0.44	56.09	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.40	0.43	56.08	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.50	0.43	56.07	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.60	0.42	56.07	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.70	0.42	56.06	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.80	0.41	56.05	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
17.90	0.41	56.05	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
18.00	0.40	56.04	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
18.10	0.40	56.03	35.47	0.65	-----	-----	-----	-----	-----	-----	-----	0.65
18.20	0.39	56.02	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.30	0.39	56.02	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.40	0.38	56.01	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.50	0.38	56.00	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.60	0.37	55.99	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.70	0.37	55.98	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.80	0.36	55.97	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
18.90	0.36	55.96	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
19.00	0.35	55.95	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
19.10	0.35	55.94	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
19.20	0.34	55.93	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
19.30	0.34	55.92	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
19.40	0.33	55.91	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
19.50	0.33	55.90	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
19.60	0.32	55.89	35.47	0.63	-----	-----	-----	-----	-----	-----	-----	0.63
19.70	0.32	55.88	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62
19.80	0.31	55.87	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62

19.90	0.31	55.86	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62
20.00	0.30	55.85	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62
20.10	0.30	55.83	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62

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20.10
14.5
15.6 hr def < 24
NO GOOD
SERV

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.20	0.29	55.82	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62
20.30	0.29	55.81	35.47	0.62	-----	-----	-----	-----	-----	-----	-----	0.62
20.40	0.28	55.80	35.47	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
20.50	0.28	55.79	35.47	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
20.60	0.28	55.78	35.47	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
20.70	0.28	55.76	35.47	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
20.80	0.28	55.75	35.47	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
20.90	0.28	55.74	35.47	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
21.00	0.28	55.73	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
21.10	0.28	55.72	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
21.20	0.28	55.71	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
21.30	0.27	55.70	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
21.40	0.27	55.68	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
21.50	0.27	55.67	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
21.60	0.27	55.66	35.47	0.59	-----	-----	-----	-----	-----	-----	-----	0.59
21.70	0.27	55.65	35.47	0.59	-----	-----	-----	-----	-----	-----	-----	0.59
21.80	0.27	55.64	35.47	0.59	-----	-----	-----	-----	-----	-----	-----	0.59
21.90	0.27	55.63	35.47	0.59	-----	-----	-----	-----	-----	-----	-----	0.59
22.00	0.27	55.62	35.47	0.59	-----	-----	-----	-----	-----	-----	-----	0.59
22.10	0.27	55.60	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
22.20	0.27	55.59	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
22.30	0.27	55.58	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
22.40	0.26	55.57	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
22.50	0.26	55.56	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
22.60	0.26	55.55	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
22.70	0.26	55.54	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
22.80	0.26	55.53	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
22.90	0.26	55.52	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
23.00	0.26	55.50	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
23.10	0.26	55.49	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
23.20	0.26	55.48	35.47	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
23.30	0.26	55.47	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
23.40	0.25	55.46	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
23.50	0.25	55.45	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
23.60	0.25	55.44	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
23.70	0.25	55.43	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
23.80	0.25	55.42	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
23.90	0.25	55.41	35.47	0.55	-----	-----	-----	-----	-----	-----	-----	0.55
24.00	0.25	55.40	35.47	0.55	-----	-----	-----	-----	-----	-----	-----	0.55
24.10	0.23	55.39	35.47	0.55	-----	-----	-----	-----	-----	-----	-----	0.55
24.20	0.19	55.37	35.47	0.55	-----	-----	-----	-----	-----	-----	-----	0.55
24.30	0.12	55.36	35.47	0.55	-----	-----	-----	-----	-----	-----	-----	0.55
24.40	0.07	55.34	35.47	0.54	-----	-----	-----	-----	-----	-----	-----	0.54
24.50	0.04	55.33	35.47	0.54	-----	-----	-----	-----	-----	-----	-----	0.54
24.60	0.01	55.31	35.47	0.54	-----	-----	-----	-----	-----	-----	-----	0.54
24.70	0.00	55.29	35.47	0.54	-----	-----	-----	-----	-----	-----	-----	0.54
24.80	0.00	55.27	35.47	0.53	-----	-----	-----	-----	-----	-----	-----	0.53
24.90	0.00	55.25	35.47	0.53	-----	-----	-----	-----	-----	-----	-----	0.53

25.00	0.00	55.23	35.47	0.53	-----	-----	-----	-----	-----	-----	-----	0.53
25.10	0.00	55.21	35.47	0.52	-----	-----	-----	-----	-----	-----	-----	0.52
25.20	0.00	55.20	35.47	0.52	-----	-----	-----	-----	-----	-----	-----	0.52

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
25.30	0.00	55.18	35.47	0.52	-----	-----	-----	-----	-----	-----	-----	0.52
25.40	0.00	55.16	35.47	0.51	-----	-----	-----	-----	-----	-----	-----	0.51
25.50	0.00	55.14	35.47	0.51	-----	-----	-----	-----	-----	-----	-----	0.51
25.60	0.00	55.12	35.47	0.51	-----	-----	-----	-----	-----	-----	-----	0.51
25.70	0.00	55.11	35.47	0.50	-----	-----	-----	-----	-----	-----	-----	0.50
25.80	0.00	55.09	35.47	0.50	-----	-----	-----	-----	-----	-----	-----	0.50
25.90	0.00	55.07	35.47	0.50	-----	-----	-----	-----	-----	-----	-----	0.50
26.00	0.00	55.05	35.47	0.49	-----	-----	-----	-----	-----	-----	-----	0.49
26.10	0.00	55.04	35.47	0.49	-----	-----	-----	-----	-----	-----	-----	0.49
26.20	0.00	55.02	35.47	0.49	-----	-----	-----	-----	-----	-----	-----	0.49
26.30	0.00	55.00	35.47	0.49	-----	-----	-----	-----	-----	-----	-----	0.49
26.40	0.00	54.98	35.47	0.48	-----	-----	-----	-----	-----	-----	-----	0.48
26.50	0.00	54.96	35.47	0.48	-----	-----	-----	-----	-----	-----	-----	0.48
26.60	0.00	54.94	35.47	0.47	-----	-----	-----	-----	-----	-----	-----	0.47
26.70	0.00	54.92	35.47	0.47	-----	-----	-----	-----	-----	-----	-----	0.47
26.80	0.00	54.90	35.47	0.47	-----	-----	-----	-----	-----	-----	-----	0.47
26.90	0.00	54.88	35.47	0.46	-----	-----	-----	-----	-----	-----	-----	0.46
27.00	0.00	54.86	35.47	0.46	-----	-----	-----	-----	-----	-----	-----	0.46
27.10	0.00	54.84	35.47	0.45	-----	-----	-----	-----	-----	-----	-----	0.45
27.20	0.00	54.82	35.47	0.45	-----	-----	-----	-----	-----	-----	-----	0.45
27.30	0.00	54.80	35.47	0.45	-----	-----	-----	-----	-----	-----	-----	0.45
27.40	0.00	54.78	35.47	0.44	-----	-----	-----	-----	-----	-----	-----	0.44
27.50	0.00	54.76	35.47	0.44	-----	-----	-----	-----	-----	-----	-----	0.44
27.60	0.00	54.74	35.47	0.44	-----	-----	-----	-----	-----	-----	-----	0.44
27.70	0.00	54.73	35.47	0.43	-----	-----	-----	-----	-----	-----	-----	0.43
27.80	0.00	54.71	35.47	0.43	-----	-----	-----	-----	-----	-----	-----	0.43
27.90	0.00	54.69	35.47	0.42	-----	-----	-----	-----	-----	-----	-----	0.42
28.00	0.00	54.67	35.47	0.42	-----	-----	-----	-----	-----	-----	-----	0.42
28.10	0.00	54.65	35.47	0.42	-----	-----	-----	-----	-----	-----	-----	0.42
28.20	0.00	54.64	35.47	0.41	-----	-----	-----	-----	-----	-----	-----	0.41
28.30	0.00	54.62	35.47	0.41	-----	-----	-----	-----	-----	-----	-----	0.41
28.40	0.00	54.60	35.47	0.41	-----	-----	-----	-----	-----	-----	-----	0.41
28.50	0.00	54.58	35.47	0.40	-----	-----	-----	-----	-----	-----	-----	0.40
28.60	0.00	54.57	35.47	0.40	-----	-----	-----	-----	-----	-----	-----	0.40
28.70	0.00	54.55	35.47	0.39	-----	-----	-----	-----	-----	-----	-----	0.39
28.80	0.00	54.53	35.47	0.39	-----	-----	-----	-----	-----	-----	-----	0.39
28.90	0.00	54.52	35.47	0.39	-----	-----	-----	-----	-----	-----	-----	0.39
29.00	0.00	54.50	35.47	0.38	-----	-----	-----	-----	-----	-----	-----	0.38
29.10	0.00	54.48	35.47	0.38	-----	-----	-----	-----	-----	-----	-----	0.38
29.20	0.00	54.47	35.47	0.38	-----	-----	-----	-----	-----	-----	-----	0.38
29.30	0.00	54.45	35.47	0.37	-----	-----	-----	-----	-----	-----	-----	0.37
29.40	0.00	54.43	35.47	0.37	-----	-----	-----	-----	-----	-----	-----	0.37
29.50	0.00	54.42	35.47	0.36	-----	-----	-----	-----	-----	-----	-----	0.36
29.60	0.00	54.40	35.47	0.36	-----	-----	-----	-----	-----	-----	-----	0.36
29.70	0.00	54.39	35.47	0.36	-----	-----	-----	-----	-----	-----	-----	0.36
29.80	0.00	54.37	35.47	0.35	-----	-----	-----	-----	-----	-----	-----	0.35
29.90	0.00	54.36	35.47	0.35	-----	-----	-----	-----	-----	-----	-----	0.35
30.00	0.00	54.34	35.47	0.35	-----	-----	-----	-----	-----	-----	-----	0.35

30.10	0.00	54.33	35.47	0.34	-----	-----	-----	-----	-----	-----	-----	0.34
30.20	0.00	54.31	35.47	0.34	-----	-----	-----	-----	-----	-----	-----	0.34
30.30	0.00	54.30	35.47	0.33	-----	-----	-----	-----	-----	-----	-----	0.33

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
30.40	0.00	54.28	35.47	0.33	-----	-----	-----	-----	-----	-----	-----	0.33
30.50	0.00	54.27	35.47	0.33	-----	-----	-----	-----	-----	-----	-----	0.33
30.60	0.00	54.26	35.47	0.32	-----	-----	-----	-----	-----	-----	-----	0.32
30.70	0.00	54.24	35.47	0.32	-----	-----	-----	-----	-----	-----	-----	0.32
30.80	0.00	54.23	35.47	0.31	-----	-----	-----	-----	-----	-----	-----	0.31
30.90	0.00	54.22	35.47	0.31	-----	-----	-----	-----	-----	-----	-----	0.31
31.00	0.00	54.20	35.47	0.31	-----	-----	-----	-----	-----	-----	-----	0.31
31.10	0.00	54.19	35.47	0.30	-----	-----	-----	-----	-----	-----	-----	0.30
31.20	0.00	54.18	35.47	0.30	-----	-----	-----	-----	-----	-----	-----	0.30
31.30	0.00	54.16	35.47	0.30	-----	-----	-----	-----	-----	-----	-----	0.30
31.40	0.00	54.15	35.47	0.29	-----	-----	-----	-----	-----	-----	-----	0.29
31.50	0.00	54.14	35.47	0.29	-----	-----	-----	-----	-----	-----	-----	0.29
31.60	0.00	54.13	35.47	0.28	-----	-----	-----	-----	-----	-----	-----	0.28
31.70	0.00	54.11	35.47	0.28	-----	-----	-----	-----	-----	-----	-----	0.28
31.80	0.00	54.10	35.47	0.28	-----	-----	-----	-----	-----	-----	-----	0.28
31.90	0.00	54.09	35.47	0.27	-----	-----	-----	-----	-----	-----	-----	0.27
32.00	0.00	54.08	35.47	0.27	-----	-----	-----	-----	-----	-----	-----	0.27
32.10	0.00	54.07	35.47	0.27	-----	-----	-----	-----	-----	-----	-----	0.27
32.20	0.00	54.06	35.47	0.26	-----	-----	-----	-----	-----	-----	-----	0.26
32.30	0.00	54.05	35.47	0.26	-----	-----	-----	-----	-----	-----	-----	0.26
32.40	0.00	54.03	35.47	0.25	-----	-----	-----	-----	-----	-----	-----	0.25
32.50	0.00	54.02	35.47	0.25	-----	-----	-----	-----	-----	-----	-----	0.25
32.60	0.00	54.01	35.47	0.25	-----	-----	-----	-----	-----	-----	-----	0.25
32.70	0.00	54.00	35.47	0.24	-----	-----	-----	-----	-----	-----	-----	0.24
32.80	0.00	53.99	35.47	0.24	-----	-----	-----	-----	-----	-----	-----	0.24
32.90	0.00	53.98	35.47	0.23	-----	-----	-----	-----	-----	-----	-----	0.23
33.00	0.00	53.97	35.47	0.23	-----	-----	-----	-----	-----	-----	-----	0.23
33.10	0.00	53.96	35.47	0.23	-----	-----	-----	-----	-----	-----	-----	0.23
33.20	0.00	53.94	35.47	0.22	-----	-----	-----	-----	-----	-----	-----	0.22
33.30	0.00	53.93	35.47	0.22	-----	-----	-----	-----	-----	-----	-----	0.22
33.40	0.00	53.92	35.47	0.21	-----	-----	-----	-----	-----	-----	-----	0.21
33.50	0.00	53.91	35.47	0.21	-----	-----	-----	-----	-----	-----	-----	0.21
33.60	0.00	53.90	35.47	0.20	-----	-----	-----	-----	-----	-----	-----	0.20
33.70	0.00	53.89	35.47	0.20	-----	-----	-----	-----	-----	-----	-----	0.20
33.80	0.00	53.88	35.47	0.19	-----	-----	-----	-----	-----	-----	-----	0.19
33.90	0.00	53.87	35.47	0.19	-----	-----	-----	-----	-----	-----	-----	0.19
34.00	0.00	53.86	35.47	0.19	-----	-----	-----	-----	-----	-----	-----	0.19
34.10	0.00	53.85	35.47	0.18	-----	-----	-----	-----	-----	-----	-----	0.18
34.20	0.00	53.84	35.47	0.18	-----	-----	-----	-----	-----	-----	-----	0.18
34.30	0.00	53.83	35.47	0.17	-----	-----	-----	-----	-----	-----	-----	0.17
34.40	0.00	53.83	35.47	0.17	-----	-----	-----	-----	-----	-----	-----	0.17
34.50	0.00	53.82	35.47	0.16	-----	-----	-----	-----	-----	-----	-----	0.16
34.60	0.00	53.81	35.47	0.16	-----	-----	-----	-----	-----	-----	-----	0.16
34.70	0.00	53.80	35.47	0.16	-----	-----	-----	-----	-----	-----	-----	0.16
34.80	0.00	53.79	35.47	0.15	-----	-----	-----	-----	-----	-----	-----	0.15
34.90	0.00	53.79	35.47	0.15	-----	-----	-----	-----	-----	-----	-----	0.15
35.00	0.00	53.78	35.47	0.14	-----	-----	-----	-----	-----	-----	-----	0.14
35.10	0.00	53.77	35.47	0.14	-----	-----	-----	-----	-----	-----	-----	0.14

35.20	0.00	53.77	35.47	0.13	-----	-----	-----	-----	-----	-----	-----	0.13
35.30	0.00	53.76	35.47	0.13	-----	-----	-----	-----	-----	-----	-----	0.13
35.40	0.00	53.75	35.47	0.12	-----	-----	-----	-----	-----	-----	-----	0.12

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
35.50	0.00	53.75	35.47	0.12	-----	-----	-----	-----	-----	-----	-----	0.12
35.60	0.00	53.74	35.47	0.11	-----	-----	-----	-----	-----	-----	-----	0.11
35.70	0.00	53.73	35.47	0.11	-----	-----	-----	-----	-----	-----	-----	0.11
35.80	0.00	53.73	35.47	0.11	-----	-----	-----	-----	-----	-----	-----	0.11
35.90	0.00	53.72	35.47	0.10	-----	-----	-----	-----	-----	-----	-----	0.10
36.00	0.00	53.72	35.47	0.10	-----	-----	-----	-----	-----	-----	-----	0.10
36.10	0.00	53.71	35.47	0.10	-----	-----	-----	-----	-----	-----	-----	0.10
36.20	0.00	53.71	35.47	0.09	-----	-----	-----	-----	-----	-----	-----	0.09
36.30	0.00	53.70	35.47	0.09	-----	-----	-----	-----	-----	-----	-----	0.09
36.40	0.00	53.70	35.47	0.09	-----	-----	-----	-----	-----	-----	-----	0.09
36.50	0.00	53.70	35.47	0.08	-----	-----	-----	-----	-----	-----	-----	0.08
36.60	0.00	53.69	35.47	0.08	-----	-----	-----	-----	-----	-----	-----	0.08
36.70	0.00	53.69	35.47	0.08	-----	-----	-----	-----	-----	-----	-----	0.08
36.80	0.00	53.68	35.47	0.08	-----	-----	-----	-----	-----	-----	-----	0.08
36.90	0.00	53.68	35.47	0.07	-----	-----	-----	-----	-----	-----	-----	0.07
37.00	0.00	53.68	35.47	0.07	-----	-----	-----	-----	-----	-----	-----	0.07
37.10	0.00	53.67	35.47	0.07	-----	-----	-----	-----	-----	-----	-----	0.07
37.20	0.00	53.67	35.47	0.07	-----	-----	-----	-----	-----	-----	-----	0.07
37.30	0.00	53.67	35.47	0.06	-----	-----	-----	-----	-----	-----	-----	0.06
37.40	0.00	53.66	35.47	0.06	-----	-----	-----	-----	-----	-----	-----	0.06
37.50	0.00	53.66	35.47	0.06	-----	-----	-----	-----	-----	-----	-----	0.06
37.60	0.00	53.66	35.47	0.06	-----	-----	-----	-----	-----	-----	-----	0.06
37.70	0.00	53.65	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
37.80	0.00	53.65	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
37.90	0.00	53.65	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
38.00	0.00	53.65	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
38.10	0.00	53.64	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
38.20	0.00	53.64	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
38.30	0.00	53.64	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
38.40	0.00	53.64	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
38.50	0.00	53.63	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
38.60	0.00	53.63	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
38.70	0.00	53.63	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
38.80	0.00	53.63	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
38.90	0.00	53.63	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
39.00	0.00	53.62	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
39.10	0.00	53.62	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
39.20	0.00	53.62	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
39.30	0.00	53.62	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
39.40	0.00	53.62	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
39.50	0.00	53.62	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
39.60	0.00	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
39.70	0.00	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
39.80	0.00	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
39.90	0.00	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
40.00	0.00	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
40.10	0.00	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
40.20	0.00	53.60	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03

40.30	0.00	53.60	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
40.40	0.00	53.60	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
40.50	0.00	53.60	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
40.60	0.00	53.60	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
40.70	0.00	53.60	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
40.80	0.00	53.60	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
40.90	0.00	53.60	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.00	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.10	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.20	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.30	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.40	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.50	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.60	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.70	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.80	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
41.90	0.00	53.59	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.00	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.10	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.20	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.30	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.40	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.50	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.60	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.70	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.80	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
42.90	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
43.00	0.00	53.58	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
43.10	0.00	53.57	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
43.20	0.00	53.57	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
43.30	0.00	53.57	35.47	0.02	-----	-----	-----	-----	-----	-----	-----	0.02
43.40	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
43.50	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
43.60	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
43.70	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
43.80	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
43.90	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.00	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.10	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.20	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.30	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.40	0.00	53.57	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.50	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.60	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.70	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.80	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
44.90	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.00	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.10	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.20	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.30	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01

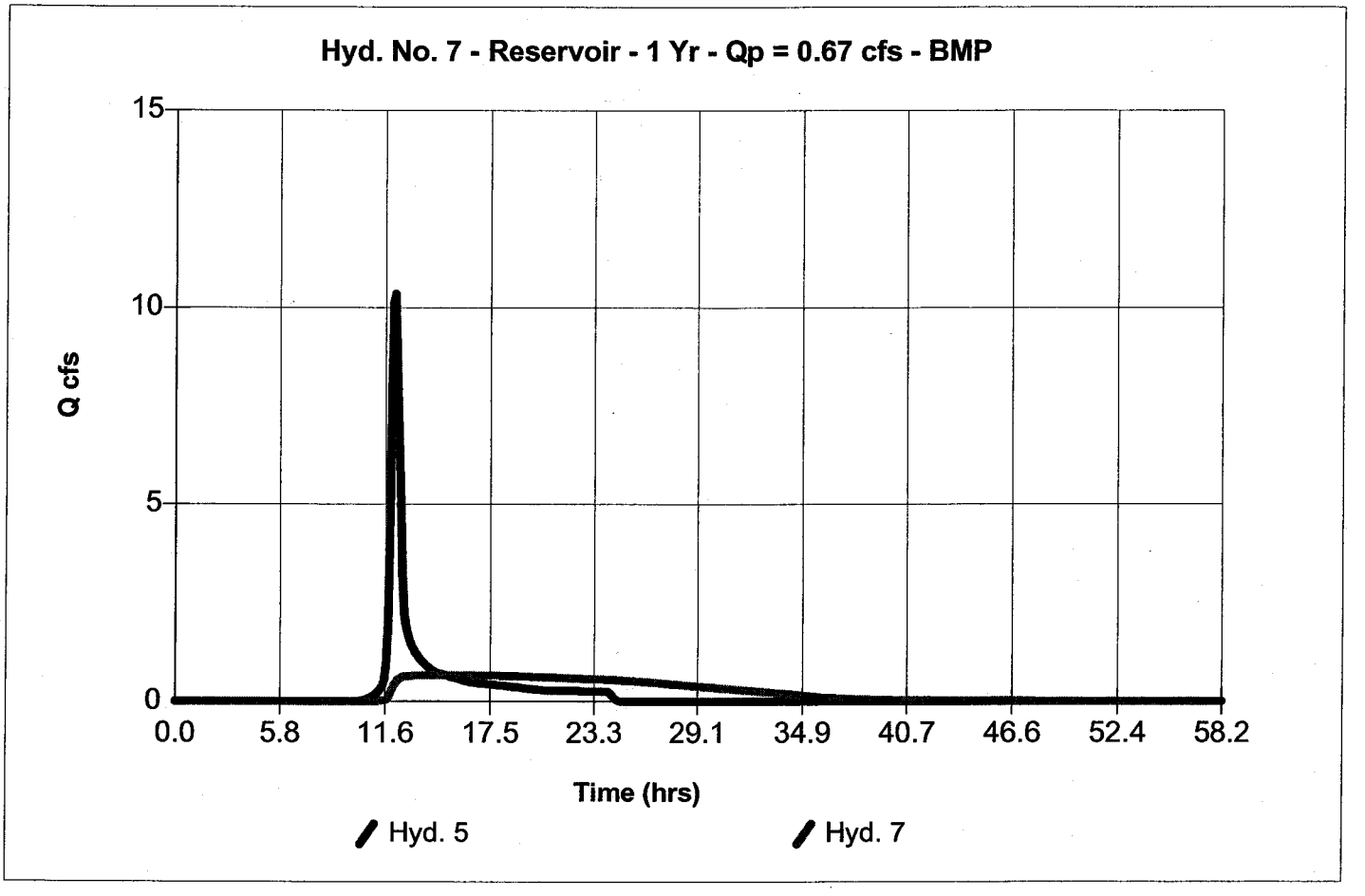
45.40	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.50	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.60	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
45.70	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.80	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
45.90	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.00	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.10	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.20	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.30	0.00	53.56	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.40	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.50	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.60	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.70	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.80	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
46.90	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.00	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.10	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.20	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.30	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.40	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.50	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.60	0.00	53.55	35.47	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.70	0.00	53.55	35.39	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.80	0.00	53.55	35.15	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
47.90	0.00	53.55	34.90	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
48.00	0.00	53.55	34.66	0.01	-----	-----	-----	-----	-----	-----	-----	0.01
48.10	0.00	53.55	34.42	0.01	-----	-----	-----	-----	-----	-----	-----	0.01

...End


Hyd. No. 7 - Reservoir - 1 Yr - Qp = 0.67 cfs - BMP
15
10
5
0
Q cfs
0.0
5.8
11.6
17.5
23.3
29.1
34.9
40.7
46.6
52.4
58.2
Time (hrs)
Hyd. 5
Hyd. 7

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 8

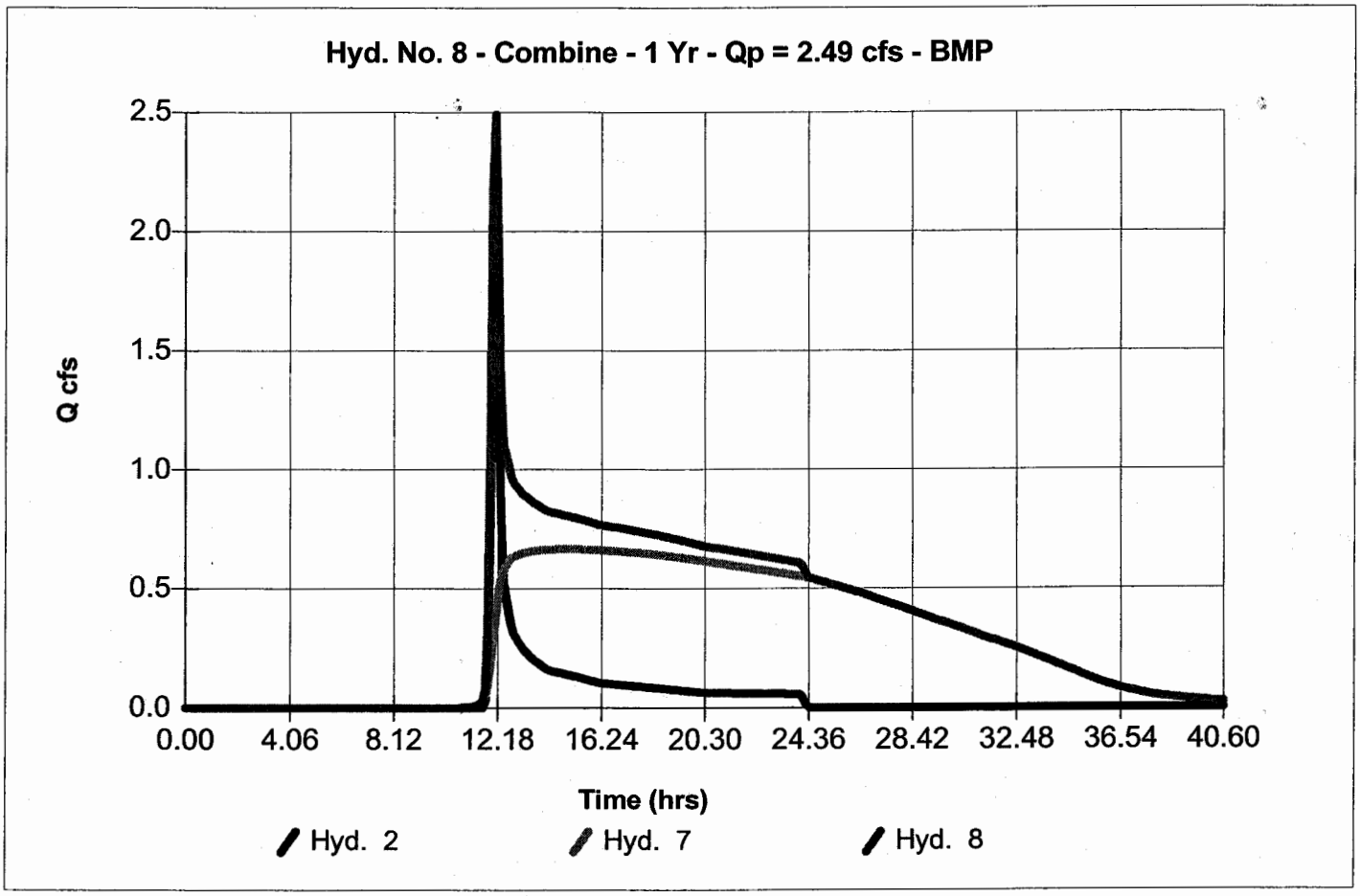
BMP

Hydrograph type	= Combine	Peak discharge	= 2.49 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Inflow hyds.	= 2, 7		

Hydrograph Volume = 50,893 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 7 = (cfs)	Outflow (cfs)
11.60	0.00	0.03	0.03
11.70	0.03	0.05	0.08
11.80	0.21	0.10	0.31
11.90	0.90	0.19	1.09
12.00	1.90	0.29	2.19
12.10	2.10 <<	0.39	2.49 <<
12.20	1.50	0.47	1.97
12.30	0.88	0.53	1.41
12.40	0.54	0.57	1.11
12.50	0.47	0.60	1.07
12.60	0.40	0.62	1.01
12.70	0.35	0.63	0.97
12.80	0.31	0.63	0.95
12.90	0.29	0.64	0.93
13.00	0.28	0.64	0.92
13.10	0.26	0.65	0.91
13.20	0.24	0.65	0.89
13.30	0.23	0.65	0.89
13.40	0.22	0.65	0.88
13.50	0.21	0.66	0.87
13.60	0.20	0.66	0.86
13.70	0.19	0.66	0.85
13.80	0.19	0.66	0.85
13.90	0.18	0.66	0.84
14.00	0.17	0.66	0.83
14.10	0.16	0.66	0.83
14.20	0.16	0.66	0.82
14.30	0.15	0.66	0.82
14.40	0.15	0.67	0.82
14.50	0.15	0.67	0.82
14.60	0.15	0.67	0.81
14.70	0.14	0.67	0.81
14.80	0.14	0.67	0.81
14.90	0.14	0.67	0.81
15.00	0.14	0.67 <<	0.80
15.10	0.13	0.67	0.80
15.20	0.13	0.67	0.80
15.30	0.13	0.67	0.80


Hyd. No. 8 - Combine - 1 Yr - Qp = 2.49 cfs - BMP
Q cfs
2.5
2.0
1.5
1.0
0.5
0.0
0.00
4.06
8.12
12.18
16.24
20.30
24.36
28.42
32.48
36.54
40.60
Time (hrs)
Hyd. 2
Hyd. 7
Hyd. 8

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	3.10	6	732	13,723	----	------	------	Pre-developed (Onsite)
2	SCS Runoff	3.72	6	726	12,522	----	------	------	Pre-developed (Offsite)
3	Combine	6.66	6	726	26,245	1, 2	------	------	Pre-Developed
5	SCS Runoff	15.58	6	732	64,390	----	------	------	Post developed
7	Reservoir	2.51	6	774	64,389	5	56.83	32,225	BMP
8	Combine	4.23	6	726	76,911	2, 7	------	------	BMP
10	Reservoir	3.98	6	756	64,389	5	56.97	28,760	Temp Sed Basin

Proj. file: 9225-BMP.gpw | Return Period: 2 yr | Run date: 12-22-2002

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

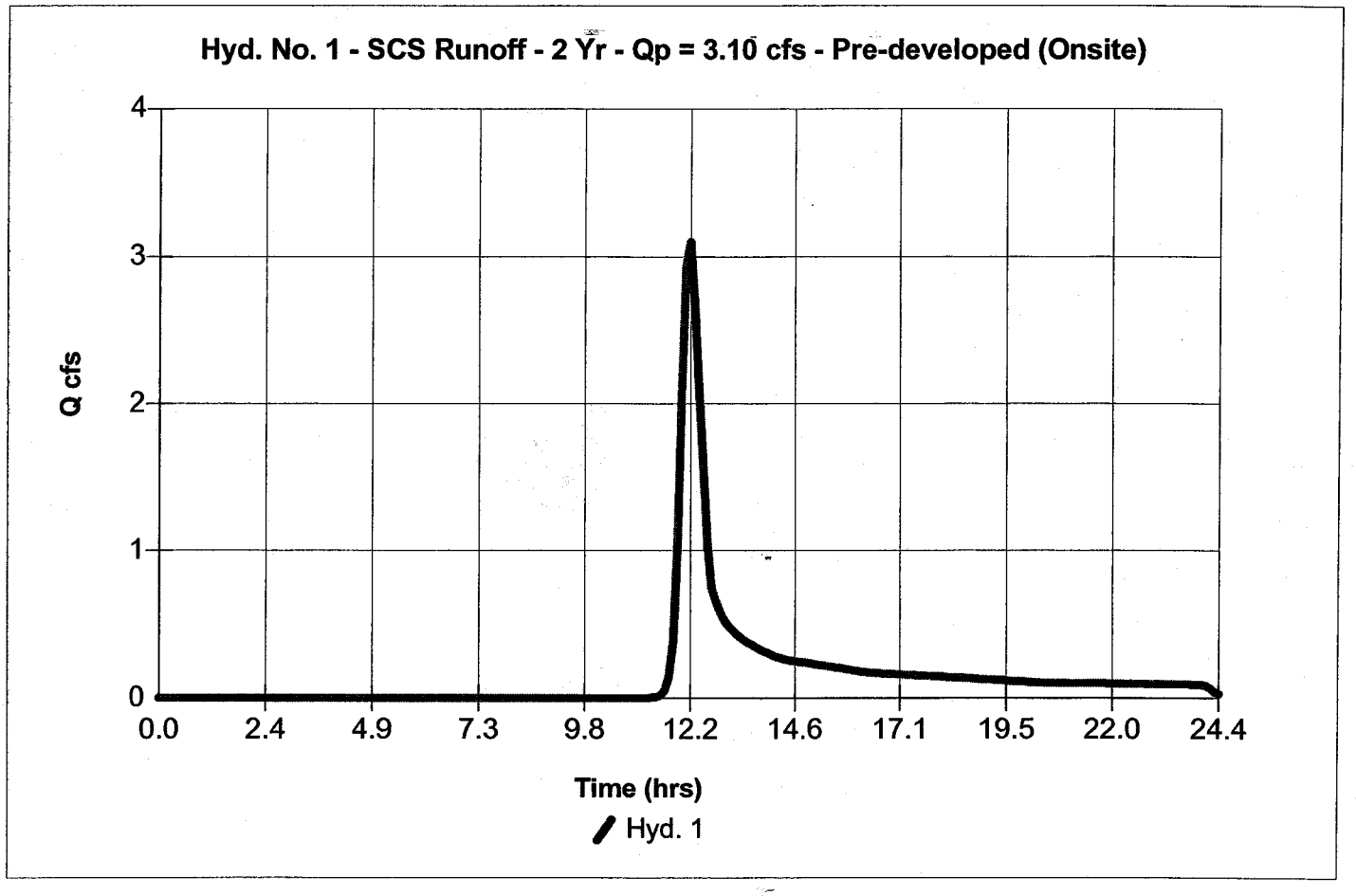
Pre-developed (Onsite)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.10 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 3.75 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 13,723 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
11.60	0.05
11.70	0.14
11.80	0.39
11.90	1.08
12.00	2.10
12.10	2.93
12.20	3.10 <<
12.30	2.66
12.40	2.14
12.50	1.58
12.60	1.05
12.70	0.74
12.80	0.65
12.90	0.58
13.00	0.52
13.10	0.48
13.20	0.45
13.30	0.43
13.40	0.40
13.50	0.38
13.60	0.37
13.70	0.35
13.80	0.33
13.90	0.32
14.00	0.30
14.10	0.29
14.20	0.28
14.30	0.27
14.40	0.26
14.50	0.26
14.60	0.25
14.70	0.25


Hyd. No. 1 - SCS Runoff - 2 Yr - Qp = 3.10 cfs - Pre-developed (Onsite)
Q cfs
4
3
2
1
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

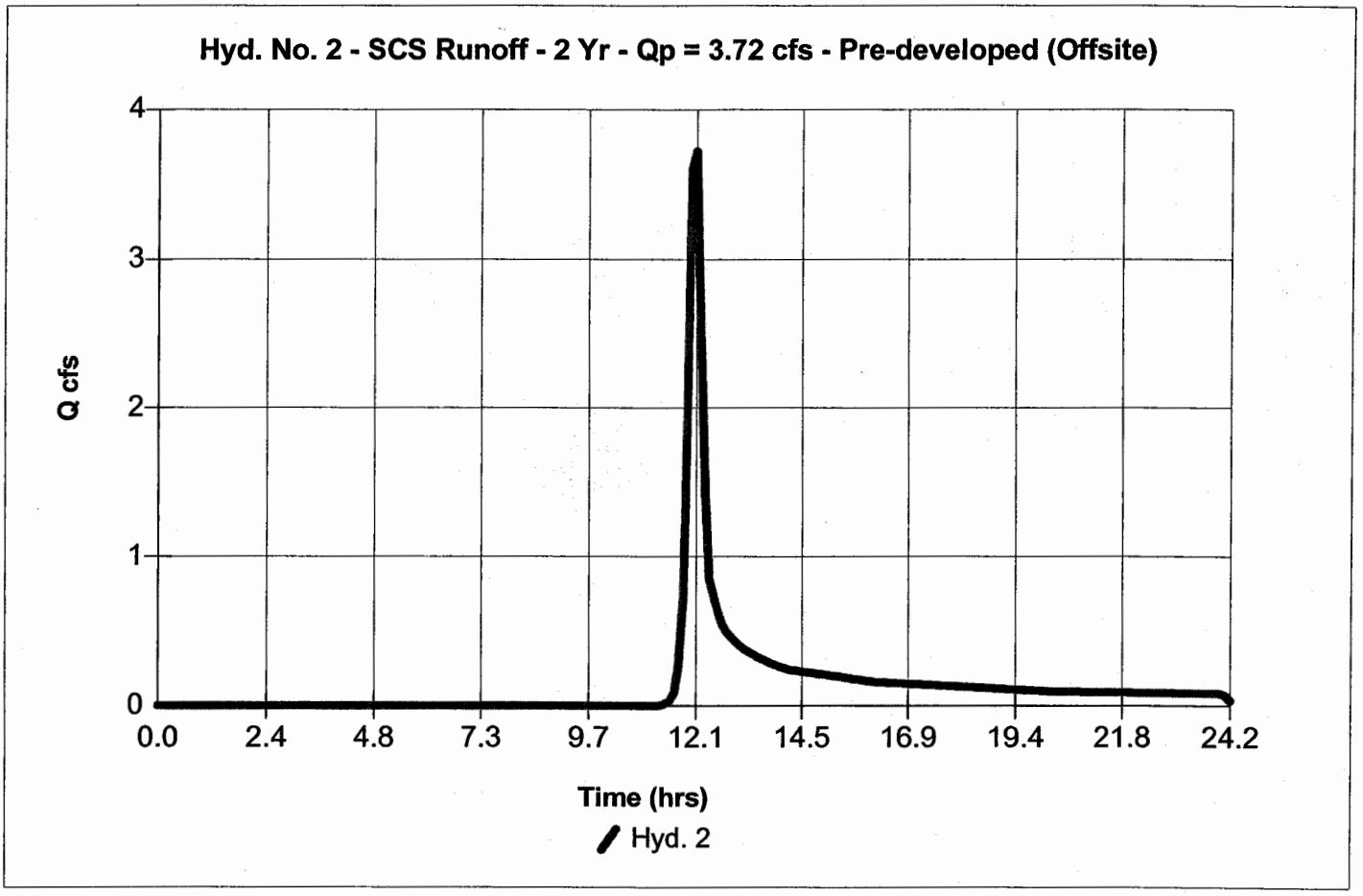
Pre-developed (Offsite)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.72 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 3.65 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 12,522 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
11.60	0.09
11.70	0.26
11.80	0.73
11.90	2.01
12.00	3.61
12.10	3.72 <<
12.20	2.55
12.30	1.44
12.40	0.85
12.50	0.74
12.60	0.63
12.70	0.54
12.80	0.49
12.90	0.46
13.00	0.43
13.10	0.40
13.20	0.38
13.30	0.36
13.40	0.34
13.50	0.33
13.60	0.31
13.70	0.30
13.80	0.29
13.90	0.27
14.00	0.26
14.10	0.25
14.20	0.24
14.30	0.24
14.40	0.23
14.50	0.23
14.60	0.22
14.70	0.22


Hyd. No. 2 - SCS Runoff - 2 Yr - Qp = 3.72 cfs - Pre-developed (Offsite)
Q cfs
4
3
2
1
0
0.0
2.4
4.8
7.3
9.7
12.1
14.5
16.9
19.4
21.8
24.2
Time (hrs)
Hyd. 2

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

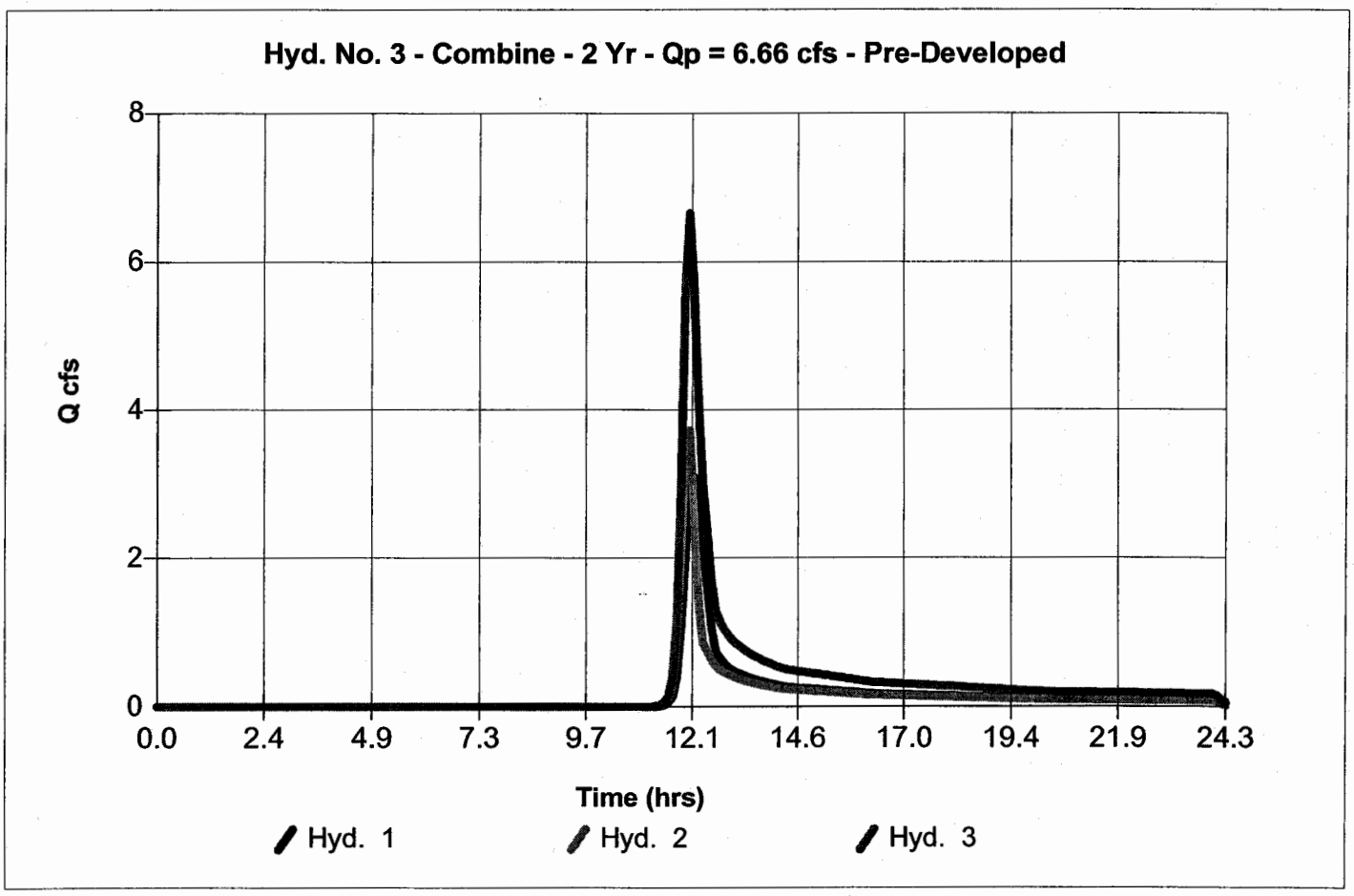
Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 6.66 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyds.	= 1, 2		

Hydrograph Volume = 26,245 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
11.60	0.05	0.09	0.14
11.70	0.14	0.26	0.40
11.80	0.39	0.73	1.12
11.90	1.08	2.01	3.09
12.00	2.10	3.61	5.71
12.10	2.93	3.72 <<	6.66 <<
12.20	3.10 <<	2.55	5.65
12.30	2.66	1.44	4.10
12.40	2.14	0.85	3.00
12.50	1.58	0.74	2.32
12.60	1.05	0.63	1.68
12.70	0.74	0.54	1.29
12.80	0.65	0.49	1.14
12.90	0.58	0.46	1.03
13.00	0.52	0.43	0.95
13.10	0.48	0.40	0.89
13.20	0.45	0.38	0.83
13.30	0.43	0.36	0.79
13.40	0.40	0.34	0.75
13.50	0.38	0.33	0.71
13.60	0.37	0.31	0.68
13.70	0.35	0.30	0.65
13.80	0.33	0.29	0.62
13.90	0.32	0.27	0.59
14.00	0.30	0.26	0.57
14.10	0.29	0.25	0.54
14.20	0.28	0.24	0.52
14.30	0.27	0.24	0.51
14.40	0.26	0.23	0.49
14.50	0.26	0.23	0.48
14.60	0.25	0.22	0.48
14.70	0.25	0.22	0.47
14.80	0.24	0.22	0.46
14.90	0.24	0.21	0.45
15.00	0.23	0.21	0.44
15.10	0.23	0.20	0.43
15.20	0.23	0.20	0.43
15.30	0.22	0.20	0.42


Hyd. No. 3 - Combine - 2 Yr - Qp = 6.66 cfs - Pre-Developed
Q cfs
8
6
4
2
0
0.0
2.4
4.9
7.3
9.7
12.1
14.6
17.0
19.4
21.9
24.3
Time (hrs)
Hyd. 1
Hyd. 2
Hyd. 3

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

Post developed

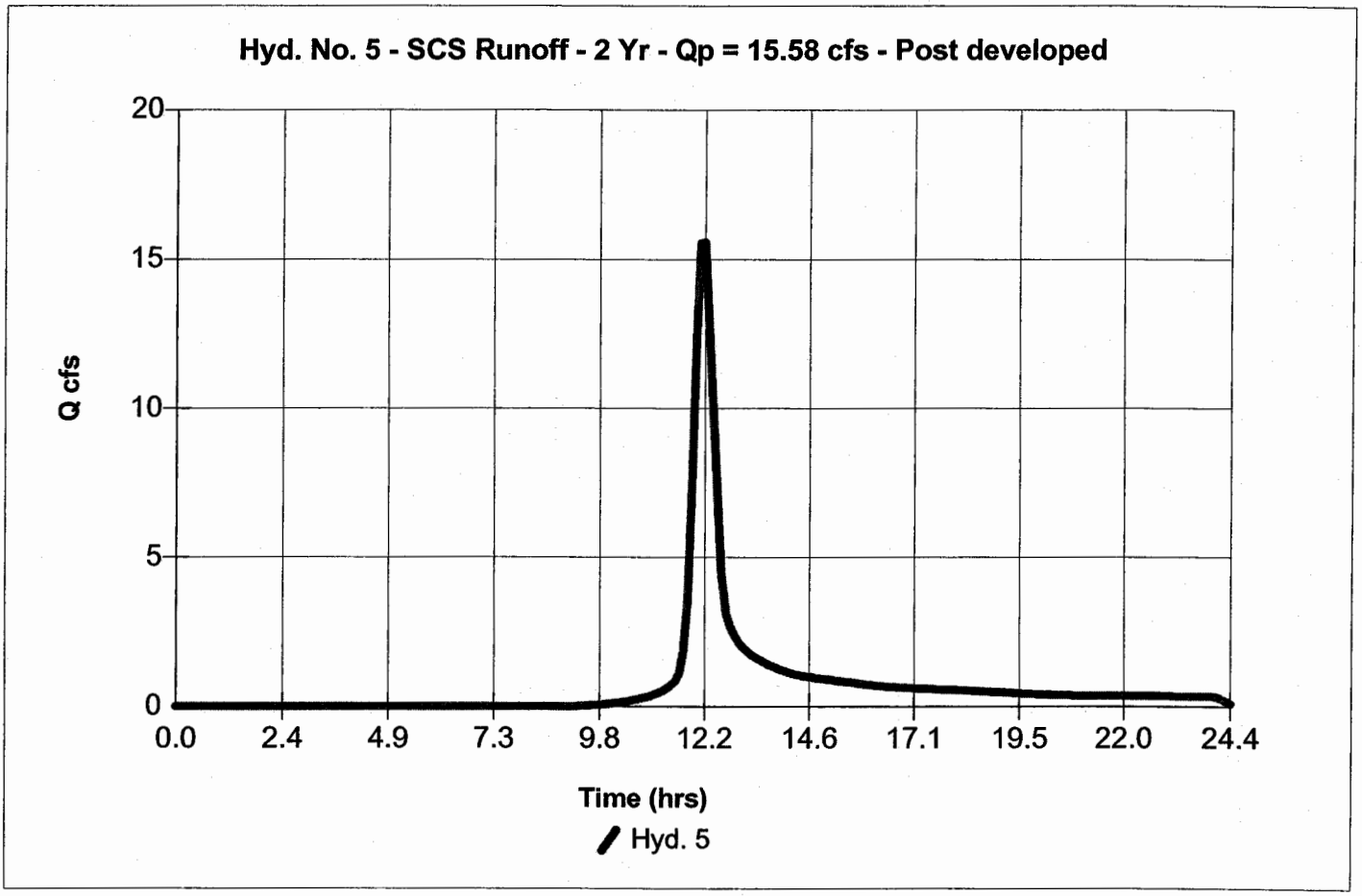
Hydrograph type	= SCS Runoff	Peak discharge	= 15.58 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 10.84 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Need comps.

Hydrograph Volume = 64,390 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
10.40	0.18
10.50	0.20
10.60	0.23
10.70	0.27
10.80	0.31
10.90	0.35
11.00	0.40
11.10	0.45
11.20	0.52
11.30	0.60
11.40	0.71
11.50	0.84
11.60	1.13
11.70	1.85
11.80	3.53
11.90	7.26
12.00	12.05
12.10	15.54
12.20	15.58 <<
12.30	12.90
12.40	9.99
12.50	7.07
12.60	4.49
12.70	3.10
12.80	2.70
12.90	2.39
13.00	2.15
13.10	1.98
13.20	1.84
13.30	1.73
13.40	1.64
13.50	1.55


Hyd. No. 5 - SCS Runoff - 2 Yr - Qp = 15.58 cfs - Post developed
Q cfs
20
15
10
5
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 5

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

BMP

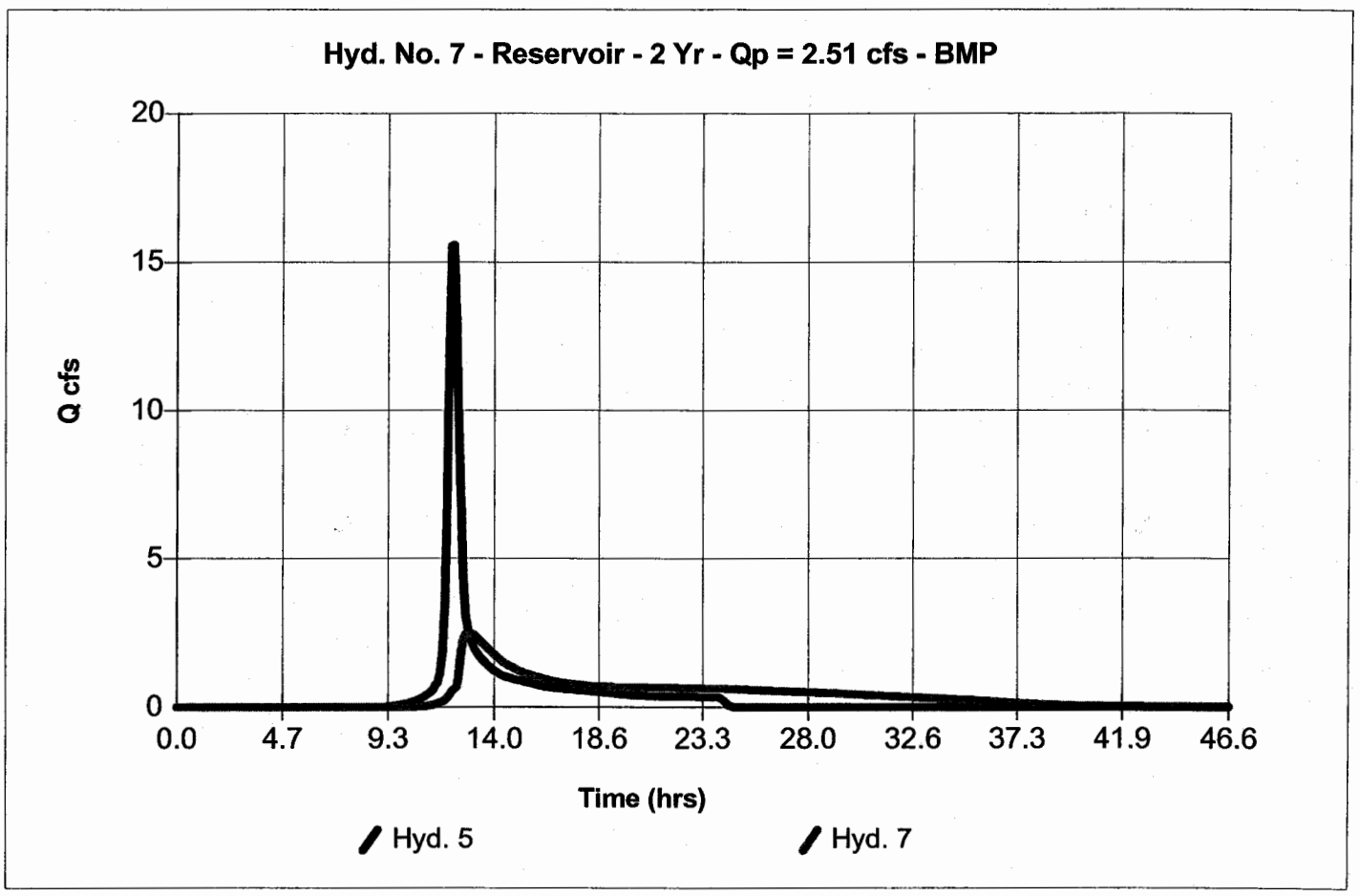
Hydrograph type	= Reservoir	Peak discharge	= 2.51 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= BMP
Max. Elevation	= 56.83 ft	Max. Storage	= 32,225 cuft

Storage Indication method used.

Outflow hydrograph volume = 64,389 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
10.90	0.35	53.61	35.47	0.03	-----	-----	-----	-----	-----	-----	-----	0.03
11.00	0.40	53.62	35.47	0.04	-----	-----	-----	-----	-----	-----	-----	0.04
11.10	0.45	53.64	35.47	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
11.20	0.52	53.66	35.47	0.06	-----	-----	-----	-----	-----	-----	-----	0.06
11.30	0.60	53.69	35.47	0.08	-----	-----	-----	-----	-----	-----	-----	0.08
11.40	0.71	53.72	35.47	0.10	-----	-----	-----	-----	-----	-----	-----	0.10
11.50	0.84	53.75	35.47	0.12	-----	-----	-----	-----	-----	-----	-----	0.12
11.60	1.13	53.79	35.47	0.15	-----	-----	-----	-----	-----	-----	-----	0.15
11.70	1.85	53.86	35.47	0.18	-----	-----	-----	-----	-----	-----	-----	0.18
11.80	3.53	53.99	35.47	0.24	-----	-----	-----	-----	-----	-----	-----	0.24
11.90	7.26	54.21	35.47	0.31	-----	-----	-----	-----	-----	-----	-----	0.31
12.00	12.05	54.61	35.47	0.41	-----	-----	-----	-----	-----	-----	-----	0.41
12.10	15.54	55.15	35.47	0.51	-----	-----	-----	-----	-----	-----	-----	0.51
12.20	15.58 <<	55.68	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
12.30	12.90	56.13	35.47	0.66	-----	-----	-----	-----	-----	-----	-----	0.66
12.40	9.99	56.45	35.47	0.70	-----	-----	0.27	-----	-----	-----	-----	0.97
12.50	7.07	56.66	35.47	0.73	-----	-----	0.99	-----	-----	-----	-----	1.72
12.60	4.49	56.78	35.47	0.74	-----	-----	1.49	-----	-----	-----	-----	2.23
12.70	3.10	56.82	35.47	0.75	-----	-----	1.69	-----	-----	-----	-----	2.44
12.80	2.70	56.83	35.47	0.75	-----	-----	1.76	-----	-----	-----	-----	2.51
12.90	2.39	56.83	35.47	0.75	-----	-----	1.76	-----	-----	-----	-----	2.51 <<
13.00	2.15	56.83	35.47	0.75	-----	-----	1.73	-----	-----	-----	-----	2.48
13.10	1.98	56.82	35.47	0.75	-----	-----	1.67	-----	-----	-----	-----	2.42
13.20	1.84	56.80	35.47	0.74	-----	-----	1.60	-----	-----	-----	-----	2.35
13.30	1.73	56.79	35.47	0.74	-----	-----	1.53	-----	-----	-----	-----	2.27
13.40	1.64	56.77	35.47	0.74	-----	-----	1.46	-----	-----	-----	-----	2.20
13.50	1.55	56.75	35.47	0.74	-----	-----	1.38	-----	-----	-----	-----	2.12
13.60	1.47	56.74	35.47	0.74	-----	-----	1.30	-----	-----	-----	-----	2.04
13.70	1.40	56.72	35.47	0.73	-----	-----	1.23	-----	-----	-----	-----	1.96
13.80	1.33	56.70	35.47	0.73	-----	-----	1.15	-----	-----	-----	-----	1.88
13.90	1.27	56.69	35.47	0.73	-----	-----	1.09	-----	-----	-----	-----	1.82
14.00	1.22	56.67	35.47	0.73	-----	-----	1.02	-----	-----	-----	-----	1.75
14.10	1.16	56.65	35.47	0.73	-----	-----	0.96	-----	-----	-----	-----	1.68
14.20	1.11	56.64	35.47	0.72	-----	-----	0.90	-----	-----	-----	-----	1.62
14.30	1.07	56.62	35.47	0.72	-----	-----	0.84	-----	-----	-----	-----	1.56
14.40	1.04	56.61	35.47	0.72	-----	-----	0.78	-----	-----	-----	-----	1.50


Hyd. No. 7 - Reservoir - 2 Yr - Qp = 2.51 cfs - BMP
Q cfs
20
15
10
5
0
0.0
4.7
9.3
14.0
18.6
23.3
28.0
32.6
37.3
41.9
46.6
Time (hrs)
Hyd. 5
Hyd. 7

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 8

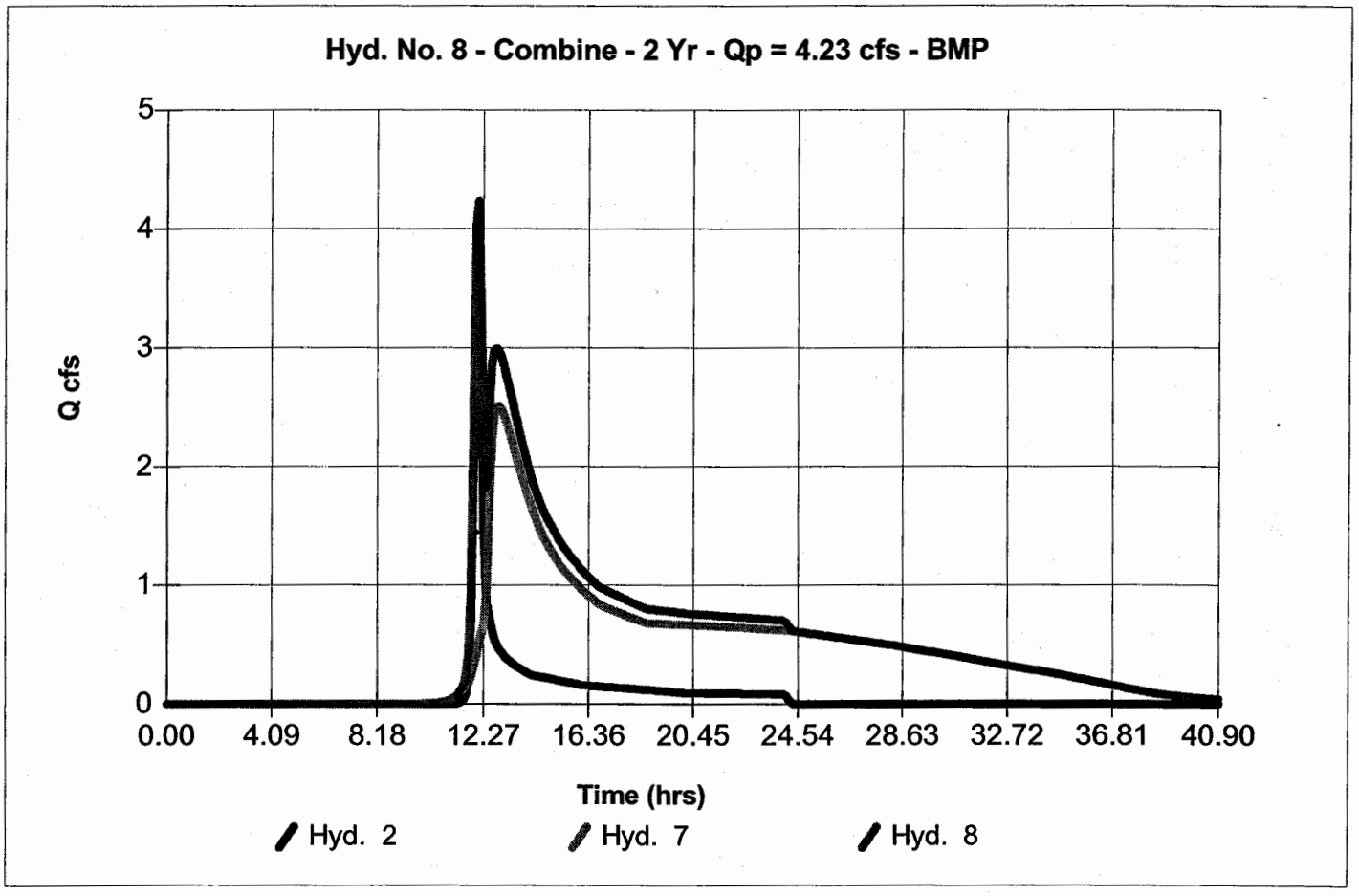
BMP

Hydrograph type	= Combine	Peak discharge	= 4.23 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyds.	= 2, 7		

Hydrograph Volume = 76,911 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 7 = (cfs)	Outflow (cfs)
11.10	0.00	0.05	0.05
11.20	0.00	0.06	0.06
11.30	0.00	0.08	0.08
11.40	0.02	0.10	0.11
11.50	0.04	0.12	0.16
11.60	0.09	0.15	0.24
11.70	0.26	0.18	0.44
11.80	0.73	0.24	0.97
11.90	2.01	0.31	2.32
12.00	3.61	0.41	4.02
12.10	3.72 <<	0.51	4.23 <<
12.20	2.55	0.60	3.14
12.30	1.44	0.66	2.10
12.40	0.85	0.97	1.83
12.50	0.74	1.72	2.46
12.60	0.63	2.23	2.86
12.70	0.54	2.44	2.98
12.80	0.49	2.51	3.00
12.90	0.46	2.51 <<	2.97
13.00	0.43	2.48	2.91
13.10	0.40	2.42	2.82
13.20	0.38	2.35	2.72
13.30	0.36	2.27	2.63
13.40	0.34	2.20	2.54
13.50	0.33	2.12	2.45
13.60	0.31	2.04	2.35
13.70	0.30	1.96	2.26
13.80	0.29	1.88	2.17
13.90	0.27	1.82	2.09
14.00	0.26	1.75	2.01
14.10	0.25	1.68	1.94
14.20	0.24	1.62	1.86
14.30	0.24	1.56	1.80
14.40	0.23	1.50	1.73
14.50	0.23	1.45	1.68
14.60	0.22	1.40	1.63
14.70	0.22	1.36	1.58
14.80	0.22	1.32	1.54


Hyd. No. 8 - Combine - 2 Yr - Qp = 4.23 cfs - BMP
Q cfs
5
4
3
2
1
0
0.00
4.09
8.18
12.27
16.36
20.45
24.54
28.63
32.72
36.81
40.90
Time (hrs)
Hyd. 2
Hyd. 7
Hyd. 8

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 10

Temp Sed Basin

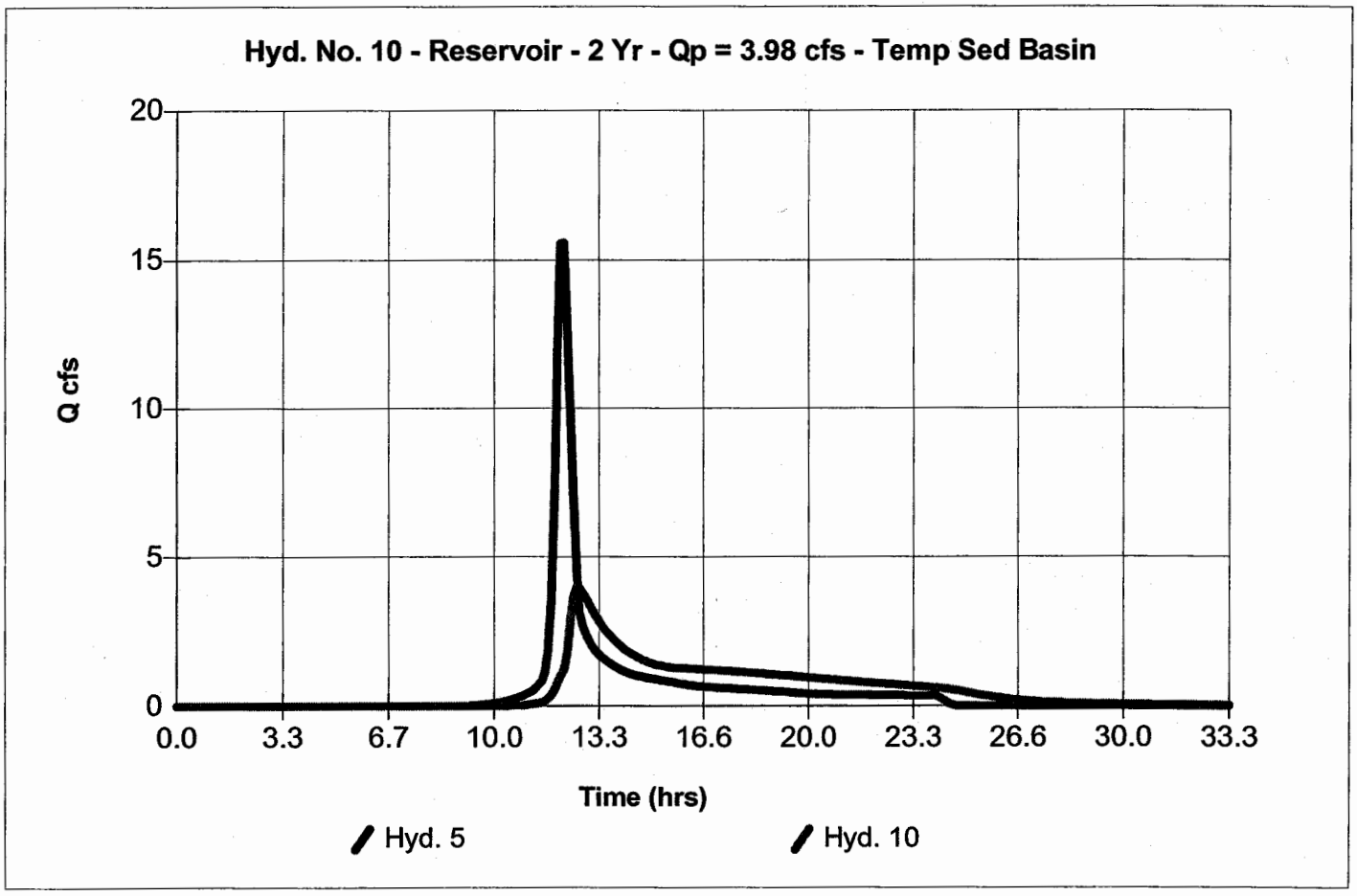
Hydrograph type	= Reservoir	Peak discharge	= 3.98 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= Temp Sed Basin
Max. Elevation	= 56.97 ft	Max. Storage	= 28,760 cuft

Storage Indication method used.

Outflow hydrograph volume = 64,389 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
11.10	0.45	54.32	37.66	0.05	-----	-----	-----	-----	-----	-----	-----	0.05
11.20	0.52	54.34	37.66	0.06	-----	-----	-----	-----	-----	-----	-----	0.06
11.30	0.60	54.36	37.66	0.07	-----	-----	-----	-----	-----	-----	-----	0.07
11.40	0.71	54.38	37.66	0.10	-----	-----	-----	-----	-----	-----	-----	0.10
11.50	0.84	54.41	37.66	0.12	-----	-----	-----	-----	-----	-----	-----	0.12
11.60	1.13	54.44	37.66	0.16	-----	-----	-----	-----	-----	-----	-----	0.16
11.70	1.85	54.50	37.66	0.23	-----	-----	-----	-----	-----	-----	-----	0.23
11.80	3.53	54.60	37.66	0.36	-----	-----	-----	-----	-----	-----	-----	0.36
11.90	7.26	54.81	37.66	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
12.00	12.05	55.15	37.66	0.79	-----	-----	-----	-----	-----	-----	-----	0.79
12.10	15.54	55.61	37.66	1.02	-----	-----	-----	-----	-----	-----	-----	1.02
12.20	15.58 <<	56.11	37.66	1.22	-----	-----	-----	-----	-----	-----	-----	1.22
12.30	12.90	56.49	37.66	1.35	-----	-----	0.39	-----	-----	-----	-----	1.74
12.40	9.99	56.76	37.66	1.44	-----	-----	1.41	-----	-----	-----	-----	2.84
12.50	7.07	56.91	37.66	1.48	-----	-----	2.17	-----	-----	-----	-----	3.65
12.60	4.49	56.97 <<	37.66	1.50	-----	-----	2.48	-----	-----	-----	-----	3.98 <<
12.70	3.10	56.97	37.66	1.50	-----	-----	2.45	-----	-----	-----	-----	3.95
12.80	2.70	56.94	37.66	1.49	-----	-----	2.29	-----	-----	-----	-----	3.79
12.90	2.39	56.90	37.66	1.48	-----	-----	2.12	-----	-----	-----	-----	3.60
13.00	2.15	56.87	37.66	1.47	-----	-----	1.93	-----	-----	-----	-----	3.40
13.10	1.98	56.83	37.66	1.46	-----	-----	1.75	-----	-----	-----	-----	3.21
13.20	1.84	56.80	37.66	1.45	-----	-----	1.58	-----	-----	-----	-----	3.03
13.30	1.73	56.76	37.66	1.44	-----	-----	1.42	-----	-----	-----	-----	2.86
13.40	1.64	56.73	37.66	1.43	-----	-----	1.28	-----	-----	-----	-----	2.71
13.50	1.55	56.70	37.66	1.42	-----	-----	1.15	-----	-----	-----	-----	2.56
13.60	1.47	56.67	37.66	1.41	-----	-----	1.03	-----	-----	-----	-----	2.44
13.70	1.40	56.65	37.66	1.40	-----	-----	0.91	-----	-----	-----	-----	2.31
13.80	1.33	56.62	37.66	1.39	-----	-----	0.81	-----	-----	-----	-----	2.21
13.90	1.27	56.59	37.66	1.38	-----	-----	0.72	-----	-----	-----	-----	2.11
14.00	1.22	56.57	37.66	1.38	-----	-----	0.64	-----	-----	-----	-----	2.01
14.10	1.16	56.55	37.66	1.37	-----	-----	0.56	-----	-----	-----	-----	1.93
14.20	1.11	56.53	37.66	1.36	-----	-----	0.49	-----	-----	-----	-----	1.85
14.30	1.07	56.50	37.66	1.36	-----	-----	0.42	-----	-----	-----	-----	1.77
14.40	1.04	56.48	37.66	1.35	-----	-----	0.36	-----	-----	-----	-----	1.71
14.50	1.01	56.47	37.66	1.34	-----	-----	0.31	-----	-----	-----	-----	1.65
14.60	0.99	56.45	37.66	1.34	-----	-----	0.26	-----	-----	-----	-----	1.59


Hyd. No. 10 - Reservoir - 2 Yr - Qp = 3.98 cfs - Temp Sed Basin
Q cfs
20
15
10
5
0
0.0
3.3
6.7
10.0
13.3
16.6
20.0
23.3
26.6
30.0
33.3
Time (hrs)
Hyd. 5
Hyd. 10

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	8.71	6	732	36,038	----	------	------	Pre-developed (Onsite)
2	SCS Runoff	10.52	6	720	32,885	----	------	------	Pre-developed (Offsite)
3	Combine	18.75	6	726	68,922	1, 2	------	------	Pre-Developed
5	SCS Runoff	34.96	6	726	141,708	----	------	------	Post developed
7	Reservoir	16.30	6	750	141,707	5	58.57	57,448	BMP
8	Combine	18.04	6	750	174,592	2, 7	------	------	BMP
10	Reservoir	17.40	6	750	141,707	5	58.58	52,515	Temp Sed Basin

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

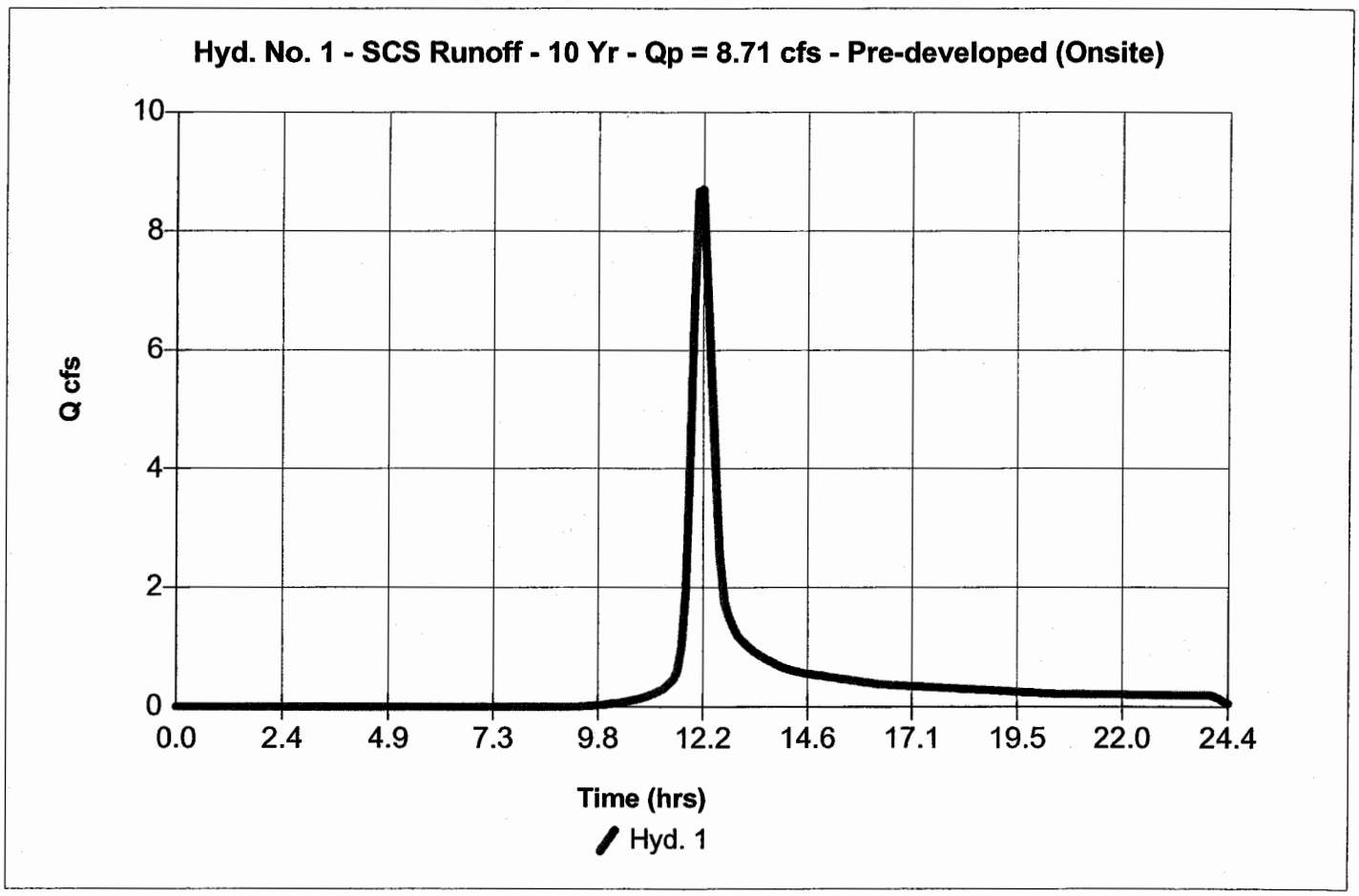
Pre-developed (Onsite)

Hydrograph type	= SCS Runoff	Peak discharge	= 8.71 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 3.75 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 36,038 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
10.40	0.09
10.50	0.10
10.60	0.12
10.70	0.14
10.80	0.16
10.90	0.18
11.00	0.21
11.10	0.24
11.20	0.27
11.30	0.32
11.40	0.38
11.50	0.45
11.60	0.61
11.70	1.01
11.80	1.94
11.90	4.01
12.00	6.70
12.10	8.67
12.20	8.71 <<
12.30	7.22
12.40	5.60
12.50	3.97
12.60	2.53
12.70	1.75
12.80	1.52
12.90	1.35
13.00	1.21
13.10	1.12
13.20	1.04
13.30	0.98
13.40	0.92
13.50	0.87


Hyd. No. 1 - SCS Runoff - 10 Yr - Qp = 8.71 cfs - Pre-developed (Onsite)
Q cfs
10
8
6
4
2
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

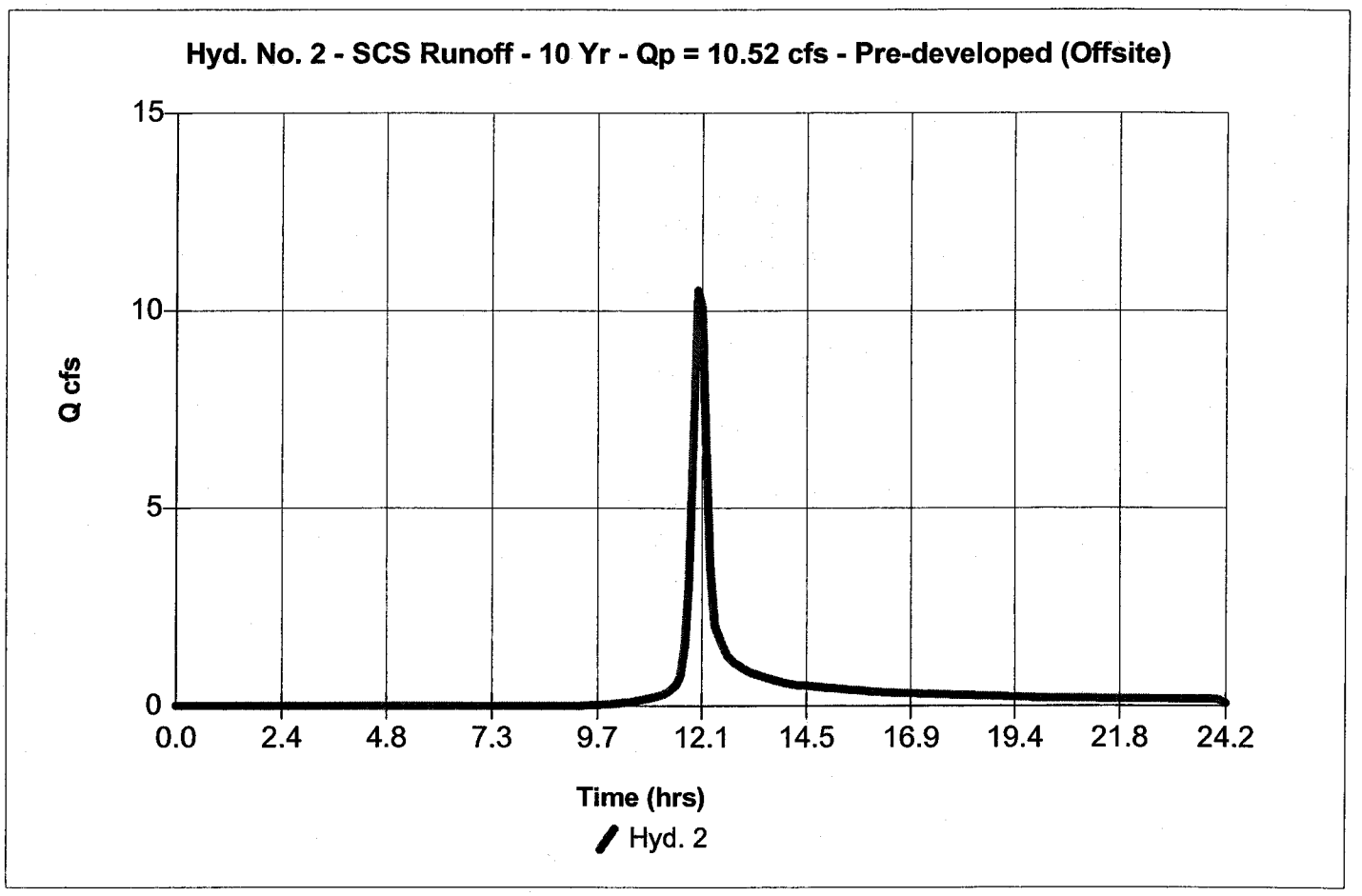
Pre-developed (Offsite)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.52 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 3.65 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 32,885 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
10.50	0.11
10.60	0.13
10.70	0.15
10.80	0.17
10.90	0.20
11.00	0.23
11.10	0.25
11.20	0.29
11.30	0.35
11.40	0.43
11.50	0.51
11.60	0.76
11.70	1.52
11.80	3.17
11.90	6.72
12.00	10.52 <<
12.10	10.09
12.20	6.59
12.30	3.53
12.40	2.04
12.50	1.75
12.60	1.48
12.70	1.27
12.80	1.14
12.90	1.06
13.00	0.99
13.10	0.92
13.20	0.87
13.30	0.82
13.40	0.78
13.50	0.74
13.60	0.71


Hyd. No. 2 - SCS Runoff - 10 Yr - Qp = 10.52 cfs - Pre-developed (Offsite)
15
10
5
0
Q cfs
0.0
2.4
4.8
7.3
9.7
12.1
14.5
16.9
19.4
21.8
24.2
Time (hrs)
Hyd. 2

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

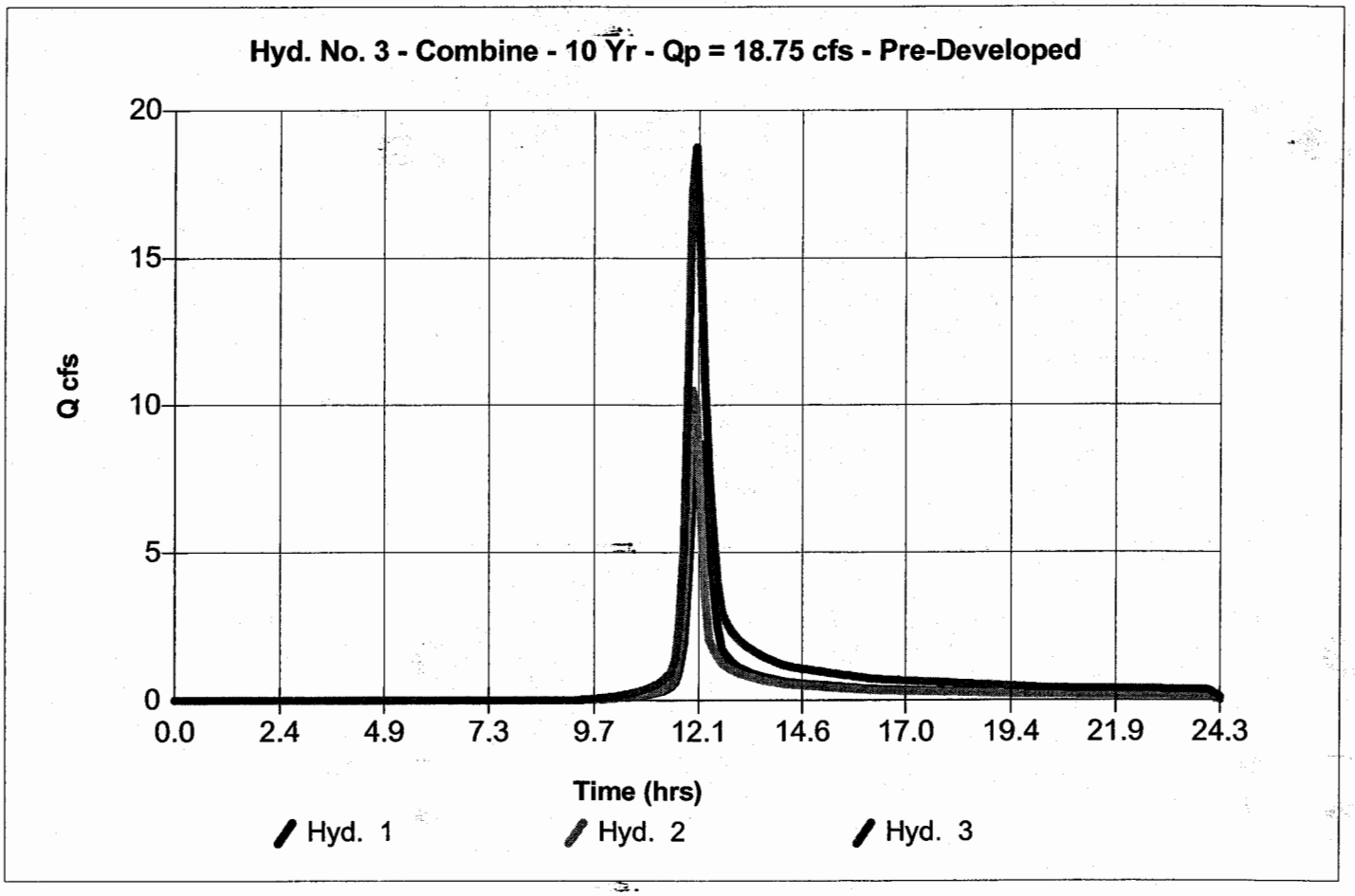
Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 18.75 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyds.	= 1, 2		

Hydrograph Volume = 68,922 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
10.50	0.10	0.11	0.21
10.60	0.12	0.13	0.25
10.70	0.14	0.15	0.28
10.80	0.16	0.17	0.33
10.90	0.18	0.20	0.38
11.00	0.21	0.23	0.44
11.10	0.24	0.25	0.49
11.20	0.27	0.29	0.56
11.30	0.32	0.35	0.67
11.40	0.38	0.43	0.81
11.50	0.45	0.51	0.97
11.60	0.61	0.76	1.37
11.70	1.01	1.52	2.53
11.80	1.94	3.17	5.11
11.90	4.01	6.72	10.74
12.00	6.70	10.52 <<	17.22
12.10	8.67	10.09	18.75 <<
12.20	8.71 <<	6.59	15.29
12.30	7.22	3.53	10.75
12.40	5.60	2.04	7.64
12.50	3.97	1.75	5.72
12.60	2.53	1.48	4.00
12.70	1.75	1.27	3.02
12.80	1.52	1.14	2.66
12.90	1.35	1.06	2.40
13.00	1.21	0.99	2.20
13.10	1.12	0.92	2.04
13.20	1.04	0.87	1.91
13.30	0.98	0.82	1.80
13.40	0.92	0.78	1.71
13.50	0.87	0.74	1.62
13.60	0.83	0.71	1.54
13.70	0.79	0.67	1.46
13.80	0.75	0.64	1.40
13.90	0.72	0.62	1.33
14.00	0.69	0.59	1.27
14.10	0.66	0.56	1.22
14.20	0.63	0.54	1.17


Hyd. No. 3 - Combine - 10 Yr - Qp = 18.75 cfs - Pre-Developed
Q cfs
20
15
10
5
0
0.0
2.4
4.9
7.3
9.7
12.1
14.6
17.0
19.4
21.9
24.3
Time (hrs)
Hyd. 1
Hyd. 2
Hyd. 3

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

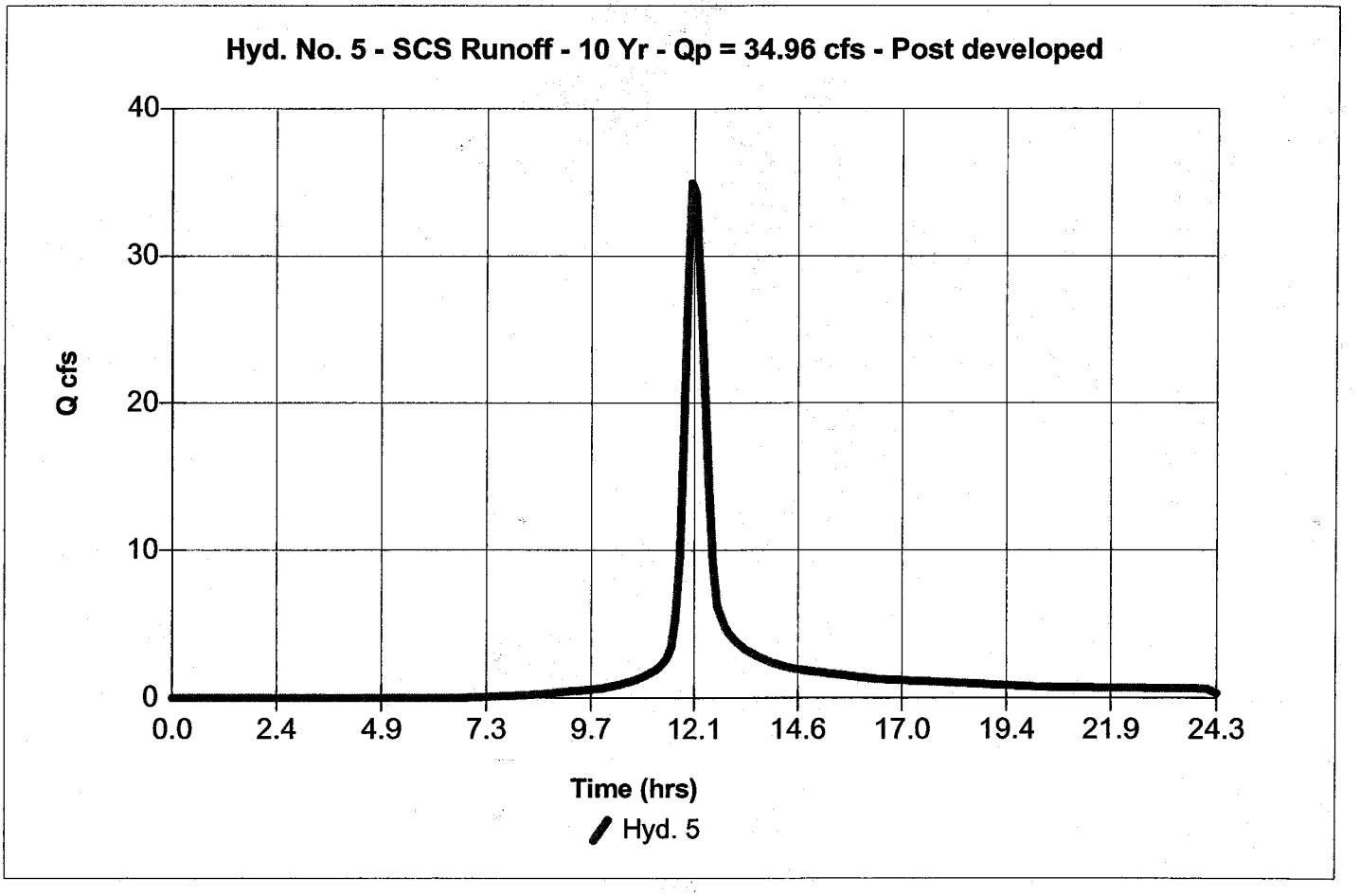
Post developed

Hydrograph type	= SCS Runoff	Peak discharge	= 34.96 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 10.84 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 141,708 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
9.00	0.37
9.10	0.40
9.20	0.43
9.30	0.46
9.40	0.48
9.50	0.50
9.60	0.53
9.70	0.55
9.80	0.58
9.90	0.62
10.00	0.66
10.10	0.71
10.20	0.77
10.30	0.84
10.40	0.91
10.50	0.99
10.60	1.07
10.70	1.17
10.80	1.28
10.90	1.40
11.00	1.54
11.10	1.67
11.20	1.84
11.30	2.05
11.40	2.35
11.50	2.70
11.60	3.45
11.70	5.33
11.80	9.45
11.90	17.87
12.00	28.05
12.10	34.96 <<


Hyd. No. 5 - SCS Runoff - 10 Yr - Qp = 34.96 cfs - Post developed
Q cfs
40
30
20
10
0
0.0
2.4
4.9
7.3
9.7
12.1
14.6
17.0
19.4
21.9
24.3
Time (hrs)
Hyd. 5

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

BMP

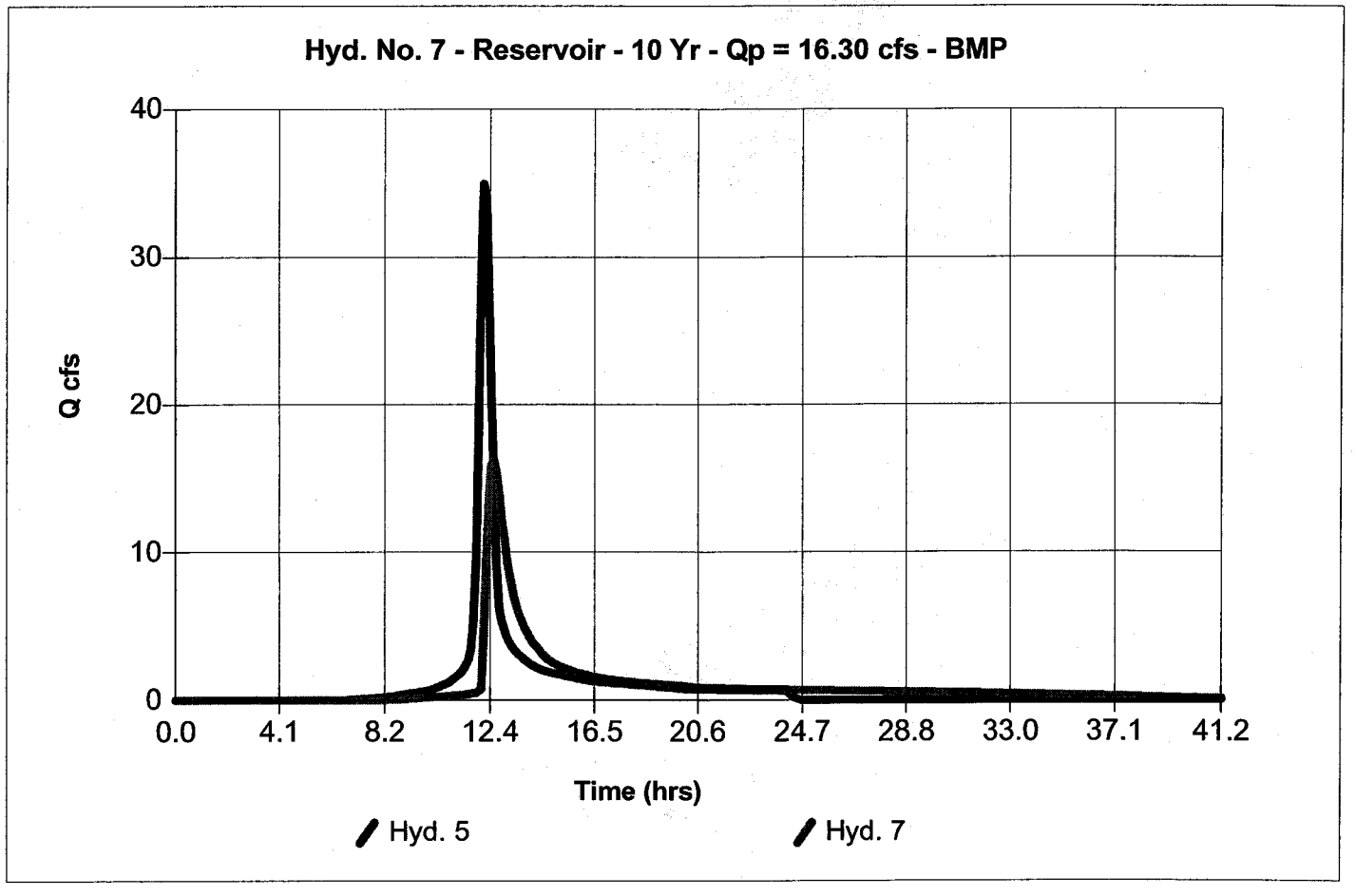
Hydrograph type	= Reservoir	Peak discharge	= 16.30 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= BMP
Max. Elevation	= 58.57 ft	Max. Storage	= 57,448 cuft

Storage Indication method used.

Outflow hydrograph volume = 141,707 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9.90	0.62	53.83	35.47	0.17	-----	-----	-----	-----	-----	-----	-----	0.17
10.00	0.66	53.86	35.47	0.18	-----	-----	-----	-----	-----	-----	-----	0.18
10.10	0.71	53.88	35.47	0.19	-----	-----	-----	-----	-----	-----	-----	0.19
10.20	0.77	53.91	35.47	0.21	-----	-----	-----	-----	-----	-----	-----	0.21
10.30	0.84	53.94	35.47	0.22	-----	-----	-----	-----	-----	-----	-----	0.22
10.40	0.91	53.97	35.47	0.23	-----	-----	-----	-----	-----	-----	-----	0.23
10.50	0.99	54.01	35.47	0.24	-----	-----	-----	-----	-----	-----	-----	0.24
10.60	1.07	54.04	35.47	0.26	-----	-----	-----	-----	-----	-----	-----	0.26
10.70	1.17	54.08	35.47	0.27	-----	-----	-----	-----	-----	-----	-----	0.27
10.80	1.28	54.12	35.47	0.28	-----	-----	-----	-----	-----	-----	-----	0.28
10.90	1.40	54.16	35.47	0.30	-----	-----	-----	-----	-----	-----	-----	0.30
11.00	1.54	54.21	35.47	0.31	-----	-----	-----	-----	-----	-----	-----	0.31
11.10	1.67	54.27	35.47	0.33	-----	-----	-----	-----	-----	-----	-----	0.33
11.20	1.84	54.33	35.47	0.34	-----	-----	-----	-----	-----	-----	-----	0.34
11.30	2.05	54.40	35.47	0.36	-----	-----	-----	-----	-----	-----	-----	0.36
11.40	2.35	54.47	35.47	0.38	-----	-----	-----	-----	-----	-----	-----	0.38
11.50	2.70	54.57	35.47	0.40	-----	-----	-----	-----	-----	-----	-----	0.40
11.60	3.45	54.68	35.47	0.42	-----	-----	-----	-----	-----	-----	-----	0.42
11.70	5.33	54.85	35.47	0.46	-----	-----	-----	-----	-----	-----	-----	0.46
11.80	9.45	55.12	35.47	0.51	-----	-----	-----	-----	-----	-----	-----	0.51
11.90	17.87	55.58	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
12.00	28.05	56.31	35.47	0.68	-----	-----	0.02	-----	-----	-----	-----	0.70
12.10	34.96 <<	57.15	35.47	0.78	-----	-----	3.55	-----	-----	-----	-----	4.33
12.20	34.22	57.86	35.47	0.86	-----	-----	8.77	-----	-----	-----	-----	9.63
12.30	27.88	58.31	35.47	0.91	-----	-----	12.82	-----	-----	-----	-----	13.73
12.40	21.18	58.53	35.47	0.93	-----	-----	14.95	-----	-----	-----	-----	15.88
12.50	14.65	58.57	35.47	0.93	-----	-----	15.37	-----	-----	-----	-----	16.30 <<
12.60	9.08	58.48	35.47	0.92	-----	-----	14.47	-----	-----	-----	-----	15.39
12.70	6.20	58.32	35.47	0.91	-----	-----	12.95	-----	-----	-----	-----	13.86
12.80	5.37	58.16	35.47	0.89	-----	-----	11.42	-----	-----	-----	-----	12.31
12.90	4.74	58.01	35.47	0.88	-----	-----	10.09	-----	-----	-----	-----	10.97
13.00	4.26	57.87	35.47	0.86	-----	-----	8.82	-----	-----	-----	-----	9.68
13.10	3.91	57.74	35.47	0.85	-----	-----	7.75	-----	-----	-----	-----	8.60
13.20	3.63	57.62	35.47	0.84	-----	-----	6.86	-----	-----	-----	-----	7.70
13.30	3.41	57.53	35.47	0.83	-----	-----	6.12	-----	-----	-----	-----	6.95
13.40	3.21	57.44	35.47	0.82	-----	-----	5.50	-----	-----	-----	-----	6.31


Hyd. No. 7 - Reservoir - 10 Yr - Qp = 16.30 cfs - BMP
Q cfs
40
30
20
10
0
0.0
4.1
8.2
12.4
16.5
20.6
24.7
28.8
33.0
37.1
41.2
Time (hrs)
Hyd. 5
Hyd. 7

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 8

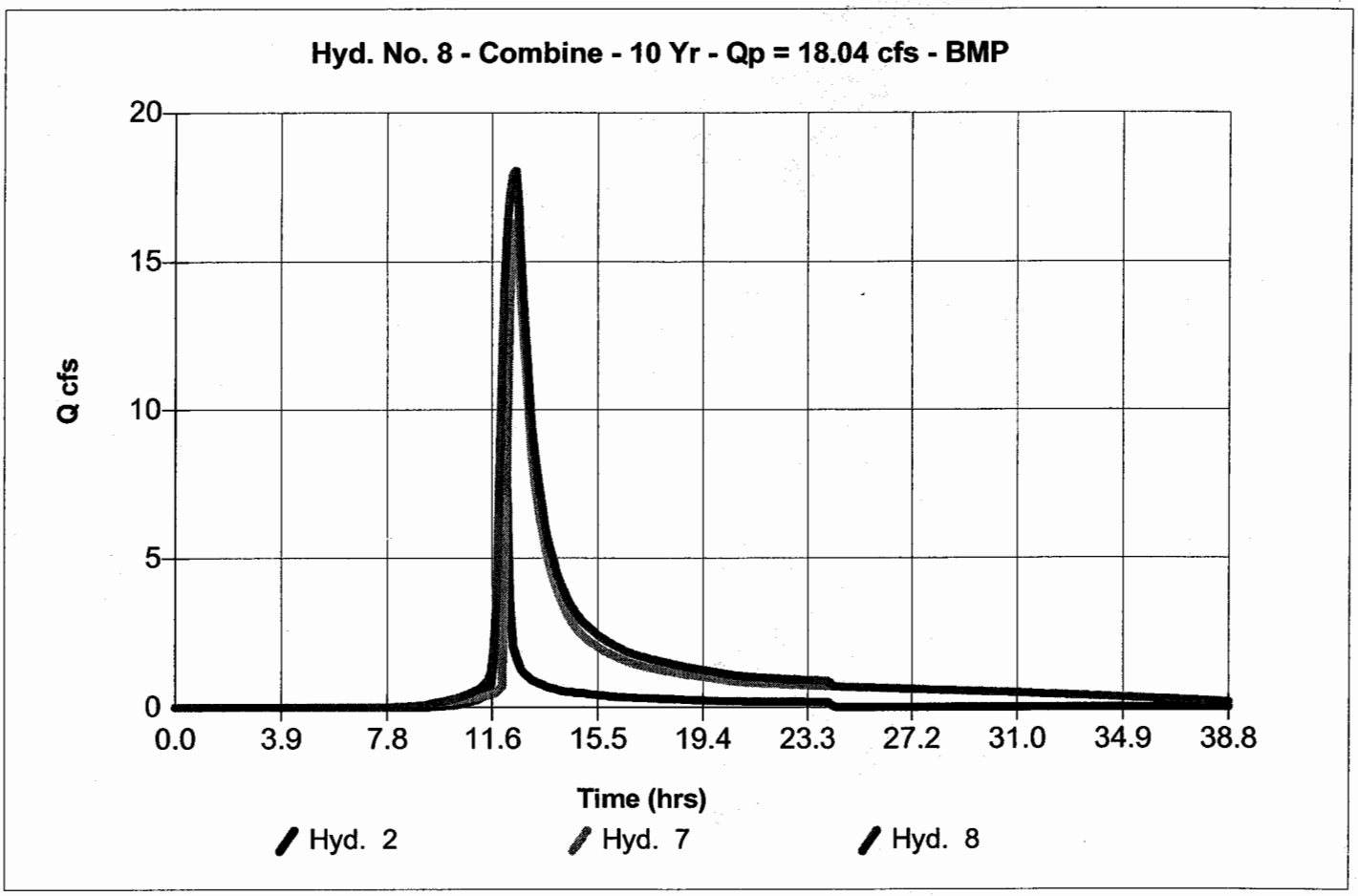
BMP

Hydrograph type	= Combine	Peak discharge	= 18.04 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyds.	= 2, 7		

Hydrograph Volume = 174,592 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 7 = (cfs)	Outflow (cfs)
9.80	0.03	0.16	0.19
9.90	0.04	0.17	0.21
10.00	0.05	0.18	0.23
10.10	0.06	0.19	0.25
10.20	0.07	0.21	0.28
10.30	0.08	0.22	0.30
10.40	0.10	0.23	0.33
10.50	0.11	0.24	0.36
10.60	0.13	0.26	0.38
10.70	0.15	0.27	0.42
10.80	0.17	0.28	0.45
10.90	0.20	0.30	0.49
11.00	0.23	0.31	0.54
11.10	0.25	0.33	0.58
11.20	0.29	0.34	0.63
11.30	0.35	0.36	0.71
11.40	0.43	0.38	0.81
11.50	0.51	0.40	0.91
11.60	0.76	0.42	1.18
11.70	1.52	0.46	1.98
11.80	3.17	0.51	3.68
11.90	6.72	0.58	7.30
12.00	10.52 <<	0.70	11.22
12.10	10.09	4.33	14.42
12.20	6.59	9.63	16.22
12.30	3.53	13.73	17.26
12.40	2.04	15.88	17.92
12.50	1.75	16.30 <<	18.04 <<
12.60	1.48	15.39	16.87
12.70	1.27	13.86	15.12
12.80	1.14	12.31	13.45
12.90	1.06	10.97	12.03
13.00	0.99	9.68	10.67
13.10	0.92	8.60	9.52
13.20	0.87	7.70	8.57
13.30	0.82	6.95	7.77
13.40	0.78	6.31	7.10
13.50	0.74	5.78	6.52


Hyd. No. 8 - Combine - 10 Yr - Qp = 18.04 cfs - BMP
Q cfs
20
15
10
5
0
0.0
3.9
7.8
11.6
15.5
19.4
23.3
27.2
31.0
34.9
38.8
Time (hrs)
Hyd. 2
Hyd. 7
Hyd. 8

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 10

Temp Sed Basin

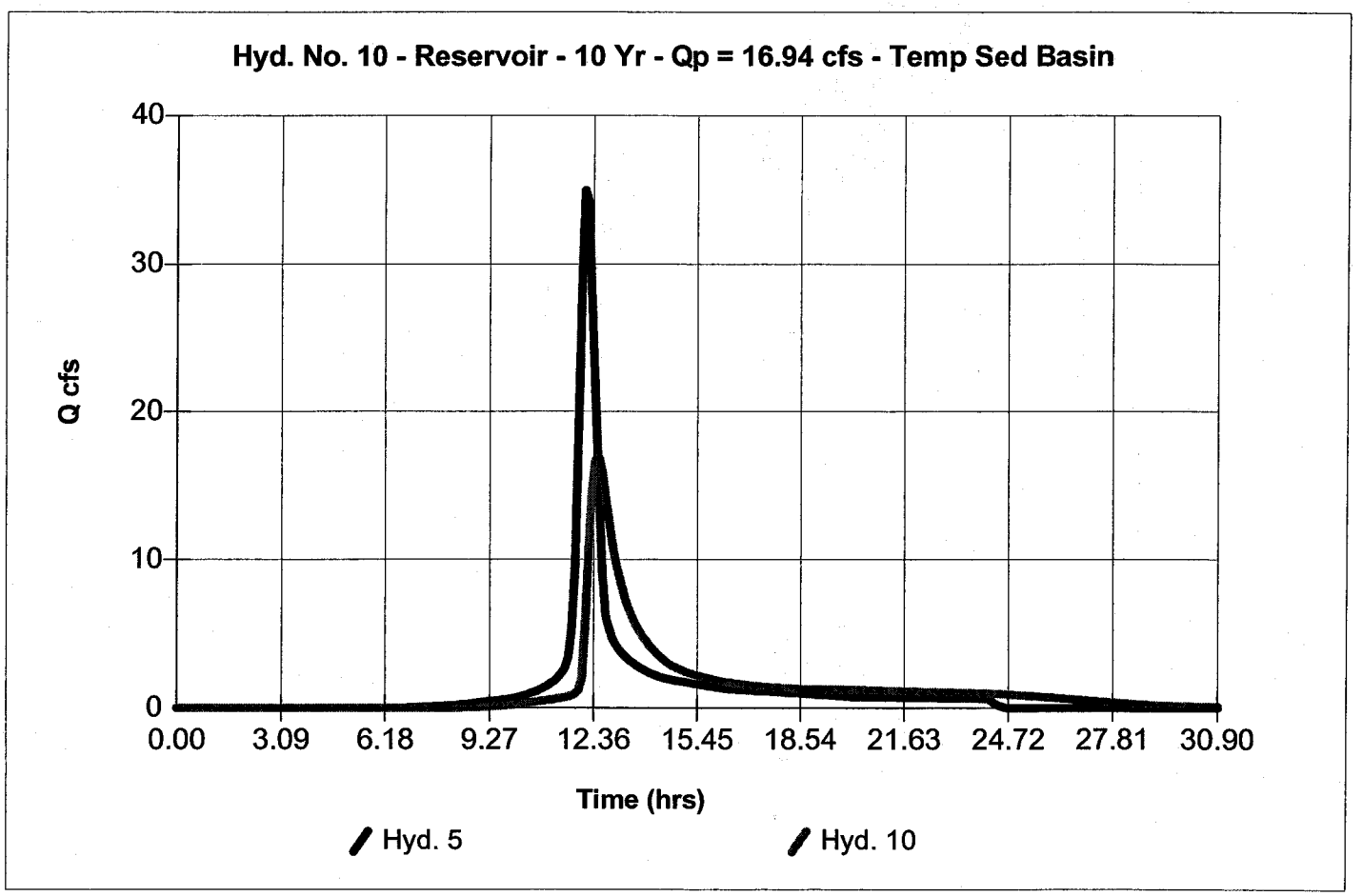
Hydrograph type	= Reservoir	Peak discharge	= 16.94 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= Temp Sed Basin
Max. Elevation	= 58.53 ft	Max. Storage	= 53,535 cuft

Storage Indication method used.

Outflow hydrograph volume = 141,707 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9.80	0.58	54.46	37.66	0.18	-----	-----	-----	-----	-----	-----	-----	0.18
9.90	0.62	54.47	37.66	0.20	-----	-----	-----	-----	-----	-----	-----	0.20
10.00	0.66	54.49	37.66	0.23	-----	-----	-----	-----	-----	-----	-----	0.23
10.10	0.71	54.51	37.66	0.25	-----	-----	-----	-----	-----	-----	-----	0.25
10.20	0.77	54.53	37.66	0.28	-----	-----	-----	-----	-----	-----	-----	0.28
10.30	0.84	54.55	37.66	0.31	-----	-----	-----	-----	-----	-----	-----	0.31
10.40	0.91	54.58	37.66	0.34	-----	-----	-----	-----	-----	-----	-----	0.34
10.50	0.99	54.60	37.66	0.37	-----	-----	-----	-----	-----	-----	-----	0.37
10.60	1.07	54.63	37.66	0.40	-----	-----	-----	-----	-----	-----	-----	0.40
10.70	1.17	54.66	37.66	0.43	-----	-----	-----	-----	-----	-----	-----	0.43
10.80	1.28	54.69	37.66	0.47	-----	-----	-----	-----	-----	-----	-----	0.47
10.90	1.40	54.73	37.66	0.50	-----	-----	-----	-----	-----	-----	-----	0.50
11.00	1.54	54.77	37.66	0.53	-----	-----	-----	-----	-----	-----	-----	0.53
11.10	1.67	54.81	37.66	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
11.20	1.84	54.86	37.66	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
11.30	2.05	54.92	37.66	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
11.40	2.35	54.98	37.66	0.69	-----	-----	-----	-----	-----	-----	-----	0.69
11.50	2.70	55.05	37.66	0.73	-----	-----	-----	-----	-----	-----	-----	0.73
11.60	3.45	55.13	37.66	0.78	-----	-----	-----	-----	-----	-----	-----	0.78
11.70	5.33	55.26	37.66	0.85	-----	-----	-----	-----	-----	-----	-----	0.85
11.80	9.45	55.48	37.66	0.96	-----	-----	-----	-----	-----	-----	-----	0.96
11.90	17.87	55.93	37.66	1.15	-----	-----	-----	-----	-----	-----	-----	1.15
12.00	28.05	56.57	37.66	1.38	-----	-----	0.62	-----	-----	-----	-----	2.00
12.10	34.96 <<	57.27	37.66	1.59	-----	-----	4.33	-----	-----	-----	-----	5.91
12.20	34.22	57.90	37.66	1.76	-----	-----	9.10	-----	-----	-----	-----	10.86
12.30	27.88	58.31	37.66	1.86	-----	-----	12.85	-----	-----	-----	-----	14.71
12.40	21.18	58.51	37.66	1.90	-----	-----	14.78	-----	-----	-----	-----	16.69
12.50	14.65	58.53	37.66	1.91	-----	-----	15.03	-----	-----	-----	-----	16.94 <<
12.60	9.08	58.43	37.66	1.89	-----	-----	14.02	-----	-----	-----	-----	15.90
12.70	6.20	58.27	37.66	1.85	-----	-----	12.41	-----	-----	-----	-----	14.26
12.80	5.37	58.10	37.66	1.80	-----	-----	10.83	-----	-----	-----	-----	12.64
12.90	4.74	57.94	37.66	1.77	-----	-----	9.44	-----	-----	-----	-----	11.21
13.00	4.26	57.79	37.66	1.73	-----	-----	8.22	-----	-----	-----	-----	9.94
13.10	3.91	57.67	37.66	1.70	-----	-----	7.19	-----	-----	-----	-----	8.89
13.20	3.63	57.55	37.66	1.67	-----	-----	6.33	-----	-----	-----	-----	8.00
13.30	3.41	57.46	37.66	1.64	-----	-----	5.60	-----	-----	-----	-----	7.24


Hyd. No. 10 - Reservoir - 10 Yr - Qp = 16.94 cfs - Temp Sed Basin
Q cfs
40
30
20
10
0
0.00
3.09
6.18
9.27
12.36
15.45
18.54
21.63
24.72
27.81
30.90
Time (hrs)
Hyd. 5
Hyd. 10

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	10.33	6	726	42,552	----	------	------	Pre-developed (Onsite)
2	SCS Runoff	12.51	6	720	38,828	----	------	------	Pre-developed (Offsite)
3	Combine	22.22	6	726	81,380	1, 2	------	------	Pre-Developed
5	SCS Runoff	40.22	6	726	163,065	----	------	------	Post developed
7	Reservoir	23.72	6	744	163,064	5	58.88	62,536	BMP
8	Combine	26.08	6	744	201,892	2, 7	------	------	BMP
10	Reservoir	24.80	6	744	163,064	5	58.88	57,444	Temp Sed Basin

Proj. file: 9225-BMP.gpw | Return Period: 25 yr | Run date: 12-22-2002

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 10

Temp Sed Basin

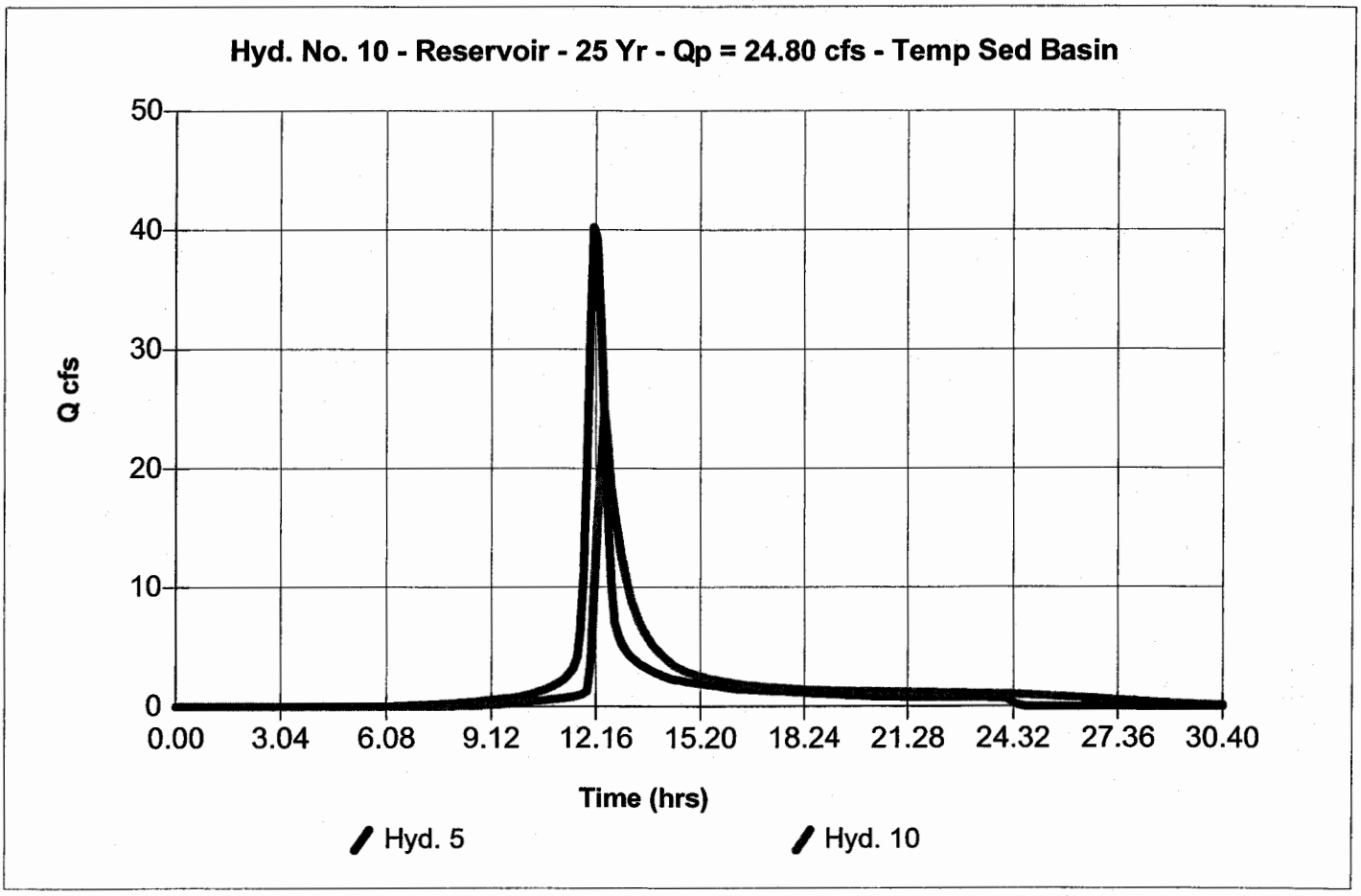
Hydrograph type	= Reservoir	Peak discharge	= 24.80 cfs
Storm frequency	= 25 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= Temp Sed Basin
Max. Elevation	= 58.88 ft	Max. Storage	= 57,444 cuft

Storage Indication method used.

Outflow hydrograph volume = 163,064 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9.70	0.71	54.53	37.66	0.27	-----	-----	-----	-----	-----	-----	-----	0.27
9.80	0.75	54.54	37.66	0.29	-----	-----	-----	-----	-----	-----	-----	0.29
9.90	0.79	54.56	37.66	0.32	-----	-----	-----	-----	-----	-----	-----	0.32
10.00	0.84	54.58	37.66	0.35	-----	-----	-----	-----	-----	-----	-----	0.35
10.10	0.90	54.61	37.66	0.37	-----	-----	-----	-----	-----	-----	-----	0.37
10.20	0.97	54.63	37.66	0.40	-----	-----	-----	-----	-----	-----	-----	0.40
10.30	1.05	54.65	37.66	0.43	-----	-----	-----	-----	-----	-----	-----	0.43
10.40	1.14	54.68	37.66	0.46	-----	-----	-----	-----	-----	-----	-----	0.46
10.50	1.23	54.71	37.66	0.48	-----	-----	-----	-----	-----	-----	-----	0.48
10.60	1.33	54.74	37.66	0.51	-----	-----	-----	-----	-----	-----	-----	0.51
10.70	1.44	54.78	37.66	0.54	-----	-----	-----	-----	-----	-----	-----	0.54
10.80	1.57	54.82	37.66	0.57	-----	-----	-----	-----	-----	-----	-----	0.57
10.90	1.72	54.86	37.66	0.61	-----	-----	-----	-----	-----	-----	-----	0.61
11.00	1.88	54.91	37.66	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
11.10	2.04	54.97	37.66	0.68	-----	-----	-----	-----	-----	-----	-----	0.68
11.20	2.23	55.02	37.66	0.72	-----	-----	-----	-----	-----	-----	-----	0.72
11.30	2.48	55.08	37.66	0.75	-----	-----	-----	-----	-----	-----	-----	0.75
11.40	2.83	55.15	37.66	0.79	-----	-----	-----	-----	-----	-----	-----	0.79
11.50	3.24	55.23	37.66	0.83	-----	-----	-----	-----	-----	-----	-----	0.83
11.60	4.12	55.33	37.66	0.88	-----	-----	-----	-----	-----	-----	-----	0.88
11.70	6.33	55.48	37.66	0.96	-----	-----	-----	-----	-----	-----	-----	0.96
11.80	11.13	55.75	37.66	1.08	-----	-----	-----	-----	-----	-----	-----	1.08
11.90	20.82	56.25	37.66	1.27	-----	-----	-----	-----	-----	-----	-----	1.27
12.00	32.43	56.95	37.66	1.49	-----	-----	2.36	-----	-----	-----	-----	3.86
12.10	40.22 <<	57.72	37.66	1.71	-----	-----	7.60	-----	-----	-----	-----	9.31
12.20	39.23	58.37	37.66	1.87	-----	-----	13.37	-----	-----	-----	-----	15.24
12.30	31.89	58.76	37.66	1.96	-----	-----	17.39	0.50	0.51	-----	-----	20.37
12.40	24.16	58.88 <<	37.66	1.99	-----	-----	18.69	2.04	2.08	-----	-----	24.80 <<
12.50	16.66	58.82	37.66	1.98	-----	-----	17.96	1.05	1.07	-----	-----	22.06
12.60	10.28	58.67	37.66	1.94	-----	-----	16.39	-----	-----	-----	-----	18.33
12.70	7.02	58.47	37.66	1.90	-----	-----	14.42	-----	-----	-----	-----	16.32
12.80	6.07	58.28	37.66	1.85	-----	-----	12.51	-----	-----	-----	-----	14.36
12.90	5.35	58.10	37.66	1.81	-----	-----	10.89	-----	-----	-----	-----	12.70
13.00	4.82	57.94	37.66	1.77	-----	-----	9.47	-----	-----	-----	-----	11.24
13.10	4.41	57.79	37.66	1.73	-----	-----	8.18	-----	-----	-----	-----	9.91
13.20	4.10	57.66	37.66	1.69	-----	-----	7.13	-----	-----	-----	-----	8.82


Hyd. No. 10 - Reservoir - 25 Yr - Qp = 24.80 cfs - Temp Sed Basin
Q cfs
50
40
30
20
10
0
0.00
3.04
6.08
9.12
12.16
15.20
18.24
21.28
24.32
27.36
30.40
Time (hrs)
Hyd. 5
Hyd. 10

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	14.93	6	726	60,770	----	------	------	Pre-developed (Onsite)
2	SCS Runoff	18.03	6	720	55,453	----	------	------	Pre-developed (Offsite)
3	Combine	31.79	6	726	116,223	1, 2	------	------	Pre-Developed
5	SCS Runoff	54.38	6	726	221,339	----	------	------	Post developed
7	Reservoir	45.70	6	738	221,338	5	59.26	69,239	BMP
8	Combine	51.38	6	738	276,791	2, 7	------	------	BMP
10	Reservoir	45.85	6	738	221,339	5	59.25	63,881	Temp Sed Basin

Proj. file: 9225-BMP.gpw | Return Period: 100 yr | Run date: 12-22-2002

Hydraflow Hydrographs by Intelisolve

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

Post developed

Hydrograph type	= SCS Runoff	Peak discharge	= 54.38 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 10.84 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

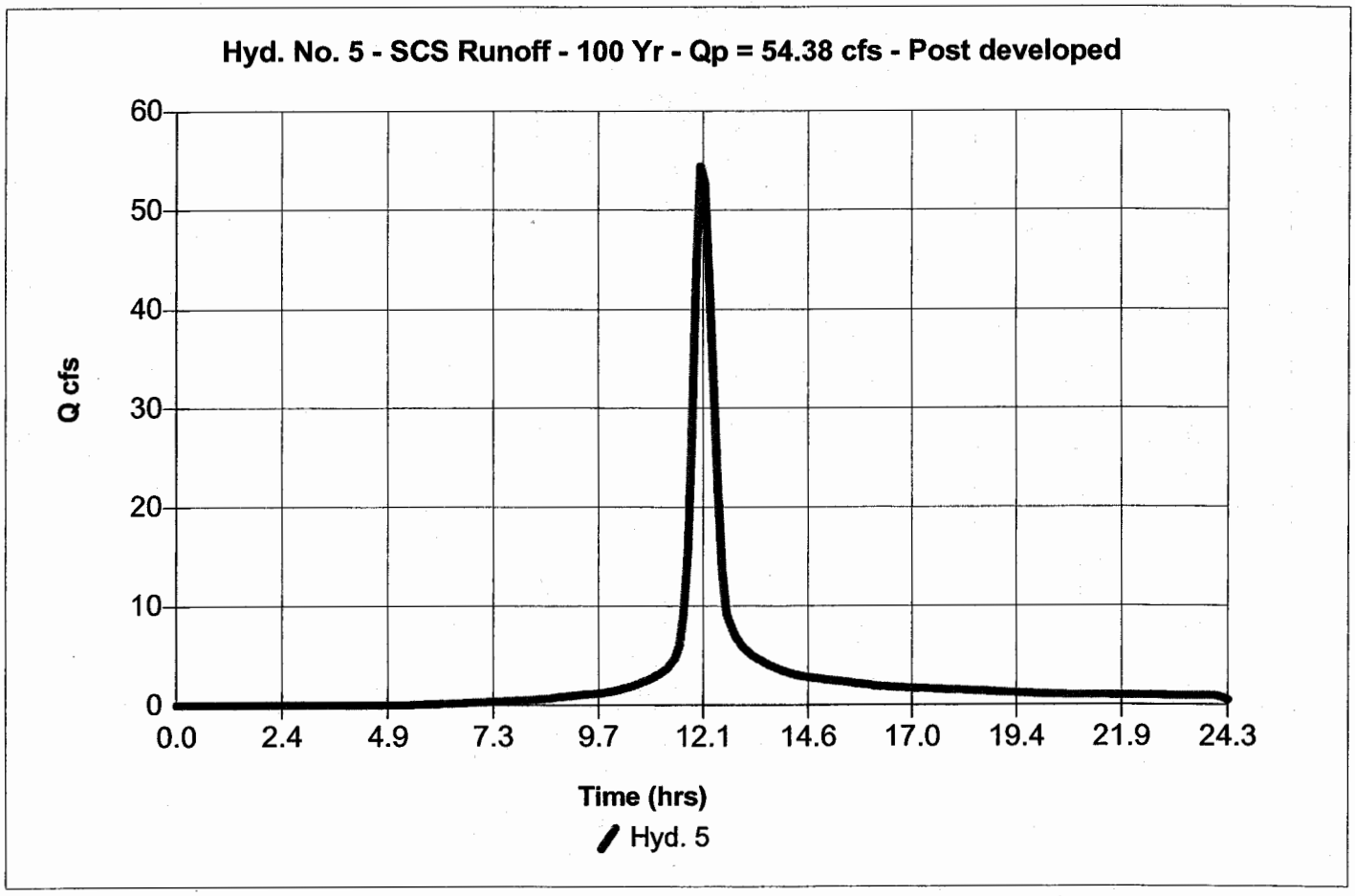
Hydrograph Volume = 221,339 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
8.30	0.56
8.40	0.60
8.50	0.64
8.60	0.68
8.70	0.73
8.80	0.78
8.90	0.83
9.00	0.88
9.10	0.94
9.20	0.99
9.30	1.04
9.40	1.08
9.50	1.11
9.60	1.14
9.70	1.18
9.80	1.23
9.90	1.29
10.00	1.37
10.10	1.46
10.20	1.56
10.30	1.67
10.40	1.79
10.50	1.92
10.60	2.07
10.70	2.23
10.80	2.42
10.90	2.63
11.00	2.86
11.10	3.08
11.20	3.35
11.30	3.69
11.40	4.19

11.50	4.76
11.60	6.00

Time -- Outflow (hrs	cfs)
11.70	9.09
11.80	15.72
11.90	28.83
12.00	44.26
12.10	54.38 <<
12.20	52.70
12.30	42.63
12.40	32.13
12.50	22.01
12.60	13.50
12.70	9.18
12.80	7.93
12.90	6.99
13.00	6.28
13.10	5.75
13.20	5.35
13.30	5.01
13.40	4.72
13.50	4.46
13.60	4.23
13.70	4.01
13.80	3.82
13.90	3.64
14.00	3.47
14.10	3.31
14.20	3.16
14.30	3.05
14.40	2.95
14.50	2.87
14.60	2.81
14.70	2.75
14.80	2.70


Hyd. No. 5 - SCS Runoff - 100 Yr - Qp = 54.38 cfs - Post developed
Q cfs
60
50
40
30
20
10
0
0.0
2.4
4.9
7.3
9.7
12.1
14.6
17.0
19.4
21.9
24.3
Time (hrs)
Hyd. 5

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

BMP

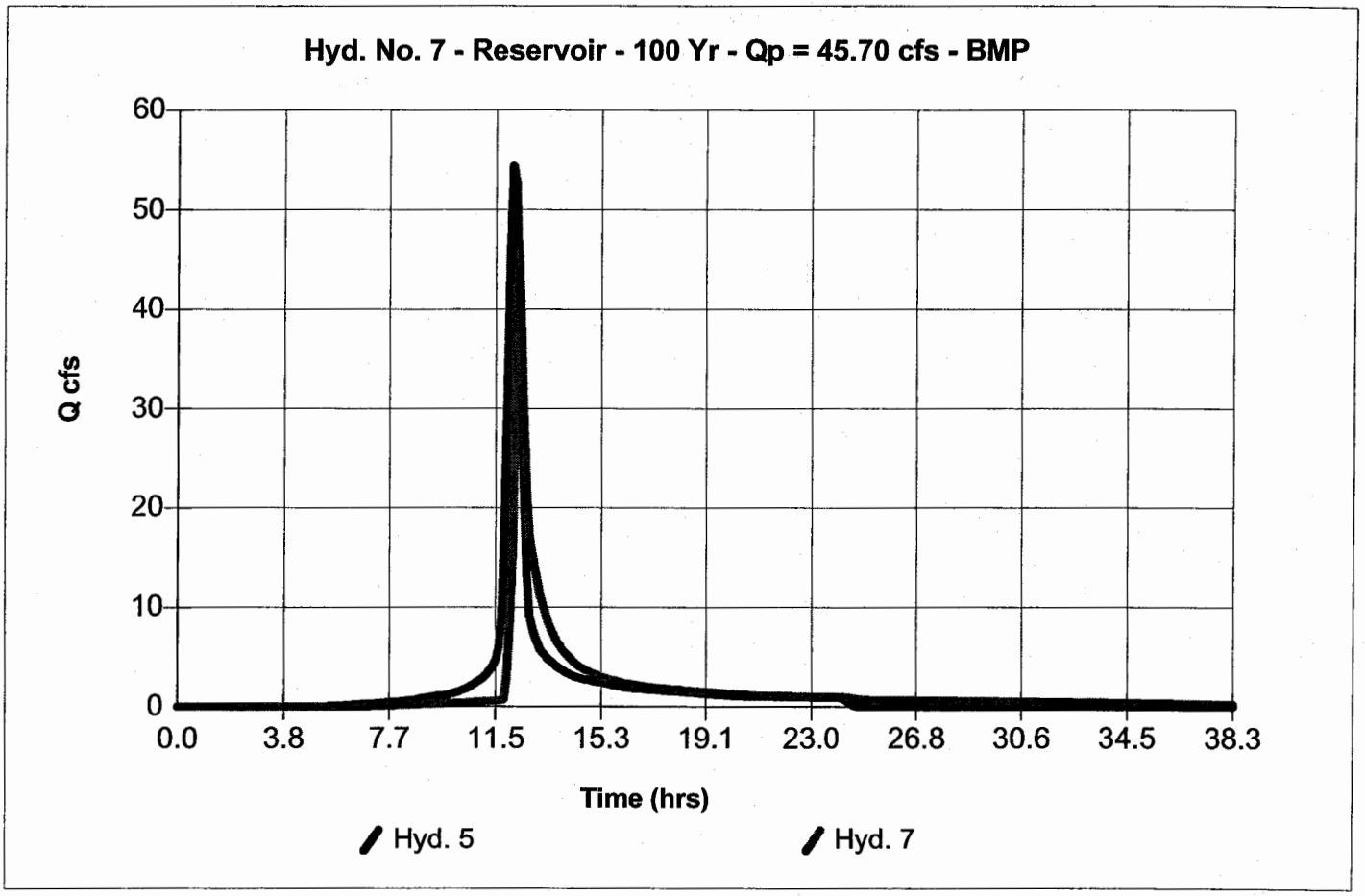
Hydrograph type	= Reservoir	Peak discharge	= 45.70 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= BMP
Max. Elevation	= 59.26 ft	Max. Storage	= 69,239 cuft

Storage Indication method used.

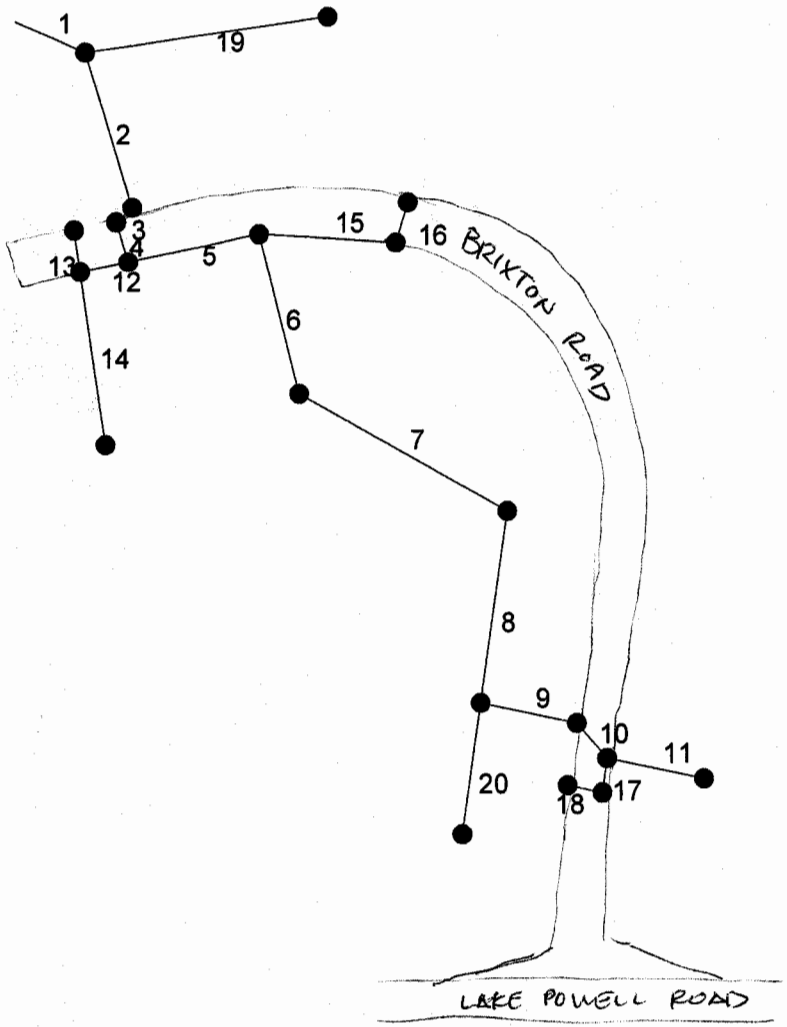
Outflow hydrograph volume = 221,338 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
10.90	2.63	54.93	35.47	0.47	-----	-----	-----	-----	-----	-----	-----	0.47
11.00	2.86	55.02	35.47	0.49	-----	-----	-----	-----	-----	-----	-----	0.49
11.10	3.08	55.11	35.47	0.50	-----	-----	-----	-----	-----	-----	-----	0.50
11.20	3.35	55.20	35.47	0.52	-----	-----	-----	-----	-----	-----	-----	0.52
11.30	3.69	55.31	35.47	0.54	-----	-----	-----	-----	-----	-----	-----	0.54
11.40	4.19	55.43	35.47	0.56	-----	-----	-----	-----	-----	-----	-----	0.56
11.50	4.76	55.57	35.47	0.58	-----	-----	-----	-----	-----	-----	-----	0.58
11.60	6.00	55.74	35.47	0.60	-----	-----	-----	-----	-----	-----	-----	0.60
11.70	9.09	55.98	35.47	0.64	-----	-----	-----	-----	-----	-----	-----	0.64
11.80	15.72	56.33	35.47	0.69	-----	-----	0.05	-----	-----	-----	-----	0.73
11.90	28.83	56.94	35.47	0.76	-----	-----	2.31	-----	-----	-----	-----	3.07
12.00	44.26	57.74	35.47	0.85	-----	-----	7.74	-----	-----	-----	-----	8.59
12.10	54.38 <<	58.59	35.47	0.93	-----	-----	15.59	-----	-----	-----	-----	16.52
12.20	52.70	59.15	35.47	0.98	-----	-----	21.67	7.77	7.92	-----	-----	38.33
12.30	42.63	59.26	35.94	0.99	-----	-----	22.94	10.78	10.99	-----	-----	45.70 <<
12.40	32.13	59.16	35.47	0.99	-----	-----	21.81	8.08	8.24	-----	-----	39.11
12.50	22.01	59.01	35.47	0.97	-----	-----	20.13	4.52	4.60	-----	-----	30.22
12.60	13.50	58.83	35.47	0.95	-----	-----	18.15	1.30	1.32	-----	-----	21.72
12.70	9.18	58.65	35.47	0.94	-----	-----	16.24	-----	-----	-----	-----	17.18
12.80	7.93	58.48	35.47	0.92	-----	-----	14.48	-----	-----	-----	-----	15.41
12.90	6.99	58.32	35.47	0.91	-----	-----	12.92	-----	-----	-----	-----	13.83
13.00	6.28	58.18	35.47	0.89	-----	-----	11.56	-----	-----	-----	-----	12.45
13.10	5.75	58.05	35.47	0.88	-----	-----	10.38	-----	-----	-----	-----	11.26
13.20	5.35	57.92	35.47	0.87	-----	-----	9.28	-----	-----	-----	-----	10.15
13.30	5.01	57.81	35.47	0.85	-----	-----	8.31	-----	-----	-----	-----	9.17
13.40	4.72	57.71	35.47	0.84	-----	-----	7.50	-----	-----	-----	-----	8.34
13.50	4.46	57.62	35.47	0.84	-----	-----	6.81	-----	-----	-----	-----	7.65
13.60	4.23	57.54	35.47	0.83	-----	-----	6.23	-----	-----	-----	-----	7.05
13.70	4.01	57.47	35.47	0.82	-----	-----	5.72	-----	-----	-----	-----	6.54
13.80	3.82	57.41	35.47	0.81	-----	-----	5.27	-----	-----	-----	-----	6.09
13.90	3.64	57.36	35.47	0.81	-----	-----	4.89	-----	-----	-----	-----	5.69
14.00	3.47	57.31	35.47	0.80	-----	-----	4.54	-----	-----	-----	-----	5.34
14.10	3.31	57.26	35.47	0.80	-----	-----	4.23	-----	-----	-----	-----	5.03
14.20	3.16	57.22	35.47	0.79	-----	-----	3.96	-----	-----	-----	-----	4.75
14.30	3.05	57.18	35.47	0.79	-----	-----	3.71	-----	-----	-----	-----	4.50
14.40	2.95	57.14	35.47	0.78	-----	-----	3.49	-----	-----	-----	-----	4.27


Hyd. No. 7 - Reservoir - 100 Yr - Qp = 45.70 cfs - BMP
Q cfs
60
50
40
30
20
10
0
0.0
3.8
7.7
11.5
15.3
19.1
23.0
26.8
30.6
34.5
38.3
Time (hrs)
Hyd. 5
Hyd. 7

Hydraflow Plan View



Project file: 9225-00.stm	IDF file: JCCstormsewer.IDF	No. Lines: 20	12-23-2002

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	68.0	20.0	MH	0.00	0.47	0.73	9.0	47.50	9.12	53.70	30	Cir	0.013	0.75	60.90	1-0 TO 1-1
2	1	124.0	50.0	MH	0.00	0.00	0.00	0.0	53.70	0.73	54.60	30	Cir	0.013	0.85	61.33	1-1 TO 1-2
3	2	18.0	73.0	MH	0.00	0.51	0.73	10.0	54.60	1.11	54.80	30	Cir	0.013	0.85	60.98	1-2 TO 1-3
4	3	32.0	-73.0	MH	0.00	0.41	0.73	9.0	54.80	1.25	55.20	30	Cir	0.013	1.00	61.01	1-3 TO 1-4
5	4	121.0	-80.0	MH	0.00	0.00	0.00	0.0	55.20	1.57	57.10	24	Cir	0.013	1.00	62.37	1-4 TO 1-5
6	5	126.0	83.0	MH	0.00	0.46	0.68	9.0	57.10	1.03	58.40	24	Cir	0.013	0.75	62.46	1-5 TO 1-6
7	6	209.0	-48.0	MH	0.00	0.00	0.00	0.0	58.40	2.34	63.30	18	Cir	0.013	0.85	72.50	1-6 TO 1-7
8	7	146.0	75.0	MH	0.00	0.20	0.70	8.0	63.30	1.03	64.80	18	Cir	0.013	1.00	70.00	1-7 TO 1-8
9	8	89.0	-90.0	MH	0.00	0.26	0.73	9.0	64.80	1.01	65.70	18	Cir	0.013	0.45	70.97	1-8 TO 1-9
10	9	38.0	34.0	MH	0.00	0.34	0.73	9.0	65.70	1.05	66.10	18	Cir	0.013	0.85	70.77	1-9 TO 1-10
11	10	89.0	-34.0	MH	0.00	2.72	0.36	20.0	66.10	4.94	70.50	12	Cir	0.013	1.00	73.50	1-10 TO 1-11
12	4	44.0	100.0	MH	0.00	0.24	0.64	5.0	55.20	0.91	55.60	24	Cir	0.013	1.00	60.76	1-4 TO 1-4A
13	12	32.0	90.0	MH	0.00	0.30	0.73	9.0	55.60	3.44	56.70	12	Cir	0.013	1.00	60.76	1-4A TO 1-4B
14	12	132.0	-90.0	MH	0.00	1.26	0.35	14.0	55.60	0.98	56.90	15	Cir	0.013	1.00	60.98	1-4A TO 1-4C
15	5	125.0	13.0	MH	0.00	0.46	0.73	9.0	57.10	2.64	60.40	15	Cir	0.013	0.85	64.87	1-5 TO 1-5A
16	15	32.0	-73.0	MH	0.00	0.61	0.73	9.0	60.40	0.94	60.70	12	Cir	0.013	1.00	64.87	1-5A TO 1-5B
17	10	26.0	56.0	MH	0.00	0.26	0.73	9.0	66.10	1.15	66.40	15	Cir	0.013	1.00	70.68	1-10 TO 1-10A
18	17	32.0	90.0	MH	0.00	0.29	0.73	9.0	66.40	0.94	66.70	12	Cir	0.013	1.00	70.68	1-10A TO 1-10B
19	1	222.0	-27.0	MH	0.00	0.99	0.73	12.0	54.00	1.35	57.00	15	Cir	0.013	1.00	61.06	1-1 TO 1-1A
20	8	100.0	0.0	MH	0.00	0.14	0.70	8.0	64.80	2.20	67.00	12	Cir	0.013	1.00	70.00	1-8 TO 1-8A

Project File: 9225-00.stm | IDF File: JCCstormsewer.IDF | Total number of lines: 20 | Date: 12-23-2002

Hydraflow Storm Sewer Tabulation

25min Drainage Map.

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	68.0	0.47	9.92	0.73	0.34	5.70	9.0	23.8	4.1	23.61	123.8	4.81	30	9.12	53.70	47.50	58.80	58.57	60.90	53.50	1-0 TO 1-1
2	1	124.0	0.00	8.46	0.00	0.00	4.64	0.0	23.3	4.2	19.43	34.94	3.96	30	0.73	54.60	53.70	59.34	59.07	61.33	60.90	1-1 TO 1-2
3	2	18.0	0.51	8.46	0.73	0.37	4.64	10.0	23.2	4.2	19.46	43.23	3.97	30	1.11	54.80	54.60	59.59	59.55	60.98	61.33	1-2 TO 1-3
4	3	32.0	0.41	7.95	0.73	0.30	4.26	9.0	23.1	4.2	17.96	45.85	3.66	30	1.25	55.20	54.80	59.86	59.80	61.01	60.98	1-3 TO 1-4
5	4	121.0	0.00	5.74	0.00	0.00	3.15	0.0	22.6	4.3	13.42	28.34	4.27	24	1.57	57.10	55.20	60.50	60.07	62.37	61.01	1-4 TO 1-5
6	5	126.0	0.46	4.67	0.68	0.31	2.37	9.0	21.9	4.3	10.24	22.97	3.26	24	1.03	58.40	57.10	61.04	60.78	62.46	62.37	1-5 TO 1-6
7	6	209.0	0.00	4.21	0.00	0.00	2.06	0.0	21.2	4.4	9.04	16.08	5.67	18	2.34	63.30	58.40	64.45	61.16	72.50	62.46	1-6 TO 1-7
8	7	146.0	0.20	4.21	0.70	0.14	2.06	8.0	20.7	4.4	9.14	10.64	5.71	18	1.03	64.80	63.30	65.96	64.96	70.00	72.50	1-7 TO 1-8
9	8	89.0	0.26	3.87	0.73	0.19	1.82	9.0	20.4	4.5	8.14	10.56	4.77	18	1.01	65.70	64.80	67.02	66.56	70.97	70.00	1-8 TO 1-9
10	9	38.0	0.34	3.61	0.73	0.25	1.63	9.0	20.3	4.5	7.32	10.77	4.55	18	1.05	66.10	65.70	67.27	67.19	70.77	70.97	1-9 TO 1-10
11	10	89.0	2.72	2.72	0.36	0.98	0.98	20.0	20.0	4.5	4.43	7.92	5.83	12	4.94	70.50	66.10	71.38	67.59	73.50	70.77	1-10 TO 1-11
12	4	44.0	0.24	1.80	0.64	0.15	0.81	5.0	15.2	5.1	4.17	21.57	1.33	24	0.91	55.60	55.20	60.08	60.07	60.76	61.01	1-4 TO 1-4A
13	12	32.0	0.30	0.30	0.73	0.22	0.22	9.0	9.0	6.2	1.35	6.60	1.72	12	3.44	56.70	55.60	60.16	60.11	60.76	60.76	1-4A TO 1-4B
14	12	132.0	1.26	1.26	0.35	0.44	0.44	14.0	14.0	5.3	2.33	6.41	1.90	15	0.98	56.90	55.60	60.28	60.11	60.98	60.76	1-4A TO 1-4C
15	5	125.0	0.46	1.07	0.73	0.34	0.78	9.0	9.2	6.1	4.79	10.49	4.24	15	2.64	60.40	57.10	61.40	60.78	64.87	62.37	1-5 TO 1-5A
16	15	32.0	0.61	0.61	0.73	0.45	0.45	9.0	9.0	6.2	2.75	3.45	3.50	12	0.94	60.70	60.40	61.86	61.67	64.87	64.87	1-5A TO 1-5B
17	10	26.0	0.26	0.55	0.73	0.19	0.40	9.0	9.3	6.1	2.45	6.94	2.00	15	1.15	66.40	66.10	67.63	67.59	70.68	70.77	1-10 TO 1-10A
18	17	32.0	0.29	0.29	0.73	0.21	0.21	9.0	9.0	6.2	1.31	3.45	1.66	12	0.94	66.70	66.40	67.70	67.69	70.68	70.68	1-10A TO 1-10B
19	1	222.0	0.99	0.99	0.73	0.72	0.72	12.0	12.0	5.6	4.05	7.51	3.30	15	1.35	57.00	54.00	59.94	59.07	61.06	60.90	1-1 TO 1-1A
20	8	100.0	0.14	0.14	0.70	0.10	0.10	8.0	8.0	6.4	0.63	5.28	1.75	12	2.20	67.00	64.80	67.34	66.56	70.00	70.00	1-8 TO 1-8A

Project File: 9225-00.stm | IDF File: JCCstormsewer.IDF | Total number of lines: 20 | Run Date: 12-23-2002

NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs. ; Initial tailwater elevation = 58.57 (ft)

AES CONSULTING ENGINEERS
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(757) 253-0040
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PROJECT KENSINGTON WOODS
PROJECT NO. 9225-00
SUBJECT Spread Calculations
SHEET NO. 1
DATE DEC. 3, 2002
BY QAM

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	Sw =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
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
			12+20 L	0.22	0.73	0.161	0.161	4	0.642		0.642	0.001	0.02	7.9	Flow Approaching From Down Station																
SUMP	3C	6									1.175	0.001	0.02		2		0.08								9.6	0.13	0.27	0.481	6.5		
				0.07	0.73	0.051	0.051	4	0.204	0.328	0.532	0.001	0.02	7.3	Flow Approaching From Up Station																
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
			12+20 R	0.22	0.73	0.161	0.161	4	0.642		0.642	0.001	0.02	7.9	Flow Approaching From Down Station																
SUMP	3C	6									1.248	0.001	0.02		2		0.08								9.6	0.132	0.27	0.489	6.6		
				0.04	0.73	0.029	0.029	4	0.117	0.489	0.605	0.001	0.02	7.7	Flow Approaching From Up Station																
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
GRADE	3A	2.5	12+46 R	0.34	0.73	0.248	0.248	4	0.993		0.993	0.027	0.02	4	2	0.5	0.08	4	0.941	0.015	2	3.44	0.143	0.155	7.677	0.326	0.508	0.504	0.489		
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
GRADE	3A	2.5	12+68 L	0.26	0.73	0.19	0.19	4	0.759		0.759	0.027	0.02	3.1	2	0.645	0.08	4	0.982	0.015	2	3.44	0.143	0.161	6.708	0.373	0.568	0.431	0.328		
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
GRADE	3B	4	17+55 L	0.46	0.73	0.336	0.336	4	1.343		1.343	0.04	0.02	4.1	2	0.488	0.08	4	0.928	0.015	2	3.44	0.143	0.153	9.913	0.404	0.605	0.813	0.53		
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
GRADE	3B	6	17+55 R	0.61	0.73	0.445	0.445	4	1.781		1.781	0.04	0.02	5.2	2	0.385	0.08	4	0.848	0.015	2	3.44	0.143	0.142	11.69	0.513	0.726	1.294	0.487		
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
GRADE	3B	6	20+18 L	0.41	0.73	0.299	0.299	4	1.197	0.53	1.727	0.01	0.02	7.5	2	0.267	0.08	4	0.67	0.015	2	3.44	0.143	0.116	8.45	0.71	0.892	1.541	0.186		
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
GRADE	3B	6	20+20 R	0.51	0.73	0.372	0.372	4	1.489	0.487	1.976	0.01	0.02	8	2	0.25	0.08	4	0.634	0.015	2	3.44	0.143	0.111	9.185	0.653	0.851	1.683	0.294		
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
			20+62 L	0.08	0.73	0.058	0.058	4	0.234	0.186	0.42	0.001	0.02	6.6	Flow Approaching From Down Station																
SUMP	3A	2.5									0.797	0.001	0.02		2		0.08								6.1	0.128	0.27	0.474	6.4		
				0.16	0.59	0.094	0.094	4	0.378		0.378	0.001	0.02	6.2	Flow Approaching From Up Station																
BRIXTON RD.																															
T allow = [(12/2) + 2] = 8'																															
			20+62 R	0.07	0.73	0.051	0.051	4	0.204	0.294	0.498	0.001	0.02	7.1	Flow Approaching From Down Station																
SUMP	3C	6									1.17	0.001	0.02		2		0.08								9.6	0.13	0.27	0.481	6.5		
				0.23	0.73	0.168	0.168	4	0.672		0.672	0.001	0.02	8	Flow Approaching From Up Station																
			Total AC	3.68																											

LD-265
Rev 3-83

Project: KENSINGTON WOODS ENTRANCE CULVERT

Plan Sheet No. ____ Designer ____ Sheet ____ of ____
Rev. Date ____ Date ____

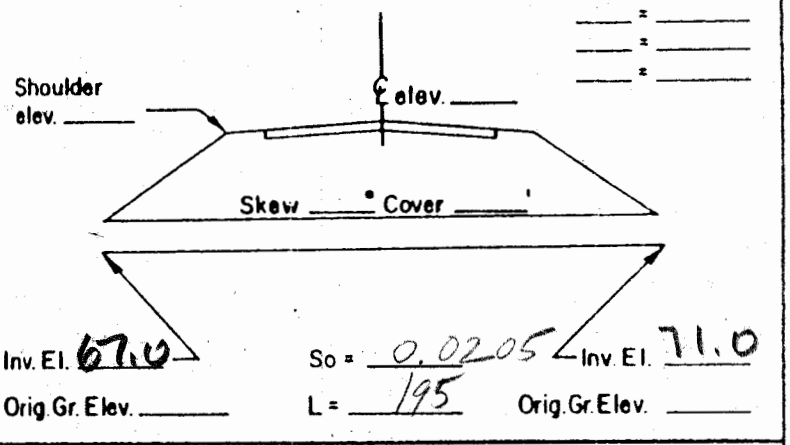
HYDROLOGICAL DATA:
D.A. = 0.65 AC.

C = 0.53
T_c = 10 min
i = 5.89
Q = CiA = (0.53)(5.89)(0.65) = 2.04 CFS

AHW Controls
100 yr. Flood plain ____ elev. ____
Design AHW depth ____ elev. ____
Structures ____ elev. ____

STATION ____

freq. TW elev.
____ = ____
____ = ____
____ = ____
____ = ____
____ = ____



DISCHARGES USED
Q 10 = 2.04 CFS
Q ____ = ____ CFS
Q ____ = ____ CFS
Q ____ = ____ CFS
Q ____ = ____ CFS

RISK ASSESSMENT ADT ____
Detours Available ____, Length ____
Overtopping Stage ____
Flood Plain Management ____
Criteria and Significant Impact ____

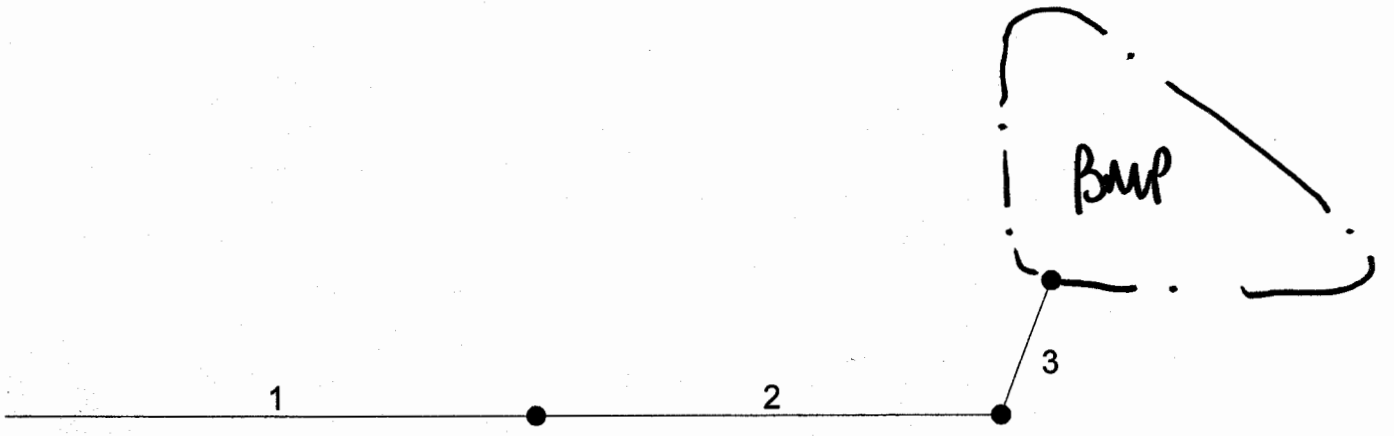
240 A

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL Ke	dc	(dc+D)/2	ho	H	LSo	HW	CONT. HW. ELEV.	OUTLET VELOCITY C.M.	OUTLET VELOCITY Smooth	End Treat.	COMMENTS
15" RCP	2.04		0.04	0.8	0.5	0.15	0.70	0.70	0.525	4.00	-2.78	71.8				

Design Flood Exceed. Prob. ____ Elev ____
Overtop Flood Exceed. Prob. ____ Elev ____
Base Flood 1% Exceed. Prob. ____ Elev ____

Hydraflow Plan View

OFF-SITE OUTFALL



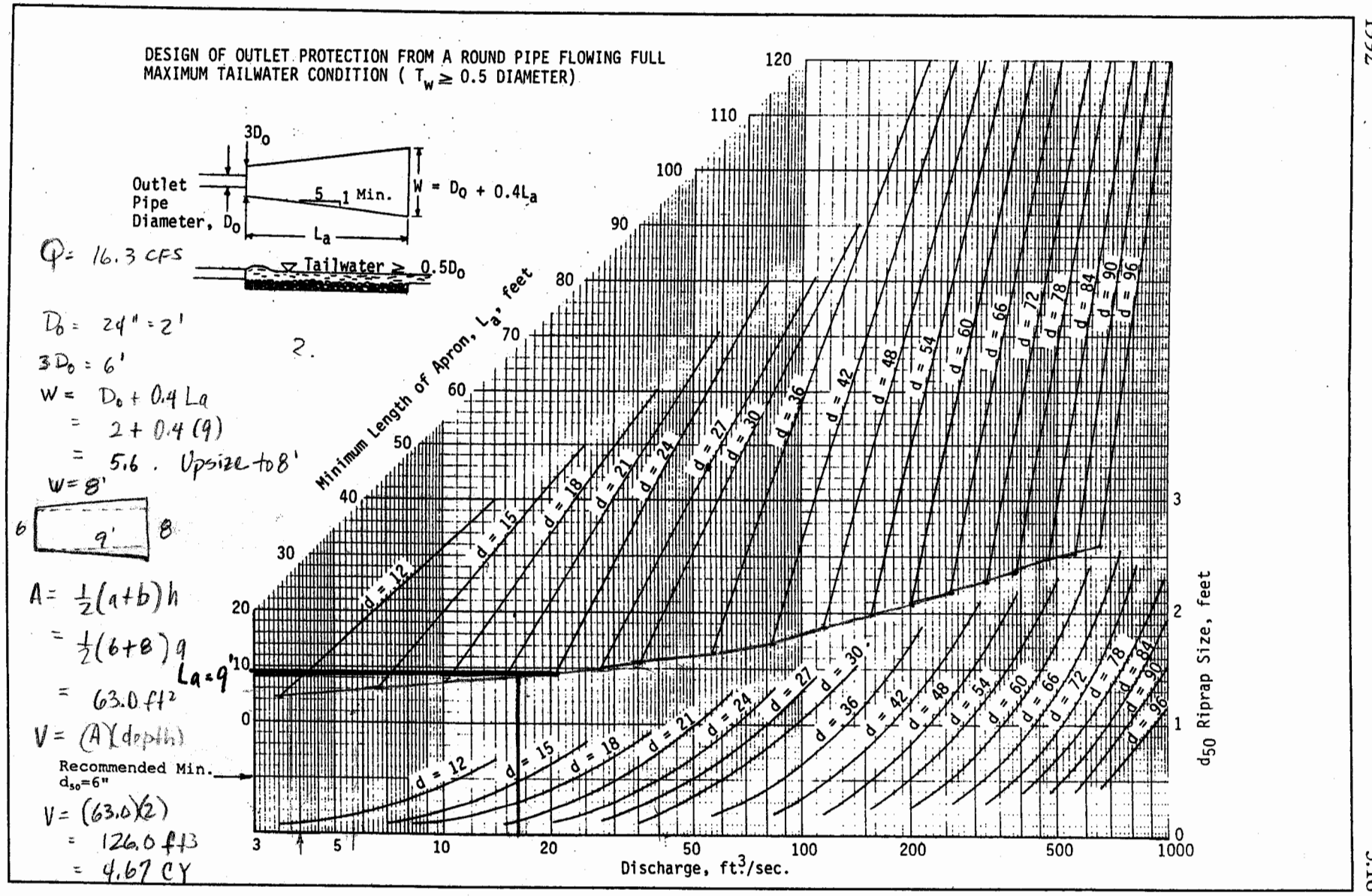
Project file: 2-9225-00.stm	IDF file: JCCstormsewer.IDF	No. Lines: 3	12-23-2002

Hydraflow 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	237.0	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	16.30	42.83	5.99	24	3.59	30.00	21.50	31.43	23.50	42.50	23.50	2-1 TO 2-2
2	1	207.0	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	16.30	42.91	9.75	24	3.60	45.20	37.75	46.63	38.60	56.00	42.50	2-2 TO 2-3
3	2	65.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	16.30	31.99	5.99	24	2.00	46.50	45.20	47.93	47.24	58.70	56.00	2-3 TO 2-4

Project File: 2-9225-00.stm | IDF File: JCCstormsewer.IDF | Total number of lines: 3 | Run Date: 12-23-2002

NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs. ; Initial tailwater elevation = 23.50 (ft) 1.5'



Q = 16.3 CFS

D_o = 24" = 2'

$3D_o$ = 6'

W = D_o + 0.4 La

= 2 + 0.4 (9)

= 5.6 . Upsize to 8'

W = 8'

6 9' 8

A = $\frac{1}{2}(a+b)h$

= $\frac{1}{2}(6+8)9$

= 63.0 ft^2

V = (A)(depth)

V = (63.0)(2)

= 126.0 ft^3

= 4.67 CY

La = 9'

2.

Source: USDA-SCS

Plate 3.18-4

NC056_STLENWA_CONS_RELEASE_PRESING_WOO 29

S-112-02

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING ANALYSIS

KENSINGTON WOODS
LAKE POWELL ROAD
JAMES CITY COUNTY, VIRGINIA

for

ASSOCIATED DEVELOPERS

Mr. Henry Stephens

April 8, 2003

ECS Project No. 07:6085

RECEIVED
APR 11 2003
AES CONSULTING ENGINEERS

ENGINEERING CONSULTING SERVICES, LTD.
Geotechnical • Construction Materials • Environmental

April 8, 2003

Mr. Henry Stephens
Associated Developers
P.O. Box 18, Parkview Station
Newport News, Virginia 23605

ECS Project No. 07:6085

Re: Subsurface Exploration and Geotechnical Engineering Analysis
Kensington Woods Subdivision
Lake Powell Road
James City County, Virginia

Dear Mr. Stephens:

Engineering Consulting Services, Ltd. has completed a subsurface exploration and engineering evaluation of the above referenced project. This report presents the results of the subsurface exploration, engineering analysis, and California Bearing Ratio testing for use in pavement design. We also performed a soil test boring in the proposed BMP facility to determine infiltration rates. Additionally, we are in the process of performing shrink-swell evaluations on the various lots throughout this subdivision. A separate report presenting foundation recommendations with respect to bearing capacity and shrink-swell concerns will be issued once complete.

Introduction

The project site is located off of the west side of Lake Powell Road, north of Wessex Hundred Conservancy Road, in James City County, Virginia. At the time of our site reconnaissance, the site was moderately to heavily wooded with moderately sloping terrain. We observed a shallow ravine which crosses the proposed roadway alignment. The centerline of the proposed roadway was staked at the time of this exploration.

Proposed for construction is a new residential subdivision consisting of approximately 40 lots, the associated roadways, and a BMP facility. We understand the roadways are planned to be maintained by VDOT and the BMP facility is proposed to be a wet pond that will primarily be cut to grade with only about 1 to 2 feet of fill required to raise the grade around the perimeter of the pond. The purposes of this exploration were to explore the soil and groundwater conditions at the site and to develop soils-related engineering recommendations to guide design and construction of the planned roadways. We accomplished these purposes by drilling soil borings to explore the subsurface soil and groundwater conditions, performing a site reconnaissance to observe general topography, and analyzing field data to develop appropriate geotechnical

engineering recommendations regarding the proposed construction. A Boring Location Diagram is included in Enclosure 1.

Field Exploration Procedures:

The soil test borings were performed with an ATV-mounted auger drill rig utilizing continuous flight, hollow stem augers to advance the borehole. Drilling fluid was not used in this process.

Representative soil samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM Specification D-1586. In this procedure, a 2-inch outside diameter split-barrel sampler is driven into the soil a distance of 24 inches by a 140-pound hammer falling 30 inches. After a 6-inch seating interval, the number of blows required to drive the sampler through the next 12-inch interval is termed the Standard Penetration Test (SPT) value and is indicated for each sample on the boring log. This value can be used as a qualitative indication of the in-place relative density and relative consistency of cohesionless soils and cohesive soils, respectively. This indication is qualitative, since many factors can significantly affect the standard penetration resistance value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies.

Field logs of the soils encountered in the borings were maintained by the drill crew. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were sealed in glass jars and delivered to our laboratory in Williamsburg, Virginia, for further visual examination and laboratory testing.

Subsurface Conditions:

Experienced personnel from our office classified each splitspoon soil sample on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS) and USDA textural classification system. Select samples from the test borings were subjected to classification testing to confirm our visual classifications. In addition, five (5) bulk samples of pavement subgrade materials received classification testing as well as California Bearing Ratio (CBR) testing for use in determining pavement design parameters. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The geotechnical engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual. A brief explanation of the USCS and a Reference Notes for Boring Logs sheet are provided in Enclosure 4 of this report.

Our subsurface exploration and site reconnaissance determined that the surface of the site is generally covered with about 2 to 5 inches of topsoil. Underlying the surficial topsoil, the subsurface soil profile was generally comprised of fairly uniform deposits of soft to medium stiff consistency Sandy and Silty CLAY (CL) that extended to the depths explored at 10 and 15 feet

below existing site grades (boring termination). The Standard Penetration Test (SPT) N-values recorded within these fine-grained layers ranged between 3 and 14 blows-per-foot (BPF).

We did not encounter groundwater during drilling of any of the borings within the proposed roadway alignment or BMP facility. Please note that groundwater levels are influenced by seasonal conditions and by periods of significant precipitation or prolonged drought. Additionally, a perched water table could be encountered due to the near-surface fine-grained layers. If groundwater is encountered during the construction of excavations, it should be pumped from sumps excavated adjacent to the construction excavations.

Subgrade Preparation and Earthwork Operations

The average depth of topsoil recorded in the test borings was about 2 to 5 inches. Typically, based on the depth of topsoil and forest litter encountered, we would recommend an average stripping depth of about 6 inches to remove unsuitable soils be considered. However, stripping of wooded areas typically disturbs the soils to a much greater depth. For project planning purposes, we recommend a 12-inch stripping depth be considered in wooded areas to completely remove tree stumps, highly organic soils, or soils disturbed due to grubbing operations. Also, please note that the test borings revealed near-surface soft consistency fine-grained soils across the project site. Some of these areas may require further cuts of an additional 12 to 18 inches (±) to completely remove unstable or unsuitable soils from beneath new pavements if proofrolling cannot sufficiently compact the existing surficial soils. Also, isolated areas may require further cuts of an additional 12 inches due to tree stumps and heavy root mat from closely spaced trees, etc. The stripping depth should be evaluated at the time of construction by representatives of the Geotechnical Engineer. If the undercuts extend into large areas, the undercut volume could be reduced by the use of geotextiles or geogrids. The use of geosynthetic reinforcement should be evaluated by the geotechnical engineer at the time of construction. Cut and fill operations should extend a minimum of 2 feet beyond the pavement limits.

After stripping or cutting to the desired grade, and prior to fill placement, subgrades should be observed by the Geotechnical Engineer or Engineering Technician. Proofrolling using a 10-ton drum roller or a loaded tandem axle dump truck having an axle weight of at least 10 tons should be used at this time to aid in identifying localized soft or unsuitable material. Any soft or unsuitable materials encountered during proofrolling should be removed and replaced with an approved backfill (engineered fill material) or scarified and recompacted as recommended by the Geotechnical Engineer. Undercut volumes should be determined by cross-sectioning the area before and after undercut. We have found that calculating undercut volumes by truck counts is less accurate and generally results in additional expense to the owner. In order to minimize undercutting we recommend earthwork operations be performed during the drier times of the year.

We recommend the contract documents include an allowance for undercutting and/or reworking soft near surface soils (if encountered) and replacement with engineered fill. Add/deduct unit

prices should also be established so adjustment for the actual volume of undercut can be made.

We understand most of the BMP facility will be excavated below existing grades. The soils excavated to construct the pond area could be utilized as a potential borrow source for low lying areas within the roadway. However, the materials encountered consist primarily of moisture sensitive clays. These soils are expected to be near or over their optimum moisture content upon their excavation, and significant drying times may be required before the material could be re-used as compacted fill. Hence these soils may be difficult to reuse. All proposed select fill soils for pavement areas should be submitted to the geotechnical engineer for approval prior to their use on the project. We recommend engineered fill (select) material required to raise pavement subgrade elevation or for use in backfilling operations should consist of an approved inorganic material classified as CL, SM, SM-SP, SP, SC or better containing less than about 70% by weight Silt or Clay and free of debris. Most of the on-site soils meet this criterion. This material should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to within +/- 3% of the optimum moisture content, and compacted to a minimum of 95% of the maximum density obtained in accordance with VTM-1, Standard Proctor method. Select fill should extend a minimum of 2 feet beyond the pavement limits and then slope no greater than 2 horizontal to 1 vertical.

Pavements

We understand the roadway will be prepared in accordance with VDOT requirements. Pavement subgrades should be prepared as discussed in the Subgrade Preparation and Earthwork Operations section of this report. Dense graded aggregate placed as pavement base course should be compacted to at least 100 percent of maximum dry density per VTM-1, Standard Proctor within the VDOT right of way.

For the construction of new exterior pavements, we recommend any soft, unstable and/or unsuitable materials be removed from the pavement areas. The subgrade should be proofrolled and carefully observed at the time of construction in order to aid in identifying any localized soft or unsuitable materials. Such materials should be removed prior to any fill placement or final grading for the new residential roads. If site work is performed during the wetter winter months, we anticipate that cohesive and moisture-sensitive subgrade soils subjected to wet conditions and/or ponding water will become unstable and require undercuts and replacement with dryer, suitable material. Ideally, site work should be performed during the dryer late summer and early fall months to minimize potential undercuts due to moisture intrusion and facilitate compaction. Exposed subgrade soils should be graded to drain surface moisture, protected from repeated construction traffic and covered as soon as possible with full design depths of select materials that are compacted in accordance with VDOT design criteria.

An important consideration with the design and construction of new pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of

the pavement can be expected. Furthermore, good drainage should minimize the possibility of the subgrade materials becoming saturated over a long period of time. Based upon the results of the soil test borings, the groundwater table should not significantly affect the performance of pavements; however, surface runoff water that is trapped during construction on the exposed subgrade soils could create localized deterioration of the soil's bearing capacity. Standing water that may develop on the surface of the pavement may be minimized by adequate design (surface graded to control runoff to desired locations - catch basins, drain inlets, gutters, etc.), adequate compaction of each lift of pavement material (to minimize localized settlements that result in ponding) and accurate fine grading of each lift of pavement material (to achieve the desired design grades). Standing water that tends to develop within the base course layer may be minimized by installing temporary weep holes in drainage structures, construction of drainage swales and diversion ditches, and proper backfill and grading behind curbs to minimize water intrusion from behind the curbs.

Subgrade samples obtained in the proposed roadway alignment consisted primarily of Sandy and Silty CLAY (CL) material. Soaked CBR values ranged between 7.0 and 15.3. We recommend a design CBR value of 8 be utilized for pavement design. This value is determined by calculating the truncated value of two-thirds the average of the CBR test results. This reduction in CBR value is an attempt to account for typical variations in the soils across the site. A Resiliency Factor (RF) of 2.0 and the resulting Soil Support Value (SSV) of 16 should also be used in this design. The following pavement sections have been based on minimum sections, VDOT Vaswani design methods and our experience in the project area, are recommended for this project:

• **Flexible Pavement - Heavy Duty Section (Main Entrance Roadway up to 1200 VPD):**

Asphalt Surface	- 1.5 inches Asphalt Concrete Surface Mix, Type SM-9.5.
Asphalt Base	- 3.0 inches Asphalt Concrete Base Mix, Type BM-25.
Aggregate Subbase	- 8.0 inches untreated Aggregate Base Material, Type I, Size 21A/B.
Subbase	- Variable Select Material (Sand); If Required.
Subgrade	- Stable and compacted to a dry density of at least 95% of the soil's Standard Proctor maximum dry density (ASTM D698) to a depth of 8.0 inches below subgrade elevation. Compaction testing may be waived by the Geotechnical Engineer based on the results of the proofrolling operations.

It should be noted that the pavement section recommended herein is considered to be minimum with regard to recognized pavement design practices, and any reductions in the pavement section could result in less than satisfactory pavement performance which could require additional long term maintenance and periodic repair.

Infiltration

Our subsurface exploration and site reconnaissance in the proposed BMP area determined that the surface of the site in this area is generally covered with about 5 inches of topsoil. Underlying the topsoil, we encountered Sandy Lean Clay (CL) soils to the depth of the boring at 15 feet below site grade.

Based on our visual soil classifications, we determined that field infiltration testing would not be practical due to the expected low permeability of the clayey soils. Soils that classify as Clay (CL or CH) are typically not recommended for in-situ testing due to the length of time that would be necessary to perform a test.

Based on a visual classification of the fine-grained soils encountered to the depths explored, we believe the surficial soils classify as Clay Loam and Sandy Clay in accordance with the USDA textural soil classification system. Soils with these classifications are considered to have Hydrologic Soil Group designations of C or D. Based on published correlations, soils with these classifications have recommended minimum infiltration rates (f) between 0.09 to 0.05 inches/hour.

Typically, soils with the Hydrologic Soil Group designations of A and B are considered to be suitable for Best Management Practices (BMP) that may utilize on-site infiltration in their designs. Some soils designated as C type soils are considered suitable for infiltration practices but these soils would need to be evaluated on a case specific basis. Soils with group designations of D are generally not considered suitable for infiltration practices.

Earthen Embankments and Slope Stability

60.5

We understand the BMP facility is planned to be utilized as a wet pond. The pond will have a planned bottom Elevation of EL 47 and crest elevation of EL 60. A normal pool elevation of about Elevation 53 is planned. Based on existing site grades most of the pond area will be cut to grade, about 13 feet. Some fill, about 2 feet, will be needed around the perimeter of the pond to grade the crest to EL 60. The soils encountered in this area are considered suitable for the planned construction.

Considering the planned construction and elevations, we do not believe a relatively small fill embankment placed above the proposed permanent pool elevation will require a key trench. However, the subgrades should be stripped of all topsoil and the surface scarified prior to fill placement to promote a good bond between natural and fill soils. Fill placed for new embankments should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to within -1% to +3% of the optimum moisture content, and compacted to a minimum 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor method. Natural or fill slopes should be constructed no greater than 3 horizontal to 1 vertical (3H:1V) as planned.

Construction Considerations

The subgrade materials are moisture sensitive, and exposure to the environment may weaken the soils at the pavement subgrade level if the excavations remain open for too long a time; therefore, the subgrades should be covered the same day they are excavated. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed and replaced by suitable select fill material.

In a dry and undisturbed state, the soil at the site will provide good subgrade support for fill placement and construction operations; however, when wet, this soil will degrade quickly with disturbance from contractor operations. Good site drainage should be maintained during earthwork operations which would help maintain the integrity of the soil.

Proper compaction control of fill is an important aspect of this project. Therefore, we recommend that all fill operations be observed full-time by a qualified soil technician to determine if minimum compaction requirements are being met.

We do not anticipate groundwater being encountered during construction. However, if ground water is encountered, we expect that dewatering in shallow trenches could be accomplished by pumping from sumps adjacent to the construction excavations. The specifications should, however, alert the contractor to the potential presence of subsurface water, and it should be incumbent on the contractor to provide the means by which to satisfactorily dewater the site.

General Comments

This report has been prepared in order to aid in the evaluation of this site and to assist the Contractor, Architect and Engineer in the design and planning of the project. The report scope is limited to the specific project and location described, and the project description represents our understanding of the significant aspects relevant to soil and foundation characteristics.

We have appreciated being of service to you during the design phase of this project and look forward to its successful construction. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.

Michael J. Galli, P.E.
Geotechincal Engineer

MICHAEL J. GALLI
No. 030684
PROFESSIONAL ENGINEER
VIRGINIA

Maureen Mallory for

Gary R. Witsman, P.E.
Principal Engineer

Appendix:
- I. Boring Location Diagram
- II. Soil Test Boring Logs
- III. Laboratory Test Summary
- IV. Unified Soil Classification System and Reference Notes for Boring Logs

Copies: (2) Associated Developers (Mr. Henry Stephens)
(1) AES Consulting Engineers (Mr. Charles Records)

I:letters/mjg/6085.doc

APPENDIX

I. Boring Location Diagram

II. Soil Boring Logs

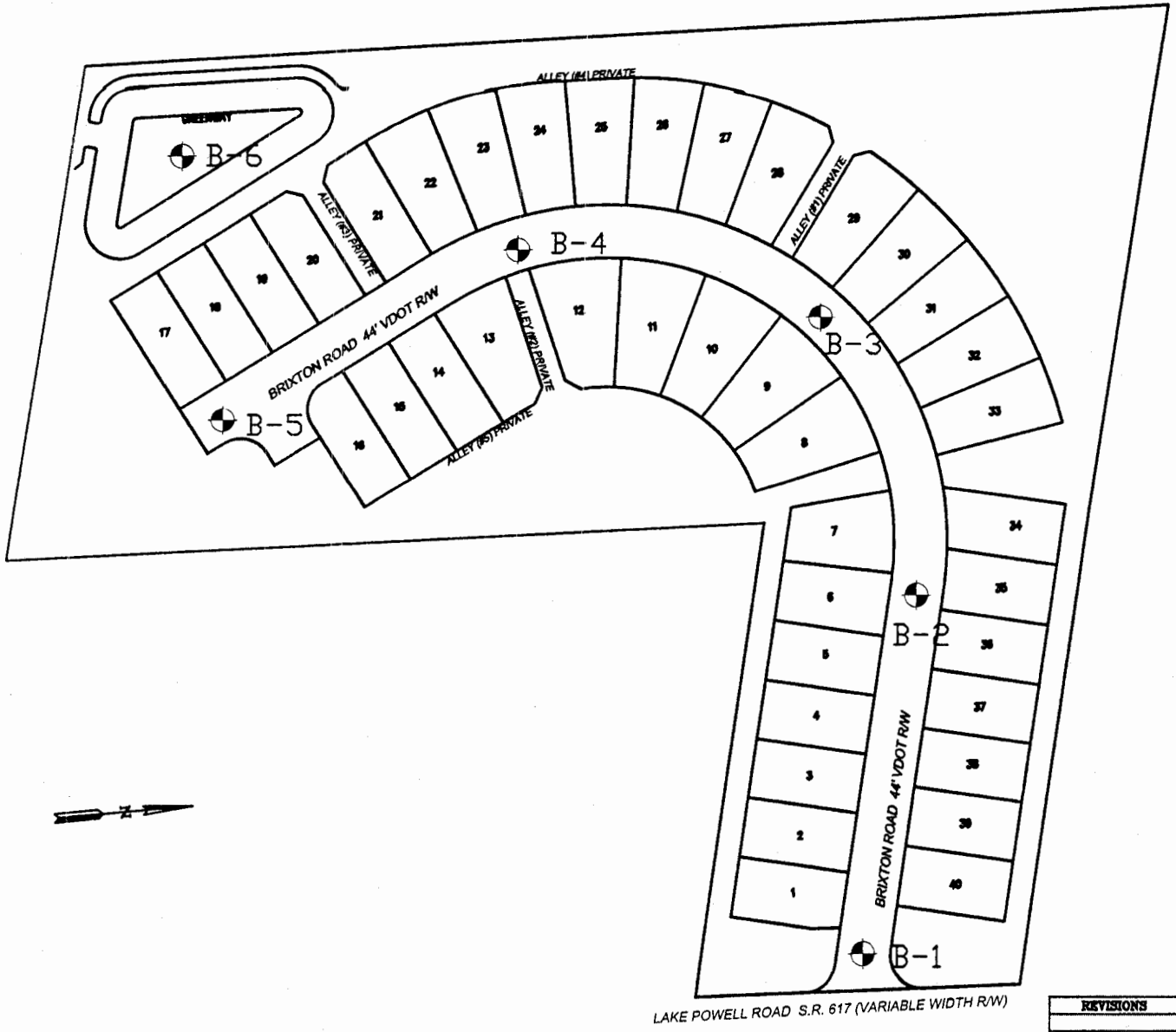
III. Soil Laboratory Test Summary

IV. Unified Soil Classification System and Reference Notes for Boring Logs

APPENDIX I

Boring Location Diagram

ECS LTD



REVISIONS	ECS LTD ENGINEERING CONSULTING SERVICES, LTD	BORING LOCATION DIAGRAM KENSINGTON WOODS				
		ASSOCIATED DEVELOPERS				
		JET	MJG	04-08-03	NTS	07:6085	1 OF 1

APPENDIX II

Soil Boring Logs

CLIENT	JOB #	BORING #	SHEET
ASSOCIATED DEVELOPERS, INC.	07:6085	B-1	1 OF 1

PROJECT NAME KENSINGTON WOODS-CBR TESTING

ARCHITECT-ENGINEER AES CONSULTING ENGINEERS

SITE LOCATION BRIXTON ROAD, JAMES CITY COUNTY, VIRGINIA

ECS LTD

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ

10 20 30 40 50+

STANDARD PENETRATION BLOWS/FT. ⊗ 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL ENGLISH UNITS SURFACE ELEVATION	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	24	TOPSOIL DEPTH 2"		4
	2	SS	24	24	Sandy Lean CLAY, Brown, Moist, Soft to Medium Stiff, (CL)		7
5	3	SS	24	24			9
	4	SS	24	24	Sandy Lean CLAY, Gray and Brown, Moist, Stiff, (CL)		11
	5	SS	24	24			11
10					END OF BORING @ 10.00'		
15							
20							
25							
30							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL DRY (WS) OR WD	BORING STARTED 03-19-03	
▼WL(AB) ▼WL(AC)	BORING COMPLETED 03-19-03	CAVE IN DEPTH ●
▽WL	RIG FOREMAN SDS	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
ASSOCIATED DEVELOPERS, INC.	07:6085	B-2	1 OF 1

PROJECT NAME KENSINGTON WOODS-CBR TESTING

ARCHITECT-ENGINEER AES CONSULTING ENGINEERS

SITE LOCATION BRIXTON ROAD, JAMES CITY COUNTY, VIRGINIA

CALIBRATED PENETROMETER TONS/FT.^{2}: 1, 2, 3, 4, 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ

10, 20, 30, 40, 50+

STANDARD PENETRATION BLOWS/FT. ⊗: 10, 20, 30, 40, 50+

ENGLISH UNITS

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	24	TOPSOIL DEPTH 3"	5
	2	SS	24	24	Sandy Lean CLAY, Brown, Moist, Soft to Stiff, (CL)	6
5	3	SS	24	24		9
	4	SS	24	24		12
	5	SS	24	24	Silty CLAY, Gray and Brown, Medium Stiff, (CL)	10
10					END OF BORING @ 10.00'	
15						
20						
25						
30						

WATER LEVELS

ELEVATION (FT)

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL DRY	WS OR WD	BORING STARTED 03-19-03
WL(AB)	WL(AC)	BORING COMPLETED 03-19-03	CAVE IN DEPTH ●
WL		RIG FOREMAN SDS	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
ASSOCIATED DEVELOPERS, INC.	07:6085	B-3	1 OF 1

PROJECT NAME KENSINGTON WOODS-CBR TESTING

ARCHITECT-ENGINEER AES CONSULTING ENGINEERS

SITE LOCATION BRIXTON ROAD, JAMES CITY COUNTY, VIRGINIA

CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ

10 20 30 40 50+

STANDARD PENETRATION BLOWS/FT. ⊗ 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS / SURFACE ELEVATION)	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	24	TOPSOIL DEPTH 3"		3
	2	SS	24	24	Sandy Lean CLAY, Brown, Moist, Very Soft to Medium Stiff, (CL)		5
5	3	SS	24	24			9
	4	SS	24	24	Silty CLAY, Brown and Gray, Moist, Medium Stiff, (CL)		9
	5	SS	24	24			10
10					END OF BORING @ 10.00'		
15							
20							
25							
30							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL DRY (WS) OR WD	BORING STARTED 03-19-03	
▽WL(AB) ▽WL(AC)	BORING COMPLETED 03-19-03	CAVE IN DEPTH ●
▽WL	RIG FOREMAN SDS	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
ASSOCIATED DEVELOPERS, INC.	07:6085	B-4	1 OF 1

PROJECT NAME KENSINGTON WOODS-CBR TESTING

ARCHITECT-ENGINEER AES CONSULTING ENGINEERS

SITE LOCATION BRIXTON ROAD, JAMES CITY COUNTY, VIRGINIA

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ (10, 20, 30, 40, 50+)

STANDARD PENETRATION BLOWS/FT. ⊗ (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS / SURFACE ELEVATION)	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	24	TOPSOIL DEPTH 4"		4
	2	SS	24	24	Sandy Lean CLAY, Brown, Moist, Soft to Stiff, (CL)		5
5	3	SS	24	24			9
	4	SS	24	24			11
	5	SS	24	24	Silty CLAY, Gray and Brown, Moist, Stiff, (CL)		11
10					END OF BORING @ 10.00'		
15							
20							
25							
30							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL DRY (WS) OR WD	BORING STARTED 03-19-03	
▽WL(AB) ▽WL(AC)	BORING COMPLETED 03-19-03	CAVE IN DEPTH ●
▽WL	RIG FOREMAN SDS	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
ASSOCIATED DEVELOPERS, INC.	07:6085	B-5	1 OF 1

PROJECT NAME KENSINGTON WOODS-CBR TESTING

ARCHITECT-ENGINEER AES CONSULTING ENGINEERS

SITE LOCATION BRIXTON ROAD, JAMES CITY COUNTY, VIRGINIA

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % Δ (10, 20, 30, 40, 50+)

STANDARD PENETRATION BLOWS/FT. ⊗ (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS / SURFACE ELEVATION)	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	24	TOPSOIL DEPTH 4"			4
	2	SS	24	24	Sandy Lean CLAY, Brown, Moist, Soft to Medium Stiff, (CL)			7
5	3	SS	24	24	Sandy Lean CLAY, Reddish Brown, Moist, Medium Stiff, (CL)			9
	4	SS	24	24				9
	5	SS	24	24				10
10					END OF BORING @ 10.00'			
15								
20								
25								
30								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WL DRY WS OR WD	BORING STARTED 03-19-03	
WL(AB) WL(AC)	BORING COMPLETED 03-19-03	CAVE IN DEPTH ●
WL	RIG FOREMAN SDS	DRILLING METHOD HSA

CLIENT	JOB #	BORING #	SHEET
ASSOCIATED DEVELOPERS, INC.	07:6085	B-6	1 OF 1

PROJECT NAME KENSINGTON WOODS-CBR TESTING

ARCHITECT-ENGINEER AES CONSULTING ENGINEERS

ECS LTD

SITE LOCATION BRIXTON ROAD, JAMES CITY COUNTY, VIRGINIA

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △ (10, 20, 30, 40, 50+)

STANDARD PENETRATION BLOWS/FT. ⊗ (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL (ENGLISH UNITS / SURFACE ELEVATION)	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	24	24	TOPSOIL DEPTH 5"		3
	2	SS	24	24	Sandy Lean CLAY, Brown, Moist, Very Soft to Soft, (CL)		4
5	3	SS	24	24	Sandy Lean CLAY, Reddish Brown, Moist, Soft to Stiff, (CL)		9
	4	SS	24	24			10
	5	SS	24	24			10
10							
	6	SS	24	24			14
15					END OF BORING @ 15.00'		
20							
25							
30							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽WL DRY (WS) OR WD	BORING STARTED 03-19-03	
▼WL(AB) ▼WL(AC)	BORING COMPLETED 03-19-03	CAVE IN DEPTH ●
▽WL	RIG FOREMAN SDS	DRILLING METHOD HSA

APPENDIX III

Soil Laboratory Test Summary

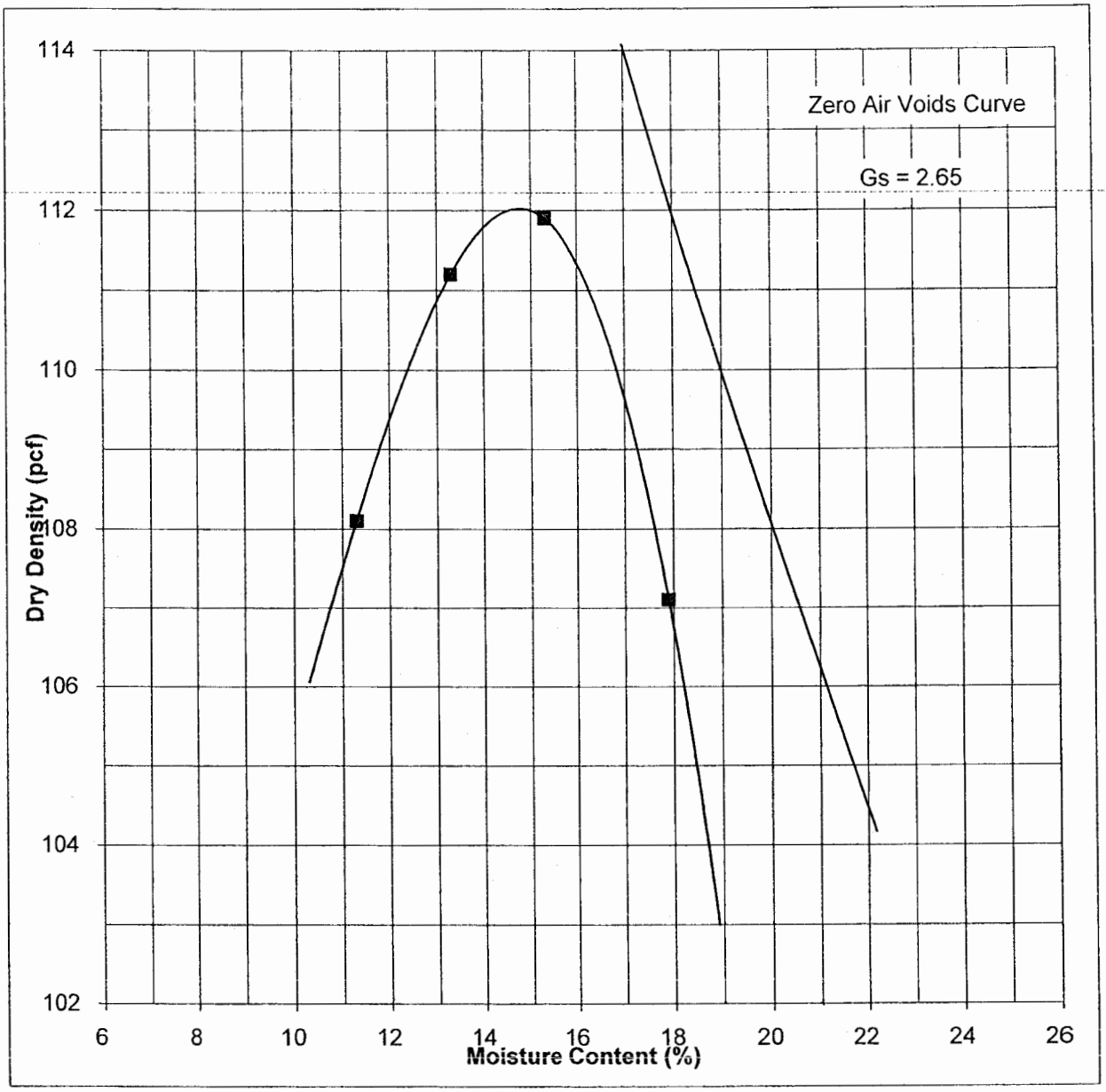
LABORATORY TEST SUMMARY

PROJECT: Kensington Woods
LOCATION: Brixton Road

ECS Job No.: 6085
DATE: 04/01/03

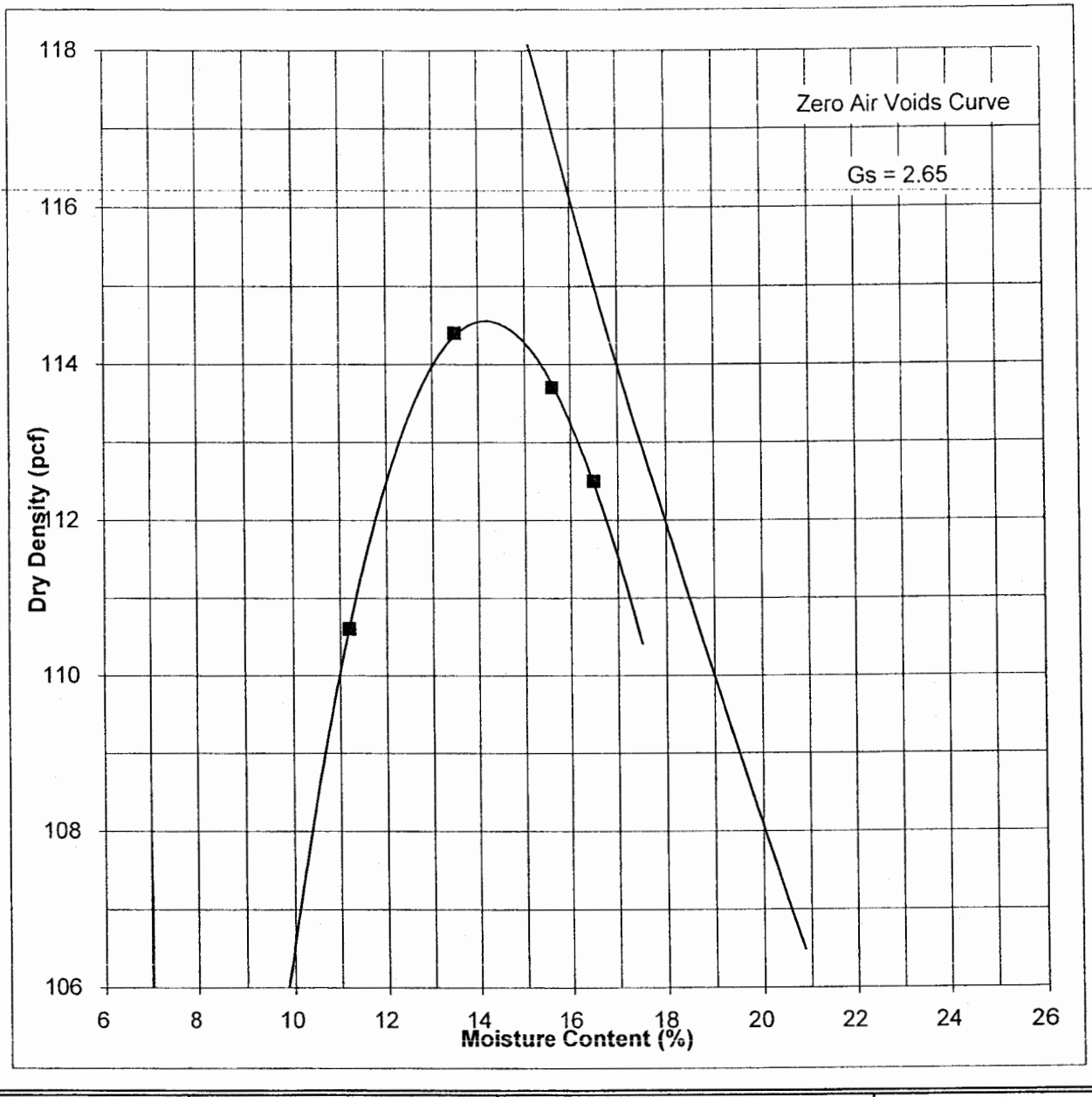
Sample Number	Depth (ft)	Percent Passing # 200 Sieve	Atterberg Limits			Maximum Dry Density (pcf)	Optimum Moisture (%)	CBR Value (Un-Soaked)	CBR Value (Soaked)	Swell (%)	USCS Symbol
			LL	PL	PI						
CBR-1	0-5	67.0	27	14	13	112.0	14.9	14.4	14.4	0	CL
CBR-2	0-5	65.9	37	18	19	114.5	14.2	20.4	7.0	0	CL
CBR-3	0-5	69.0	36	16	20	111.9	14.0	15.3	15.3	0	CL
CBR-4	0-5	75.2	42	20	22	106.1	17.2	14.8	11.1	0	CL
CBR-5	0-5	63.4	39	16	23	110.0	15.1	9.7	10.2	0	CL

Notes:



Sample No.	CBR-1	Natural Moisture Content	20.0
Street	Brixton Road	Percent Passing No. 200 Sieve	67.0
Station	10+50	Percent Retained on No. 4 Sieve	
Liquid Limit (LL)	27	Percent Retained on 3/4" Sieve	
Plastic Limit (PL)	14	Maximum Dry Density (pcf)	112.0
Plasticity Index (PI	13	Optimum Moisture Content (%)	14.9
Liquidity Index (LI)		Corr. Maximum Dry Density (pcf)	112.0
Description	Brown, Fine to Medium Sandy Lean CLAY	Corr. Optimum Moisture Content (%	14.9
Classification	CL	Percent (%) Gravel as Tested	0.0
Specific Gravity	2.65	Percent (%) Gravel Total	
Test Standard	VTM-1	Test Method	A

Project: Kensington Woods	**Engineering Consulting Services, Ltd**
Project No.: 6085	**Chesapeake, Virginia**
Date: 03/27/03	**Moisture Density Relationship Curve**



Sample No.	CBR-2	Natural Moisture Content	19.0
Street	Brixton Road	Percent Passing No. 200 Sieve	65.9
Station	13+00	Percent Retained on No. 4 Sieve	
Liquid Limit (LL)	37	Percent Retained on 3/4" Sieve	
Plastic Limit (PL)	18	Maximum Dry Density (pcf)	114.5
Plasticity Index (PI	19	Optimum Moisture Content (%)	14.2
Liquidity Index (LI)		Corr. Maximum Dry Density (pcf)	114.5
Description	Brown, Fine to Medium Sandy Lean CLAY	Corr. Optimum Moisture Content (%	14.2
Classification	CL	Percent (%) Gravel as Tested	0.0
Specific Gravity	2.65	Percent (%) Gravel Total	
Test Standard	VTM-1	Test Method	A

Project: Kensington Woods

Project No.: 6085

Date: 03/27/03

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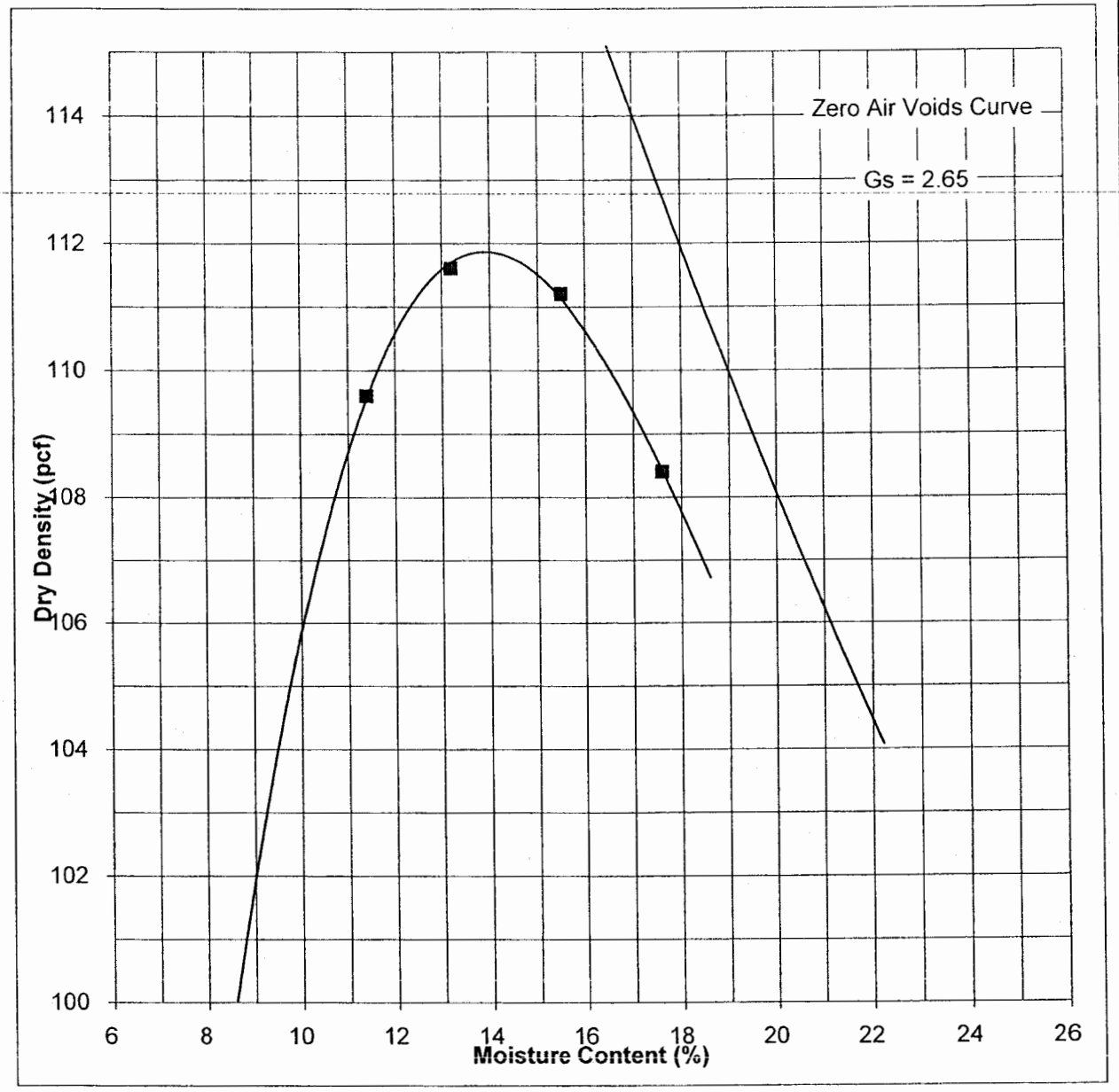
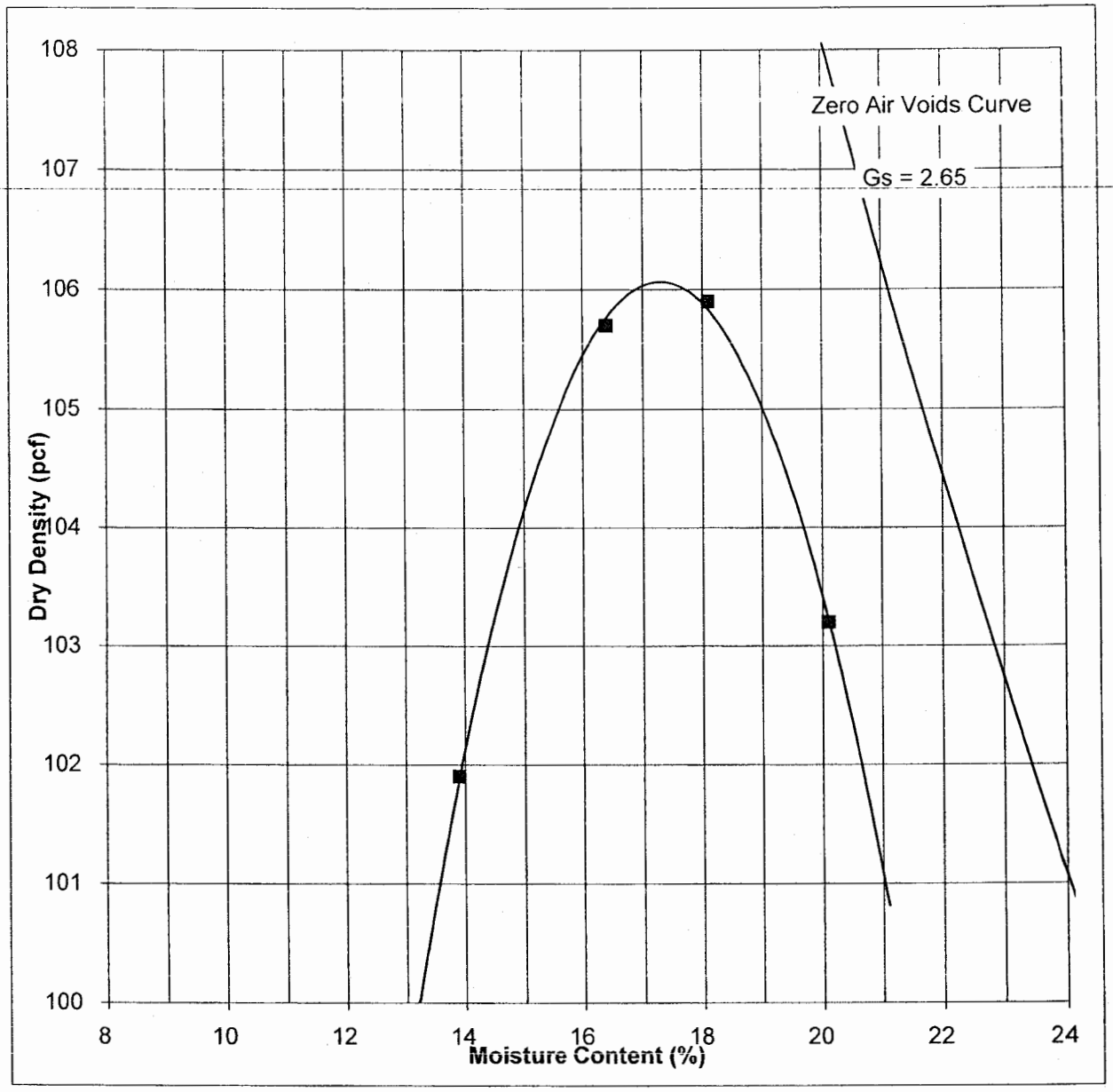
Chesapeake, Virginia

Moisture Density Relationship Curve



Sample No.	CBR-3	Natural Moisture Content	21.0
Street	Brixton Road	Percent Passing No. 200 Sieve	69.0
Station	16+00	Percent Retained on No. 4 Sieve	
Liquid Limit (LL)	36	Percent Retained on 3/4" Sieve	
Plastic Limit (PL)	16	Maximum Dry Density (pcf)	111.9
Plasticity Index (PI	20	Optimum Moisture Content (%)	14.0
Liquidity Index (LI)		Corr. Maximum Dry Density (pcf)	111.9
Description	Brown, Fine to Medium Sandy Lean CLAY	Corr. Optimum Moisture Content (%	14.0
Classification	CL	Percent (%) Gravel as Tested	0.0
Specific Gravity	2.65	Percent (%) Gravel Total	
Test Standard	VTM-1	Test Method	A

Project: Kensington Woods	**Engineering Consulting Services, Ltd**
Project No.: 6085	**Chesapeake, Virginia**
Date: 03/27/03	**Moisture Density Relationship Curve**



Sample No.	CBR-4	Natural Moisture Content	24.0
Street	Brixton Road	Percent Passing No. 200 Sieve	75.2
Station	19+00	Percent Retained on No. 4 Sieve	
Liquid Limit (LL)	42	Percent Retained on 3/4" Sieve	
Plastic Limit (PL)	20	Maximum Dry Density (pcf)	106.1
Plasticity Index (PI	22	Optimum Moisture Content (%)	17.2
Liquidity Index (LI)		Corr. Maximum Dry Density (pcf)	106.1
Description	Brown, Fine to Medium Sandy Lean CLAY	Corr. Optimum Moisture Content (%	17.2
Classification	CL	Percent (%) Gravel as Tested	0.0
Specific Gravity	2.65	Percent (%) Gravel Total	
Test Standard	VTM-1	Test Method	A

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Project No.: 6085

Date: 03/27/03

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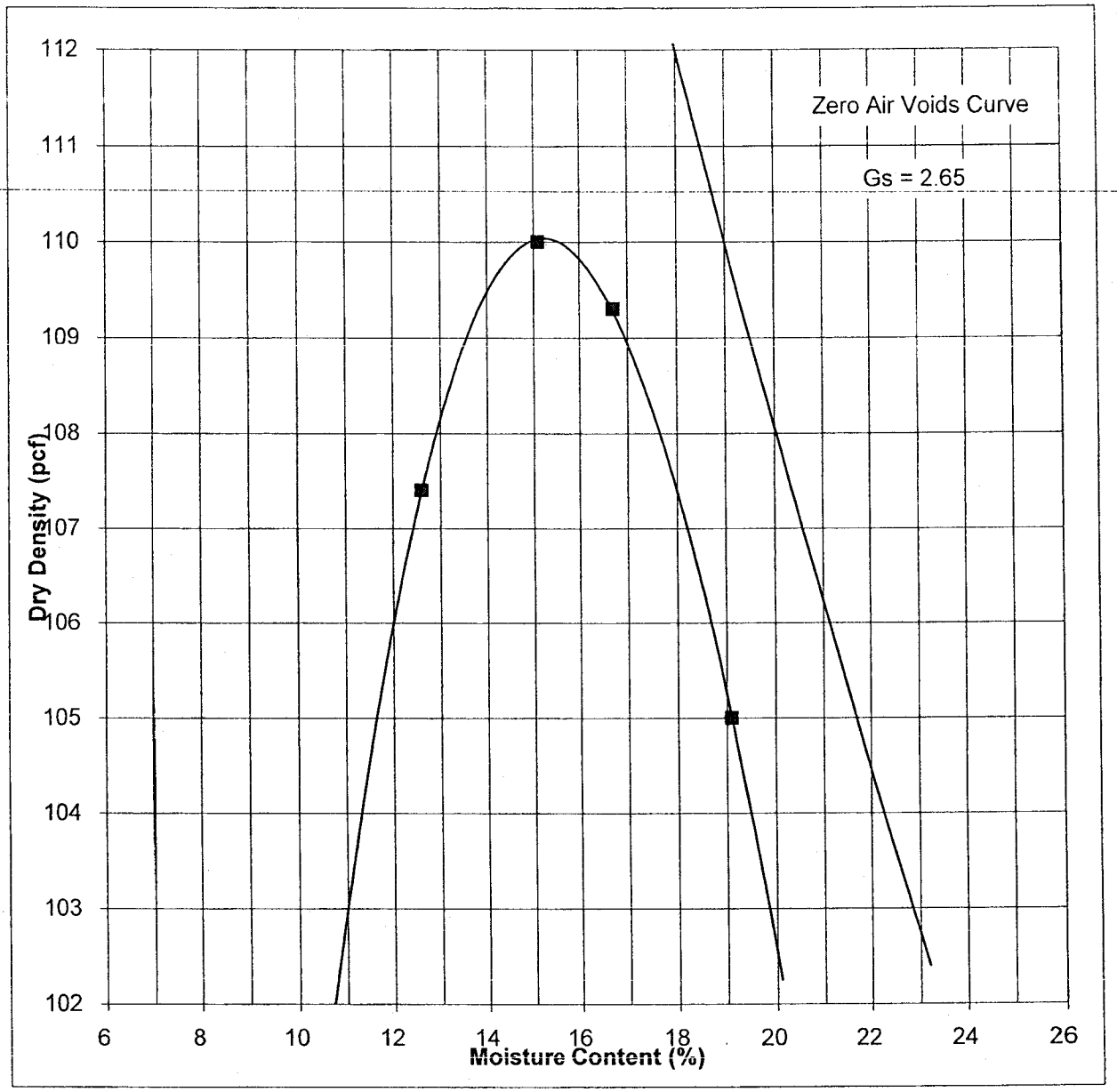
Moisture Density Relationship Curve



Sample No.	CBR-5	Natural Moisture Content	23.0
Street	Brixton Road	Percent Passing No. 200 Sieve	63.4
Station	21+50	Percent Retained on No. 4 Sieve	
Liquid Limit (LL)	39	Percent Retained on 3/4" Sieve	
Plastic Limit (PL)	16	Maximum Dry Density (pcf)	110.1
Plasticity Index (PI	23	Optimum Moisture Content (%)	15.1
Liquidity Index (LI)		Corr. Maximum Dry Density (pcf)	110.1
Description	Brown, Fine to Medium Sandy Lean CLAY	Corr. Optimum Moisture Content (%	15.1
Classification	CL	Percent (%) Gravel as Tested	0.0
Specific Gravity	2.65	Percent (%) Gravel Total	
Test Standard	VTM-1	Test Method	A

Project: Kensington Woods	**Engineering Consulting Services, Ltd**
Project No.: 6085	**Chesapeake, Virginia**
Date: 03/27/03	**Moisture Density Relationship Curve**

APPENDIX IV

Unified Soil Classification System and

Reference Notes for Boring Logs

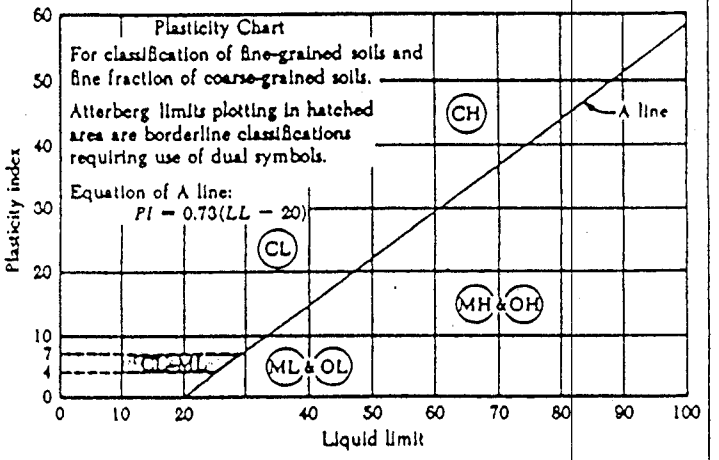
UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Table Unified System of Classification

Major divisions			Group symbols	Typical names
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Table (Continued)

Classification criteria		
Classification on basis of percentage of fines Less than 5% pass No. 200 sieve GW, GP, SW, SP More than 12% pass No. 200 sieve GM, GC, SM, SC 5% to 12% pass No. 200 sieve Borderline classification requiring use of dual symbols	$C_u = D_{60}/D_{10}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
	Not meeting both criteria for GW	
	Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
	Atterberg limits plot above "A" line and plasticity index greater than 7	
	$C_u = D_{60}/D_{10}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
	Not meeting both criteria for SW	
	Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
	Atterberg limits plot above "A" line and plasticity index greater than 7	



Visual-manual identification, see ASTM Designation D2488.

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REFERENCE NOTES FOR BORING LOGS

I. Drilling and Sampling Symbols:

SS - Split Spoon Sampler
ST - Shelby Tube Sampler
RC - Rock Core: NX, BX, AX
PM - Pressuremeter
DC - Dutch Cone Penetrometer

RB - Rock Bit Drilling
BS - Bulk Sample of Cuttings
PA - Power Auger (no sample)
HSA - Hollow Stem Auger
WS - Wash Sample

Standard Penetration (Blows/Ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2 in. O.D. splitspoon sampler, as specified in ASTM D-1586. The blow count is commonly referred to as the N value.

II. Correlation of Penetration Resistances to Soil Properties:

Relative Density-Sands, Silts

SPT-N	Relative Density
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
50 - 80	Very Dense
over 80	Extremely Dense

Consistency of Cohesive Soils

Unconfined Compressive Strength, Qp, tsf	Consistency
Under 0.25	Very Soft
0.25 - 0.49	Soft
0.50 - 0.99	Firm
1.00 - 1.99	Stiff
2.00 - 3.99	Very Stiff
4.00 - 8.00	Hard
over 8.00	Very Hard

III. Unified Soil Classification Symbols:

GP - Poorly Graded Gravel
GW - Well Graded Gravel
GM - Silty Gravel
GC - Clayey Gravels
SP - Poorly Graded Sands
SW - Well Graded Sands
SM - Silty Sands
SC - Clayey Sands

ML - Low Plasticity Silts
MH - High Plasticity Silts
CL - Low Plasticity Clays
CH - High Plasticity Clays
OL - Low Plasticity Organics
OH - High Plasticity Organics
CL-ML - Dual Classification (Typical)

IV. Water Level Measurement Symbols:

WL - Water Level
WS - While Sampling
WD - While Drilling

BCR - Before Casing Removal
ACR - After Casing Removal
WCI - Wet Cave In
DCI - Dry Cave In

The water levels are those water levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In Clays and Plastic Silts the accurate determination of water levels may require several days for the water level to stabilize. In such cases additional methods of measurement are generally applied.

Subdivision - released

Siltation reduced to
$5,000.00 - Still
have lots on site